

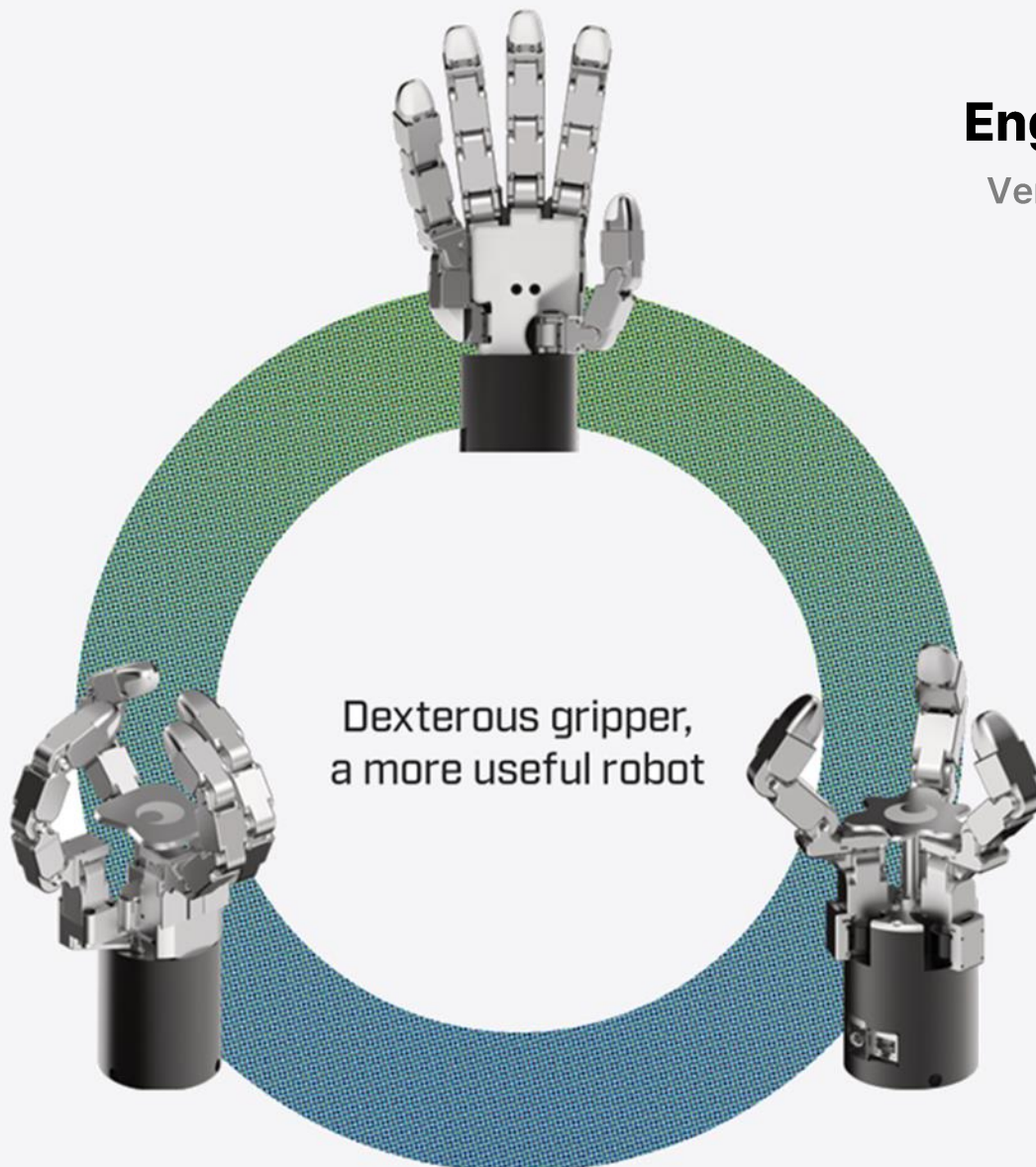
Delto Gripper

Universal Robot

User Manual

English

Ver. 1.0.0



INFORMATION

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Notice of revisions to the user guide

This documentation is subject to revision for technical improvements.

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Chapter 1. About the documentation

- This manual describes how to use the URCaps for the DG-3F-M and DG-5F products.
- The provided URCaps are developed for use with Universal Robots e-Series and have been verified to operate under the following specifications:
 - UR 3e (polyscope 5.20)
 - URSim (polyscope 5.21)
- The URCaps control utilizes the gripper's [Operator Mode], and the supported communication protocols are Modbus RTU and Modbus TCP.
- For detailed information on the gripper's functions, please refer to the Gripper Manual and the SDK Manual.

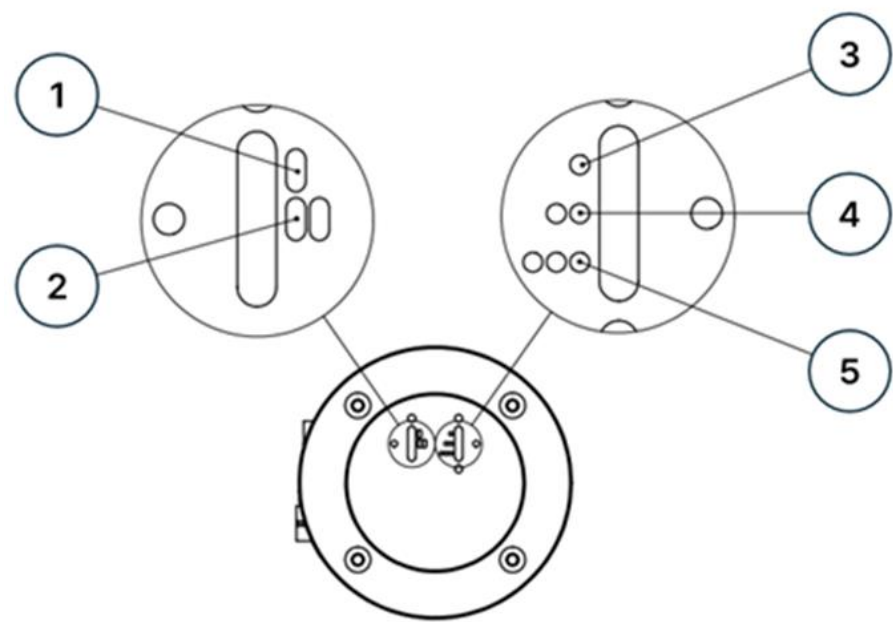
Chapter 2. Precautions

- Depending on your working environment, the program may not operate as expected.
- Failure to follow the instructions in this manual and incorrect operation may result in malfunctions. This may cause damage to the gripper and in some cases may not be covered by the after-sales service.
- If you need any other support, please contact Tesollo Support (support@tesollo.com)

Chapter 3. Getting started

3.1 Preliminary Setup

3.1.1 Before Attaching the Gripper



To control the gripper via URCap, you must configure the switches located at the bottom of the device. Set the left switch to position ①, and set the right switch according to the desired communication method.

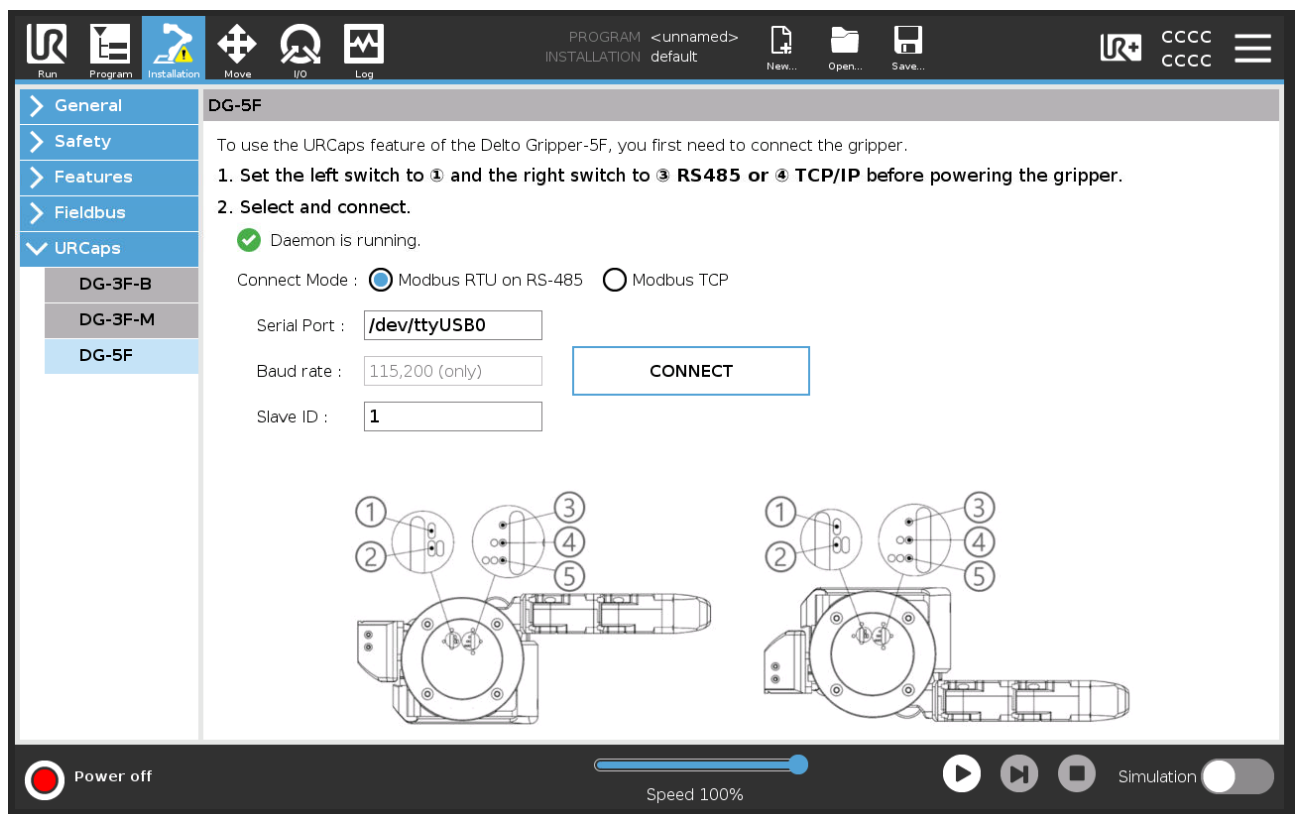
Example: To control the gripper using Modbus TCP, set the switches to ① and ④.

Item

Number	Item	Description
1	Operator Mode	Set gripper control mode to Operator Mode
2	Developer Mode	Set gripper control mode to Developer Mode
3	Modbus RTU (RS-485)	Set communication mode to Modbus RTU
4	Modbus TCP	Set communication mode to Modbus TCP
5	Not Used	Do not use

3.1.2 Installing URCaps

1. Save the provided URCaps file to a USB flash drive.
2. Insert the USB drive into the teach pendant.
3. On the Polyscope interface, tap the ☰ (Menu) button at the top and open Settings.
4. Navigate to System > URCaps, then tap the '+' button at the bottom of the screen to locate and open the URCap file from the USB drive.
5. Tap the Restart button to install the URCap.
6. After rebooting, go to Installation > URCaps, select the installed URCap, and verify that "Daemon is running." is displayed correctly.



3.2 Gripper Communication

3.2.1 Modbus RTU (on RS-485)

If the switch was set to position ③ during the [Before Attaching the Gripper](#) step (see section 3.1.1), follow the steps below:

1. Connect the white and brown wires of the gripper power cable to the RS-485 converter.
2. Connect the converter to the UR control box.
3. In the URCap, set the Connect Mode to Modbus RTU on RS-485.
4. Set the Serial Port to `/dev/ttyUSB0`, then press [CONNECT] to establish the connection.

Note: The port name may vary depending on your system (e.g., `/dev/ttyUSB1`).

Connect Mode : ☒ Modbus RTU on RS-485 ☐ Modbus TCP

Serial Port :

Baud rate :

Slave ID :

CONNECT

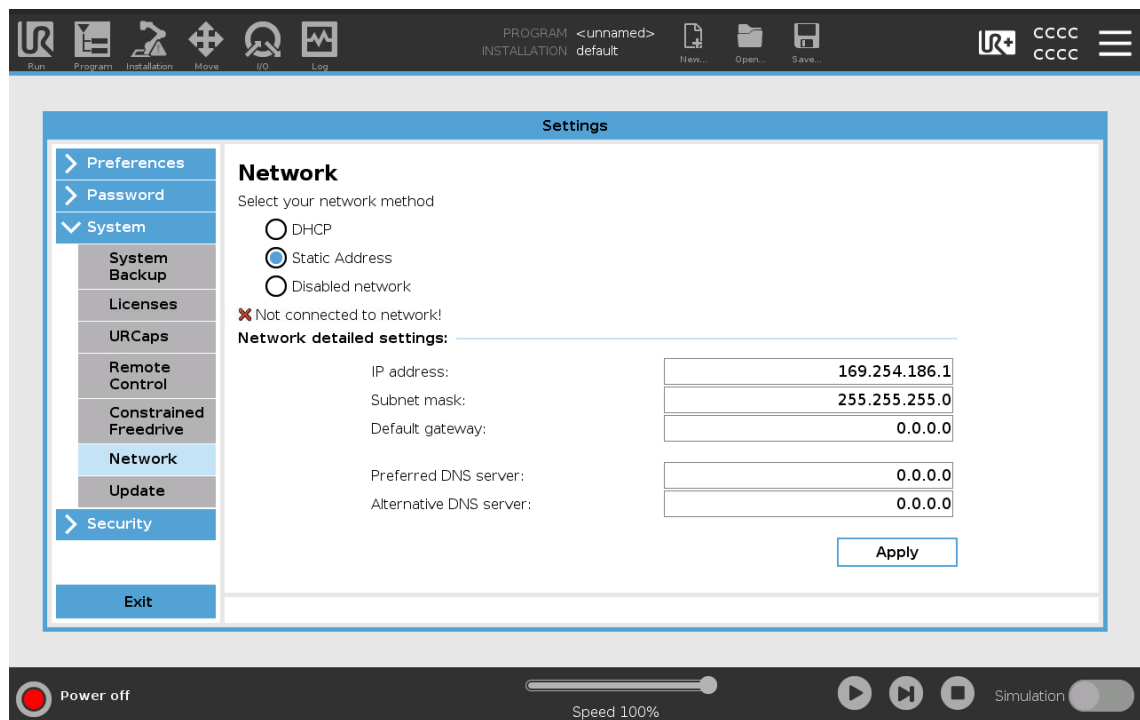
3.2.2 Modbus TCP

If the switch was set to position ④ during the [Before Attaching the Gripper](#) step (see section 3.1.1), follow the steps below:

Note: The default IP address of the gripper is 169.254.186.72 (or 169.254.186.73).

Depending on your connection method, you may need to adjust the UR Controller's network settings.

1. Connect a LAN cable to the Ethernet port on the gripper, and connect the other end to either a network environment (e.g., router/switch) or the Ethernet port on the UR Control Box.
2. Go to Settings > Network tab on the UR teach pendant, and configure the network so the gripper can be reached.



3. In the URCap, set the Connect Mode to Modbus TCP.
4. Enter the IP address, port, and slave ID, then press [CONNECT] to establish the connection.

Connect Mode : ☐ Modbus RTU on RS-485 ☒ Modbus TCP

IP Address :

Port :

Slave ID :

CONNECT

Note: The gripper's IP address, subnet mask, gateway, and port can be changed after the connection is established.

Chapter 4. URCap Features

4.1 URCap Installation

4.1.1 Connection Screen

Description

DG-5F

To use the URCaps feature of the Delto Gripper-5F, you first need to connect the gripper.

1. Set the left switch to ① and the right switch to ③ RS485 or ④ TCP/IP before powering the gripper.

2. Select and connect.

1

✓ Daemon is running.

2

Connect Mode : ☐ Modbus RTU on RS-485 ☒ Modbus TCP

3

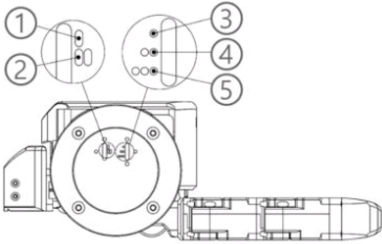
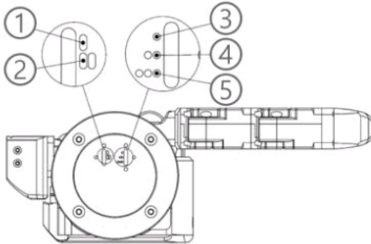
IP Address :

Port :

Slave ID :

4

CONNECT



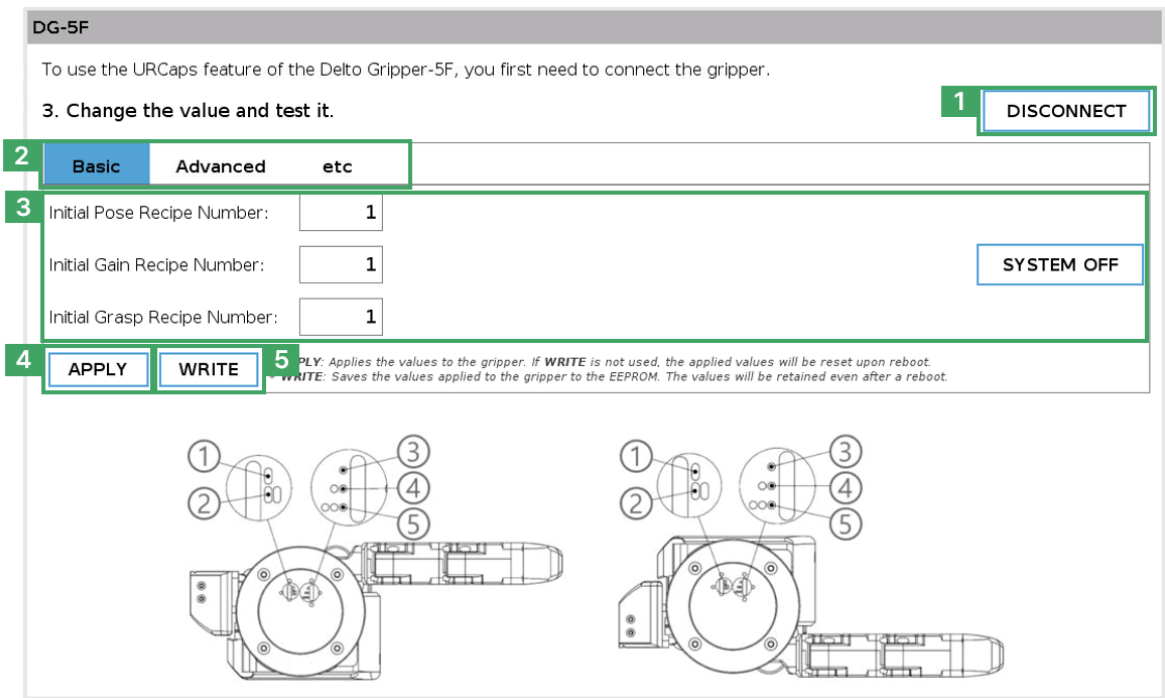
Delto Gripper supports both Modbus RTU and Modbus TCP.

Item

Number	Name	Description
1	Service Status	Displays the running status of the service communicating with the gripper
2	Connect Mode	Sets the communication method for the gripper
3	Connection Settings	Enter the connection details for the gripper
4	CONNECT	Initiates the connection based on the information entered in step 3

4.1.2 Configuration Screen

Description



Once the connection to the gripper is established, the current gripper information is retrieved, and system control begins.

Item

Number	Name	Description
1	DISCONNECT	Terminates communication with the gripper
2	Options Tab	Categorizes the gripper settings: ☐ Basic: Initial operation settings of the gripper ☐ Advanced: Additional features of the gripper ☐ etc: Provides basic information about the gripper
3	Settings List	Modify and control the gripper's settings
4	APPLY	Applies the settings configured in step 3 to the gripper
5	WRITE	Saves the applied settings permanently

4.1.2.1 Basic

Description

Basic

Advanced

etc

1

Initial Pose Recipe Number:

1

2

Initial Gain Recipe Number:

1

3

Initial Grasp Recipe Number:

1

4

SYSTEM OFF

APPLY

WRITE

* APPLY: Applies the values to the gripper. If WRITE is not used, the applied values will be reset upon reboot.

* WRITE: Saves the values applied to the gripper to the EEPROM. The values will be retained even after a reboot.

Set the recipes to be applied at the initial operation of the gripper. Recipes can be saved and used from the corresponding nodes.

Item

Number	Name	Description
1	Initial Pose Recipe Number	Pose recipe number to be called at gripper startup
2	Initial Gain Recipe Number	Gain recipe number to be called at gripper startup
3	Initial Grasp Recipe Number	Grasp recipe number to be called at gripper startup
4	SYSTEM ON / OFF	Gripper system start/stop

4.1.2.2 Advanced

Description

Basic

Advanced

etc

1

Settings

Joint Offset

Joint Offset

Joint Inpose

Moving Inpose

Slave ID

IP Address

Subnet Mask

Gateway

Port

Low Pass Filter

2

Joint 1

0.0

3

* APPLY: Applies the values to the gripper. If WRITE is not used, the applied values will be reset upon reboot.

* WRITE: Saves the values applied to the gripper to the EEPROM. The values will be retained even after a reboot.

3

4

5

1

2

3

4

5

Item

Number	Name	Description
1	Setting List	Select the gripper options to be changed ☐ Joint Offset: Adjust the gripper's joint offset ☐ Joint Inpose: Adjust the joint arrival detection range ☐ Moving Inpose: Adjust the gripper motion detection range ☐ Slave ID: Change the Slave ID for Modbus protocol ☐ IP Address: Change the communication IP ☐ Subnet Mask: Change the communication subnet mask ☐ Gateway: Change the communication gateway ☐ Port: Change the communication port ☐ Low Pass Filter: Set the low-pass filter
2	Joint List	Used to classify data for each joint when changing settings
3	Setting Input Field	Enter the data to be changed when modifying settings

4.1.2.3 etc.

Description

	Basic	Advanced	etc
1	Product ID : 5F12		
2	Firmware Version : 2.2		

Item

Number	Name	Description
1	Product ID	Product number of the connected gripper
2	Firmware Version	Firmware version of the connected gripper

4.2 URCap Program

These are the commands used to control the gripper within the program. The functions are listed in alphabetical order.

4.2.1 CURRENT

Description

DG-5F CURRENT

Set the gripper to current-based position control mode.

1

☒ Activate ☐ Deactivate

2

Joint 1 (mA)	Joint 2 (mA)	Joint 3 (mA)	Joint 4 (mA)
0	0	0	0
Joint 5 (mA)	Joint 6 (mA)	Joint 7 (mA)	Joint 8 (mA)
0	0	0	0
Joint 9 (mA)	Joint 10 (mA)	Joint 11 (mA)	Joint 12 (mA)
0	0	0	0
Joint 13 (mA)	Joint 14 (mA)	Joint 15 (mA)	Joint 16 (mA)
0	0	0	0
Joint 17 (mA)	Joint 18 (mA)	Joint 19 (mA)	Joint 20 (mA)
0	0	0	0

3

TEST

This function controls the current applied to each joint of the gripper.

Item

Number	Name	Description
1	Activate / Deactivate	Enable or disable the current control function
2	Current Input	Control current according to the set value for each joint. Allowed input range: -150 to 150 (mA)
3	TEST	Apply the current settings to the gripper

4.2.2 GAIN

Description

DG-5F GAIN

The screenshot shows the 'DG-5F GAIN' configuration interface. It includes a control mode selector (PD or PID), a finger and gain type selector, a table for entering gain values for four joints, a section for advanced settings (Load Gain, Save Recipe, EEPROM Write), and a TEST button.

1 Gain Mode Setting: ☒ PD Control ☐ PID Control

2 Input Selection: Finger 1 ▼ P Gain ▼

3 Enter Gain Value:

Joint	P	D	I	L
Joint 1 (P / D / I / L)	1	3	0	0
Joint 2 (P / D / I / L)	1	3	0	0
Joint 3 (P / D / I / L)	1	3	0	0
Joint 4 (P / D / I / L)	1	3	0	0

4 Advanced Settings: ☒ Advanced Settings

5 Load Gain: ACTIVE DEFAULT

* ACTIVE: Loads the currently applied gain values of the gripper.
* DEFAULT: Loads the initial gain values of the gripper.

6 Save Recipe: SAVE

* Warning! The existing saved data will be overwritten. Please use with caution.

7 EEPROM Write: WRITE

* To use the saved recipe after a reboot, please perform **[WRITE]**.

8 TEST: TEST

Item

Number	Name	Description
1	Gain Mode Setting	Set the gripper's gain mode to PD or PID
2	Input Selection	Select the gripper finger number and the item to be modified
3	Enter Gain Value	Enter the gain values for each joint of the gripper: P Gain / D Gain / I Gain / I Limit
4	Display Additional Features	Show additional functions to assist with program input
5	Load Gain Data	Load the gain data of the gripper ☐ ACTIVE: Currently applied values on the gripper ☐ DEFAULT: Default gain values of the gripper

6	Save Gain Recipe	Save the currently applied gain values to the specified recipe number
7	EEPROM Write	Permanently store the applied settings to the gripper
8	TEST	Apply the currently entered values to the gripper

4.2.3 GPIO

Description

DG-5F GPIO

This node configures the GPIO operation of the gripper.
It allows you to set the value of a GPIO output or check the status of a GPIO input.

1 ☒ Set GPIO Output
☐ Output 1 ☐ Output 2 ☐ Output 3

3 ☐ Wait for GPIO Input LOW ▼

4 ☐ Wait time before node start is 0.0 seconds
☐ Wait time after node completion is 0.0 seconds

2 TEST

Controls the built-in GPIO function of the gripper.

Item

Number	Name	Description
1	Set Output	Turn the gripper's GPIO Output on or off
2	TEST	Apply the currently entered GPIO Output value
3	Wait for Input	Continuously read the GPIO Input value and wait until it matches the selected value
4	Pre / Post wait	Set a wait time before or after executing the current node in the program

4.2.4 GRASP

Description

DG-5F GRASP

1

☒ Grasp ☐ Release

2

Grasping Algorithm 5 fingers toward the center ▼

3

Grasp Force 3

4

Position Control

Finger 1	Finger 2	Finger 3	Finger 4	Finger 5
☐ Joint 1	☐ Joint 5	☐ Joint 9	☐ Joint 13	☐ Joint 17
☐ Joint 2	☐ Joint 6	☐ Joint 10	☐ Joint 14	☐ Joint 18
☐ Joint 3	☐ Joint 7	☐ Joint 11	☐ Joint 15	☐ Joint 19
☐ Joint 4	☐ Joint 8	☐ Joint 12	☐ Joint 16	☐ Joint 20

5

☒ Update Grasp Option

6

☒ Advanced Settings

7

Save Recipe

8

EEPROM Write

9

* Warning! The existing saved data will be overwritten. Please use with caution.

* To use the saved recipe after a reboot, please perform **[WRITE]**.

This function allows you to configure the grab data. It provides a grasping algorithm tailored for each model. By default, a real-time force control grasping algorithm is used.

The force control grasping algorithm causes each fingertip involved in the grasp to follow the center point between the fingers. Since this operates in real-time, even if an external force changes the joint positions of the gripper, it attempts to maintain the grasping posture from the updated position.

Item

Number	Name	Description
1	Grasp / Release	Signal settings for gripper grasp and release
2	Grasping Algorithm	Algorithm that controls the motor when the gripper grasps DG 3F: ☐ 3 fingers toward the center ☐ 2 fingers toward the center ☐ Parallel Grasp ☐ Envelop Grasp DG 5F: ☐ 5 fingers toward the center ☐ 3 fingers toward the center (1&2&3) ☐ parallel grasp with 3 fingers (1&2&3) ☐ 2 fingers toward the center ☐ parallel grasp with 5 fingers ☐ envelop grasp with 5 fingers
3	Force	Set the grasping force (unit: N)
4	Position Control	Maintain the selected joint positions when the gripper grasps
5	Update Option	Choose whether to apply options 2, 3, and 4 together with the grasp signal
6	Display Additional Features	Display additional functions related to grasp options
7	Save Grasp Recipe	Save the currently applied grasp options to the specified recipe number
8	EEPROM Write	Permanently store the applied settings to the gripper
9	TEST	Apply the currently entered values to the gripper

4.2.5 JOINT

Description

DG-5F JOINT

1

Joint 1

0.0 / 300

Joint 2

0.0 / 300

Joint 3

0.0 / 300

Joint 4

0.0 / 300

Joint 5

0.0 / 300

Joint 6

0.0 / 300

Joint 7

0.0 / 300

Joint 8

0.0 / 300

Joint 9

0.0 / 300

Joint 10

0.0 / 300

Joint 11

0.0 / 300

Joint 12

0.0 / 300

Joint 13

0.0 / 300

Joint 14

0.0 / 300

Joint 15

0.0 / 300

Joint 16

0.0 / 300

Joint 17

0.0 / 300

Joint 18

0.0 / 300

Joint 19

0.0 / 300

Joint 20

0.0 / 300

2

Degree(°) / Time(ms)

3

☒

Advanced Settings

4

Load Joint

TARGET

CURRENT

Teaching Mode

ACTIVATE

DEACTIVATE

5

* TARGET: Loads the target values applied to the gripper.

* REAL-TIME: Loads the gripper's current joint values.

* Activates/Deactivates the teaching mode.

** When exiting teaching mode, be sure to deactivate the mode.

6

Save Recipe

TARGET

CURRENT

EEPROM Write

WRITE

7

* Warning! The existing saved data will be overwritten. Please use with caution.

* To use the saved recipe after a reboot, please perform **[WRITE]**.

8

TEST

This function allows you to move the joints of the gripper to specific positions. To perform a position move, you must set a target value. The unit for the target value is degrees. Additionally, you can set the time it takes to move to the target, with the unit in milliseconds (ms).

When using the time setting, the actual movement may not match the exact specified value depending on the control environment, gripper settings, or the current control values applied to the joints.

Item

Number	Name	Description
1	Set Value	Set target values and motion time for joint position control
2	Input Selection	Select the item to input
3	Display Additional Features	Display additional functions related to joint control
4	Load Joint	Load joint information corresponding to the selected button and apply it to the input field ☐ TARGET: Load the currently applied target values of the gripper ☐ CURRENT: Load the current actual joint values of the gripper
5	Teaching Mode	Enable / Disable Teaching Mode
6	Save Pose Recipe	Save the currently applied pose data of the gripper to the specified recipe number
7	EEPROM Write	Permanently store the applied settings to the gripper
8	TEST	Apply the currently entered values to the gripper

4.2.6 LOAD

Description

DG-5F LOAD

1

☒ Recipe Pose ☐ Recipe Gain ☐ Recipe Grasp ☐ Recipe Blend

2

Load Recipe Number: 1

3

☒ Advanced Settings

4

Save Blend Recipe
Press [CLEAR] to initialize

Blend Pose Recipe Number: 1

Blend Gain Recipe Number: 1

Blend Wait Time: 100

5

CLEAR

ADD

6

7

Blend Index:

SAVE

8

EEPROM Write

WRITE

9

TEST

This function is used to call saved recipes. Recipes can also be stored and called as blends. The blend function requires input for pose, gain, and wait time information.

Item

Number	Name	Description
1	Control Mode	Set PD or PID gain mode
2	Set Gain	Set PID gain values for each joint
3	Display Additional Features	Display additional functions related to joint control
4	Enter Blend Data	Enter pose recipe number, gain recipe number, and wait time
5	Clear Blend Recipe	Clear the currently entered list on the gripper

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6	Add Blend Recipe	Add a blend item to the currently entered list on the gripper
7	Save Blend Recipe	Save the currently applied grasp options to the specified recipe number
8	EEPROM WRITE	Permanently store the applied settings to the gripper
9	TEST	Apply the currently entered values to the gripper

4.2.7 WAIT

Description

DG-5F WAIT

Select the gripper state condition that will trigger the program's next action.

1

☒ Wait until the joint stops moving

☐ Wait until the joint reaches the target value

☐ Wait until the gripper's Blend function becomes STOP ▼

2

☐ Wait time before node start is 0.0 seconds

☐ Wait time after node completion is 0.0 seconds

This function reads the current data of the gripper and waits until it reaches the state selected by the user.

Item

Number	Name	Description
1	Select wait option	☐ stops moving: Wait until the gripper stops moving ☐ reaches target value: Wait until the gripper reaches the user-defined target value ☐ Wait until a specific state during blend operation • STOP: When the blend is stopped • RUNNING: While the blend is in progress • COMPLETE: When the blend is completed
2	Pre / Post Wait	Set the wait time before or after executing the current program node

