

***i*-8094 Function Reference**

(Primary Version)

(For LinPAC controller)



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Introduction

This software package is dedicated to i-8094 pulse-based motion controller. It includes the driver and ANSI-C Library for LinPAC.

The slot number that the module installed on will be referred by each function in Library. This slot number helps to identify multiple i-8094 modules in LinPAC

There are samples that are provided for LinPAC cross-platform tool-chain to demonstrate the functions of i-8094 Library. Some samples need the Generic-Type terminal-board (DN-8468G) to connect the external sensors, output pulse and encoder-input.

This documentation provides the detailed information of i-8094 APIs, including the function-decelerations, definitions of both parameters and return codes. The APIs will be cataloged and described in the following chapters:

- CHAPTER 2 – System Initialization
- CHAPTER 3 – Automatic Home Search
- CHAPTER 4 – Independent Moving Functions
- CHAPTER 5 – Interpolation Moving Functions
- CHAPTER 6 – Other Motion Functions
- CHAPTER 7 – Advanced Motion Configurations
- CHAPTER 8 – Miscellaneous Functions
- CHAPTER 9 – Status
- CHAPTER 10 – FRnet I/O extension

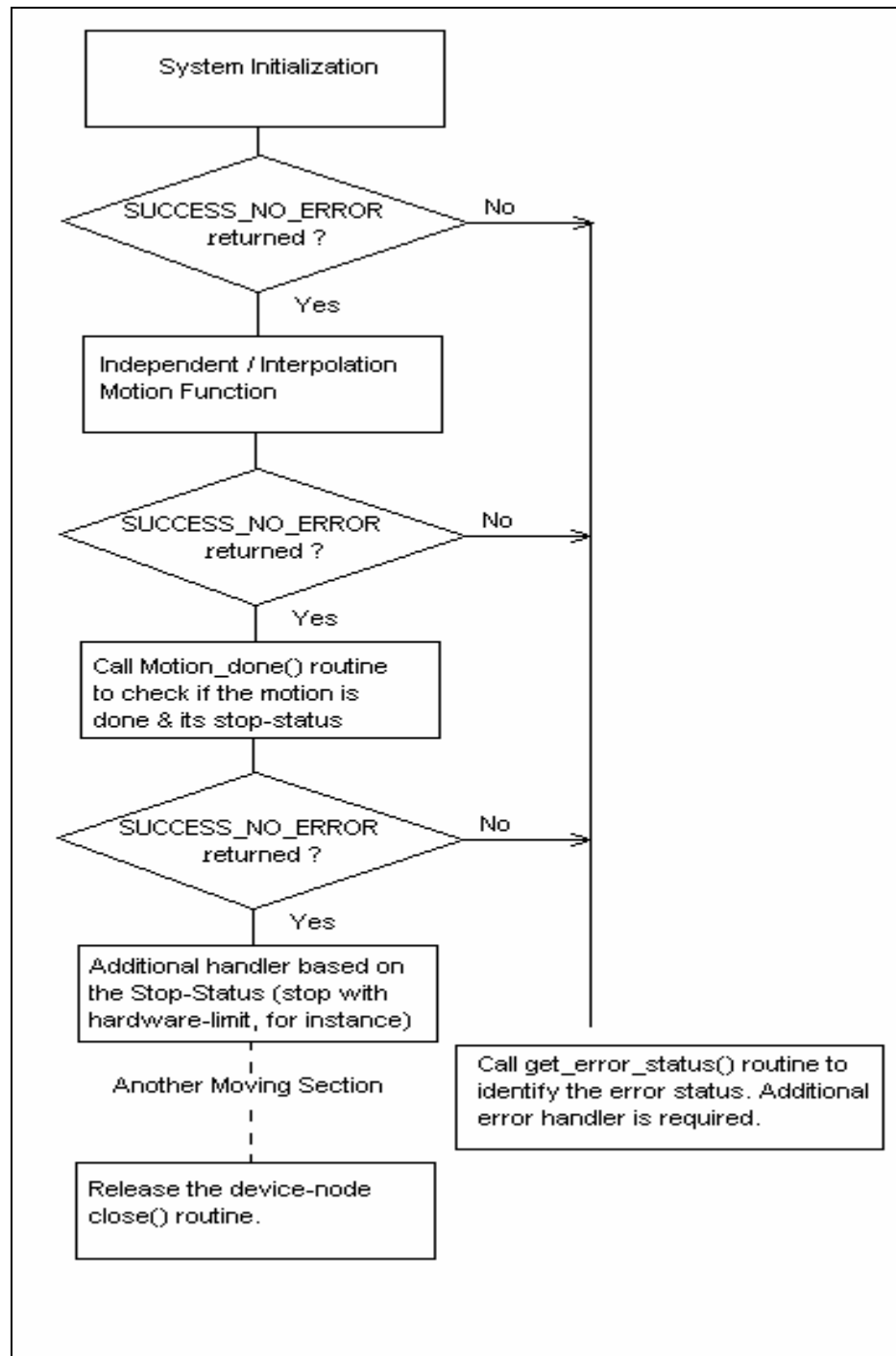


Figure 1 - typical programming following-chart

System Initialization

2.1 Operating-System Configuration

The functions in this chapter provide the interface to LinPAC. By calling these functions, your applications can scan all active i-8094 modules in your PAC, and get the specific slot-number. Open the module and access the internal Motion-Control ASIC with the other functions in i-8094 Library.

2.1.1 i8094_scan

short i8094_scan(short* pModuleNum, BYTE* pAvailModules)

Description:

This function scans all active i-8094 modules in your LinPAC. The pModuleNum saves the numbers of available i-8094 modules. The user-provided Array, pAvailModules, indicates the presence of active i-8094 module. (1: present, 0: absent)

Parameters:

pModuleNum: The pointer to the memory that stores the numbers of active i-8094 modules.

pAvailModules: The address of user-provided **BYTE**-Array. Based on the slot-number, each element indicates the presence of active i-8094 module. The user must prepare one **BYTE**-Array with **I8094_MaxModules** elements.

For instance, there are three active i-8094 modules with slot-number 3, 5 and 7. The content of pAvailModules Array will be

{ 0, 0, 0, 1, 0, 1, 0, 1 }

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_NO_MODULE_FOUND: There is no active module available in your PAC.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

2.1.2 i8094_get_cardinfo

short i8094_get_cardinfo(int ScannedIndex, BYTE* pSlotNum, WORD* pModuleID)

Description:

This function returns the slot-number based on the scanned-index. This routine will get the slot number that i-8094 module is installed on.

Parameters:

ScannedIndex: The index that the active i-8094 module is scanned. This index begins from 0, and is less than the active i-8094 modules.

pSlotNum: The pointer to the memory that stores the specific slot-number.

pModuleID: The pointer to the memory that stores the module-ID. This parameter is optional.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_NO_MODULE_FOUND: There is no active module available in your system.

ERROR_INVALID_SCANNED_INDEX: Indicates the ScannedIndex is not less than the numbers of active I-8094 modules.

2.1.3 i8094_open

short i8094_open(BYTE bSlotNum)

Description:

This function opens the device node of i-8094 based on the specific slot-number. If this function returns successfully, the process that calls this function owns the device until i8094_close() is called. The device node of i-8094 is ought to be owned before accessing the Motion-Control ASIC with the other functions. It's recommended to call i8094_scan() and i8094_get_cardinfo() to get the slot-number.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_IOCTL_FAILED: Cannot get the settings of **Range** register, please call GetLastError() for further system information.

ERROR_DEVICE_OPEN: Fail to open the device-node of i-8094. Please make sure no other process owns that i-8094 module.

2.1.4 i8094_close

short i8094_close(BYTE bSlotNum)

Description:

This function closes the device node of i-8094 based on the specific slot-number. After calling this function, i-8094 module will be released, and other process can open it.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_DEVICE_CLOSE: Fail to close the device-node of i-8094.

2.1.5 i8094_reset

short i8094_reset(BYTE bSlotNum)

Description:

This function re-sets the internal Motion-Control ASIC and re-configures the basic registers with default value. After calling this function, all configuration set before will be ignored. This function terminates the current motion, too.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MODULE_RESET: Cannot reset the Motion-Control ASIC, please call GetLastError() for further system information.

2.2 Hardware Configuration

After the i-8094 module is activated, the pre-defined configurations are assigned to the relative registers of Motion-Control ASIC. The functions in this chapter configure/change the default-settings and polarities of output-pulse, input-encoder and hardware-limit sensors.

2.2.1 i8094_set_pls_cfg

short i8094_set_pls_cfg(BYTE bSlotNum, WORD wAxis, WORD wPulseMode, WORD wPulseLogic, WORD wDirectionLogic)

Description:

This function configures the output-pulse mode of i-8094.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wPulseMode: PULSE_MODE_CW_CCW or PULSE_MODE_PULSE_DIRECTION.

wPulseLogic: PULSE_LOGIC_ACTIVE_HIGH or PULSE_LOGIC_ACTIVE_LOW

wDirectionLogic: PULSE_FORWARD_ACTIVE_HIGH or PULSE_FORWARD_ACTIVE_LOW. This parameter will be ignored if the parameter **wPulseMode** is assigned to PULSE_MODE_CW_CCW.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_PULSE_MODE: Neither PULSE_MODE_CW_CCW nor PULSE_MODE_PULSE_DIRECTION is assigned to parameter **wPulseMode**.

ERROR_INVALID_PULSE_LEVEL: Neither PULSE_LOGIC_ACTIVE_HIGH nor PULSE_LOGIC_ACTIVE_LOW is assigned to parameter **wPulseLogic**.

ERROR_INVALID_PULSE_DIRECTION: Neither PULSE_FORWARD_ACTIVE_HIGH nor PULSE_FORWARD_ACTIVE_LOW is assigned to parameter **wDirectionLogic**.

ERROR_PULSE_MODE_SET: Cannot change the output pulse mode, please call GetLastError() for further system information.

2.2.2 i8094_set_enc_cfg

short i8094_set_enc_cfg(BYTE bSlotNum, WORD wAxis, WORD wEncoderMode, BYTE bCounterSource = 0)

Description:

This function configures the input-encoder mode of i-8094.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wEncoderMode: ENCODER_MODE_AB, ENCODER_MODE_AB_DIVID_2, ENCODER_MODE_AB_DIVID_4 or ENCODER_MODE_CW_CCW.

bCounterSource: The optional parameter that is reserved for future.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_ENCODER_MODE: No valid encoder mode is assigned to parameter **wEncoderMode**.

ERROR_ENCODER_MODE_SET: Cannot change the input encoder mode, please call GetLastError() for further system information.

2.2.3 i8094_set_limit

short i8094_set_limit(BYTE bSlotNum, WORD wAxis, WORD wLimitLogic, WORD wStopMode = LIMIT_STOP_SUDDEN)

Description:

This function configures the polarity and stop-mode of hardware-limit sensor.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wLimitLogic: LIMIT_LOGIC_ACTIVE_HIGH or LIMIT_LOGIC_ACTIVE_LOW.

wStopMode: LIMIT_STOP_SUDDEN or LIMIT_STOP_SLOWDOWN. This optional parameter is set as LIMIT_STOP_SUDDEN by default.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_LIMIT_LOGIC: Neither LIMIT_LOGIC_ACTIVE_HIGH nor LIMIT_LOGIC_ACTIVE_LOW is assigned to parameter **wLimitLogic**.

ERROR_INVALID_STOP_MODE: Neither LIMIT_STOP_SUDDEN nor LIMIT_STOP_SLOWDOWN is assigned to parameter **wStopMode**.

ERROR_LIMIT_SENSOR_SET: Cannot configure the hardware-limit sensor, please call GetLastError() for further system information.

2.3 Hardware Configuration (optional)

The functions in this chapter enable/disable the additional signals, including INP and ALARM. The signal-filtering feature is built in Motion-Control ASIC, and can be configured with `i8094_set_filter()`.

The **Range** register of Motion-Control ASIC can be configured with `i8094_set_range()` function.

Assigning different value to the **Range** register, the accuracy and valid-range of speed, acceleration/deceleration and jerk/deceleration-rate will be changed.

The Motion-Control ASIC also provides the software-limit feature, and is enabled/configured with `i8094_set_softlimit()`. Another helpful function, `i8094_load_config()`, configures all i-8094 modules with the pre-defined configuration file, `I8094_Config.bin`.

2.3.1 i8094_set_range

short `i8094_set_range(BYTE bSlotNum, WORD wAxis, DWORD dwRange)`

Description:

This function changes the **Range** register to change the accuracy and valid-range of speed, acceleration/deceleration and jerk/deceleration-rate. The relationship between **Range** register and Speed/Acceleration/Jerk is illustrated in Figure 2. Another function, `i8094_get_range_settings()`, gets the current valid-range of speed, acceleration/deceleration and jerk/deceleration-rate.

$\text{Multiple} = \frac{8,000,000}{R}$	$\text{Deceleration Increasing Rate (PPS/SEC}^2) = \frac{62.5 \times 10^6}{L} \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$
$\text{Jerk (PPS/SEC}^3) = \frac{62.5 \times 10^6}{K} \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$	$\text{Deceleration (PPS/SEC)} = D \times 125 \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$
$\text{Acceleration (PPS/SEC)} = A \times 125 \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$	$\text{Initial Speed (PPS)} = SV \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$
$\text{Drive Speed (PPS)} = V \times \underbrace{\frac{8,000,000}{R}}_{\text{Multiple}}$	

Figure 2 – relationship between **Range** register and Speed/Acceleration/Jerk

Parameters:

`bSlotNum`: The specific slot number that i-8094 installed on.

`wAxis`: Can be one of `AXIS_X`, `AXIS_Y`, `AXIS_Z` or `AXIS_U`.

dwRange: The value to be assigned to the **Range** register (16,000 ~ 8,000,000)

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_RANGE: The value to be assigned to **Range** register is invalid.

ERROR_RANGE_CHANGE: Cannot change the content of **Range** register, please call GetLastError() for further system information.

2.3.2 i8094_get_range_settings

short i8094_get_range_settings(BYTE bSlotNum, WORD wAxis, AXIS_RANGE_SETTINGS* pAxisRangeSetting)

Description:

This function gets the valid-range of Speed, Acceleration/Deceleration and Jerk/Deceleration-Increasing-Rate based on the setting of **Range** register. Please refer to the 'Set_Range' sample.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pAxisRangeSetting: The pointer to the data structure that stores the valid-range of Speed, Acceleration/Deceleration and Jerk/Deceleration-Increasing-Rate.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

2.3.3 i8094_set_inp

short i8094_set_inp(BYTE bSlotNum, WORD wAxis, WORD wINPEnable, WORD wINPLogic)

Description:

This function enables/disables INP feature and configures its polarity. This feature is active until calling i8094_set_inp() with INP_DISABLE_FEATURE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wINPEnable: INP_ENABLE_FEATURE or INP_DISABLE_FEATURE.

wINPLogic: INP_LOGIC_ACTIVE_HIGH or INP_LOGIC_ACTIVE_LOW.

Caveat:

If the incorrect setting is assigned to parameter **wINPLogic**, the i8094_motion_done() will report MOTION_NOT_DONE always.

It's recommended to run **i8094_EzGo.exe** to check the correct settings.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_INP_ENABLE: Neither INP_ENABLE_FEATURE nor INP_DISABLE_FEATURE is assigned to parameter **wINPEnable**.

ERROR_INVALID_INP_LOGIC_LEVEL: Neither INP_LOGIC_ACTIVE_HIGH nor INP_LOGIC_ACTIVE_LOW is assigned to parameter **wINPLogic**.

ERROR_INP_SIGNAL_SET: Cannot set the INP configuration, please call GetLastError() for further system information.

2.3.4 i8094_set_alarm

short i8094_set_alarm(BYTE bSlotNum, WORD wAxis, WORD wAlarmEnable, WORD wAlarmLogic)

Description:

This function enables/disables ALARM feature and configures its polarity. This feature is active until calling i8094_set_alarm() with ALARM_DISABLE_FEATURE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wAlarmEnable: ALARM_ENABLE_FEATURE or ALARM_DISABLE_FEATURE.

wAlarmLogic: ALARM_LOGIC_ACTIVE_HIGH or ALARM_LOGIC_ACTIVE_LOW.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_ALARM_ENABLE: Neither ALARM_ENABLE_FEATURE nor ALARM_DISABLE_FEATURE is assigned to parameter **wAlarmEnable**.

ERROR_INVALID_ALARM_LOGIC_LEVEL: Neither ALARM_LOGIC_ACTIVE_HIGH nor ALARM_LOGIC_ACTIVE_LOW is assigned to parameter **wAlarmLogic**.

ERROR_ALARM_SIGNAL_SET: Cannot set the ALARM configuration, please call GetLastError() for further system information.

2.3.5 i8094_set_filter

short i8094_set_filter(BYTE bSlotNum, WORD wAxis, WORD wFilterEnable, WORD wFilterCfg, WORD wDelayTime)

Description:

This function enables/disables the signal filter built in Motion-Control ASIC, and configures the signal-sources and delay-time. This feature is active until calling i8094_set_filter() with FILTER_DISABLE_FEATURE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wFilterEnable: FILTER_ENABLE_FEATURE or FILTER_DISABLE_FEATURE.

wFilterCfg: The following signal-sources can be combined with OR (|) operator.

FILTER_CFG_EMG_EL_ORG_NORG (for EMG, hardware-limit, Home and Near-Home),

FILTER_CFG_ENCODER_Z_PHASE (for Z-Phase/INDEX),

FILTER_CFG_INP_ALARM (for INP and ALARM),

FILTER_CFG_EXP_EXPLSN (for manual-pulse-generator),

FILTER_CFG_IN3 (for digital-input IN3)

wDelayTime: Can be one of the following delay-time settings (unit: micro-second):

FILTER_DELAY_2us,

FILTER_DELAY_256us,

FILTER_DELAY_512us,

FILTER_DELAY_1024us,

FILTER_DELAY_2048us,

FILTER_DELAY_4096us,

FILTER_DELAY_8192us,

FILTER_DELAY_16384us

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_FILTER_ENABLE: Neither FILTER_ENABLE_FEATURE nor

FILTER_DISABLE_FEATURE is assigned to parameter **wFilterEnable**.

ERROR_INVALID_FILTER_CONFIGURATION: Invalid Filter-Source combination is assigned to

parameter **wFilterCfg**.

ERROR_INVALID_FILTER_DELAY_TIME: Invalid delay-time is assigned to parameter **wDelayTime**.

ERROR_FILTER_SET: Cannot set the Filter configuration, please call GetLastError() for further system information.

2.3.6 i8094_set_softlimit

short i8094_set_softlimit(BYTE bSlotNum, WORD wAxis, WORD wSWLimitEnable, WORD wCmpSource, long LimitPositive, long LimitNegative)

Description:

The internal comparators of Motion-Control ASIC provide the software-limit feature. The Motion-Control ASIC will monitor either Logic-Command counter or Encoder-Position counter. Once the content of these counters exceeds the pre-defined value, the deceleration stop will be started. This feature is active until calling i8094_set_softlimit() with SW_LIMIT_DISABLE_FEATURE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSWLimitEnable: SW_LIMIT_ENABLE_FEATURE or SW_LIMIT_DISABLE_FEATURE.

wCmpSource: CMP_SRC_LOGIC_COMMAND or CMP_SRC_ENCODER_POSITION.

LimitPositive: The pre-defined value for the comparator in forward direction.

LimitNegative: The pre-defined value for the comparator in reverse direction.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_SOFTWARE_LIMIT_ENABLE: Neither SW_LIMIT_ENABLE_FEATURE nor SW_LIMIT_DISABLE_FEATURE is assigned to parameter **wSWLimitEnable**.

ERROR_INVALID_SOFTWARE_LIMIT_COMPARATOR_SOURCE: Neither CMP_SRC_LOGIC_COMMAND nor CMP_SRC_ENCODER_POSITION is assigned to parameter **wCmpSource**.

ERROR_CONFLICT_WITH_VRING: Indicates that the ASIC-Internal Comparators are used for Variable-Ring counter. Please disable Variable-Ring counter with i8094_set_vring().

ERROR_CONFLICT_WITH_SYNCH_ACTION: Indicates that the ASIC-Internal Comparators are used as the condition of Synchronous-Action. Please disable synchronous-condition with i8094_set_synch().

ERROR_SW_LIMIT_SET: Cannot configure the software-limit settings, please call GetLastError() for further system information.

2.3.7 i8094_servo_on

short i8094_servo_on(BYTE bSlotNum, WORD wAxis, BYTE bServoON, BYTE bAutoOFF)

Description:

This function turns on/off the Servo.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

bServoON: SERVO_ON or SERVO_OFF.

bAutoOFF: SERVO_MANUAL_OFF: turn off Servo manually.

SERVO_AUTO_OFF: turn off Servo when the i8094_close() or i8094_close_all() is called.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_SERVO_SETTING: Neither SERVO_ON nor SERVO_OFF is assigned to parameter **bServoON**.

ERROR_SERVO_ON_SET: Cannot set the Servo output, please call GetLastError() for further system information.

Automatic Home Search

With the external Near-Home (NORG), Home (ORG) and Z-Phase/INDEX sensors, the auto-homing feature provided by Motion-Control ASIC will help to search the Home (ORG) automatically.

The typical Automatic Home Search is illustrated in Figure 3.

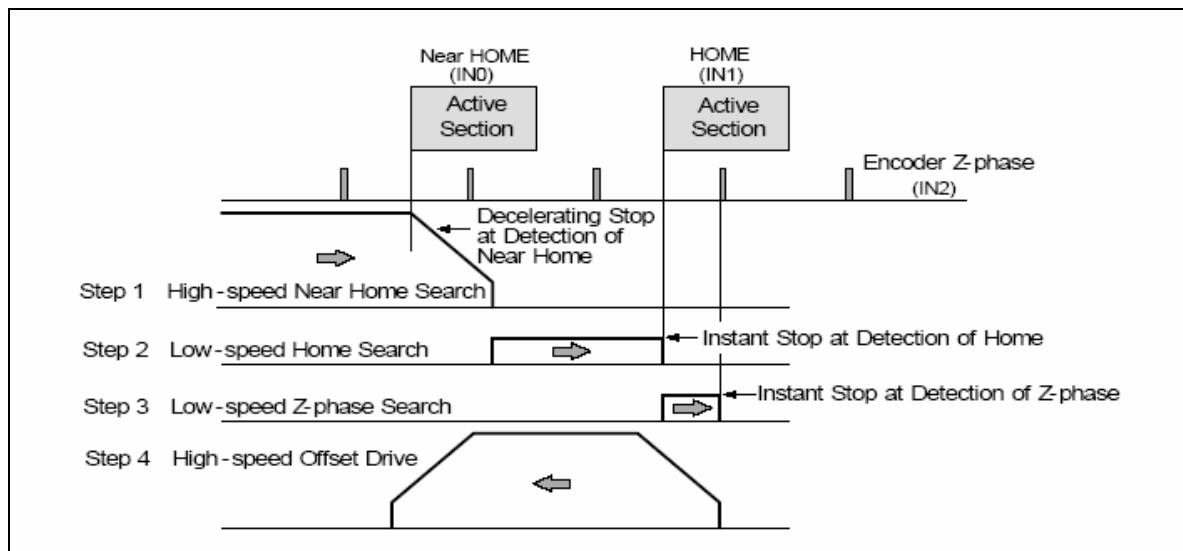


Figure 3 - typical Automatic Home Search

3.1 i8094_set_home_cfg

short i8094_set_home_cfg(BYTE bSlotNum, WORD wAxis, WORD wHomeLogic, WORD wNHomeLogic, WORD wIndexLogic, WORD wHomeSteps, DWORD dwStep4Offset)

Description:

This function configures the polarities of Near-Home(NORG), Home(ORG) and Z-Phase/INDEX sensors. The searching-steps of Automatic-Home-Search are configured in this function, too.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wHomeLogic: HOME_LOGIC_ACTIVE_HIGH or HOME_LOGIC_ACTIVE_LOW.

wNHomeLogic: NHOME_LOGIC_ACTIVE_HIGH or NHOME_LOGIC_ACTIVE_LOW

wIndexLogic: INDEX_LOGIC_ACTIVE_HIGH or INDEX_LOGIC_ACTIVE_LOW

wHomeSteps: The combination of Automatic-Home-Search 4-Steps. The configurations are:

Step-1:

AUTO_HOME_STEP1_FORWARD, AUTO_HOME_STEP1_REVERSE and
AUTO_HOME_STEP1_DISABLE

Step-2:

AUTO_HOME_STEP2_FORWARD, AUTO_HOME_STEP2_REVERSE and
AUTO_HOME_STEP2_DISABLE

Step-3:

AUTO_HOME_STEP3_FORWARD, AUTO_HOME_STEP3_REVERSE and
AUTO_HOME_STEP3_DISABLE

Step-4:

AUTO_HOME_STEP4_FORWARD, AUTO_HOME_STEP4_REVERSE and
AUTO_HOME_STEP4_DISABLE

Notice: Based on external sensor, It's recommended to include either

AUTO_HOME_STEP1_FORWARD/AUTO_HOME_STEP1_REVERSE or

AUTO_HOME_STEP2_FORWARD/AUTO_HOME_STEP2_REVERSE in wHomeSteps.

dwStep4Offset: The offset driving in Step-4 of Automatic Home Search.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_HOME_LOGIC_LEVEL: Neither HOME_LOGIC_ACTIVE_HIGH nor HOME_LOGIC_ACTIVE_LOW is assigned to parameter **wHomeLogic**.

ERROR_INVALID_NEAR_HOME_LOGIC_LEVEL: Neither NHOME_LOGIC_ACTIVE_HIGH nor NHOME_LOGIC_ACTIVE_LOW is assigned to parameter **wNHomeLogic**.

ERROR_INVALID_INDEX_LOGIC_LEVEL: Neither INDEX_LOGIC_ACTIVE_HIGH nor INDEX_LOGIC_ACTIVE_LOW is assigned to parameter **wIndexLogic**.

ERROR_INVALID_AUTO_HOME_STEP: The Automatic-Home-Search Steps are out of pre-defined configurations.

ERROR_HOME_CFG_SET: Cannot change the configuration of Automatic-Home-Search, please call GetLastError() for further system information.

3.2 i8094_home_start

short i8094_home_start(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwAcceleration, DWORD dwDeceleration, DWORD dwNHomeSearchSpeed, DWORD dwHomeSearchSpeed, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts Automatic-Home-Search with the Start-Speed, Acceleration/Deceleration, Near-Home Searching Speed and Home Searching Speed.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwStartSpeed: The Start Speed in Step-1 of Automatic-Home-Search.

dwAcceleration: The Acceleration in Step-1 of Automatic-Home-Search motion.

dwDeceleration: The Deceleration in Step-1 of Automatic-Home-Search motion.

dwNHomeSearchSpeed: The Near-Home Search Speed(Driving Speed) in Step-1 of Automatic-Home-Search motion.

dwHomeSearchSpeed: The Home Search Speed in Step-2 of Automatic-Home-Search motion. This speed is recommended to be lower than dwStartSpeed.

wBlockMode: The Block/Non-Block operation mode. Now only DISABLE_BLOCK_OPEARTION is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_BLOCK_OPEARTION_MODE: Not DISABLE_BLOCK_OPEARTION is assigned to parameter **wBlockMode**.

ERROR_INVALID_HOME_SEARCH_SPEED: The value assigned to parameter **dwHomeSearchSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwNHomeSearchSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwNHomeSearchSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DECELERATION: The value assigned to parameter **dwDeceleration** is out of range of Deceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_CONFIG_IS_NEEDED: The Automatic-Home-Search had not been configured. Please configure the Automatic-Home-Search with `i8094_set_home_cfg()` first.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:
Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed. Please wait for completion of motion, or stop motion with `i8094_stop_move()`.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with `i8094_set_mpg()`.

ERROR_START_HOME: Cannot start Automatic-Home-Search, please call `GetLastError()` for further system information.

Independent Moving Functions

These functions in this chapter start the independent motion, including velocity-move, constant-speed move, trapezoidal-profile and S-curve move.

4.1 i8094_velocity_move

short i8094_velocity_move(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, BYTE bDirection)

Description:

This function starts velocity-move with **dwDriveSpeed** driving-speed continuously. The trapezoidal-profile moving will be applied to Acceleration. Calling i8094_stop_move() to terminate the velocity-move.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwStartSpeed: The Start-Speed in trapezoidal-profile move.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile move.

dwAcceleration: The Acceleration in trapezoidal-profile move.

bDirection: MOVE_DIRECTION_FORWARD or MOVE_DIRECTION_REVERSE.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_MOVE_DIRECTION: Neither MOVE_DIRECTION_FORWARD nor MOVE_DIRECTION_REVERSE is assigned to parameter **bDirection**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:
Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_CONTI_MOVE_START: Cannot start velocity-move, please call GetLastError() for further system information.

4.2 i8094_const_move

short i8094_const_move(BYTE bSlotNum, WORD wAxis, DWORD dwDriveSpeed, long FixedPulse)

Description:

This function starts constant-speed, fixed-pulse motion. No acceleration/deceleration is applied in this motion.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwDriveSpeed: The Drive-Speed in constant-speed moving.

FixedPulse: The total numbers of output pulse. This parameter is a signed 32-bits variable, the negative value indicates motion in reverse-direction

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:

Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_CONST_MOVE_START: Cannot start constant-speed motion, please call GetLastError() for further system information.

4.3 i8094_t_move

short i8094_t_move(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, DWORD dwDeceleration, long FixedPulse, short wAccCntOffset = 8)

Description:

This function starts trapezoidal-profile, fixed-pulse motion.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwStartSpeed: The Start-Speed in trapezoidal-profile moving.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving.

dwAcceleration: The Acceleration in trapezoidal-profile moving.

dwDeceleration: The Deceleration in trapezoidal-profile moving.

FixedPulse: The total numbers of output pulse. This parameter is a signed 32-bits variable, the negative value indicates motion in reverse-direction

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DECELERATION: The value assigned to parameter ***dwDeceleration*** is out of range of Deceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

Notice: In the case, ***dwAcceleration*** > ***dwDeceleration*** , the following formula should be satisfied, too.

$$\mathbf{dwDeceleration} > (\mathbf{dwAcceleration} \times \mathbf{dwDriveSpeed}) / 4,000,000.$$

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:

Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active.
Please disable MPG settings with `i8094_set_mpg()`.

ERROR_T_MOVE_START: Cannot start trapezoidal moving, please call `GetLastError()` for further system information.

4.4 i8094_s_move

short i8094_t_move(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAccelerationRate, DWORD dwDecelerationRate, long FixedPulse, short wAccCntOffset = 8)

Description:

This function starts S-curve, fixed-pulse motion.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwStartSpeed: The Start-Speed in S-curve moving.

dwDriveSpeed: The Drive-Speed in S-curve moving.

dwAccelerationRate: The Acceleration-Increasing-Rate in S-curve moving. The Acceleration will be assigned to maximum value automatically.

dwDecelerationRate: The Deceleration-Increasing-Rate in S-curve moving. The Deceleration will be assigned to maximum value automatically.

FixedPulse: This parameter is a signed 32-bits variable, the negative value indicates motion in reverse-direction

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than or equal to **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_JERK: The value assigned to parameter **dwAccelerationRate** is out of range of Acceleration-Increasing-Rate. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DECELERATION_RATE: The value assigned to parameter **dwDecelerationRate** is out of range of Deceleration-Increasing-Rate. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:

Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with `i8094_set_mpg()`.

ERROR_S_MOVE_START: Cannot start S-curve moving, please call `GetLastError()` for further system information.

Interpolation Moving Functions

5.1 Individual Interpolation Moving

The functions in this chapter provide both trapezoidal and S-curve acceleration/deceleration in 2D/3D linear interpolation moving. And only trapezoidal acceleration/deceleration can be applied to circular interpolation moving.

5.1.1 i8094_t_line2_move

short i8094_t_line2_move(BYTE bSlotNum, WORD wMainAxis, WORD wSlaveAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, DWORD dwDeceleration, long MainAxisFinishPoint, long SlaveAxisFinishPoint, short wAccCntOffset = 8, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts the trapezoidal-profile, 2-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSlaveAxis: The slave-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (cannot be the same as **wMainAxis**).

dwStartSpeed: The Start-Speed in trapezoidal-profile moving. This Start-Speed will be applied to main-axis.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving. This Drive-Speed will be applied to main-axis.

dwAcceleration: The Acceleration in trapezoidal-profile moving. This Acceleration will be applied to main-axis.

dwDeceleration: The Deceleration in trapezoidal-profile moving. This Deceleration will be applied to main-axis.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SlaveAxisFinishPoint: The finish point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

wBlockMode: The Block/Non-Block operation mode. Now only DISABLE_BLOCK_OPEARTION is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, **bSlotNum**; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: The parameter **wSlaveAxis** includes the axis ID assigned to **wMainAxis**.

ERROR_INVALID_BLOCK_OPEARTION_MODE: Not DISABLE_BLOCK_OPEARTION is assigned to parameter **wBlockMode**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DECELERATION: The value assigned to parameter **dwDeceleration** is out of range of Deceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

Notice: In the case, $dwAcceleration > dwDeceleration$, the following formula should be satisfied, too.

$$dwDeceleration > (dwAcceleration \times dwDriveSpeed) / 4,000,000.$$

ERROR_INTERPOLATION_NOT_COMPLETE: The interpolation moving started before had not completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,
ERROR_OCCURS_IN_AXIS_ZU:

Indicates that some error happens to AXIS_xxxx. Please call `i8094_get_error_status()` for detailed information.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with `i8094_set_mpg()`.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call `GetLastError()` for further system information.

ERROR_T_LINE2_START: Cannot start trapezoidal 2D interpolation moving, please call `GetLastError()` for further system information.

5.1.2 i8094_s_line2_move

short i8094_s_line2_move(BYTE bSlotNum, WORD wMainAxis, WORD wSlaveAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAccelerationRate, DWORD dwDecelerationRate, long MainAxisFinishPoint, long SlaveAxisFinishPoint, short wAccCntOffset = 8, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts the S-curve, 2-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSlaveAxis: The slave-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (cannot be the same as **wMainAxis**).

dwStartSpeed: The Start-Speed in S-curve moving. This Start-Speed will be applied to main-axis.

dwDriveSpeed: The Drive-Speed in S-curve moving. This Drive-Speed will be applied to main-axis.

dwAccelerationRate: The Acceleration-Increasing-Rate in S-curve moving. The Acceleration will be assigned to maximum value automatically. This Acceleration-Increasing-Rate will be applied to main-axis.

dwDecelerationRate: The Deceleration-Increasing-Rate in S-curve moving. The Deceleration will be assigned to maximum value automatically. This Acceleration-Increasing-Rate will be applied to main-axis.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SlaveAxisFinishPoint: The finish point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

wBlockMode: The Block/Non-Block operation mode. Now only DISABLE_BLOCK_OPEARTION is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: The parameter **wSlaveAxis** includes the axis ID assigned to **wMainAxis**.

ERROR_INVALID_BLOCK_OPEARITION_MODE: Not DISABLE_BLOCK_OPEARITION is assigned to parameter **wBlockMode**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than or equal to **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_JERK: The value assigned to parameter **dwAccelerationRate** is out of range of Acceleration Increasing Rate. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DECELERATION_RATE: The value assigned to parameter **dwDecelerationRate** is out of range of Deceleration Increasing Rate. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INTERPOLATION_NOT_COMPLETE: The interpolation moving started before had not completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z, ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY, ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ, ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU, ERROR_OCCURS_IN_AXIS_ZU:

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call GetLastError() for further system information.

ERROR_S_LINE2_START: Cannot start S-curve 2D interpolation moving, please call GetLastError() for further system information.

5.1.3 i8094_t_line3_move

short i8094_t_line3_move(BYTE bSlotNum, WORD wMainAxis, WORD wSecondAxis, WORD wThirdAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, DWORD dwDeceleration, long MainAxisFinishPoint, long SecondAxisFinishPoint, long ThirdAxisFinishPoint, short wAccCntOffset = 8, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts the trapezoidal-profile, 3-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSecondAxis: The second-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (cannot be the same as **wMainAxis**).

wThirdAxis: The third-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (neither **wMainAxis** nor **wSecondAxis** can be assigned to **wThirdAxis**)

dwStartSpeed: The Start-Speed in trapezoidal-profile moving. This Start-Speed will be applied to main-axis.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving. This Drive-Speed will be applied to main-axis.

dwAcceleration: The Acceleration in trapezoidal-profile moving. This Acceleration will be applied to main-axis.

dwDeceleration: The Deceleration in trapezoidal-profile moving. This Deceleration will be applied to main-axis.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SecondAxisFinishPoint: The finish point of second-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

ThirdAxisFinishPoint: The finish point of third-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

wBlockMode: The Block/Non-Block operation mode. Now only DISABLE_BLOCK_OPEARTION is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, *bSlotNum*; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter *wMainAxis*, *wSecondAxis* or *wThirdAxis*.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter *wMainAxis*, *wSecondAxis* or *wThirdAxis*.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: Either *wSecondAxis* or *wThirdAxis* includes the axis ID assigned to *wMainAxis*.

ERROR_INTERPOLATION_SLAVE_AXES_DUPLICATED: The axis ID assigned to *wSecondAxis* and *wThirdAxis* is the same.

ERROR_INVALID_BLOCK_OPEARTION_MODE: Not DISABLE_BLOCK_OPEARTION is assigned to parameter *wBlockMode*.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The *dwStartSpeed* is larger than *dwDriveSpeed*.

ERROR_INVALID_START_SPEED: The value assigned to parameter *dwStartSpeed* is out of range of Speed. Please refer to *i8094_set_range()* and *i8094_get_range_settings()*.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter *dwDriveSpeed* is out of range of Speed. Please refer to *i8094_set_range()* and *i8094_get_range_settings()*.

ERROR_INVALID_ACCELERATION: The value assigned to parameter *dwAcceleration* is out of range of Acceleration. Please refer to *i8094_set_range()* and *i8094_get_range_settings()*.

ERROR_INVALID_DECELERATION: The value assigned to parameter *dwDeceleration* is out of range of Deceleration. Please refer to *i8094_set_range()* and *i8094_get_range_settings()*.

Notice: In the case, *dwAcceleration* > *dwDeceleration* , the following formula should be satisfied, too.

$$\mathbf{dwDeceleration > (dwAcceleration \times dwDriveSpeed) / 4,000,000.}$$

ERROR_INTERPOLATION_NOT_COMPLETE: The interpolation moving started before had not completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,
ERROR_OCCURS_IN_AXIS_ZU, ERROR_OCCURS_IN_AXIS_XYZ,
ERROR_OCCURS_IN_AXIS_XYU, ERROR_OCCURS_IN_AXIS_XZU,

ERROR_OCCURS_IN_AXIS_YZU,;

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call GetLastError() for further system information.

ERROR_T_LINE3_START: Cannot start trapezoidal 3D interpolation moving, please call GetLastError() for further system information.

5.1.4 i8094_s_line3_move

short i8094_s_line3_move(BYTE bSlotNum, WORD wMainAxis, WORD wSecondAxis, WORD wThirdAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAccelerationRate, DWORD dwDecelerationRate, long MainAxisFinishPoint, long SecondAxisFinishPoint, long ThirdAxisFinishPoint, short wAccCntOffset = 8, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts the S-curve, 3-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSecondAxis: Thhe second-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (cannot be the same as **wMainAxis**).

wThirdAxis: The third-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (neither **wMainAxis** nor **wSecondAxis** can be assigned to **wThirdAxis**)

dwStartSpeed: The Start-Speed in S-curve moving. This Start-Speed will be applied to main-axis.

dwDriveSpeed: The Drive-Speed in S-curve moving. This Drive-Speed will be applied to main-axis.

dwAccelerationRate: The Acceleration-Increasing-Rate in S-curve moving. The Acceleration will be assigned to maximum value automatically. This Acceleration-Increasing-Rate will be applied to main-axis.

dwDecelerationRate: The Deceleration-Increasing-Rate in S-curve moving. The Deceleration will be assigned to maximum value automatically. This Acceleration-Increasing-Rate will be applied to main-axis.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SecondAxisFinishPoint: The finish point of second-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

ThirdAxisFinishPoint: The finish point of third-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

wBlockMode: The Block/Non-Block operation mode. Now only DISABLE_BLOCK_OPEARITION is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis**, **wSecondAxis** or **wThirdAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis**, **wSecondAxis** or **wThirdAxis**.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: Either **wSecondAxis** or **wThirdAxis** includes the axis ID assigned to **wMainAxis**.

ERROR_INTERPOLATION_SLAVE_AXES_DUPLICATED: The axis ID assigned to **wSecondAxis** and **wThirdAxis** is the same.

ERROR_INVALID_BLOCK_OPEARITION_MODE: Not DISABLE_BLOCK_OPEARITION is assigned to parameter **wBlockMode**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than or equal to **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_JERK: The value assigned to parameter **dwAccelerationRate** is out of range of Acceleration Increasing Rate. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DECELERATION_RATE: The value assigned to parameter **dwDecelerationRate** is out of range of Deceleration Increasing Rate. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INTERPOLATION_NOT_COMPLETE: The interpolation moving started before had not completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,
ERROR_OCCURS_IN_AXIS_ZU, ERROR_OCCURS_IN_AXIS_XYZ,
ERROR_OCCURS_IN_AXIS_XYU, ERROR_OCCURS_IN_AXIS_XZU,

ERROR_OCCURS_IN_AXIS_YZU:

Indicates that some error happens to AXIS_XXXX. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with `i8094_set_mpg()`.

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call `GetLastError()` for further system information.

ERROR_S_LINE3_START: Cannot start S-curve 3D linear interpolation moving, please call `GetLastError()` for further system information.

5.1.5 i8094_t_arc2_move

short i8094_t_arc2_move(BYTE bSlotNum, WORD wMainAxis, WORD wSlaveAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, WORD wArcDirection, long MainAxisCenterPoint, long SlaveAxisCenterPoint, long MainAxisFinishPoint, long SlaveAxisFinishPoint, short wAccCntOffset = 8, WORD wBlockMode = DISABLE_BLOCK_OPEARTION)

Description:

This function starts the trapezoidal-profile, 2-dimension circular interpolation moving. Only symmetric trapezoidal Acceleration/Deceleration is applied to circular interpolation. The start-point will be the *Origin* of circular-interpolation motion. The **MainAxisCenterPoint** & **SlaveAxisCenterPoint** are center coordinates related to *Origin*; and **MainAxisFinishPoint** & **SlaveAxisFinishPoint** are finish coordinates related to *Origin*. The position tolerance for the specified circular curve is ± 1 within the interpolation range. When the value of finish-point reaches the coordinate of *short-axis*, the circular interpolation will be completed. Figure 4 illustrates the finish-point checking of circular interpolation.

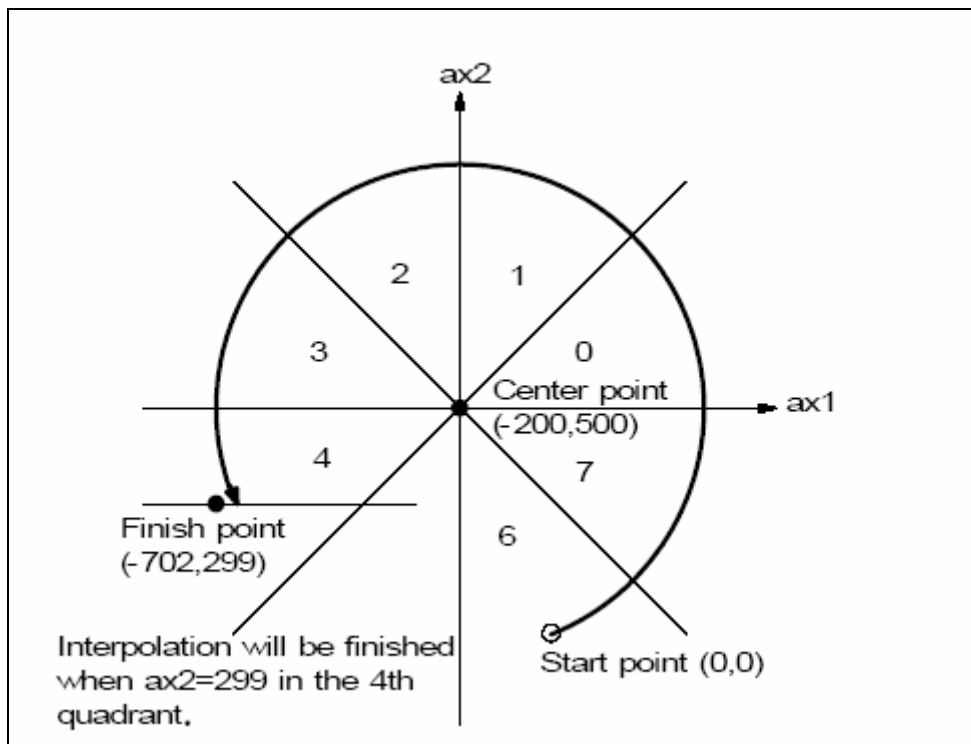


Figure 4 – finish-point checking of circular interpolation

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of Interpolation moving, can be one of `AXIS_X`, `AXIS_Y`, `AXIS_Z` or `AXIS_U`.

wSlaveAxis: The slave-axis of Interpolation moving, can be one of `AXIS_X`, `AXIS_Y`, `AXIS_Z` or `AXIS_U` (cannot be the same as **wMainAxis**).

dwStartSpeed: The Start-Speed in trapezoidal-profile moving. This Start-Speed will be applied to main-axis.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving. This Drive-Speed will be applied to main-axis.

dwAcceleration: The Acceleration in trapezoidal-profile moving. This Acceleration will be applied to main-axis.

wArcDirection: Clockwise (`INTERP_ARC_DIRECTION_CLOCKWISE`) or Counter-Clockwise (`INTERP_ARC_DIRECTION_COUNTER_CLOCKWISE`).

MainAxisCenterPoint: The center point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SlaveAxisCenterPoint: The center point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

SlaveAxisFinishPoint: The finish point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-direction.

wAccCntOffset: This optional parameter to configure the offset for Acceleration/Deceleration driving. The default setting of **wAccCntOffset** is 8.

wBlockMode: The Block/Non-Block operation mode. Now only `DISABLE_BLOCK_OPEARTION` is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, `bSlotNum`; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis** or **wSlaveAxis**.

ERROR_INVALID_INTERPOLATION_ARC_DIRECTION: Neither `INTERP_ARC_DIRECTION_CLOCKWISE` nor

INTERP_ARC_DIRECTION_COUNTER_CLOCKWISE is assigned to parameter **wArcDirection**.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: The parameter **wSlaveAxis** includes the axis ID assigned to **wMainAxis**.

ERROR_INVALID_BLOCK_OPEARTION_MODE: Not DISABLE_BLOCK_OPEARTION is assigned to parameter **wBlockMode**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_ARC_DECELERATION_POINT_CALCULATE: The path of circular moving is too small. Please try to increase the circular-path.

ERROR_INTERPOLATION_NOT_COMPLETE: The interpolation moving started before had not completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z, ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY, ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ, ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU, ERROR_OCCURS_IN_AXIS_ZU:

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call GetLastError() for further system information.

ERROR_T_ARC2_START: Cannot start circular interpolation moving, please call GetLastError() for further system information.

5.2 Continuous Interpolation Moving

The continuous interpolation provides none-stop linear & circular interpolation moving. The continuous interpolation moving is combined with multiple linear & circular interpolation segments. To add arbitrary interpolation segment, only the constant Vector-Speed is applied to continuous-interpolation moving.

The continuous interpolation moving is configured with `i8094_conti_interp_begin()` and completed with `i8094_conti_interp_end()`. All settings that are configured with `i8094_conti_interp_begin()` will be kept in driver until `i8094_conti_interp_end()` being called. The interpolation segments after `i8094_conti_interp_begin()` will use these configurations, including axes involved in interpolation-moving and constant Vector-Speed.

To avoid the continuous interpolation to be interrupted, the configurations of next interpolation segment had better be set as soon as possible. The function, `i8094_conti_interp_next_ready()`, indicates the next interpolation segment is ready to be configured.

In case the continuous-interpolation moving is terminated, you could re-start the uncompleted interpolation segments with `INTERP_CONTINUE_START` setting in parameter ***wContiInterpMoveMode***. The typical programming following-chart is described in Figure 5. Please refer to the 'Conti_Interp' sample.

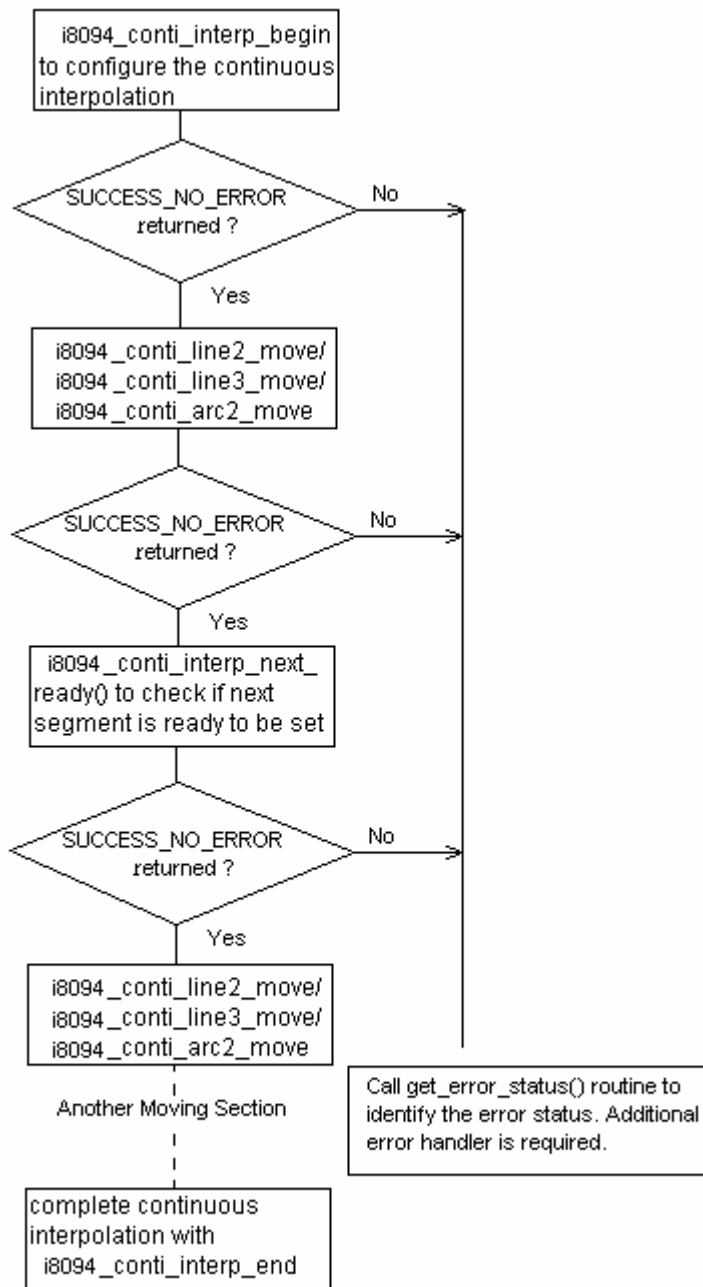


Figure 5 - typical programming following-chart of continuous-interpolation

5.2.1 i8094_conti_interp_begin

short i8094_conti_interp_begin(BYTE bSlotNum, WORD wMainAxis, WORD wSecondAxis, WORD wThirdAxis, DWORD dwConstSpeed)

Description:

This function configures the involved axes, the constant vector-speed in continuous interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wSecondAxis: The second-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U (cannot be the same as **wMainAxis**).

wThirdAxis: The third-axis of Interpolation moving, can be one of AXIS_X, AXIS_Y, AXIS_Z, AXIS_U or INVALID_AXIS_ASSIGNMENT. (neither **wMainAxis** nor **wSecondAxis** can be assigned to **wThirdAxis**).

dwConstSpeed: The constant Vector-Speed in continuous interpolation. This parameter should be less than 2,000,000 PPS)

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis**, **wSecondAxis** or **wThirdAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis**, **wSecondAxis** or **wThirdAxis**.

ERROR_INVALID_INTERPOLATION_SLAVE_AXES: Either **wSecondAxis** or **wThirdAxis** includes the axis ID assigned to **wMainAxis**.

ERROR_INTERPOLATION_SLAVE_AXES_DUPLICATED: The axis ID assigned to **wSecondAxis** and **wThirdAxis** is the same.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INTERPOLATION_NOT_COMPLETE: The previous interpolation-moving had not been completed.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,
ERROR_OCCURS_IN_AXIS_ZU, ERROR_OCCURS_IN_AXIS_XYZ,
ERROR_OCCURS_IN_AXIS_XYU, ERROR_OCCURS_IN_AXIS_XZU,
ERROR_OCCURS_IN_AXIS_YZU:

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status() for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_CONFLICT_WITH_MPG: Indicates the previous Manual-Pulse-Generator setting is active. Please disable MPG settings with i8094_set_mpg().

ERROR_AXES_MOVE_CHECK: Cannot forward the Axes-checking command to system, please call GetLastError() for further system information.

ERROR_INVALID_RANGE: The assigned value is invalid.

ERROR_RANGE_CHANGE: Cannot change the settings of **Range** register, please call GetLastError() for further system information.

ERROR_CONTI_INTERP_SET: Cannot configure continuous-interpolation moving, please call GetLastError() for further system information.

5.2.2 i8094_conti_interp_next_ready

short i8094_conti_interp_next_ready(BYTE bSlotNum, BYTE *pReady)

Description:

This function checks if the next interpolation segment is ready to be set.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

pReady: The pointer to the memory that stores the ready-status of next interpolation segment.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_CONFIG_IS_NEEDED: The continuous interpolation had not been configured. Please call i8094_conti_interp_begin() first.

ERROR_CONTI_INTERP_NEXT_READY: Cannot get the next-ready status, please call GetLastError() for further system information.

5.2.3 i8094_conti_line2_move

short i8094_conti_line2_move(BYTE bSlotNum, long MainAxisFinishPoint, long SlaveAxisFinishPoint, WORD wContiInterpMoveMode)

Description:

This function starts the constant vector-speed, 2-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way.

SlaveAxisFinishPoint: The finish point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way

wContiInterpMoveMode:

INTERP_CONTINUE_START: indicates the begin of continuous interpolation moving.

INTERP_NEXT_CONTINUOUS_MOTION: indicates the interpolation segment is one part of continuous interpolation moving, and the interrupt of motion checking in involved implicitly.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_CONFIG_IS_NEEDED: The continuous interpolation had not been configured. Please call i8094_conti_interp_begin() first.

ERROR_INVALID_CONTINUE_INTERPOLATION_MOTION: Neither INTERP_CONTINUE_START nor INTERP_NEXT_CONTINUOUS_MOTION is assigned to parameter **wContiInterpMoveMode**.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,

ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,

ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,

ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,

ERROR_OCCURS_IN_AXIS_ZU:

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status() for detailed information.

ERROR_CONTI_INTERP_INTERRUPTED: Indicates the continuous interpolation moving is interrupted. This code is returned only when **wContiInterpMoveMode** is set as INTERP_NEXT_CONTINUOUS_MOTION.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed. This code is returned only when **wContiInterpMoveMode** is set as INTERP_CONTINUE_START.

ERROR_CONTI_INTERP_NEXT_NOT_READY: Indicates the internal Motion-Control ASIC is not ready to set the next interpolation segment. Please call `i8094_conti_interp_next_ready()` first.

ERROR_CONTI_INTERP_LINE2_MOVE: Cannot start `i8094_conti_line2_move`, please call `GetLastError()` for further system information.

5.2.4 i8094_conti_line3_move

short i8094_conti_line3_move(BYTE bSlotNum, long MainAxisFinishPoint, long SecondAxisFinishPoint, long ThirdAxisFinishPoint, WORD wContiInterpMoveMode)

Description:

This function starts the constant vector-speed, 3-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way.

SecondAxisFinishPoint: The finish point of second-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way

ThirdAxisFinishPoint: The finish point of third-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way

wContiInterpMoveMode:

INTERP_CONTINUE_START: indicates the begin of continuous interpolation moving.

INTERP_NEXT_CONTINUOUS_MOTION: indicates the interpolation segment is one part of continuous interpolation moving, and the interrupt of motion checking in involved implicitly.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_CONFIG_IS_NEEDED: The continuous interpolation had not been configured. Please call i8094_conti_interp_begin() first.

ERROR_INVALID_CONTINUE_INTERPOLATION_MOTION: Neither INTERP_CONTINUE_START nor INTERP_NEXT_CONTINUOUS_MOTION is assigned to parameter **wContiInterpMoveMode**.

ERROR_CONTI_INTERP_INCORRECT_CONFIG: Only two axes are configured with i8094_conti_interp_begin(), and i8094_conti_line3_move() failed to execute.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,

ERROR_OCCURS_IN_AXIS_ZU, ERROR_OCCURS_IN_AXIS_XYZ,
ERROR_OCCURS_IN_AXIS_XYU, ERROR_OCCURS_IN_AXIS_XZU,
ERROR_OCCURS_IN_AXIS_YZU:

Indicates that some error happens to AXIS_xxxx. Please call `i8094_get_error_status()` for detailed information.

ERROR_CONTI_INTERP_INTERRUPTED: Indicates the continuous interpolation moving is interrupted. This code is returned only when **wContiInterpMoveMode** is set as INTERP_NEXT_CONTINUOUS_MOTION.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed. This code is returned only when **wContiInterpMoveMode** is set as INTERP_CONTINUE_START.

ERROR_CONTI_INTERP_NEXT_NOT_READY: Indicates the internal Motion-Control ASIC is not ready to set the next interpolation segment, please call `i8094_conti_interp_next_ready()` first.

ERROR_CONTI_INTERP_LINE3_MOVE: Cannot start `i8094_conti_line3_move`, please call `GetLastError()` for further system information.

5.2.5 i8094_conti_arc2_move

short i8094_conti_arc2_move(BYTE bSlotNum, WORD wArcDirection, long MainAxisCenterPoint, long SlaveAxisCenterPoint, long MainAxisFinishPoint, long SlaveAxisFinishPoint, WORD wContiInterpMoveMode)

Description:

This function starts the constant vector-speed, 2-dimension linear interpolation moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wArcDirection: Clockwise (INTERP_ARC_DIRECTION_CLOCKWISE) or Counter-Clockwise (INTERP_ARC_DIRECTION_COUNTER_CLOCKWISE).

MainAxisCenterPoint: The center point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way.

SlaveAxisCenterPoint: The center point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way

MainAxisFinishPoint: The finish point of main-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way.

SlaveAxisFinishPoint: The finish point of slave-axis. This parameter is the relative offset to the current position. And the negative value indicates that the finish point is in reverse-way

wContiInterpMoveMode:

INTERP_CONTINUE_START: indicates the begin of continuous interpolation moving.

INTERP_NEXT_CONTINUOUS_MOTION: indicates the interpolation segment is one part of continuous interpolation moving, and the interrupt of motion checking in involved implicitly.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_CONFIG_IS_NEEDED: The continuous interpolation had not been configured. Please call i8094_conti_interp_begin() first.

ERROR_INVALID_CONTINUE_INTERPOLATION_MOTION: Neither INTERP_CONTINUE_START nor INTERP_NEXT_CONTINUOUS_MOTION is assigned to parameter **wContiInterpMoveMode**.

ERROR_INVALID_INTERPOLATION_ARC_DIRECTION: Neither
INTERP_ARC_DIRECTION_CLOCKWISE nor
INTERP_ARC_DIRECTION_COUNTER_CLOCKWISE is assigned to parameter
wArcDirection.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z,
ERROR_OCCURS_IN_AXIS_U, ERROR_OCCURS_IN_AXIS_XY,
ERROR_OCCURS_IN_AXIS_XZ, ERROR_OCCURS_IN_AXIS_YZ,
ERROR_OCCURS_IN_AXIS_XU, ERROR_OCCURS_IN_AXIS_YU,
ERROR_OCCURS_IN_AXIS_ZU:

Indicates that some error happens to AXIS_xxxx. Please call i8094_get_error_status()
for detailed information.

ERROR_CONTI_INTERP_INTERRUPTED: Indicates the continuous interpolation moving is
interrupted. This code is returned only when **wContiInterpMoveMode** is set as
INTERP_NEXT_CONTINUOUS_MOTION.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed. This code is
returned only when **wContiInterpMoveMode** is set as INTERP_CONTINUE_START.

ERROR_CONTI_INTERP_NEXT_NOT_READY: Indicates the internal Motion-Control ASIC is not
ready to set the next interpolation segment, please call i8094_conti_interp_next_ready()
first.

ERROR_CONTI_INTERP_ARC2_MOVE: Cannot start i8094_conti_arc2_move, please call
GetLastError() for further system information.

5.2.6 i8094_conti_interp_end

short i8094_conti_interp_end (BYTE bSlotNum)

Description:

This function completes the continuous-interpolation moving, and clears the related configurations kept in driver.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_INVALID_RANGE: The assigned value is invalid.

ERROR_RANGE_CHANGE: cannot change the settings of **Range** register, please call GetLastError() for further system information.

ERROR_CONTI_INTERP_CLEAR: Cannot clear continuous-interpolation settings, please call GetLastError() for further system information.

Other Motion Functions

This chapter introduces several helpful functions, including `i8094_stop_move()`, `i8094_drv_hold()` and `i8094_drv_start()`.

6.1 `i8094_stop_move`

short `i8094_stop_move`(BYTE `bSlotNum`, WORD `wAxis`, WORD `wStopMode`)

Description:

This function stops current motion with slowdown or stop-sudden mode. Please call `i8094_motion_done()` to make sure that specific axis stop before starting next motion.

Parameters:

`bSlotNum`: The specific slot number that i-8094 installed on.

`wAxis`: Can be one of `AXIS_X`, `AXIS_Y`, `AXIS_Z` or `AXIS_U`.

`wStopMode`: `STOP_SLOWDOWN` or `STOP_SUDDEN`.

Return Code:

`SUCCESS_NO_ERROR`: The function returns successfully.

`ERROR_INVALID_CARD_ID`: There is no active i-8094 module on the given slot, `bSlotNum`; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

`ERROR_MULTI_AXES_ASSIGNED`: Multiple axes are assigned to parameter ***wAxis***.

`ERROR_NO_VALID_AXIS_ASSIGNED`: No valid axis ID is assigned to parameter ***wAxis***.

`ERROR_INVALID_STOP_MODE`: Neither `STOP_SLOWDOWN` nor `STOP_SUDDEN` is assigned to parameter ***wStopMode***.

`ERROR_MOTION_STOP_SET`: Cannot stop current motion, please call `GetLastError()` for further system information.

6.2 i8094_drv_hold

short i8094_drv_hold(BYTE bSlotNum, WORD wAxes)

Description:

This function holds the motion-starting of the involved axes. And these involved axes will start moving simultaneously when i8094_drv_start() is called.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxes: Can be any combination of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Invalid axis-combination is assigned to parameter **wAxes**.

ERROR_HOLD_AXES_NOT_RELEASE: Indicates the some axes had been hold, please call i8094_drv_start() to release the hold-axes first.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_DRIVE_HOLD: Cannot hold the motion-starting, please call GetLastError() for further system information.

6.3 i8094_drv_start

short i8094_drv_start(BYTE bSlotNum, WORD wAxes)

Description:

This function starts multiple axes simultaneously that are held by i8094_drv_hold().

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxes: Can be any combination of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Invalid axis-combination is assigned to parameter **wAxes**.

ERROR_HOLD_AXES_NOT_MATCH: The axes that will to be started are not match to the axes that are held by i8094_drv_hold().

ERROR_DRIVE_START: Cannot start motion of held axes, please call GetLastError() for further system information.

Advanced Motion Configurations

This chapter introduces some advanced features, including variable-ring counter, manual-pulse-generator and the synchronous-action between axes.

The advanced features are special, and maybe not co-exist with normal operation. It's recommended to disable these functions when they are not needed.

7.1 i8094_set_vring

short i8094_set_vring(BYTE bSlotNum, WORD wAxis, WORD wVRINGEnable, DWORD dwRingValue)

Description:

This function enables and configures the variable-ring feature for both logic-command and encoder-position counters. After enabling variable-ring feature, these two counters will be reset to zero automatically.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wVRINGEnable: VARIABLE_RING_ENABLE_FEATURE or VARIABLE_RING_DISABLE_FEATURE.

dwRingValue: The total numbers that counter can count. ($2 < dwRingValue$).

For instance, assigning 10,000 to dwRingValue indicates the operation of ring-counter

will be: increasing in forward direction ... →9998→9999→0→1→...

decreasing in reserve direction ...→1→0→9999→9998→...

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, `bSlotNum`; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter ***wAxis***.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter ***wAxis***.

ERROR_INVALID_RING_COUNTER: Indicates the parameter ***dwRingValue*** is less than 2.

ERROR_INVALID_FILTER_ENABLE: Neither `VARIABLE_RING_ENABLE_FEATURE` nor `VARIABLE_RING_DISABLE_FEATURE` is assigned to parameter ***wVRINGEnable***.

ERROR_CONFLICT_WITH_SOFTLIMIT: Indicates that the AXIS-Internal Comparators are used for software-limit. Please disable software-limit feature with `i8094_set_softlimit()`.

ERROR_CONFLICT_WITH_SYNCH_ACTION: Indicates that the ASIC-Internal Comparators are used as the condition of Synchronous-Action. Please disable synchronous-condition with `i8094_set_synch()`.

ERROR_VRING_SET: Cannot enable/configure the variable-ring feature, please call `GetLastError()` for further system information.

7.2 i8094_set_mpg

short i8094_set_mpg(BYTE bSlotNum, WORD wAxis, WORD wEXPCConfig, DWORD dwFixedPulse, DWORD dwSpeed, DWORD dwMaxMPGFreq)

Description:

This function enables and configures the manual-pulse-generator feature. After enabling manual-pulse-generator feature, the constant-speed motion will be started when every pulse is sent from external manual-pulse-generator.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wEXPCConfig: EXP_AB_PHASE_MPG, EXP_CW_CCW_ACTIVE_LOW_MPG or EXP_DISABLE_FEATURE.

dwFixedPulse: Indicates the numbers of pulse will be output when each pulse is sent from manual-pulse-generator. For instance, assigning 5 to this parameter, 5 pulses will be output when each pulse is sent from external manual-pulse-generator.

dwSpeed: The constant-speed of output pulse.

dwMaxMPGFreq: The maximum frequency of the manual-pulse-generator. Please check the datasheet of manual-pulse-generator.

Notice: the following formula is needed to be satisfied:

$$\text{dwSpeed} \quad \text{dwMaxMPGFreq} \times \text{dwFixedPulse} \times 2.$$

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_MPG_EXP_CONFIG: Indicates the invalid MPG setting is assigned to parameter **wEXPCConfig**.

ERROR_INVALID_MPG_SPEED: The value assigned to parameter **dwSpeed** is out of range of Speed or is less than **2 x dwMaxMPGFreq x dwFixedPulse**.

ERROR_MPG_SET: Cannot enable/configure the manual-pulse-generator, please call GetLastError() for further system information.

7.3 i8094_set_int_factor

short i8094_set_int_factor(BYTE bSlotNum, WORD wAxis, WORD wIntFactor)

Description:

This function configures the motion-related interrupt-factors. Please call i8094_get_int_status() to get the relevant interrupt-status;

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wIntFactor: The interrupt factor can be the combination of following settings:

INT_FACTOR_DISABLE: disables all interrupt factors.

INT_FACTOR_PULSE: interrupt will be triggered when pulse is at its active level.

For instance, if the PULSE_LOGIC_ACTIVE_HIGH is configured in

i8094_set_pls_cfg(), the interrupt will raised at each raising-edge of output-pulse.

INT_FACTOR_EXCEED_CMP_NEGATIVE: interrupt will be triggered while the content of logic-command/encoder-position counter is larger than COMP- comparator.

INT_FACTOR_LESS_CMP_NEGATIVE: interrupt will be triggered while the content of logic-command/encoder-position counter is less than COMP- comparator.

INT_FACTOR_LESS_CMP_POSITIVE: interrupt will be triggered while the content of logic-command/encoder-position counter is less than COMP+ comparator.

INT_FACTOR_EXCEED_CMP_POSITIVE: interrupt will be triggered while the content of logic-command/encoder-position counter is larger than COMP+ comparator.

INT_FACTOR_END_CONST_SPEED_MOVE: interrupt will be triggered when the constant-speed moving is completed.

INT_FACTOR_START_CONST_SPEED_MOVE: interrupt will be triggered when the constant-speed moving is started.

INT_FACTOR_END_DRIVING: interrupt will be triggered when the motion is completed.

Notice:

If the INT_FACTOR_START_CONST_SPEED_MOVE is set, the interrupt will be triggered both at the end of Acceleration and Deceleration.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_INT_FACTOR: Indicates the invalid interrupt factor is assigned to parameter **wIntFactor**.

ERROR_INT_FACTOR_SET: Cannot enable/configure the specific interrupt factor, please call GetLastError() for further system information.

7.4 i8094_set_synch

short i8094_set_synch(BYTE bSlotNum, WORD wMainAxis, WORD wSyncEnable, WORD wSyncAxes, WORD wSyncCondition, WORD wSyncActionMainAxis, WORD wSyncActionOtherAxes, WORD wCmpSource, DWORD dwComparatorPositive, DWORD dwComparatorNegative)

Description:

This function enables and configures the synchronous condition/actions in main-axis and other axes that the synchronous action will be applied to.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wMainAxis: The main-axis of synchronous-action, this parameter can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_Y.

wSyncEnable: SYNC_ENABLE_FEATURE or SYNC_DISABLE_FEATURE.

wSyncAxes: The other involved axes of synchronous-action, they be any combination of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. However, this parameter cannot include **wMainAxis**.

wSyncCondition: The conditions of main-axis to start synchronous-actions, including
SYNC_CONDITION_EXCEED_CMP_POSITIVE: the value of counter COMP+.
SYNC_CONDITION_LESS_CMP_POSITIVE: the value of counter < COMP+.
SYNC_CONDITION_LESS_CMP_NEGATIVE: the value of counter < COMP-.
SYNC_CONDITION_EXCEED_CMP_NEGATIVE: the value of counter COMP-.
SYNC_CONDITION_START_DRIVING: moving is started.
SYNC_CONDITION_END_DRIVING: moving is completed or terminated.

wSyncActionMainAxis: When the synchronous-condition is satisfied, the synchronous action that can be applied to main-axis, including:

SYNC_ACTION_NONE: no synchronous action is applied to main-axis.

SYNC_ACTION_LOGIC_CMD_LATCH: stores the content of logic-command counter into **Buffer** Register.

SYNC_ACTION_ENCODER_POS_LATCH: stores the content of encoder-position counter into **Buffer** Register.

wSyncActionOtherAxes: When the synchronous-condition is satisfied, the synchronous action that can be applied to other axes, including:

SYNC_ACTION_NONE: no synchronous action is applied to other axes.

SYNC_ACTION_FIXED_FORWARD_DRIVE: starts the fixed-pulse moving in forward direction.

SYNC_ACTION_FIXED_REVERSE_DRIVE: starts the fixed-pulse moving in reverse direction.

SYNC_ACTION_CONTINUE_FORWARD_DRIVE: starts the velocity moving in forward direction.

SYNC_ACTION_CONTINUE_REVERSE_DRIVE: starts the velocity moving in reverse direction.

SYNC_ACTION_SLOWDOWN_STOP: stops the current motion with slowdown mode.

SYNC_ACTION_SUDDEN_STOP: stops the current motion immediately.

SYNC_ACTION_LOGIC_CMD_LATCH: stores the content of logic-command counter into **Buffer** Register.

SYNC_ACTION_ENCODER_POS_LATCH: stores the content of encoder-position counter into **Buffer** Register.

wCmpSource: CMP_SRC_LOGIC_COMMAND or CMP_SRC_ENCODER_POSITION

dwComparatorPositive: the value to be set into COMP+.

dwComparatorNegative: the value to be set into COMP-.

Notice: please refer to i8094_get_latch() to read the **Buffer** register.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wMainAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wMainAxis**.

ERROR_INVALID_SYNCHRONOUS_AXES: Indicates invalid axes are assigned to parameter **wSyncAxes**.

ERROR_INVALID_SYNCH_ENABLE: Neither SYNC_ENABLE_FEATURE nor SYNC_DISABLE_FEATURE is assigned to parameter **wSyncEnable**.

ERROR_INVALID_SYNCH_CONDITION: Indicates no valid synchronous-condition is assigned to parameter **wSyncCondition**.

ERROR_INVALID_SYNCH_ACTION: Indicates invalid synchronous-action is assigned to parameter **wSyncActionMainAxis** or **wSyncActionOtherAxes**.

ERROR_INVALID_COMPARE_SOURCE: Neither CMP_SRC_LOGIC_COMMAND nor CMP_SRC_ENCODER_POSITION is assigned to parameter **wCmpSource**.

ERROR_CONFLICT_WITH_SOFTLIMIT: Indicates that the AXIS-Internal Comparators are used for software-limit. Please disable software-limit feature with i8094_set_softlimit().

ERROR_CONFLICT_WITH_VRING: Indicates that the ASIC-Internal Comparators are used for Variable-Ring counter. Please disable Variable-Ring counter with i8094_set_vring().

ERROR_SYNCH_SET: Cannot enable/configure the synchronous condition & actions, please call
GetLastError() for further system information.

7.5 i8094_synch_t_move_cfg

short i8094_synch_t_move_cfg(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAcceleration, DWORD dwDeceleration, long FixedPulse)

Description:

This function configures the necessary parameters of trapezoidal-profile moving. This function is helpful when the synchronous-action is set as SYNC_ACTION_XXXX_XXXXXXXX_DRIVE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: This axis should be one axis of the parameter **wSyncAxes** that is assigned to i8094_set_synch().

dwStartSpeed: The Start-Speed in trapezoidal-profile moving.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving.

dwAcceleration: The Acceleration in trapezoidal-profile moving.

dwDeceleration: The Deceleration in trapezoidal-profile moving.

FixedPulse: The total numbers of output pulse. This parameter is a signed 32-bits variable, the negative value indicates motion in reverse-direction

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_ACCELERATION: The value assigned to parameter **dwAcceleration** is out of range of Acceleration. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_INVALID_DECELERATION: The value assigned to parameter ***dwDeceleration*** is out of range of Deceleration. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

Notice: In the case, ***dwAcceleration*** > ***dwDeceleration*** , the following formula should be satisfied, too.

$$\mathbf{dwDeceleration} > (\mathbf{dwAcceleration} \times \mathbf{dwDriveSpeed}) / 4,000,000.$$

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:

Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_T_MOVE_START: Cannot configure the parameters of trapezoidal moving, please call `GetLastError()` for further system information.

7.6 i8094_synch_s_move_cfg

short i8094_synch_s_move_cfg(BYTE bSlotNum, WORD wAxis, DWORD dwStartSpeed, DWORD dwDriveSpeed, DWORD dwAccelerationRate, DWORD dwDecelerationRate, long FixedPulse)

Description:

This function configures the necessary parameters of S-curve moving. This function is helpful when the synchronous-action is set as SYNC_ACTION_FIXED_XXXXXXXX_DRIVE.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: This axis should be one axis of the parameter **wSyncAxes** that is assigned to `i8094_set_synch()`.

dwStartSpeed: The Start-Speed in S-curve moving.

dwDriveSpeed: The Drive-Speed in S-curve moving.

dwAccelerationRate: The Acceleration-Increasing-Rate in S-curve moving. The Acceleration will be assigned to maximum value automatically.

dwDecelerationRate: The Deceleration-Increasing-Rate in S-curve moving. The Deceleration will be assigned to maximum value automatically.

FixedPulse: The total numbers of output pulse. This parameter is a signed 32-bits variable, the negative value indicates motion in reverse-direction

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_START_SPEED_EXCEED_DRIVING_SPEED: The **dwStartSpeed** is larger than or equal to **dwDriveSpeed**.

ERROR_INVALID_START_SPEED: The value assigned to parameter **dwStartSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_JERK: The value assigned to parameter **dwAccelerationRate** is out of range of Acceleration Increasing Rate. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_INVALID_DECELERATION_RATE: The value assigned to parameter ***dwDecelerationRate*** is out of range of Deceleration Increasing Rate. Please refer to `i8094_set_range()` and `i8094_get_range_settings()`.

ERROR_OCCURS_IN_AXIS_X, ERROR_OCCURS_IN_AXIS_Y, ERROR_OCCURS_IN_AXIS_Z
ERROR_OCCURS_IN_AXIS_U:

Indicates that some error happens to AXIS_X, AXIS_Y, AXIS_Z or AXIS_U. Please call `i8094_get_error_status()` for detailed information.

ERROR_MOTION_NOT_COMPLETE: Indicates the previous motion is not completed.

ERROR_S_MOVE_START: Cannot configure the parameters of S-curve moving, please call `GetLastError()` for further system information.

Miscellaneous Functions

This chapter introduces some functions that are difficult to be cataloged, including setting the logic-command counter and encoder-position counter, triangle prevention of trapezoidal-profile fixed-pulse driving, changing driving-speed while trapezoidal-profile moving and updating the total numbers of output pulse.

8.1 i8094_t_change_v

short i8094_t_change_v(BYTE bSlotNum, WORD wAxis, DWORD dwDriveSpeed)

Description:

This function changes the Drive-Speed during trapezoidal-profile moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwDriveSpeed: The Drive-Speed in trapezoidal-profile moving.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_DRIVING_SPEED: The value assigned to parameter **dwDriveSpeed** is out of range of Speed. Please refer to i8094_set_range() and i8094_get_range_settings().

ERROR_SPEED_CHANGE_FAIL_IN_ACC_DEC: Indicates the Drive-Speed cannot be changed during Acceleration/Deceleration.

ERROR_INVALID_OPERATION_IN_S_CURVE: Indicates the Drive-Speed cannot be applied to S-curve moving.

ERROR_NOT_CONSTANT_SPEED_IN_T_MOVE: Indicates the Drive-Speed cannot be changed in non-constant speed area of trapezoidal-profile moving.

ERROR_T_DRIVING_SPEED_CHANGE: Cannot change the Drive-Speed, please call GetLastError() for further system information.

8.2 i8094_t_set_avtri

short i8094_t_set_avtri(BYTE bSlotNum, WORD wAxis, WORD wAvTriCfg)

Description:

This function enables the triangle prevention of fixed-pulse, trapezoidal-profile moving. After enabling this feature, the Motion-Control ASIC will determine the deceleration-point by the following formula:

Numbers of output pulse $2 \times (\text{pulse number at Acceleration} + \text{pulse number at Deceleration})$.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

wAvTriCfg: AVOID_TRIANGLE_ENABLE_FEATURE or AVOID_TRIANGLE_DISABLE_FEATURE.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_INVALID_AVOID_TRIANGLE_CONFIG: Neither AVOID_TRIANGLE_ENABLE_FEATURE nor AVOID_TRIANGLE_DISABLE_FEATURE is assigned to parameter **wAvTriCfg**.

ERROR_T_AVOID_TRIANGLE_SET: Cannot set the avoid-triangle feature, please call GetLastError() for further system information.

8.3 i8094_change_p

short i8094_change_p(BYTE bSlotNum, WORD wAxis, DWORD dwP)

Description:

This function changes the total numbers of output pulse during moving.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

dwP: The total numbers of output pulse.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_CONFLICT_WITH_INTERPOLATION_MOVE: Indicates the finish-point of interpolation moving cannot be changed dynamically.

ERROR_OUTPUT_PULSE_CHANGE: Cannot change total number of output pulse, please call GetLastError() for further system information.

8.4 i8094_set_cmdcounter

short i8094_set_cmdcounter(BYTE bSlotNum, WORD wAxis, long lData)

Description:

This function set the logic-command counter.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

lData: The value to be set to logic-command counter.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_CMD_COUNTER_SET: Cannot set the logic-command counter, please call GetLastError() for further system information.

8.5 i8094_set_enccounter

short i8094_set_enccounter(BYTE bSlotNum, WORD wAxis, DWORD IData)

Description:

This function set the encoder-counter.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

IData: The value to be set to encoder-position counter.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_POS_COUNTER_SET: Cannot set the encoder-position counter, please call GetLastError() for further system information.

Status

This chapter introduces functions to get the status of i-8094 module, including `i8094_motion_done()`, `i8094_get_cmdcounter()`, `i8094_get_position()`, `i8094_get_speed()`, `i8094_get_acc()`, `i8094_get_latch()`, `i8094_get_mdi_status()`, `i8094_get_in3()`, `i8094_get_int_status()` and `i8094_get_error_status()`.

9.1 i8094_motion_done

short `i8094_motion_done`(BYTE `bSlotNum`, WORD `wAxis`, BYTE* `pDone`, WORD* `pStopStatus`)

Description:

This function checks the completion of motion and reports the cause of motion-completion.

Parameters:

`bSlotNum`: The specific slot number that i-8094 installed on.

`wAxis`: can be one of `AXIS_X`, `AXIS_Y`, `AXIS_Z` or `AXIS_U`.

`pDone`: The pointer to the memory that stores the motion-status. The motion-status will be

`MOTION_DONE`: the specific axis is stop.

`MOTION_NOT_DONE`: the specific axis is driving.

`pStopStatus`: The pointer to the memory that stores the cause of motion-completion, including

`DRIVE_FINISH_WITH_SW_LIMIT_POSITIVE`: reaches software limit in forward direction and stops

`DRIVE_FINISH_WITH_SW_LIMIT_NEGATIVE`: reaches software limit in reverse direction and stops

`DRIVE_FINISH_WITH_STOP_COMMAND`: the stop command is executed.

`DRIVE_FINISH_OUTPUT_FIXED_PULSE`: completion of fixed-pulse moving.

`DRIVE_FINISH_WITH_AUTO_HOME`: completion of automatic-home-search.

`DRIVE_FINISH_WITH_LIMIT_POSITIVE`: reaches hardware limit in forward direction and stops

DRIVE_FINISH_WITH_LIMIT_NEGATIVE: reaches hardware limit in reverse direction and stops

DRIVE_FINISH_WITH_ALARM: the ALARM feature is enabled and is active to stop driving.

DRIVE_FINISH_WITH_EMG: the driving is stopped when EMG is active.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_MOTION_DONE_GET: Cannot get motion status, please call GetLastError() for further system information.

9.2 i8094_get_cmdcounter

short i8094_get_cmdcounter(BYTE bSlotNum, WORD wAxis, long* pData)

Description:

This function gets the content of logic-command counter.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pData: The pointer to the memory that stores logic-command counter.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_CMD_COUNTER_GET: Cannot get the logic-command counter, please call GetLastError() for further system information.

9.3 i8094_get_enccounter

short i8094_get_enccounter(BYTE bSlotNum, WORD wAxis, long* pData)

Description:

This function gets the content of encoder-counter.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pData: The pointer to the memory that stores encoder-position counter.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_POS_COUNTER_GET: Cannot get the encoder-position counter, please call GetLastError() for further system information.

9.4 i8094_get_speed

short i8094_get_speed(BYTE bSlotNum, WORD wAxis, DWORD* pSpeed)

Description:

This function gets the speed of current motion.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pSpeed: The pointer to the memory that stores speed of current motion.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_SPEED_GET: Cannot get the current speed, please call GetLastError() for further system information.

9.5 i8094_get_acc

short i8094_get_acc(BYTE bSlotNum, WORD wAxis, DWORD* pAcc)

Description:

This function gets the acceleration of current motion.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pAcc: The pointer to the memory that stores acceleration of current motion.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_ACCELERATION_GET: cannot get the current acceleration, please call GetLastError() for further system information.

9.6 i8094_get_latch

short i8094_get_latch(BYTE bSlotNum, WORD wAxis, long* pLatchData)

Description:

This function gets the content of **Buffer** register.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pLatchData: The pointer to the memory that stores data latched in **Buffer** register. Please refer to i8094_set_synch() for to latched data into **Buffer** register.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_LATCH_GET: Cannot get the latched data, please call GetLastError() for further system information.

9.7 i8094_get_mdi_status

short i8094_get_mdi_status(BYTE bSlotNum, WORD wAxis, WORD* pDIStatus)

Description:

This function checks the status of motion-related digital inputs.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pDIStatus: The pointer to the memory that stores the motion-related digital inputs. The value stored in this parameter may be the combination of following status:

DI_STATUS_ACTIVE_DRIVING: indicates the specific axis is driving.

DI_STATUS_ACTIVE_LMTP: the hardware limit in forward direction is active.

DI_STATUS_ACTIVE_LMTM: the hardware limit in reverse direction is active.

DI_STATUS_ACTIVE_EMG: the EMG signal is active.

DI_STATUS_ACTIVE_ALARM: the ALARM signal is enabled and active.

DI_STATUS_ACTIVE_HOME: the Home (ORG) signal is active.

DI_STATUS_ACTIVE_NEARHOME: the Near-Home (NORG) signal is active.

DI_STATUS_ACTIVE_INP: the INP signal is enabled and active.

DI_STATUS_ACTIVE_INDEX: The Z-Phase/INDEX signal is active.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_DI_STATUS_GET Cannot get motion-related digital inputs, please call GetLastError() for further system information.

9.8 i8094_get_in3

short i8094_get_in3(BYTE bSlotNum, WORD wAxis, BYTE* pIN3Status)

Description:

This function gets the status of digital input **IN3**.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pIN3Status: The pointer to the memory that stores the input of IN3. The value stored in this parameter will be 0x01 or 0x00.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_IN3_GET: Cannot get the digital input **IN3**, please call GetLastError() for further system information.

9.9 i8094_get_int_status

short i8094_get_int_status(BYTE bSlotNum, WORD wAxis, WORD* plntStatus)

Description:

This function gets the status of interrupt factors.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

plntStatus: The pointer to the memory that stores the status of interrupt factors, including

INT_STATUS_EXCEED_CMP_NEGATIVE,
INT_STATUS_LESS_CMP_NEGATIVE,
INT_STATUS_LESS_CMP_POSITIVE,
INT_STATUS_EXCEED_CMP_POSITIVE,
INT_STATUS_END_CONST_SPEED_MOVE,
INT_STATUS_START_CONST_SPEED_MOVE,
INT_STATUS_END_DRIVING

Please refer to i8094_set_int_factor() for the setting of relative interrupt factors.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_INT_STATUS_GET: Cannot get the status of interrupt, please call GetLastError() for further system information.

9.10 i8094_get_error_status

short i8094_get_error_status(BYTE bSlotNum, WORD wAxis, WORD* pErrorStatus)

Description:

This function gets the error-status of specific axis.

Parameters:

bSlotNum: The specific slot number that i-8094 installed on.

wAxis: Can be one of AXIS_X, AXIS_Y, AXIS_Z or AXIS_U.

pErrorStatus: The pointer to the memory that stores the error status, including

DRIVE_ERROR_STATUS_SLMTP: error caused by software limit in forward direction.

DRIVE_ERROR_STATUS_SLMTM: error cause by software limit in reverse direction.

DRIVE_ERROR_STATUS_LMTP: error caused by hardware limit in forward direction.

DRIVE_ERROR_STATUS_LMTM: error caused by hardware limit in reverse direction.

DRIVE_ERROR_STATUS_ALARM: error caused by ALARM signal.

DRIVE_ERROR_STATUS_EMG: error caused by EMG signal.

DRIVE_ERROR_STATUS_HOME: error caused by execution of automatic-home-search.

The Z-Phase/INDEX is already active at the start of Automatic-Home-Search Step-3.

Please refer to i8094_set_home_cfg() for detailed information.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_MULTI_AXES_ASSIGNED: Multiple axes are assigned to parameter **wAxis**.

ERROR_NO_VALID_AXIS_ASSIGNED: No valid axis ID is assigned to parameter **wAxis**.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_ERROR_STATUS_GET: Cannot get the error status, please call GetLastError() for further system information.

FRnet I/O extension

The I-8094F equips the FRnet ASIC to connect the remote FRnet I/O extension. The FRnet ASIC provides the real-time status-updating of its remote I/O modules. This chapter introduces the FRnet functions, including `i8094_get_FRnet_DI()` and `i8094_set_FRnet_DO()`.

10.1 i8094_get_FRnet_DI

```
short i8094_get_FRnet_DI(BYTE bSlotNum, WORD wSA, WORD *pStatus, WORD
wEnableDirectAccess = FRNET_ENABLE_DIRECT_ACCESS)
```

Description:

This function get the digital-inputs of *FRnet* DI module.

Parameters:

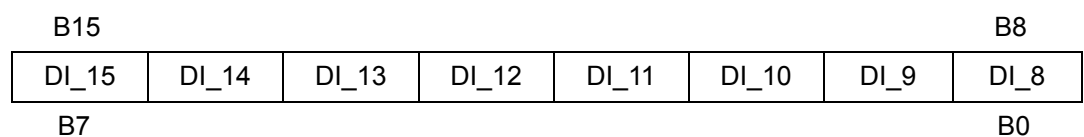
`bSlotNum`: The specific slot number that i-8094F installed on.

`wSA`: The Group-Address of *FRnet* DI module. One of following Group-Address can be assigned to

this parameter:

FRNET_SA8,
FRNET_SA9,
FRNET_SA10,
FRNET_SA11,
FRNET_SA12,
FRNET_SA13,
FRNET_SA14,
FRNET_SA15.

`pStatus`: The pointer to the WORD that indicates each digital-input of *FRnet* DI module.



DI_7	DI_6	DI_5	DI_4	DI_3	DI_2	DI_1	DI_0
------	------	------	------	------	------	------	------

wEnableDirectAccess: Now only FRNET_ENABLE_DIRECT_ACCESS is valid.

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_INVALID_FRNET_ACCESS_MODE: Not FRNET_ENABLE_DIRECT_ACCESS is assigned to parameter **wEnableDirectAccess**.

ERROR_INVALID_FRNET_SA_GROUP_ADDRESS: Indicates the invalid Group-Address of *FRnet* DI module is assigned to parameter **wSA**.

ERROR_UNSUPPORTED_FUNCTION : Indicate this function does not support i-8094 module.

ERROR_ACCESS_VIOLATION_DATA_COPY: Some system exception occurs while copying memory, please check the pointer-type parameter you assign to this function.

ERROR_FRNET_INPUT: Cannot get the digital-inputs of *FRnet* DI module, please call GetLastError() for further system information.

10.2 i8094_set_FRnet_DO

short i8094_set_FRnet_DO(BYTE bSlotNum, WORD wRA, WORD wDOData)

Description:

This function set the digital-outputs of *FRnet* DO module.

Parameters:

bSlotNum: The specific slot number that i-8094F installed on.

wRA: The Group-Address of *FRnet* DO module. One of following Group-Address can be assigned to

this parameter:

FRNET_RA0,

FRNET_RA1,

FRNET_RA2,

FRNET_RA3,

FRNET_RA7,

FRNET_RA5,

FRNET_RA6,

FRNET_RA7.

wDOData: The 16-bits data to be set to *FRnet* DO module.

B15						B8	
DO_15	DO_14	DO_13	DO_12	DO_11	DO_10	DO_9	DO_8
B7						B0	
DO_7	DO_6	DO_5	DO_4	DO_3	DO_2	DO_1	DO_0

Return Code:

SUCCESS_NO_ERROR: The function returns successfully.

ERROR_INVALID_CARD_ID: There is no active i-8094 module on the given slot, bSlotNum; or the given slot-number is invalid (for instance, slot-number is assigned to 254).

ERROR_INVALID_FRNET_RA_GROUP_ADDRESS: Indicates the invalid Group-Address of *FRnet* DO module is assigned to parameter **wRA**.

ERROR_UNSUPPORTED_FUNCTION : Indicate this function does not support i-8094 module.

ERROR_FRNET_OUTPUT: Cannot set the digital-outputs of *FRnet* DO module, please call GetLastError() for further system information.

Error Code

The Error Codes are divided into three parts: System Error, Parameter Error and Runtime Error.

SUCCESS_NO_ERROR	0
------------------	---

System Error:

ERROR_ROUTINE_FAIL_BASE	-100
ERROR_GET_MODULE_ID	-101
ERROR_DEVICE_OPEN	-102
ERROR_DEVICE_CLOSE	-103
ERROR_MODULE_RESET	-104
ERROR_RANGE_CHANGE	-105
ERROR_PULSE_MODE_SET	-106
ERROR_ENCODER_MODE_SET	-107
ERROR_LIMIT_SENSOR_SET	-108
ERROR_INP_SIGNAL_SET	-109
ERROR_ALARM_SIGNAL_SET	-110
ERROR_SERVO_ON_SET	-111
ERROR_IN3_SET	-112
ERROR_IN3_GET	-113
ERROR_FILTER_SET	-114
ERROR_SW_LIMIT_SET	-115
ERROR_HOME_CFG_SET	-116
ERROR_HOME_LIMIT_SET	-117
ERROR_START_HOME	-118
ERROR_DI_STATUS_GET	-119
ERROR_ERROR_STATUS_GET	-120
ERROR_CMD_COUNTER_SET	-121
ERROR_CMD_COUNTER_GET	-122
ERROR_POS_COUNTER_SET	-123

ERROR_POS_COUNTER_GET	-124
ERROR_MOTION_DONE_GET	-125
ERROR_SPEED_GET	-126
ERROR_ACCELERATION_GET	-127
ERROR_LATCH_GET	-128
ERROR_MOTION_STOP_SET	-129
ERROR_MOTION_STOP_ALL_SET	-130
ERROR_DRIVE_START	-131
ERROR_DRIVE_HOLD	-132
ERROR_VRING_SET	-133
ERROR_MPG_SET	-134
ERROR_CMPTRIG_SET	-135
ERROR_SYNCH_SET	-136
ERROR_INT_FACTOR_SET	-137
ERROR_INT_STATUS_GET	-138
ERROR_CONTI_MOVE_START	-139
ERROR_CONST_MOVE_START	-140
ERROR_T_MOVE_START	-141
ERROR_S_MOVE_START	-142
ERROR_T_LINE2_START	-143
ERROR_T_LINE3_START	-144
ERROR_S_LINE2_START	-145
ERROR_S_LINE3_START	-146
ERROR_T_ARC2_START	-147
ERROR_CONTI_INTERP_SET	-148
ERROR_CONTI_INTERP_CLEAR	-149
ERROR_CONTI_INTERP_NEXT_READY	-150
ERROR_CONTI_INTERP_LINE2_MOVE	-151
ERROR_CONTI_INTERP_LINE3_MOVE	-152
ERROR_CONTI_INTERP_ARC2_MOVE	-153
ERROR_T_DRIVING_SPEED_CHANGE	-154
ERROR_T_AVOID_TRIANGLE_SET	-155
ERROR_OUTPUT_PULSE_CHANGE	-156
ERROR_OUT1_GET	-157
ERROR_FRNET_DI_MODULE_GET	-158
ERROR_FRNET_FREQUENCY_SET	-159
ERROR_FRNET_INPUT	-160
ERROR_FRNET_OUTPUT	-161

ERROR_FRNET_RESET -162

Parameter Error:

ERROR_INVALID_PARAMETER_BASE -200
ERROR_INVALID_CARD_ID -201
ERROR_INVALID_SCANNED_INDEX -202
ERROR_MODULE_ID_DUPLICATED -203
ERROR_INVALID_RANGE -204
ERROR_INVALID_PULSE_MODE -205
ERROR_INVALID_PULSE_LEVEL -206
ERROR_INVALID_PULSE_DIRECTION -207
ERROR_INVALID_ENCODER_MODE -208
ERROR_INVALID_LIMIT_LOGIC -209
ERROR_INVALID_STOP_MODE -210
ERROR_INVALID_INP_ENABLE -211
ERROR_INVALID_INP_LOGIC_LEVEL -212
ERROR_INVALID_ALARM_ENABLE -213
ERROR_INVALID_ALARM_LOGIC_LEVEL -214
ERROR_INVALID_SERVO_SETTING -215
ERROR_INVALID_IN3_ENABLE -216
ERROR_INVALID_IN3_LOGIC_LEVEL -217
ERROR_INVALID_FILTER_ENABLE -218
ERROR_INVALID_FILTER_CONFIGURATION -219
ERROR_INVALID_FILTER_DELAY_TIME -220
ERROR_INVALID_SOFTWARE_LIMIT_ENABLE -221
ERROR_INVALID_SOFTWARE_LIMIT_COMPARATOR_SOURCE -222
ERROR_INVALID_MOVE_DIRECTION -223
ERROR_INVALID_HOME_LOGIC_LEVEL -224
ERROR_INVALID_NEAR_HOME_LOGIC_LEVEL -225
ERROR_INVALID_INDEX_LOGIC_LEVEL -226
ERROR_INVALID_AUTO_HOME_STEP -227
ERROR_INVALID_BLOCK_OPEARTION_MODE -228
ERROR_INVALID_AVOID_TRIANGLE_CONFIG -229
ERROR_INVALID_MPG_EXP_CONFIG -230
ERROR_INVALID_NHOME_SEARCH_SPEED -231
ERROR_INVALID_HOME_SEARCH_SPEED -232
ERROR_INVALID_ACCELERATION -233
ERROR_INVALID_DECELERATION -234

ERROR_INVALID_JERK	-235
ERROR_INVALID_DECELERATION_RATE	-236
ERROR_INVALID_RING_COUNTER	-237
ERROR_INVALID_RING_ENABLE	-238
ERROR_INVALID_AXIS	-239
ERROR_INVALID_CONST_PITCH	-240
ERROR_INVALID_OFFSET_BUFFER	-241
ERROR_INVALID_OFFSET_LEN	-242
ERROR_INVALID_OFFSET_DATA	-243
ERROR_INVALID_START_SPEED	-244
ERROR_INVALID_DRIVING_SPEED	-245
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ERROR_START_SPEED_EXCEED_DRIVING_SPEED	-247
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