HYUNDAI ROBOTICS

WARNING

THE INSTALLATION SHALL BE MADE BY QUALIFIED INSTALLATION PERSONNEL AND SHOULD CONFORM TO ALL NATIONAL AND LOCAL CODES

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Hi5aMC230626FMEN2

Hi5a Controller Function Manual

Model-based collision-detection function

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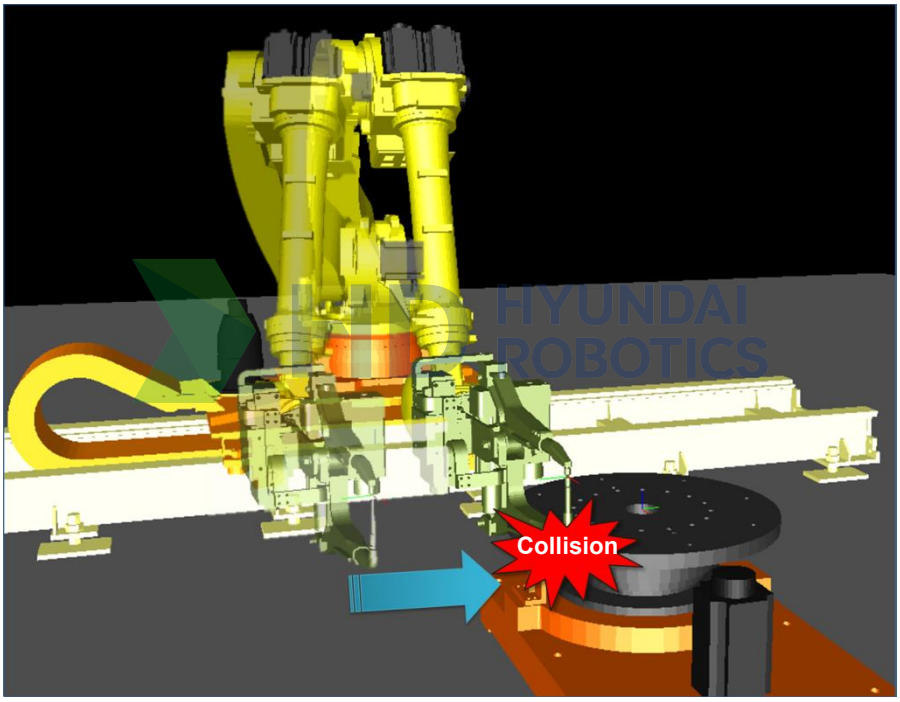
1 Overview

1.1. Model-based collision-detection function

1.1.1. Purpose of the function

This function displays an error code and stops the robot to minimize damages from collision if the robot collides with nearby objects during operation. This function compares between the torque that should be created normally during robot operation and the torque that is currently being created. If an abnormal torque exceeding the reference value is detected, the function will recognize it as a collision, and display an error code.



1.1.2. Scope of the function

In this function, because the robot axis detects collision, no collision will be detected if the impact cannot be transmitted to the robot.

- This function works only when the motor is turned on.
- Collision cannot be detected for positioners, orienting guns, and jigs that are not mounted to the robot.
- Robots of special running types do not have the model-based collision-detection function.
- Collision will not be detected during load estimation, and implementation of the sensor-based/sensorless force control function.
- Misdetection may occur if the tool weight and the applied weight by axis deviate from the actual values.
  Make sure to implement load estimation before using the function.

NOTE

- This function is available from Hi5a controller version **V40.17-00** or later.

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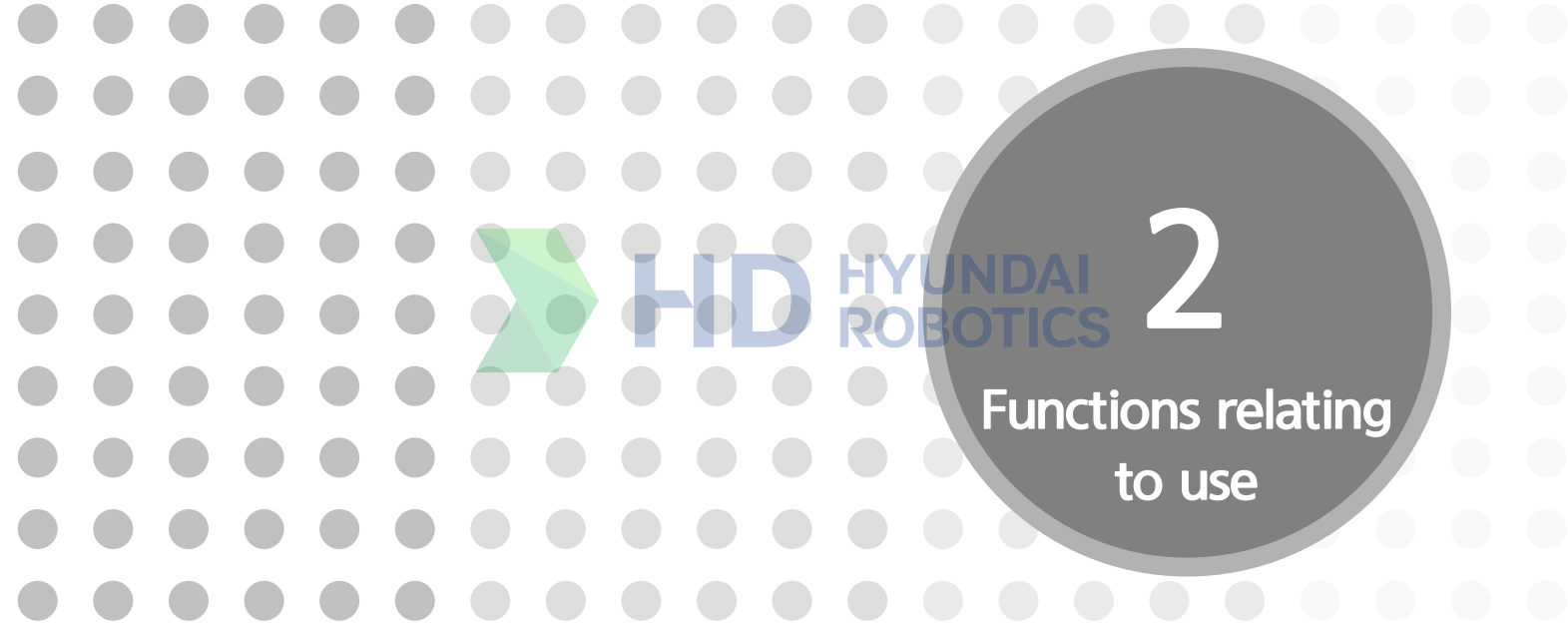
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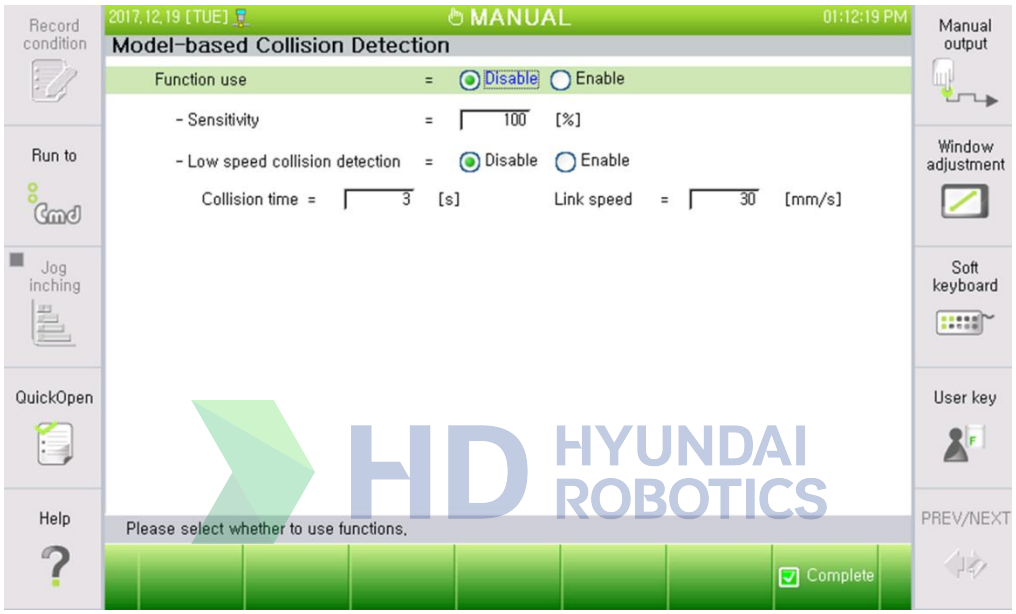
2
Functions relating
to use

2.1. How to configure the function

2.1.1. Select menu

Select menu: 『[F2]: System』 → 『3: Robot parameter』 → 『14: Model-based collision detection』.



2.1.2. Configuration of the function

- Enable function: Select whether to enable the collision-detection function.
- Sensitivity: Set the sensitivity for collision detection. The higher the value, the more sensitive it will be to impact.
  (default value: 100%)
- Low-speed collision detection

  - Enable function: Select whether to enable the low-speed collision-detection function or not.
  - Reference time: The reference time for determining collision
    If impact is detected for the reference time, it will be determined as collision.
  - Link speed: The reference speed for determining low speed
    Low-speed collision will be detected at speeds lower than the reference link speed.

2.2. Command statement

The sensitivity of the model-based collision-detection function can be adjusted by a command in the job program.

2.2.1. Command input

<table>
<tr><td>Command</td><td colspan="3">ColDet Sensitivity</td></tr>
<tr><td>Description</td><td colspan="3">Change sensitivity of the model-based collision-detection function</td></tr>
<tr><td>Input Method</td><td colspan="3">『[F6]: Command input』 → 『[F1]: Motion, I/O』 → 『ColSense』</td></tr>
<tr><td>Grammar</td><td colspan="3">ColDet Sensitivity=100</td></tr>
<tr><td>Parameter</td><td>Sensitivity</td><td>0-200</td><td>The higher the value, the more sensitive it is to impact.
0: Disable function</td></tr>
<tr><td>Example</td><td colspan="3">
<pre>
S1 MOVE P,S=60%,A=3,T=1
S2 MOVE P,S=60%,A=3,T=1
S3 MOVE P,S=60%,A=3,T=1
S4 MOVE P,S=60%,A=3,T=1
    ColDet Sensitivity=50
    CALL 10
S5 MOVE P,S=60%,A=3,T=1
S6 MOVE P,S=60%,A=3,T=1
S7 MOVE P,S=60%,A=3,T=1
    END
</pre>
When the sensitivity is set to 100% in the collision-detection menu:
- S1-S4: Detected with sensitivity of 100%
- CALL 10- S7: Detected with sensitivity of 50%
</td></tr>
</table>

- If no command is given, collision will be detected with the default sensitivity set in the collision-detection menu.
- The sensitivity set with a command will be reset to the default sensitivity in the following cases:
  - ■ When an “END” command of the main program is met;
  - ■ When steps/functions are changed; and
  - ■ When the step counter is reset.

- Setting of a too high sensitivity may lead to misdetection.
- Setting of a too low sensitivity may lead to nondetection.

2.3. Error Message

Code	Message	Cause	Remedy
E0268	(0-axis) High-speed collision occurred.	A rapid external force was applied to the axis.	Identify the cause of collision.
E0269	(0-axis) Low-speed collision occurred.	A slow external force was applied to the axis.	Identify the cause of collision.

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