HYUNDAI ROBOTICS

WARNING

INSTALLATION SHOULD ONLY BE PERFORMED BY QUALIFIED INSTALLATION PERSONNEL AND MUST CONFORM TO ALL NATIONAL AND LOCAL CODES

Hi5aCD230703FMEN2

Hi5a Controller Function Manual

Collision Detection

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Contents

1. Introduction 1-1

1.1. Introduction 1-2

2. Collision detection setting – Menu components 2-1

2.1. Collision Detection Function 2-2
2.2. Level 1 2-3
2.3. Level 2 ~ Level 15 2-3
2.4. Measured value and set value 2-4
2.5. Summary of the method of applying the collision detection function for a specific working range 2-5

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1 Introduction

1.1. Introduction

The collision detection function is used to stop the robot by immediately detecting collision when it collides with another robot or workpiece.

It is a safety device for cases of a robot operating under abnormal conditions. It helps enhance the safety of a robot by operating in a mutually supplementary manner with the other existing functions such as overcurrent, overload, overspeed, and position-deviation error detection functions.

The collision detection function monitors the “disturb. torque” and “disturb. torque rate” that occur to individual axes of a robot. If the values exceed the preset values, the function will handle the situation and error as shown below.

- When the measured 『disturb. torque』 value exceeds the set value: “E0160 ?axis collision detection”
- When the measured 『disturb. Torque rate』 value exceeds the set value: “E0161 ?axis impact detection”

However, the collision detection function is only applicable to the robot’s main body, not for additional axes. It is impossible to set the function as “Enable” in the case of a robot that cannot use the function.

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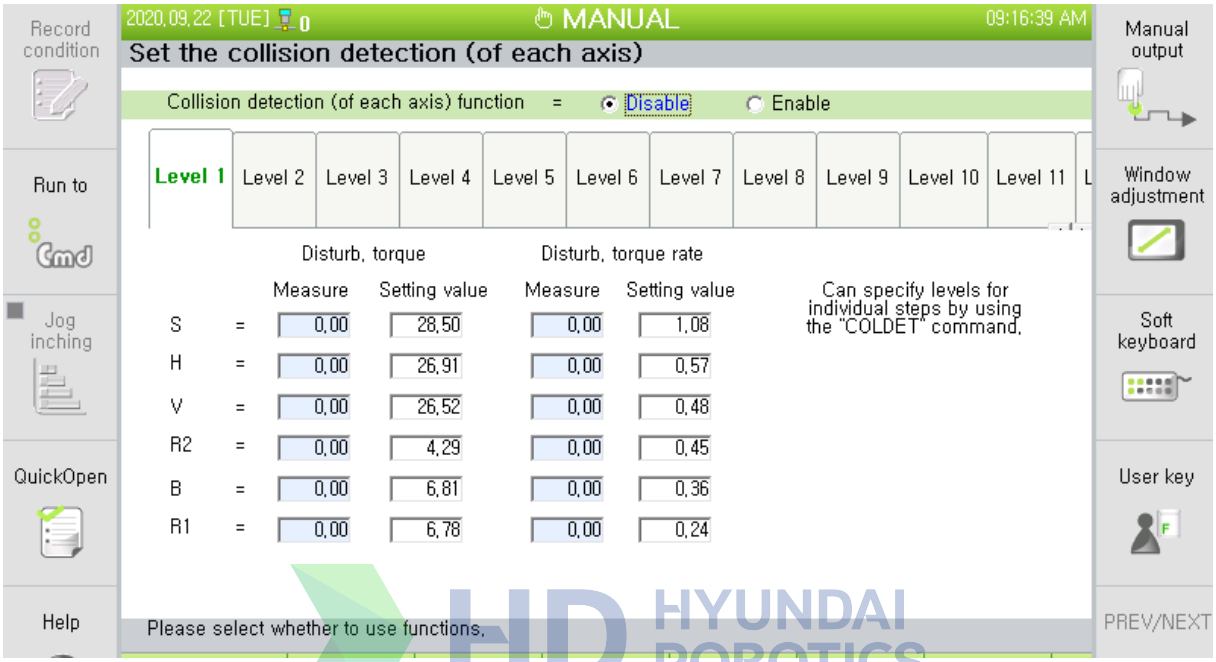
Collision detection setting - Menu Components

The menu as below is provided from 『[F2]: System』 → 『3: Robot Parameter』 → 『8: Collision Detection』



2.1. Collision Detection Function

Select “enable/disable” of Collision Detection Function.
Each detection level may need to be adjusted according to the installed area or environment. For a step that requires Collision Detection Function with high sensitivity, Collision Detection level must be adjusted precisely.

Even if Collision Detection Function is enabled, the function will not operate while GUN squeeze force is charging.

Note)
Set the “Tool data” and “Additional weight on each axis” before using the collision detection function.
Use the load information of a robot to detect collision. As much as possible, accurately input the load information.
『F2: System』 → 『3. Robot parameter』 → 『Tool data』
『F2: System』 → 『3. Robot parameter』 → 『Additional weight on each axis』

※ Can automatically set the tool data through 『F2: System』 → 『6. Auto calibration』 → 『4. Load Estimate Function』

2.2. Level 1

This is a level that is commonly applicable when the collision detection function is “Enable.”
This level is applied when teaching in manual mode, step FWD/BWD, and when COLDET command is not used in automatic mode.

2.3. Level 2 ~ Level 15

This is an error detection level that is applicable for enhancing the detection sensitivity in auto mode.
The detection level can be set in the program, and the following command can be used.

『F6: Command input』 → 『F1: Motion,I/O』 → 『COLDET』 → "Level setting"

Level can be designated between 2-15, Collision Detection is disabled when it is 0.
Selected level is valid until the next COLDET command is executed.

(Example) When Collision Detection Function is set to enabled and job program is as below,

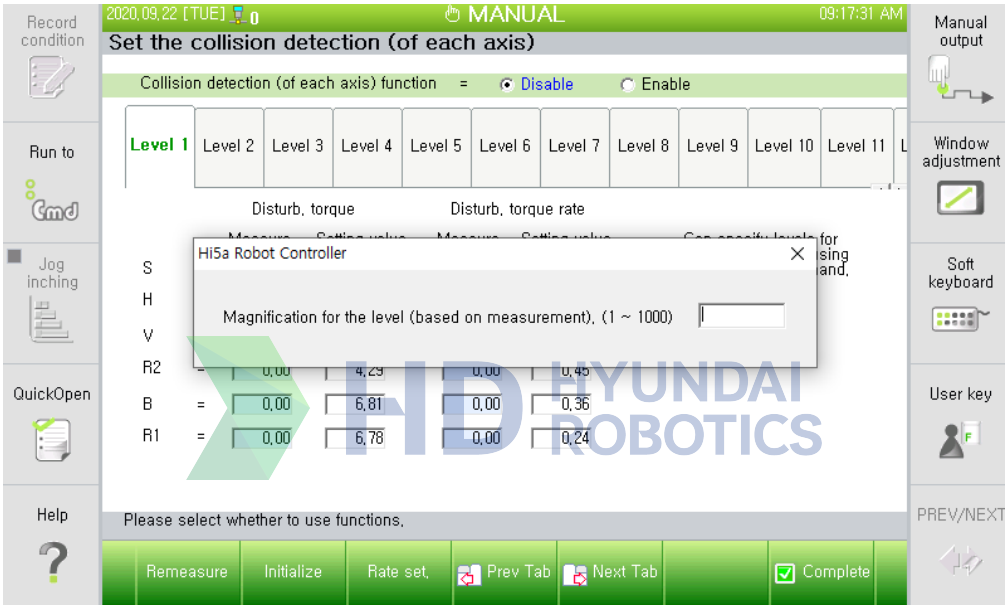
```
S1    MOVE   L,S=60%,A=1,T=0
S2    MOVE   L,S=300mm/s,A=1,T=0
COLDET 5
S3    MOVE   L,S=80%,A=1,T=0
COLDET 0
S4    MOVE   L,S=100%,A=1,T=0
S5    MOVE   L,S=50%,A=1,T=0
END
```

Step S1 and S2 execute the detection with Level 1, S3 execute the detection with Level 5. S4, S5 do not execute the Collision Detection.

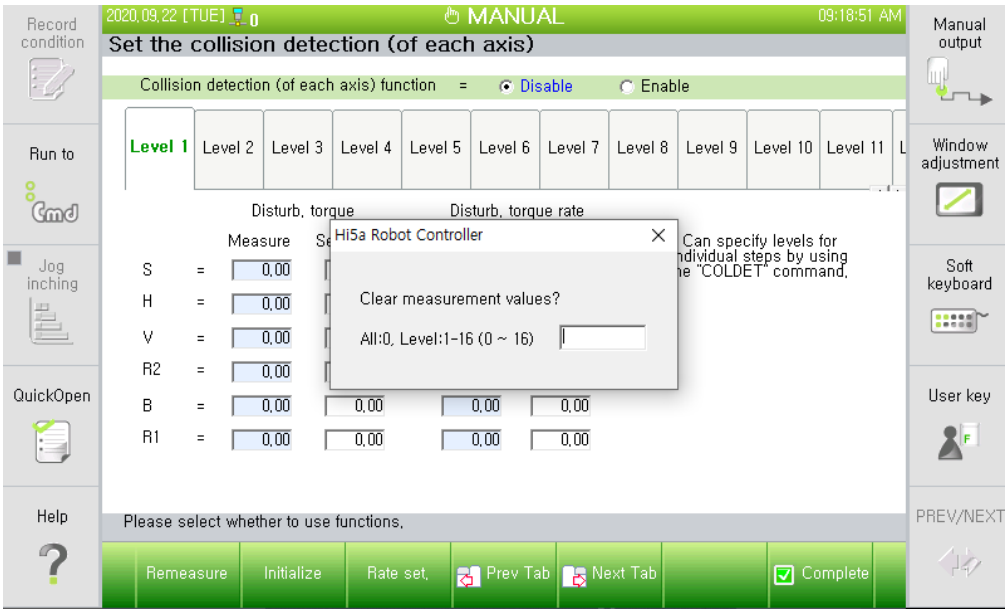
2.4. Measured value and set value

『Measured value』 shows the maximum values of the “disturb. torque” and “disturb. torque rate” occurring along the operation range of the relevant level after the controller is powered on.

The user needs to set the 『set value』 while securing enough room in the measured value. Can carry out the setting by using the 『F3: Rate set.』 button in each input window. 120(%)–150(%) is recommended.



The 『F1: Remeasure』 key can be used to clear the measured values of the “disturb torque” and “disturb torque rate,” and then measure again. When required to clear one level, input the level number. When required to clear the total, input 16.



2.5. Summary of the method of applying the collision detection function for a specific working range

1. Check whether the collision detection function is “Disable.”
2. Insert a COLDET command in the start and end sections of a working range where the collision detection sensitivity needs to be enhanced, and then set the individual levels. (Refer to 2.3)
3. Check whether the measured value at the relevant level is cleared in the collision detection setting menu (refer to 2.4).
4. Run the job program 2~3 times while the robot suffers no collision.
5. Set the set value of the relevant level in the collision detection setting menu. (Refer to 2.4)
6. Set the collision detection function as “Enable”.
7. Run the job program to check whether there is any wrong error detection under normal conditions.

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