

Multi-Axis Controller

KOSMOS series
Model: ARIES/LYNX



User's Manual

Read this manual before using this product.
Keep in a convenient place for future reference.

**ARIES/LYNX**

Introduction

In this document, information and operation method for the multi-axis controller "ARIES" and "LYNX" are explained.

Please read and understand this document thoroughly to utilize the functions of "ARIES" and "LYNX" in the best condition.

In addition, keep this document in a convenience place for future reference.

Symbols Identifications

In this document, noted items that should be followed to prevent danger to people and damage to the device are divided as shown next.



Prohibited

This symbol indicates prohibited items. Do not conduct actions specified under this symbol.



Warning (Caution)

This symbol indicates items that require warning (caution). If operation is conducted ignoring noted contents, it may cause injury or physical damage.



Note/Remarks

This symbol indicates items to provide further understanding or useful information.

Safety Precautions

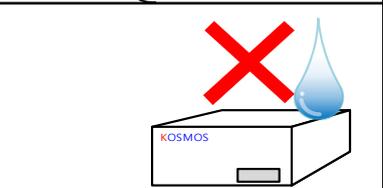
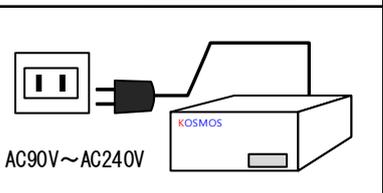
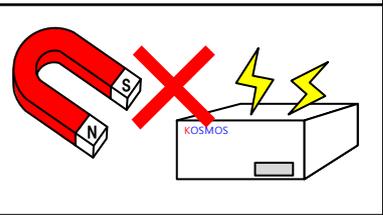
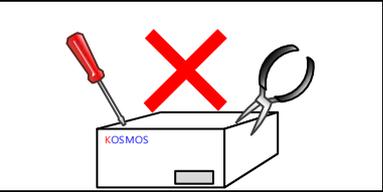
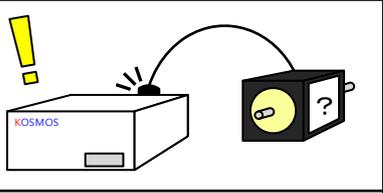
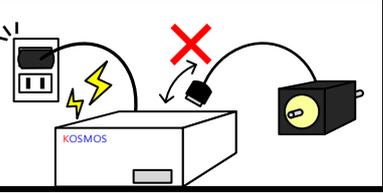
| | | |
|---|---|---|
|  |  | <p>Do not apply severe shock to the product and avoid using in a place with vibration.</p> |
|  |  | <p>Liquid or chemical splashes on this device are dangerous and cause failures. Never use this device in the place above phenomena may occur.</p> |
|  |  | <p>Use 90-240V AC (50/60Hz) as a power supply. *Confirm ratings of the power cable. *Always ground FG (frame ground).</p> |
|  |  | <p>This product is precision electronic equipment. Because malfunction may occur near large motors, high voltage electric devices or device that generates strong magnetism, do not use this product under these environment.</p> |
|  |  | <p>Do not disassemble or modify the product.</p> |
|  |  | <p>Pay close attention when connecting the motor driven stage or a motor other than those specified by our company.</p> |
|  |  | <p>When the controller's power supply is turned ON, do not pull out or insert cables.</p> |

Table of Contents

| | | | |
|--|-----------|--|-----------|
| Introduction | 1 | | |
| Symbols Identifications | 1 | | |
| Safety Precautions | 2 | | |
| Table of Contents | 3 | | |
| 1. Product Summary | 5 | 3. Functions | 17 |
| 1-1. About this Product | 5 | 3-1. Speed Setting | 17 |
| 1-1-1. Features of this Product | 5 | 3-1-1. Speed Table | 17 |
| 1-1-2. Product Configuration Example | 6 | 3-1-2. Speed Change in Remote Control... | 17 |
| 1-2. List of Functions | 7 | 3-1-3. Speed Setting Regulations | 18 |
| 1-3. Attachments and Options | 8 | 3-2. Acceleration Pattern | 19 |
| 1-3-1. Attachments | 8 | 3-3. Backlash Correction | 20 |
| 1-3-2. Optional Products (required) | 9 | 3-3-1. Setting Steps | 20 |
| 1-3-3. Optional products (convenient tools) | 10 | 3-3-2. Details of Correction Method | 21 |
| 2. Installation and Preparation | 11 | 3-4. Trigger Specification | 22 |
| 2-1. Proceeding with Installation and Preparation | 11 | 3-4-1. Trigger Signal Output Method | 22 |
| 2-2-1. Part Names | 12 | 3-4-2. Trigger Signal Setting Procedures ... | 22 |
| 2-2-1. Part Names of ARIES | 12 | 3-4-3. Explanation of Trigger Function | 23 |
| 2-2-2. Part Names of LYNX | 13 | 3-5. Emergency Stop Function | 26 |
| 2-3. Connection method | 14 | 3-6. Stepping Motor Excitation and Servo ON/OFF Specification | 27 |
| 2-4. Rotary Switch for Communication Setting | 15 | 3-7. Soft Limit Setting | 27 |
| 2-5. Device No. Setting Switch | 16 | 3-8. Encoder Correction | 28 |
| | | 3-8-1. Encoder Correction | 28 |
| | | 3-8-2. Encoder Feedback Setting | 29 |
| | | 3-9. Origin Return Method | 30 |
| | | 3-10. ARIES Touch Panel "PYXIS" | 40 |
| | | 3-10-1. Connection and Operation | 40 |
| | | 3-10-2. "Main" Screen Details | 41 |
| | | 3-10-3. "ABS" Screen Details | 42 |
| | | 3-10-4. "REL" Screen Details | 42 |
| | | 3-10-5. "SYS" Screen Details | 43 |
| | | 3-10-6. "PYXIS" Display Error List | 45 |
| | | 3-11. General I/O | 46 |

| | | | |
|---|------------|---|------------|
| 4. Remote Control | 47 | 6. Maintenance and Service | 132 |
| 4-1. Proceeding with Installation and Preparation | 47 | 6-1. Troubleshooting | 132 |
| 4-1-1. Transmitting/Receiving | 47 | 6-2. Maintenance | 134 |
| 4-1-2. Remote Control Procedures | 48 | 6-3. Warranty and Service | 134 |
| 4-1-3. Command Format | 48 | 6-4. Contact | 134 |
| 4-1-4. Response | 49 | | |
| 4-1-5. Characters to Use | 50 | Ex Revision History | 135 |
| 4-2. Ethernet (TCP/IP) Communication ... | 51 | | |
| 4-2-1. Flow from Ethernet (TCP/IP) Related Parameter Setting to Connection ... | 52 | | |
| 4-2-2. Cautions when Multiple Clients are Connected | 55 | | |
| 4-2-3. Other Cautions | 55 | | |
| 4-3. Command List | 56 | | |
| 4-4. Command Details | 58 | | |
| 4-5. Error Code | 110 | | |
| 4-5-1. Error Code and Warning Code List | 111 | | |
| 4-6. System Settings | 113 | | |
| 4-6-1. System Setting List | 113 | | |
| 4-6-2. System Setting Details | 115 | | |
| 5. Specification | 122 | | |
| 5-1. Specification | 122 | | |
| 5-2. Connector | 123 | | |
| 5-2-1. Motor Connecting Connector | 123 | | |
| 5-2-2. Encoder Connector | 124 | | |
| 5-2-3. I/O Connector | 125 | | |
| 5-2-4. Emergency Stop Signal Input Connector | 126 | | |
| 5-2-5. Trigger Signal Output Connector | 126 | | |
| 5-2-6. RS-232C Connector | 127 | | |
| 5-3. Input/Output Signal Circuit Diagram | 128 | | |
| 5-4. Appearance Dimensions | 129 | | |

1. Product Summary

1-1. About this Product

1-1-1. Features of this Product

Thank you for purchasing our multi-axis controller "ARIES" and "LYNX".

Adopting Motionnet®, "ARIES" and "LYNX" are controllers that enable comprehensive system configuration through unified management of multi-axis control.

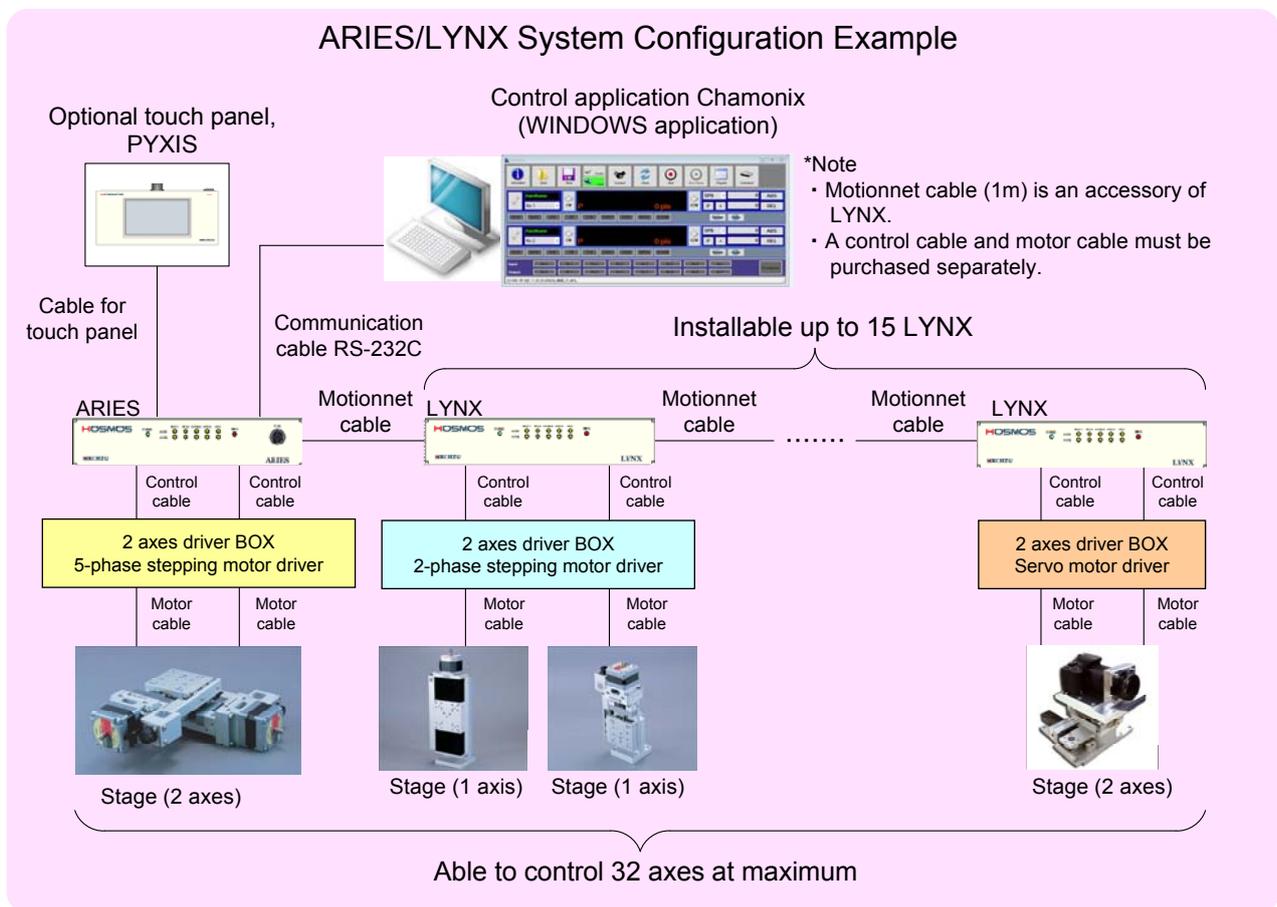
By installing more LYNX (slave controller) for ARIES (master controller), 32 axes can be controlled at maximum.

While keeping the functions of SC series as feedback control and trigger function, new functions as servo control, general I/O and soft limit are added.

- Completely supports our company's motor drive precision stage <MontBlanc Series>.
- In addition to 5-phase micro step motor drive, a connection is possible for 2-phase motor driver of pulse train control or servo driver connection.
- Supports rectangular drive, trapezoid drive, S shape drive, asymmetric trapezoid drive and asymmetric S shape drive.
- Origin return method can be selected from 15 kinds (+ORG OFFSET).
- Remote control by Ethernet(TCP/IP) communication is possible.
- Remote control by RS-232C communication is possible.
- Control is possible with "PYXIS" (option), a touch panel for "ARIES".
- Control is possible through application for stage drive, "Chamonix" that comes with this product.
Please download from our company's HP.

<http://www.kohzu.co.jp/>

1-1-2. Product Configuration Example

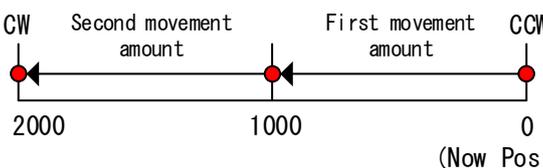
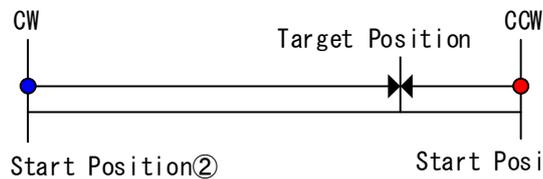
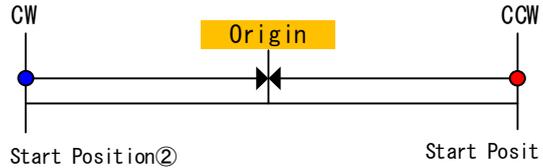


■ Outside of product range

This product does not offer the following functions.

- Automatic operation is not possible with only ARIES and LYNX.
 - *For automatic operation, connect a computer with ARIES and conduct with remote control.
 - *It is possible to operate with Touch Panel PYXIS (sold separately). (Excluding some functions).
- Not compatible with some remote controls (sequencer connection, etc.) besides RS-232C and Ethernet (TCP/IP) communication.

1-2. List of Functions

| | |
|---|---|
| <p>Relative Position Movement (4 axes simultaneous start is possible)</p> | <p>Moves toward the designated direction from the present position by a set value.</p>  <p>The diagram shows a horizontal axis with a red dot at 0 labeled 'CCW' and another red dot at 2000 labeled 'CW'. A third red dot is at 1000, labeled '(Now Position)'. A double-headed arrow between 1000 and 2000 is labeled 'Second movement amount'. A double-headed arrow between 1000 and 0 is labeled 'First movement amount'.</p> <p>Example : Move to CW angle(1000 pulse)at two times.</p> |
| <p>Absolute Position Drive (4 axes simultaneous start is possible)</p> | <p>Moves to the designated target position.</p>  <p>The diagram shows a horizontal axis with a blue dot at 'Start Position②' on the left and a red dot at 'Start Position①' on the right. A double-headed arrow between them is labeled 'Target Position'. 'CW' is labeled above the left end and 'CCW' above the right end.</p> <p>Example : Start position① or start position② move to target position.</p> |
| <p>Origin Return Movement</p> | <p>Performs origin return with the specified origin return method.</p>  <p>The diagram shows a horizontal axis with a blue dot at 'Start Position②' on the left and a red dot at 'Start Position①' on the right. A double-headed arrow between them points to a yellow box labeled 'Origin'. 'CW' is labeled above the left end and 'CCW' above the right end.</p> <p>Example : Start position① or ② move return Origin position.</p> |

1-3. Attachments and Options

1-3-1. Attachments

The following items come as accessories for the products.

Make sure to check that all items are included.

Immediately contact your retainer or our sales department if there are missing or damaged parts.

① **Power cable (3P)**

A power cable (3P) for AC100V comes as standard.

In addition, a 3P->2P conversion plug comes as an option.

*A power cable for AC200V must be prepared by customer or contact our sales department.



② **Motionnet® connector/cable**

A connector/cable to connect between ARIES-LYNX.

A terminal plug for ARIES and 0.5m Motionnet® cable for LYNX come as accessories.



* The standard Motionnet® cable is a LAN cable with CAT5e or more shield (straight). If a longer cable is required than the attached cable, please purchase separately.

* The maximum length of Motionnet® cable shall be the Motionnet® cable length with connected ARIES/LYNX < 100m.

③ **CD-ROM (Operation Manual)**

In order to save paper resources, no printed operation manual is available.

Print the file inside the CD-R if necessary.

The format of the Operating Manual is Acrobat (PDF) format.



In order to view the PDF format file, Adobe Reader from Adobe Systems is necessary.

Adobe Reader is not included in this CD-R.



④ **Emergency stop short plug**

A short plug to connect when not using the emergency stop signal comes as an accessory.



1-3-2. Optional products (required)

A driver BOX necessary to drive the <MontBlanc series>, a motor cable for KOSMOS series, an encoder cable, and a RS-232C (cross) communication cable used to control from a computer or a LAN cable do not come with the product.

Please purchase a driver BOX, a motor cable and an encoder cable separately.

Also, purchase a communication cable or LAN cable (recommended CAT5e or more) available on the market.

Driver BOX list for KOSMOS series

| Type | Driver BOX type |
|--------------------------|-----------------|
| AC driver BOX for 2 axes | TITAN-A II |
| DC driver BOX for 2 axes | TITAN-D II F |

Driver connection cable list for KOSMOS series

| Length | Cable type |
|--------|------------|
| 0.5m | CPS005 |
| 1m | CPS010 |

Motor cable list for KOSMOS series

| Connector shape (stage side) | Length | Cable type |
|------------------------------|--------|------------|
| Rectangular connector | 3m | CA1503A |
| | 5m | CA1505A |
| | 10m | CA1510A |
| Round type connector | 3m | CB1503A |
| | 5m | CB1505A |
| | 10m | CB1510A |

*The encoder cable is an ordered product.
For details, please contact our sales department.

1-3-3. Optional Products (convenient tools)

The following optional products are available to make this product more convenient to use. Purchase as necessary or download.

For questions about the following products, please contact your retainer or our sales department.

① ARIES Touch Panel, "PYXIS"

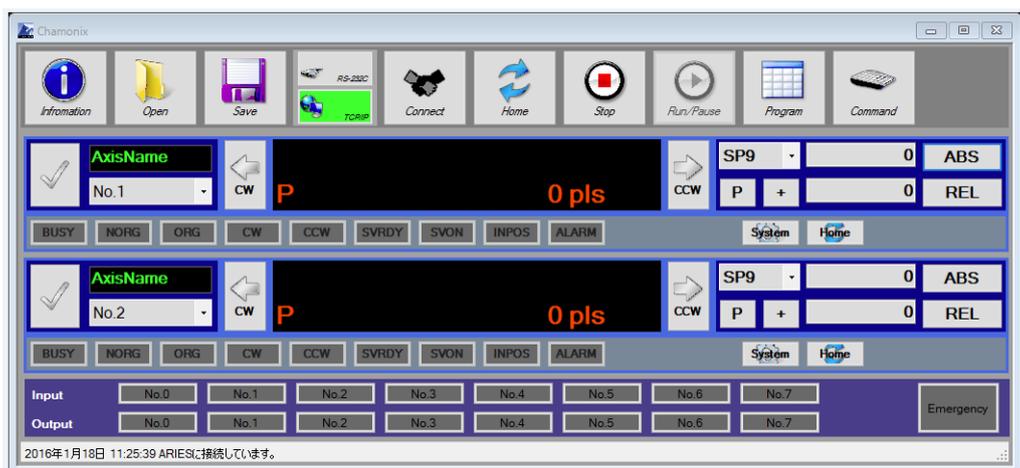
A touch panel that can control the functions of ARIES.

See "3-10. ARIES Touch Panel PYXIS" (page 40) for details.



② Stage Control Application, "Chamonix"

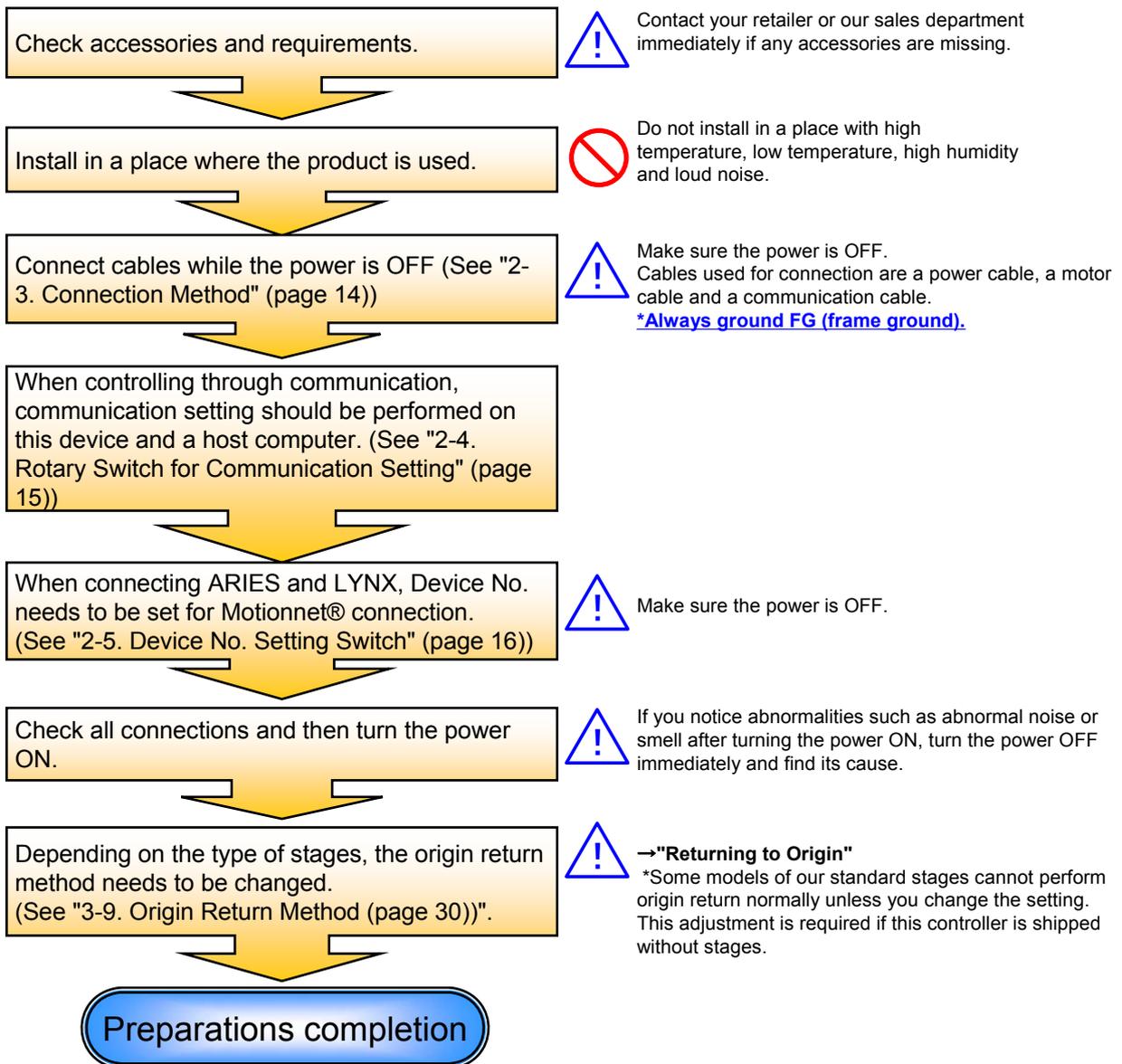
This application enable you to control all functions of ARIES and LYNX from PC. Please download from our company's HP.



2. Installation and Preparation

2-1. Proceeding with Installation and Preparation

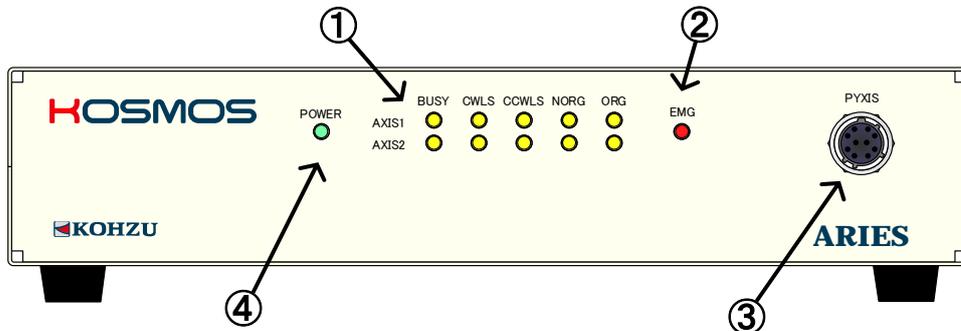
Install the product in the following order.



It takes about 1 second for launching to complete, after the power is turned ON.

2-2-1. Part Names

2-2-1. Part Names of ARIES



① Limit and Position Sensor Display LED

Status of each position sensor and driving status are displayed.

BUSY: Turns ON yellow during motor driving.

CWLS: When the CW limit sensor is in detection status, it turns ON yellow.

CCWLS: When the CCW limit sensor is in detection status, it turns ON yellow.

NORG: When the NORG sensor is in detection status, it turns ON yellow.

ORG: When the ORG sensor is in detection status, it turns ON yellow.

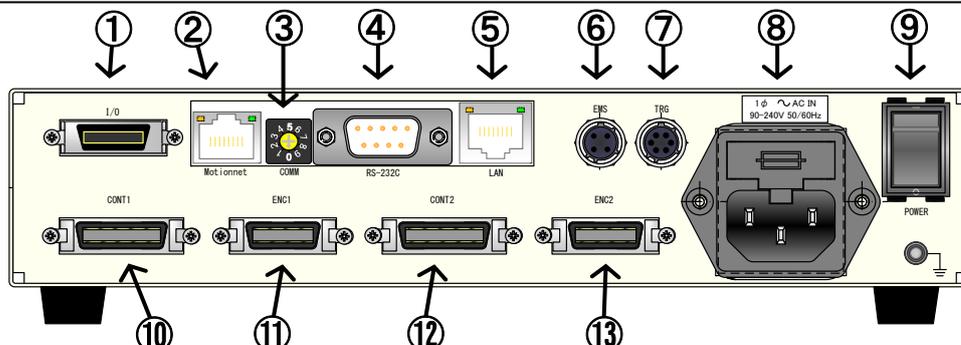
② Emergency Stop LED

When the emergency stop is ON, it turns ON red.

③ Connector for "PYXIS" Connection

④ Power Light

Turns ON green when the power is ON.



① I/O Connector

Connector for General Input/Output Signal

② Motionnet® Connector

Motionnet® Connector

Green LED: It turns on when Motionnet® system is connected properly.
Orange LED: ON when switching from normal connection status to abnormal status.

③ Rotary Switch for Communication Setting

④ RS-232C Connector

Connector 9-pin for RS-232C communication line

⑤ LAN Connector

Ethernet (TCP/IP) Connector

Green LED: ON when communication speed is 100Mbps.

Orange LED: ON when a link is established with the other side.

⑥ Emergency Stop Signal Input Connector

⑦ Trigger Signal Output Connector

⑧ Power Connector (including fuse)

⑨ Power Switch

Turns power ON/OFF.

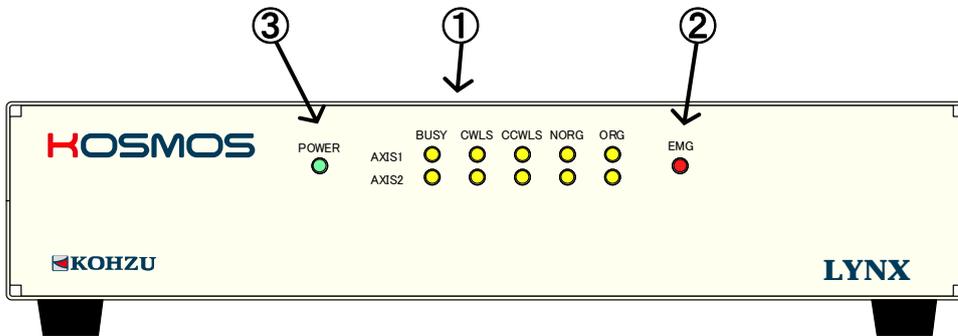
⑩ 1st Axis Motor Control Pulse Output Connector

⑪ 1st Axis Encoder Signal Input Connector

⑫ 2nd Axis Motor Control Pulse Output Connector

⑬ 2nd Axis Encoder Signal Input Connector

2-2-2. Part Names of LYNX



① Limit and Position Sensor Display LED

Status of each position sensor and moving status are displayed.

BUSY: Turns ON yellow during motor driving.

CWLS: When the CW limit sensor is in detection status, it turns ON yellow.

CCWLS: When the CCW limit sensor is in detection status, it turns ON yellow.

NORG: When the NORG sensor is in detection status, it turns ON yellow.

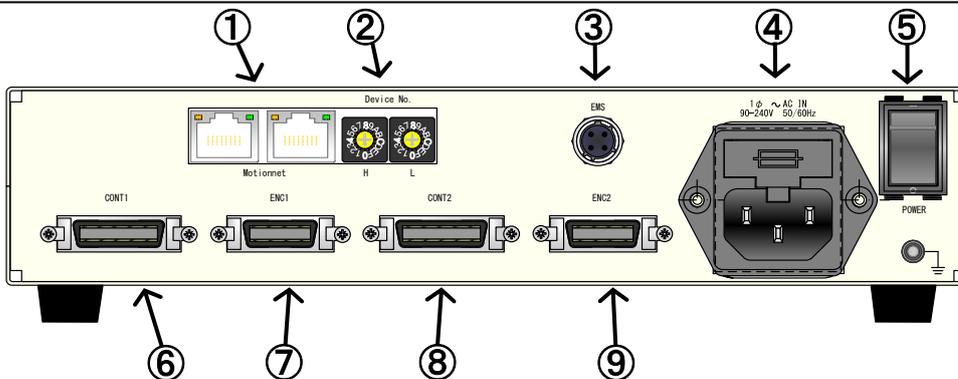
ORG: When the ORG sensor is in detection status, it turns ON yellow.

② Emergency Stop LED

When the emergency stop is ON, it turns ON red.

③ Power Light

Turns ON green when the power is ON.



① Motionnet® Connector

Motionnet® Connector

Green LED: It turns ON when Motionnet® system is connected properly.

Orange LED: ON when switching from normal connection status to abnormal status.

② Rotary Switch for Device No. Setting

③ Emergency Stop Signal Input Connector

④ Power Connector (including fuse)

⑤ Power Switch

Turns power ON/OFF.

⑥ 1st Axis Motor Control Pulse Output Connector

⑦ 1st Axis Encoder Signal Input Connector

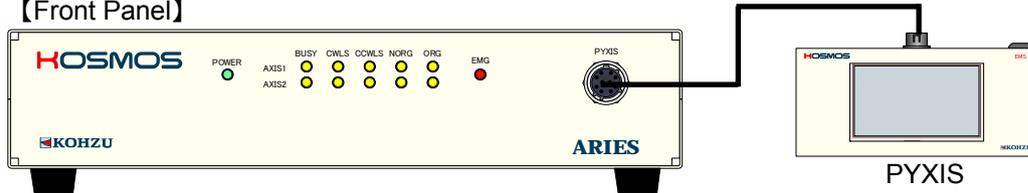
⑧ 2nd Axis Motor Control Pulse Output Connector

⑨ 2nd Axis Encoder Signal Input Connector

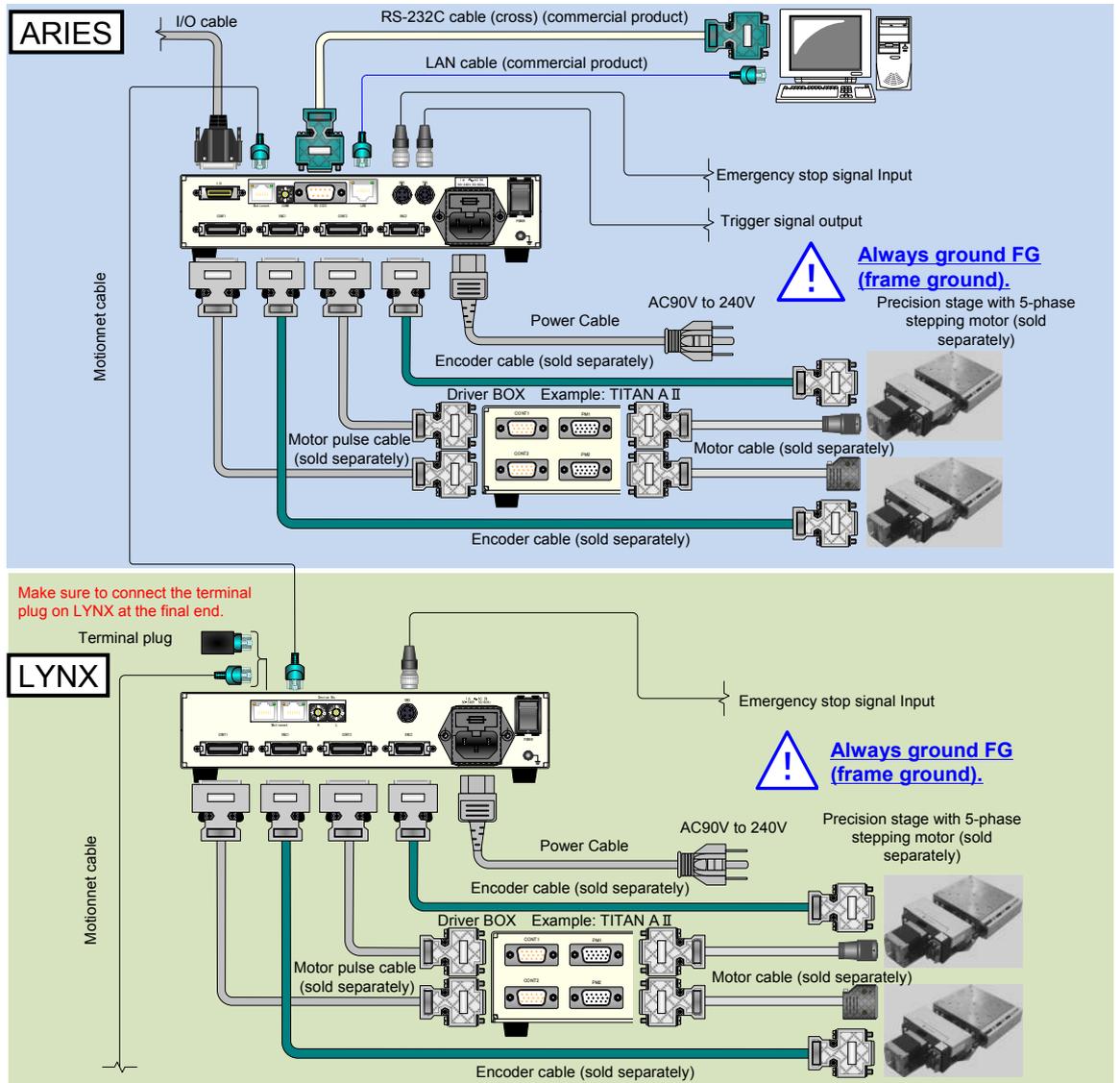
2-3. Connection Method

When pulling out or inserting a connection, make sure the power of main body is OFF.
 Connection/connecting wires between ARIES and external equipment are explained.

【Front Panel】



【Rear Panel】



*** Do not use a hub between Motionnet® cable connections.**

2-4. Rotary Switch for Communication Setting

ARIES can set or change communication conditions with the rotary switch (COMM) in the rear panel.

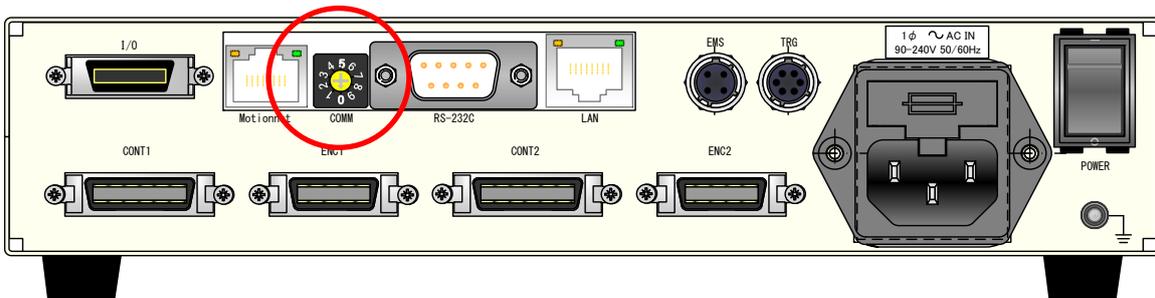
Default setting is Mode 4 (RS-232C 115200baud).

*Settings of RS-232C communication except for speed (baud):

Parity : NON
 Word length : 8bit
 Stop bit : 1
 The settings are fixed.

■ Position of Rotary Switch

【Rear Panel】



■ Settings

Settings are as shown in the table below.
 (Mode 6 to 9 cannot be used)

| Communication mode | Communications settings | |
|--------------------|-------------------------|-----|
| | RS-232C speed (baud) | LAN |
| 0 | 9600 | * |
| 1 | 19200 | * |
| 2 | 38400 | * |
| 3 | 57600 | * |
| 4 | 115200 | * |
| 5 | * | LAN |
| 6 | * | * |
| 7 | * | * |
| 8 | * | * |
| 9 | * | * |

2-5. Device No. Setting Switch

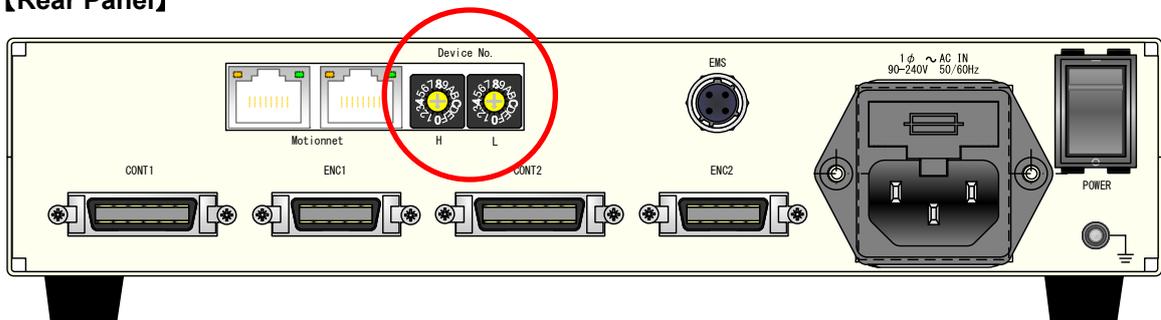
For Motionnet® equipped with ARIES/LYNX, Device No. needs to be set as more LYNX is installed.

Device No.00 is assigned to ARIES as the fixed value.

Set Device No. of LYNX from (H/L → 0/2) to (H/L → 1/E) in the unit of 2 with the Device No. setting switch.

■ Position of Device No. Setting Switch

【Rear Panel】



■ Settings

Settings are as shown in the table below.

| Model | No. of axes | Device No. | | Axis No. |
|-------------|-------------|------------|---|----------|
| | | H | L | |
| ARIES | 2 | 0 | 0 | 1,2 |
| LYNX (No1) | 4 | 0 | 2 | 3,4 |
| LYNX (No2) | 6 | 0 | 4 | 5,6 |
| LYNX (No3) | 8 | 0 | 6 | 7,8 |
| LYNX (No4) | 10 | 0 | 8 | 9,10 |
| LYNX (No5) | 12 | 0 | A | 11,12 |
| LYNX (No6) | 14 | 0 | C | 13,14 |
| LYNX (No7) | 16 | 0 | E | 15,16 |
| LYNX (No8) | 18 | 1 | 0 | 17,18 |
| LYNX (No9) | 20 | 1 | 2 | 19,20 |
| LYNX (No10) | 22 | 1 | 4 | 21,22 |
| LYNX (No11) | 24 | 1 | 6 | 23,24 |
| LYNX (No12) | 26 | 1 | 8 | 25,26 |
| LYNX (No13) | 28 | 1 | A | 27,28 |
| LYNX (No14) | 30 | 1 | C | 29,30 |
| LYNX (No15) | 32 | 1 | E | 31,32 |

- Device No. settings are expressed with hexadecimal.
- The H side is the ten's place and the L side is the one's place.
- Device No. of 00 to 1E corresponds to the axis 1 to 32.
- ARIES has Device No.[00](=Axis No.1 and 2), and LYNX has Device No.[Set value](= Axis No.Set value+1 and Set value+2).
- When a duplicate exists in Device No. it can cause malfunction. Make sure to set Device No. according to the table on the left.

3. Functions

3-1. Speed Setting

3-1-1. Speed Table

Speed settings of ARIES and LYNX are possible in the range of 2 to 5,000,000 (pulse/second). However, because only a few cases generally require to define speed change in detail, a selection method from the **12 steps speed table** is adopted.

No.10 is "High" in the JOG mode button of PYXIS, and No.11 is "Low".

(See "3-10. ARIES Touch Panel "PYXIS" (page 40))

Also, since each speed table can be set freely, a necessary driving speed can be set to 12 patterns.

■ Speed table

*Setting value shown in the next table are default values.

| Speed table No. | Start speed [pps] | Maximum speed [pps] | Accelerating time x 10msec | Decelerating time x 10msec | Accelerating pattern |
|-----------------|-------------------|---------------------|----------------------------|----------------------------|------------------------|
| 0 | 500 | 1,000 | 16 | 16 | Trapezoidal drive |
| 1 | 500 | 2,000 | 20 | 20 | Trapezoidal drive |
| 2 | 500 | 3,000 | 24 | 24 | Trapezoidal drive |
| 3 | 500 | 4,000 | 28 | 28 | Trapezoidal drive |
| 4 | 500 | 5,000 | 32 | 32 | Trapezoidal drive |
| 5 | 500 | 6,000 | 36 | 36 | Trapezoidal drive |
| 6 | 500 | 7,000 | 40 | 40 | Trapezoidal drive |
| 7 | 500 | 8,000 | 44 | 44 | Trapezoidal drive |
| 8 | 500 | 9,000 | 48 | 48 | Trapezoidal drive |
| 9 | 500 | 10,000 | 52 | 52 | Trapezoidal drive |
| 10 | 10 | 8,000 | 50 | 15 | S shaped drive (fixed) |
| 11 | 5 | 4,000 | 25 | 10 | S shaped drive (fixed) |

3-1-2. Speed Change in Remote Control

In remote control, specify a speed table No. in each moving command.

Command example →

`STX RPS 1/0/1000/0 CRLF` (RPS command example)

Set the speed table No.0



For settings of speed table No.0 to 11, use the **RTB** and **WTB** command.
For details, see **RTB** (page 88) and **WTB** (page 108) in "4.4. Command Details".

3-1-3. Speed Setting Regulations

In addition to the setting range of parameter in each speed, there are regulations in a relationship between acceleration/deceleration speed and maximum speed.

- ① Depending on a maximum speed range, the settable acceleration/deceleration time is restricted.
- ② The start setting speed range is restricted to 50% or less the maximum setting speed.
- ③ The maximum speed cannot be set more than the setting in the system parameter No.16 "Maximum Speed Limit Value" (hereinafter, referred to as "SYS.16"). By changing SYS.16, the limit value of the maximum speed can be changed.
- ④ The larger the maximum speed is, the more error increases on the set value of the acceleration/deceleration time.
When the speed table is set with the WTB command, the nearest value to the sending parameter is set within the settable range, and its value is returned.
- ⑤ The deceleration time cannot be set to twice or more of an acceleration time. When such setting is conducted with the WTB command, the deceleration time is set to a value within twice the acceleration time.

Please set within the range not exceeding the regulations shown below.

When a setting range is exceeded, error code 601 to 605 is returned.

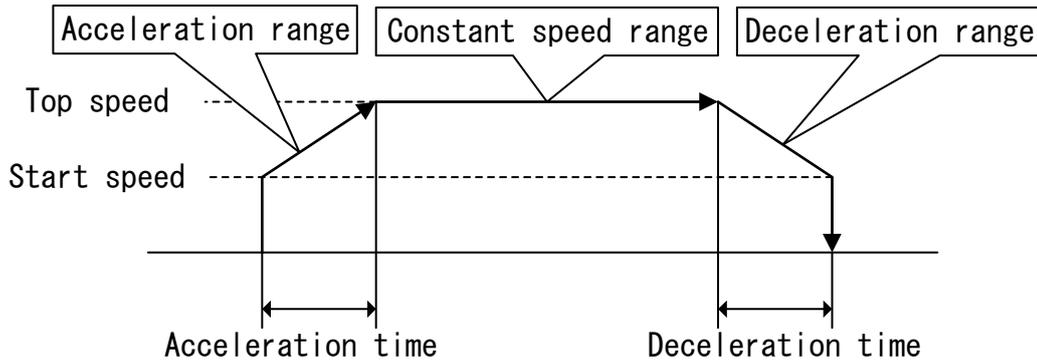
*As a setting value becomes larger, a setting unit becomes larger for the maximum speed and acceleration/deceleration time.

| Maximum speed range [pps] | Speed setting unit [pps] | Acceleration/deceleration time | | | | | |
|------------------------------|-----------------------------------|--------------------------------|---------------------------|----------------------|----------------------|--|--|
| | | Setting range [msec] | Setting unit [msec] | Setting error [msec] | | | |
| | | | | At trapezoid drive | At S shaped drive | | |
| 1 to 20 | 1 | 10 to 100 | 10 | ±0.01 or less | ±0.02 or less | | |
| 21 to 250 | 1 | 10 to 1,000 | 10 | ±0.125 or less | ±0.25 or less | | |
| 251 to 500 | 1 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 501 to 1,000 | 1 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 1,001 to 2,500 | 1 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 2,501 to 5,000 | 1 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 5,002 to 10,000 | 2 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 10,005 to 25,000 | 5 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 25,010 to 50,000 | 10 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 50,020 to 100,000 | 20 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 100,050 to 250,000 | 50 | 10 to 10,000 | 10 | ±0.5 or less | ±1 or less | | |
| 250,200 to 500,000 | 50 | 10 to 10,000 | 10 | ±1 or less | ±2 or less | | |
| 500,050 to 1,000,000 | 50 | 20 to 20,000 | 20 | ±2 or less | ±4 or less | | |
| 1,000,050 to 2,000,000 | 50 | 40 to 40,000 | 40 | ±4 or less | ±8 or less | | |
| 2,000,050 to 5,000,000 | 50 | 100 to 100,000 | 100 | ±10 or less | ±20 or less | | |

Note: The acceleration time unit in the table is [msec]; however, the setting unit with the WTB command is [10 msec].

3-2. Acceleration Pattern

When moving an object, it cannot be moved in high speed abruptly due to inertial force. In case of a stepping motor also, it normally starts in low speed and then achieve high speed with gradual acceleration.

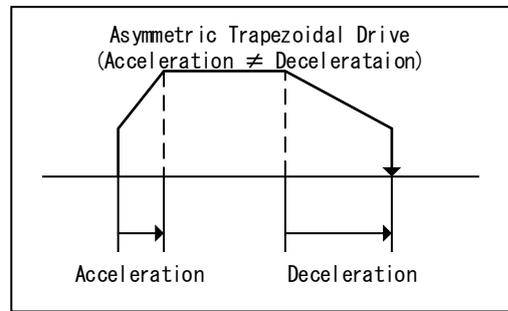
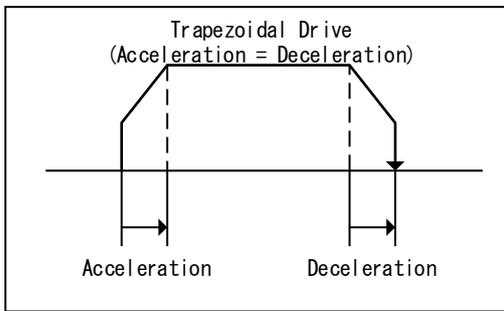


By setting the **start speed (low speed), maximum speed, acceleration time and deceleration time**, ARIES and LYNX calculate the acceleration/deceleration rate internally, and series of acceleration/deceleration operation are conducted automatically.

Trapezoidal Drive and Asymmetric Trapezoidal Drive

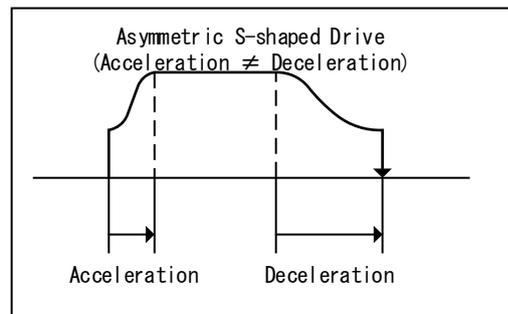
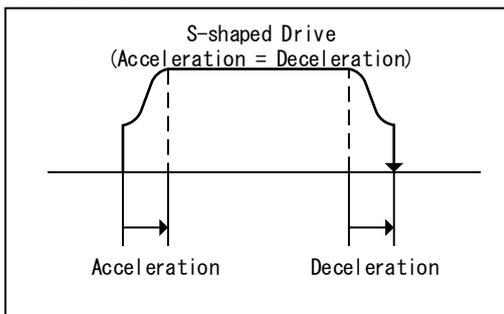
A method to increase and decrease acceleration and deceleration at a constant acceleration and deceleration ratio is called a **trapezoidal drive**.

This product also supports an **asymmetric trapezoidal drive** that acceleration and deceleration can be set in different setting.



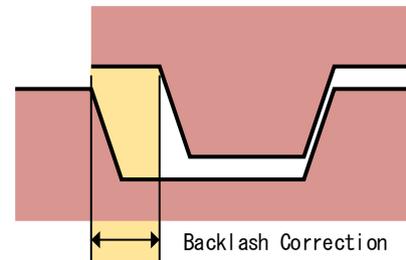
S-Shaped Drive and Asymmetric S-Shaped Drive

S-shaped drive is a method to actualize smooth movement by accelerating and decelerating with a quadric curve.



3-3. Backlash Correction

Corrects backlash generated by gear mechanism, etc. In order to carry out backlash correction, correction pulse amount and a correction method need to be set.



*Remote commands valid for backlash correction are APS RPS, and MPS only.

*When encoder correction and backlash correction are simultaneously valid, backlash correction becomes invalid.

3-3-1. Setting Steps

With the ARIES touch panel, "PYXIS" (sold separately), stage control application "Chamonix" and other remote controls:

- ① Set correction amount with System No.11 (backlash correction pulse setting).
- ② Set a method with System No.12 (backlash correction method setting).
- ③ Execute backlash correction control along with each drive command execution.

System No.12

Executable backlash correction methods are as follows.

| Method | Description |
|--------|---|
| 0 | Backlash correction invalid (Default value) |
| 1 | When reverting from CCW direction to CW direction, correction reciprocation drive of correction pulse number before moving. |
| 2 | When reverting from CW direction to CCW direction, correction reciprocation drive of correction pulse number before moving. |
| 3 | When moving to CCW direction, correction reciprocation drive of correction pulse number after moving. |
| 4 | When moving to CW direction, correction reciprocation drive of correction pulse number after moving. |

See "4-6-2. System Setting Details" (page 115) for details.

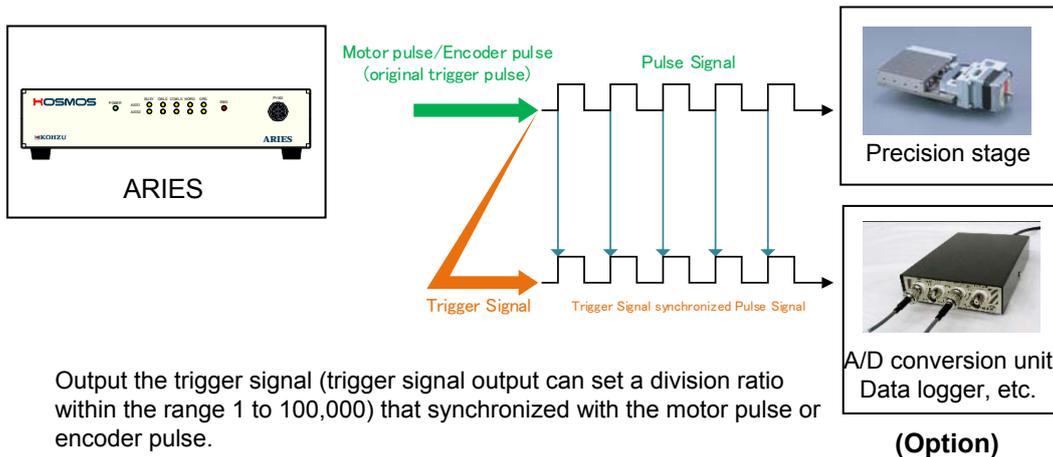
3-3-2. Details of Correction Method

| | | |
|-----------------|--|---|
| <p>1</p> | | <p>When changing moving direction from CCW to CW, moving to CW direction is performed after correction reciprocation drive (move to CCW direction→move to CW direction) for set correction pulse amount is conducted. In this method, though an error is generated for the backlash part between the drive of CW direction and that of CCW direction, the error amount becomes constant.</p> |
| <p>2</p> | | <p>When changing moving direction from CW to CCW, moving to CCW direction is performed after correction reciprocation drive (move to CW direction→move to CCW direction) for set correction pulse amount is conducted. In this method, though an error is generated for the backlash part between the drive of CW direction and that of CCW direction, the error amount becomes constant.</p> |
| <p>3</p> | | <p>When moving to CCW direction, move to CCW direction first, then conduct correction reciprocation drive (move to CCW direction→move to CW direction) for backlash correction amount, and finally move to CW direction to finish. With this method, since it stops at one sides of fixed gear when moved to either CW or CCW direction, no lost motion due to backlash is generated.</p> |
| <p>4</p> | | <p>When moving to CW direction, move to CW direction first, then conduct correction reciprocation drive (move to CW direction→move to CCW direction) for backlash correction amount, and finally move to CCW direction to finish. With this method, since it stops at one sides of fixed gear (opposite side from 3) when moved to either CW or CCW direction, no lost motion due to backlash is generated.</p> |

In the table above, **S** indicates the drive start position and **E** is the moving finish position.

3.4. Trigger Specification

ARIES can output trigger signal for external devices such as the A/D conversion unit and data logger, etc. by selecting the trigger signal source from motor pulse/encoder pulse.



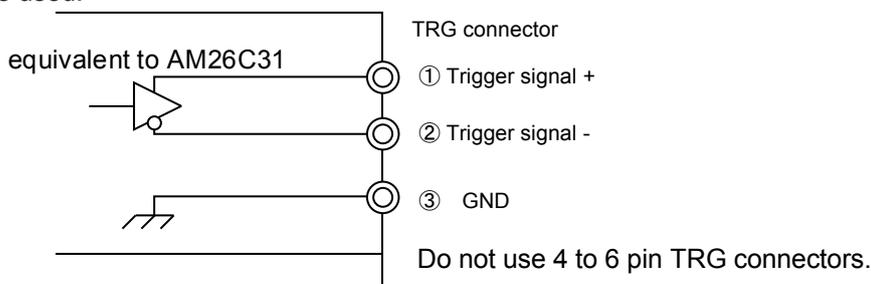
*Synchronization targets are axes connected to ARIES only.
LYNX connection axis cannot be synchronized.

3-4-1. Trigger Signal Output Method

The output method of ARIES trigger signal is differential output (TTL level).

Differential output (TTL level)

For the output circuit in the ARIES side, the differential output IC (equivalent to AM26C31) is used.



3-4-2. Trigger Signal Output Method

Manual: Output trigger signal for 1 pulse

Issue the TFR command to immediately output trigger pulse once.

(See "⑥ Optional timing trigger output" (page 25))

The trigger pulse width follows the setting of the TFR command.

Auto: Synchronized with the drive to output trigger pulse

① Trigger signal detail settings are conducted with the TRS command.

② Then issue the drive command to output trigger pulse synchronized with drive.

The trigger pulse width follows the system parameter (System No.55).

3-4-3. Explanation of Trigger Function

A summary of the trigger output function provided by ARIES is explained next.

Trigger signal is only valid for a drive command after the TRS command is issued.
 (See "4-4. Command Details" TRS (page 94))

① Output synchronized with pulse

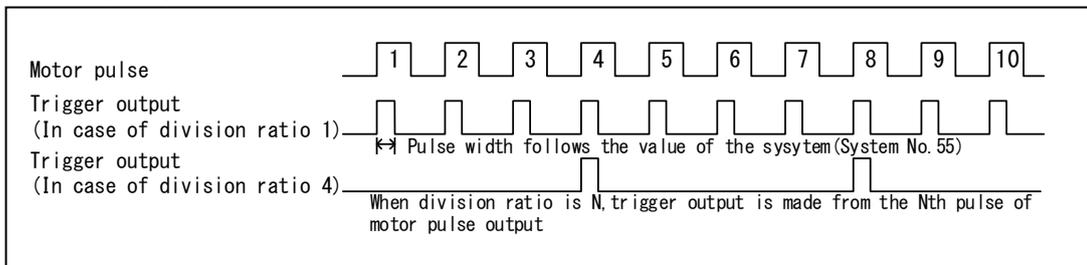
There are 2 types, "Output synchronized with motor pulse" and "Output synchronized with encoder pulse".

Both can be set with division ratio (1 to 100,000).

The trigger signal source to synchronize follows the system parameter (System No.51).

The trigger pulse width follows the system parameter (System No.55).

①-1. Output synchronized with motor pulse



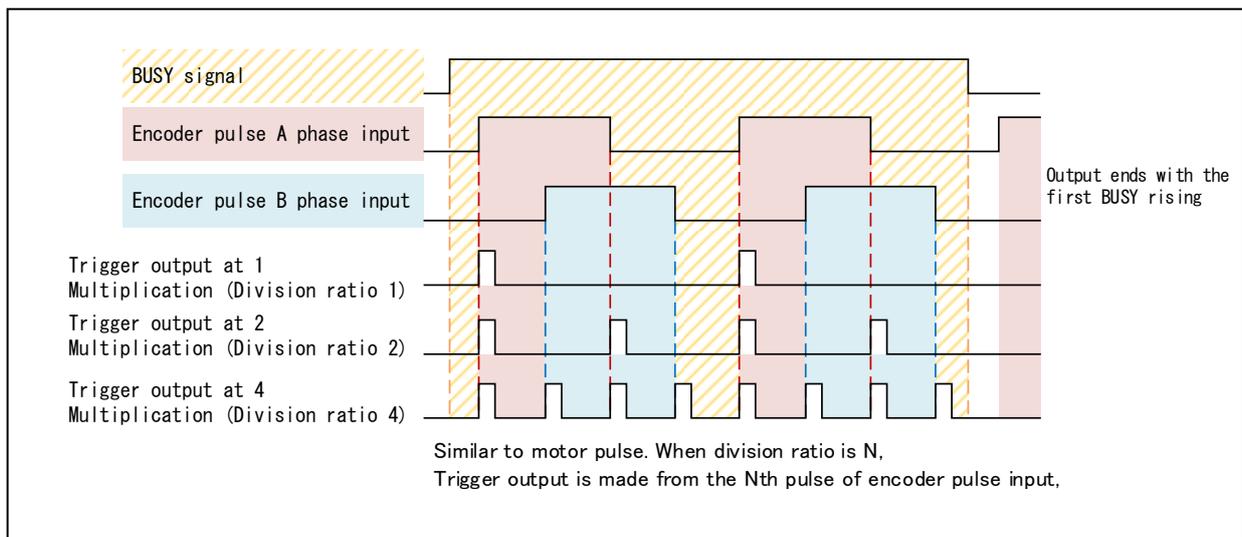
①-2. Output synchronized with encoder pulse

Trigger pulse can be output for 1, 2 and 4 multiplication respectively.

Pulse output is performed with the count timing according to a multiplication number. (No distinction for CW/CCW direction)

Output period of trigger is while BUSY signal is active.

(Though BUSY signal becomes active at encoder correction driving, no trigger signal is output).

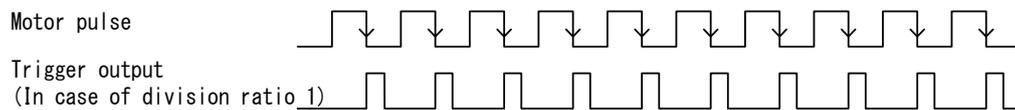


② Rising/falling edge selection

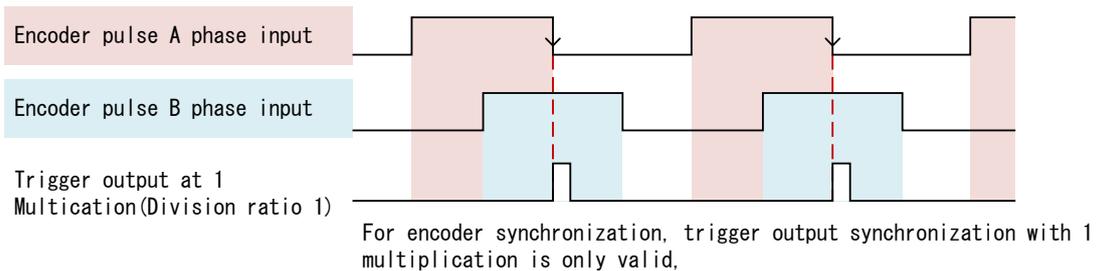
Select to synchronize at rising or falling of trigger signal source for trigger output in pulse synchronization. When setting falling, see the figure below.

The trigger pulse width follows the system parameter (System No.55).

②-1. When rising edge is selected for motor pulse synchronization



②-2. When falling edge is selected for encode pulse synchronization



In case of output synchronized with encoder pulse in 2 or 4 multiplication, The falling edge selection is not reflected in output results, (It becomes the same output results when the rising edge is selected)

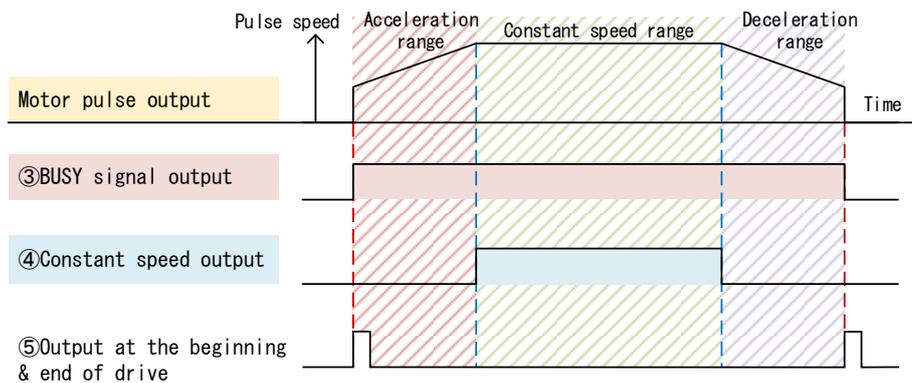
③ BUSY signal output (See the figure below)

④ Constant speed output (See the figure below)

⑤ Trigger output at the beginning & end of drive

Trigger pulse is output at the beginning and end of drive. (See the figure below)
The trigger pulse width follows the system parameter (System No.55).

③ BUSY signal, ④ Constant speed signal, and ⑤ Trigger signal output figure at the beginning and end of drive



⑥ Optional timing trigger output

Trigger is output with optional timing. When the TRF command is received, 1 pulse is output with the pulse width according to the TRF command parameter.

(It is not related to the value of the system parameter "System No.55")

⑦ Output logic reversal

Output level of trigger is reversed.

3-5. Emergency Stop Function

Emergency stop can be divided into the following two factors.
Please note that a releasing method differs for each factor.

Factor ①. Emergency stop by detection of emergency stop signal

For the following case, emergency stop is applied on all axes that emergency stop signal is detected, the pulse is stopped, and the EMG light on the front panel becomes ON.

- The emergency stop signal of the emergency stop input connector (EMS) on ARIES and LYNX is operating
- The emergency stop switch of "PYXIS" that is the touch panel for ARIES is ON
- The cable between the connected ARIES and LYNX is disconnected
- The terminal plug is not connected

Check the condition: In this condition, ARIES transmits the error code "E SYS 5" to PC spontaneously. (See "4-5-1. Error Code and Warning Code List" (page 111))
Also, the emergency stop detection condition can be checked with the **STR** command.
For details, see **STR** (page 91) in "4.3. Command Details".

Releasing method: After solving a cause of emergency stop, the condition can be released by executing the **REM** command.
For details, see **REM** (page 73) in "4-4. Command Details".

Factor ②. Emergency stop due to Motionnet error

When disconnection of any LYNX connections is verified while some axes are driving (for example, power OFF, etc.), emergency stop is applied on all axes, and the EMG light on the front panel becomes ON.

Check the condition: In this condition, ARIES transmits the error code "E SYS 6" to PC spontaneously. (See "4-5-1. Error Code and Warning Code List" (page 111))
Also, if a drive command or the **STR** command is issued in this condition, the error code 802 is returned.
(See "4-5-1. Error Code and Warning Code List" (page 111))

Releasing method: The condition can be released by executing the RAX command that is axes configuration reading command.
For details, see **RAX** (page 69) in "4-4. Command Details".

When the Motionnet cable is disconnected while driving, both ① and ② factors are applied.
In the case, ARIES transmits both the error code 5 and 6.
To release the condition, it is necessary to issue the **REM** and **RAX** commands after solving a cause of emergency stop.

*When emergency stop is executed, it is possible that position misalignment of stages may have happened.

It is strongly recommended to conduct origin returning after releasing emergency stop.
(**ROG** command (verification of origin return) becomes incomplete also.
For details, see **ROG** (page 79) in "4-4. Command Details").

3-6. Stepping Motor Excitation and Servo ON/OFF Specification

ARIES and LYNX regulate a type and state of motors with system setting. Motor specification and motor state can be set with System No.61 and 62 respectively. The state when the power is turned ON differs according to the selected motor specification with No.62.

Motor specification

- Stepping motor specification (**Default value**)
- Servo motor specification

Initial State at Turning the Power ON

- Stepping motor specification: **Excitation ON**
- Servo motor specification: **Excitation OFF(Servo OFF)**

See "4-6-2 System Setting Details" (page 115) for details.

*Motor specification and state parameters are out of scope of the **RST** command.

3-7. Soft Limit Setting

Since the default setting of soft limit setting value in ARIES and LYNX is large enough, it will not be reached in usual operation.

When setting a soft limit, set a soft limit value with System No.13, 14 and 15.

| SYS No. | Function | Setting | Default value |
|---------|---------------------------|-----------------------------------|---------------|
| 13 | Soft limit setting | 0: Invalid 1: Valid | 0 |
| 14 | + side soft limit setting | - 134,217,728 to + 134,217,727 | +134,217,727 |
| 15 | - side soft limit setting | - 134,217,728 to + 134,217,727 | -134,217,728 |

◇ When exceeding a soft limit value during drive command execution, deceleration stop is performed toward the soft limit value.

*A soft limit becomes invalid during origin return, backlash correction execution and encoder feedback execution.

*When one of the axes reaches a soft limit position during multiple axes drive (**MPS** and **SPS**), all axes are stopped.

*Verifying soft limit state: Verification is possible with the STR command. For details, see **STR** (page 91) in "4-4. Command Details".

3-8. Encoder Correction

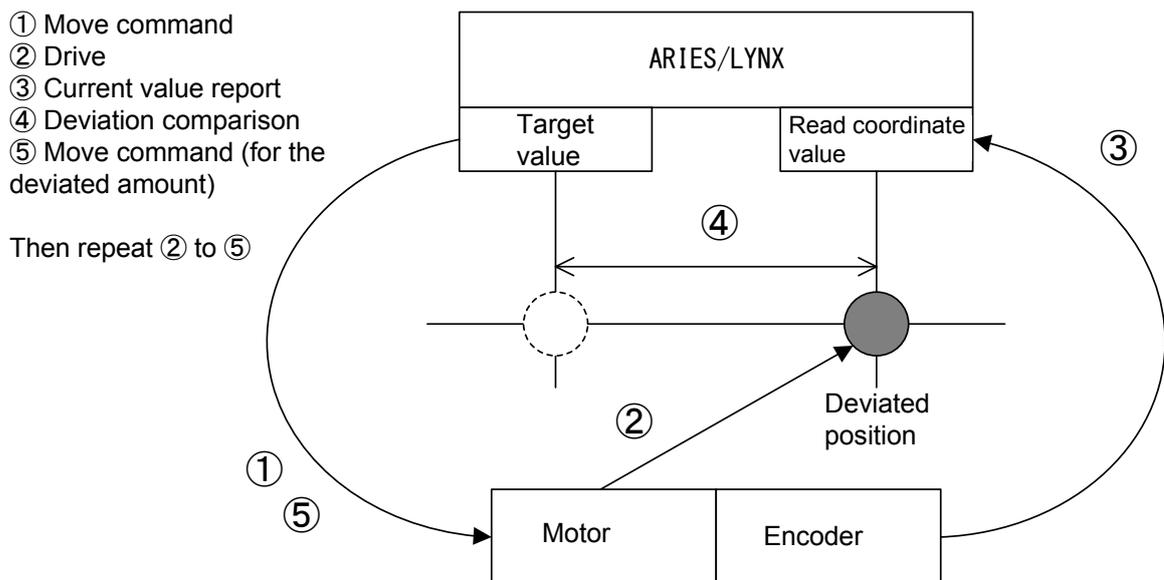
Position correction (feedback) by encoder signal output is possible in ARIES and LYNX.

It also supports when the encoder signal output method is the incremental method (differential type).

*Remote commands that the encoder correction is valid are **APS** and **MPS** (absolute position drive mode) only.

*When encoder correction and backlash correction are simultaneously effective, backlash correction becomes invalid.

This product performs encoder correction by managing the coordinate value (absolute value) as shown in the figure below.



3-8-1. Encoder Correction

ARIES and LYNX controllers read coordinate values with signals from the encoder, and compare with the drive designated position. If deviation is generated in the coordinate read by the encoder and drive designated position, a motor is driven for the stage to move to the designated position.

Coordinate range that can be managed with this product is wide (-134,217,728 to +134,217,727 pulses) and if position misalignment happens within the range, it can be corrected.

3-8-2. Encoder Feedback Setting

When using encoder feedback, the following setting procedures are required.

- ① Set parameters required for encoder feedback. (See the parameters shown below)
- ② When a drive type command is issued, it performs driving with encoder feedback.

*Condition of encoder feedback can be checked with the **STR** command.

■ List of encoder feedback parameters

| SYS No. | Parameter name | Description | Default value |
|---------|--------------------|--------------------------------------|---------------------|
| 31 | ENC MULTIPLICITY | Encoder value multiplication | 4: 4 multiplication |
| 32 | ENC PRESCALE | Encoder value prescale | 0 |
| 33 | ENC CALC NUM | Motor pulse/encoder resolution ratio | 1 |
| 34 | ENC CALC DEN | *See the example below | 1 |
| 35 | ENC ROTATE CHANGE | Change of encoder adding direction | 0: Normal |
| 36 | ENC Z LOGIC | Logic switch of the encoder Z phase | 1: Negative logic |
| 37 | PM&ENC SYNC WRITE | Encoder value reset at origin return | 1: Execute |
| 38 | ENC FILTER | Filter switch of the encoder signal | 0: With filter |
| 41 | FEEDBACK TYPE | Feedback control method | 0: Not correct |
| 42 | PERMIT RANGE | Pulse allowable range at feedback | 1 |
| 43 | RETRY COUNT | No. of retries at feedback | 100 |
| 44 | FEEDBACK WAIT TIME | Feedback waiting time (msec) | 100 |

Motor pulse/encoder resolution ratio

Example: When the motor pulse resolution is $0.1 \mu\text{m}/1$ pulse and encoder resolution is $1 \mu\text{m}/1$ pulse, **the resolution ratio of the motor pulse/encoder is 1:10.**

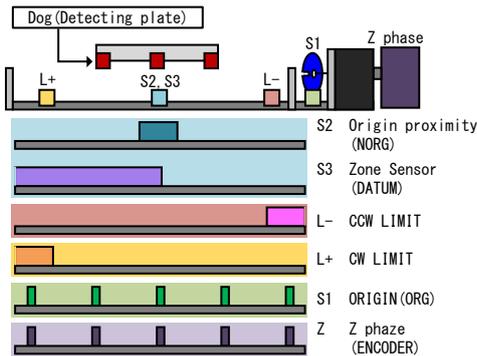
In this case, set **1** for **System No.33** and **10** for **System No.34**.

See "4-6-2 System Setting Details" (page 115) for details.

3-9. Origin Return Method

An origin return method can be selected in ARIES according to the combination of sensors of the positioning device used.

Sensor Configuration



Based on the set origin return method, after moving near the specified sensor at the maximum speed of the specified speed table, it moves to the origin with ORG scan speed (SYS No.3 Default value: 500pps) and stops.



Though our standard stages can support the default setting, Method 4, for the most models, it is necessary to change to Method 3 for the models that equip an origin sensor (S1) in a part of motor axis.



S3 zone sensor (DATUM) has the identical input signal with S2 origin proximity (NORG).

| Method | Sensor Configuration | Description |
|--------|----------------------|---|
| 1 | S1,S3 | A return direction is judged with the zone sensor (DATUM) and set the edge of the first origin sensor (ORG) within the range sensor as the origin position. |
| 2 | S3 | The edge of zone sensor (DATUM) is the origin position. |
| 3 | S1,S2,L- | The edge of origin sensor (ORG) located in the origin proximity sensor (NORG) is the origin position. |
| 4 | S2,L- | The edge of origin proximity sensor (NORG) is the origin position. (Our standard method) |
| 5 | S1,L+ | Origin sensor (ORG) in proximity of CW limit is the origin position. |
| 6 | S1,L- | Origin sensor (ORG) in proximity of CCW limit is the origin position. |
| 7 | L+ | The edge of CW limit is the origin position. |
| 8 | L- | The edge of CCW limit is the origin position. |
| 9 | S1 | The edge of origin sensor (ORG) is the origin position. |
| 10 | None | Present position is the origin position. (No driving) |
| 11 | Z phase | When an encoder is equipped, the edge of Z phase within the movement range is the origin position. |
| 12 | Z phase, S3 | A return direction is judged with the region sensor (DATUM) and set the edge of Z phase encoder within the range sensor as the origin position. |
| 13 | Z phase, S2 | When an encoder is equipped, the edge of Z phase within the origin proximity sensor (NORG) is the origin position. |
| 14 | Z phase, L+ | When an encoder is equipped, the edge of Z phase within the movement range is the origin position. |
| 15 | Z phase, L- | When an encoder is equipped, the edge of Z phase in proximity of CCW limit is the origin position. |



Setting with System No.1 ORG OFFSET

After executing each origin return operation, it moves just as much as the set value in System No.1 "ORG OFFSET", and the position is set as 0 coordinate values.

***In Method 10, "ORG OFFSET" is invalid.**

1

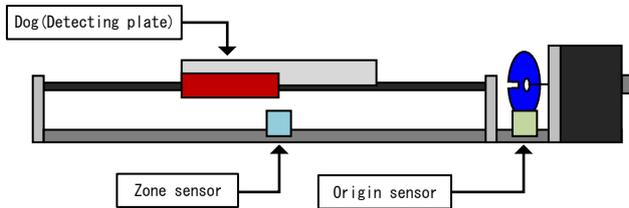
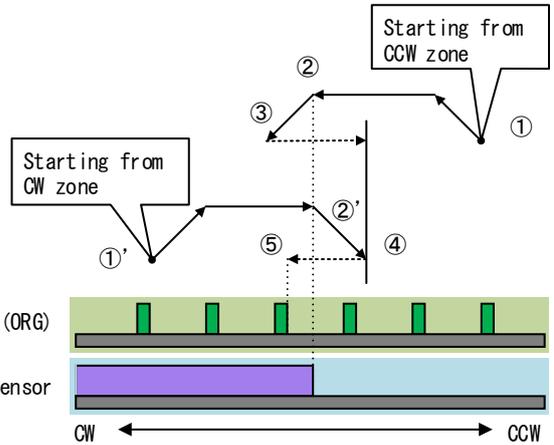
A return direction is judged with the zone sensor (DATUM), and set the edge of the first origin sensor (ORG) within the range sensor as the origin position.

Starting from CCW zone

- ① Detection starts to CW direction with trapezoidal drive.
- ② Decelerate and stop when the zone sensor is detected.
- ③ Reverses to CCW direction, and moves in low speed.
- ④ Reverse to CW direction after moving through the zone sensor.
- ⑤ Stop at the initial origin sensor detection after a zone sensor detection.

Starting from CW zone

- ①' Detection starts to CCW direction with trapezoidal drive.
- ②' Decelerate and stop after moving through the zone sensor.
- ④ Reverse to CW direction and moves in low speed.
- ⑤ Stop at the initial origin sensor detection after a zone sensor detection.



2

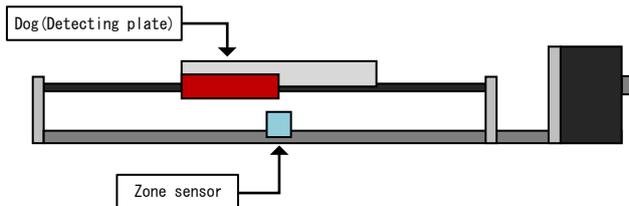
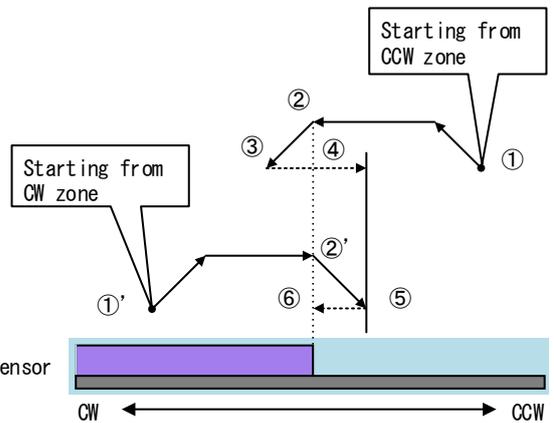
The edge of zone sensor (DATUM) is the origin position.

Starting from CCW zone

- ① Detection starts to CW direction with trapezoidal drive.
- ② Decelerate and stop when the zone sensor is detected.
- ③ Reverse to CCW direction, and moves in low speed.
- ④ Decelerate and stop after moving through the zone sensor.
- ⑤ Reverse to CW direction and moves in slow speed.
- ⑥ Stop at the edge detection of the zone sensor.

Starting from CW zone

- ①' Detection starts to CCW direction with trapezoidal drive.
- ②' Decelerate and stop after moving through the zone sensor.
- ⑤ Reverse to CW direction and moves in slow speed.
- ⑥ Stop at the edge detection of the zone sensor.



3

The edge of origin sensor (ORG) located in the origin proximity sensor (NORG) is the origin position.



For a stage in which the origin sensor exists in the motor axis, it is necessary to select this method.

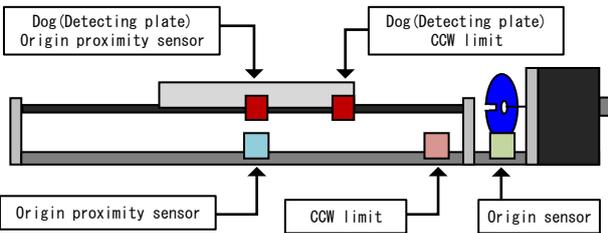
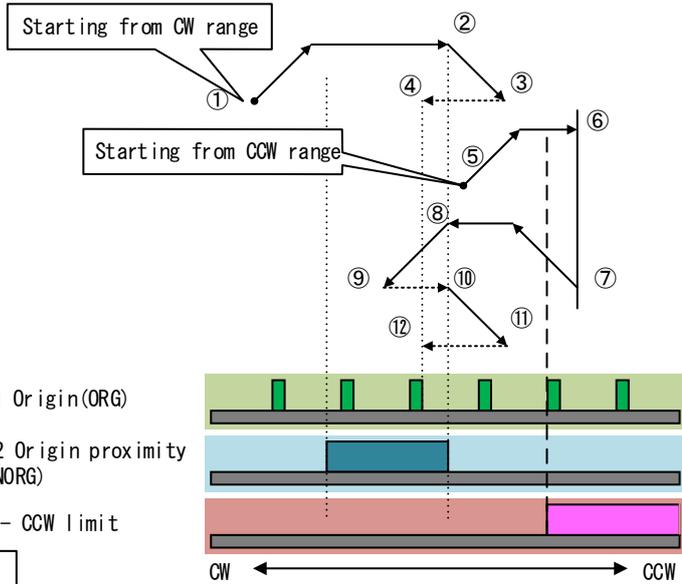
Starting from CW zone

- ① Detection starts to CCW direction with trapezoidal drive.
- ② Decelerate and stop after moving through the origin proximity.
- ③ Reverse to CW direction and moves in slow speed.
- ④ After origin proximity detection, it stops at the initial origin detection.

Starting from CCW zone

- ⑤ Detection starts to CCW direction with trapezoidal drive.
- ⑥ Stop when CCW limit is detected.
- ⑦ Reverse to CW direction and start trapezoidal drive.
- ⑧ Decelerate and stop after moving through the origin proximity.
- ⑨ Reverse to CCW direction, and moves in low speed.
- ⑩ Decelerate and stop again after moving through the origin proximity.
- ⑪ Reverse to CW direction and move in slow speed.
- ⑫ After origin proximity detection, it stops at the initial origin detection.

*When starting from the origin proximity zone, execute from ⑨.



4

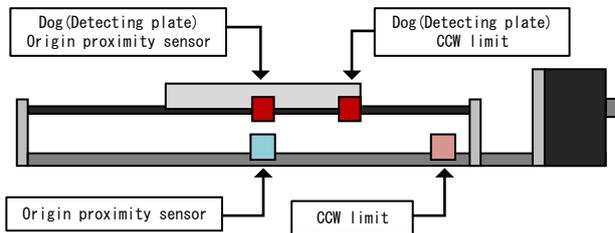
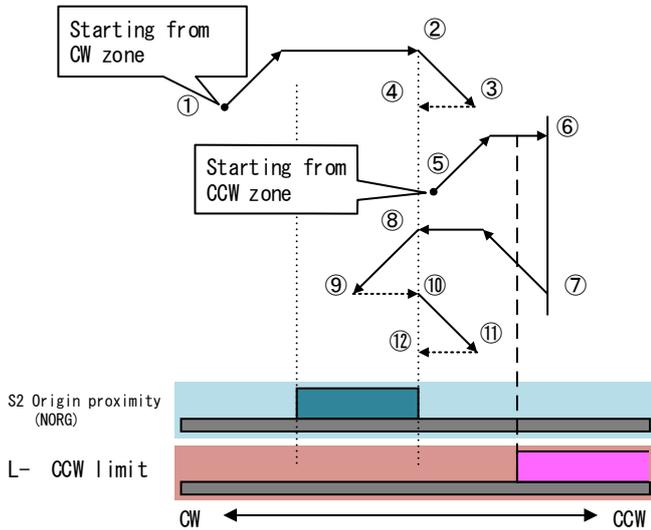
The edge of region proximity sensor (NORG) is the origin position.
(Our company's standard method)

Starting from CW zone

- ① Detection starts to CCW direction with trapezoidal drive.
- Decelerate and stop when moving through the origin proximity.
- ③ Reverse to CW direction and move in slow speed.
- ④ Stop when the origin proximity is detected.

Starting from CCW zone

- ⑤ Detection starts to CCW direction with trapezoidal drive.
 - ⑥ Stop when CCW limit is detected.
 - ⑦ Reverse to CW direction and start trapezoidal drive.
 - ⑧ Decelerate and stop after moving through the origin proximity.
 - ⑨ Reverse to CCW direction and move in low speed.
 - ⑩ Decelerate and stop again after moving through origin proximity.
 - ⑪ Reverse to CW direction and move at slow speed.
 - ⑫ Stop when the origin proximity is detected.
- *When starting from the origin proximity zone, execute from ⑨.



5

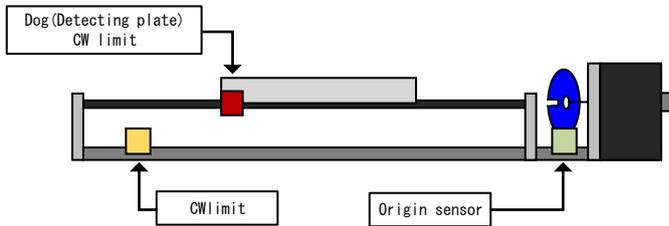
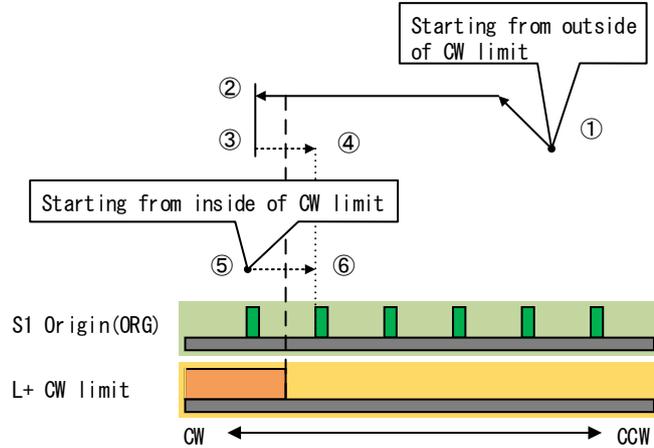
Origin sensor (ORG) in proximity of the CW limit is the origin position.

Starting from outside of CW limit

- ① Detection starts to CW direction with trapezoidal drive.
- ② Stop when CW limit is detected.
- ③ Reverse to CCW direction, and move in low speed.
- ④ Stop at the initial origin detection position after moving through the CW limit.

Starting from inside of CW limit

- ⑤ Move in low speed to CW direction.
- ⑥ Stop at the initial origin detection position after moving through the CW limit.



6

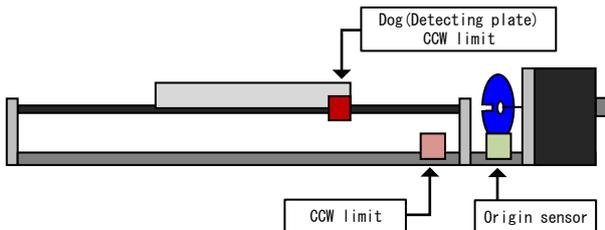
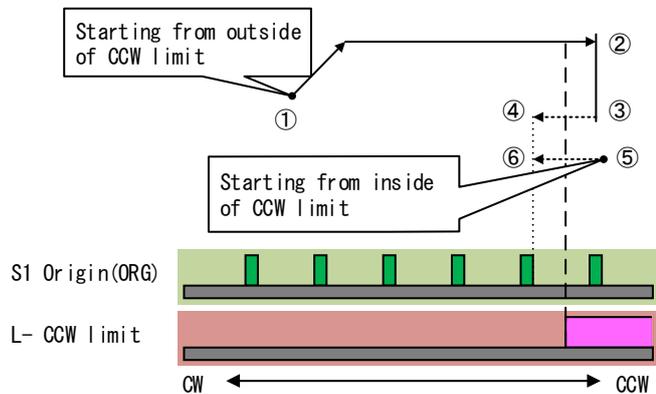
Origin sensor (ORG) in proximity of the CCW limit is the origin position.

Starting from outside of CCW limit

- ① Detection starts to CCW direction with trapezoidal drive.
- ② Stop when CCW limit is detected.
- ③ Reverse to CW direction and move in low speed.
- ④ Stop at the initial origin detection position after moving through the CCW limit.

Starting from inside of CCW limit

- ⑤ Move in low speed to CW direction.
- ⑥ Stop at the initial origin detection position after moving through the CW limit.



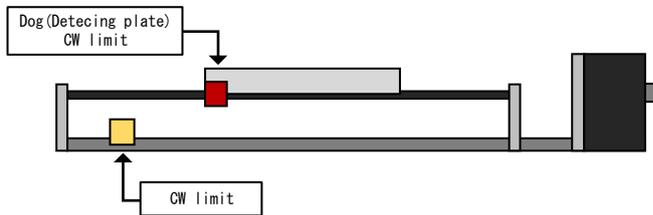
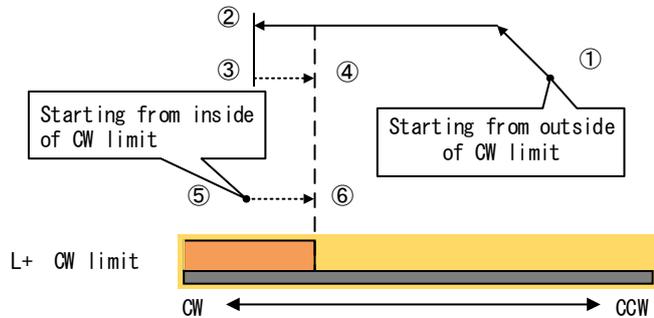
7 The edge of CW limit is set to the origin position.

Starting from outside of CW limit

- ① Detection starts to CW direction with trapezoidal drive.
- ② Stop when CW limit is detected.
- ③ Reverse to CCW direction, and move in low speed.
- ④ A position after moving through the CW limit is origin.

Starting from inside of CW limit

- ⑤ Move in low speed to CCW direction.
- ⑥ A position after moving through CW limit is origin.



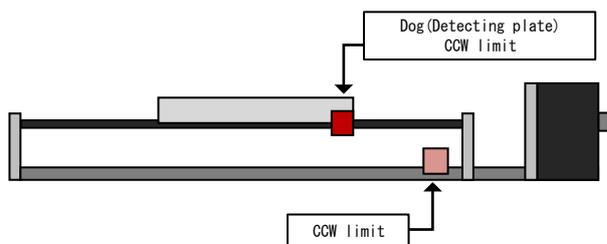
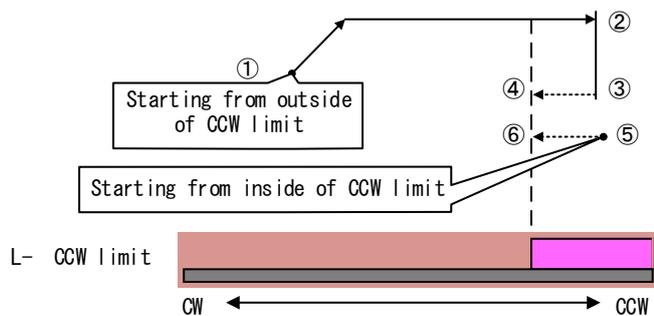
8 The edge of CCW limit is set to the origin position.

Starting from outside of CCW limit

- ① Detection starts to CCW direction with trapezoidal drive.
- ② Stop when CCW limit is detected.
- ③ Reverse to CW direction and move in low speed.
- ④ A position after moving through the CCW limit is origin.

Starting from inside of CCW limit

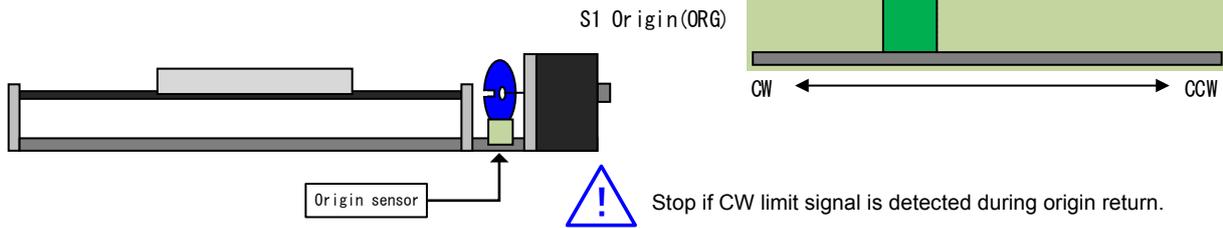
- ⑤ Move in low speed to CW direction.
- ⑥ A position after moving through CCW limit is origin.



9 The edge of origin sensor is the origin position.

Starting from CCW zone

- ① Detection starts to CW direction with trapezoidal drive.
- ② Decelerate and stop when the ORG sensor is detected.* 1
- ③ Reverse to CCW direction.
- ④ Decelerate and stop again when the ORG sensor is detected.* 1
- ⑤ Reverse to CW direction and move in slow speed.
- ⑥ Stop at ORG sensor detection.



*1. For ② or ④, when the ORG sensor is detected after stopping, move to CCW direction in low speed, and perform movement ⑤ and ⑥ after passing through the ORG sensor.

10 The current position is origin. (No driving)

The current position is set as the origin position without driving in this mode, and it is regarded as completion of the origin return detection.



For a stage with no encoder, this method cannot be selected.

Starting from CW zone

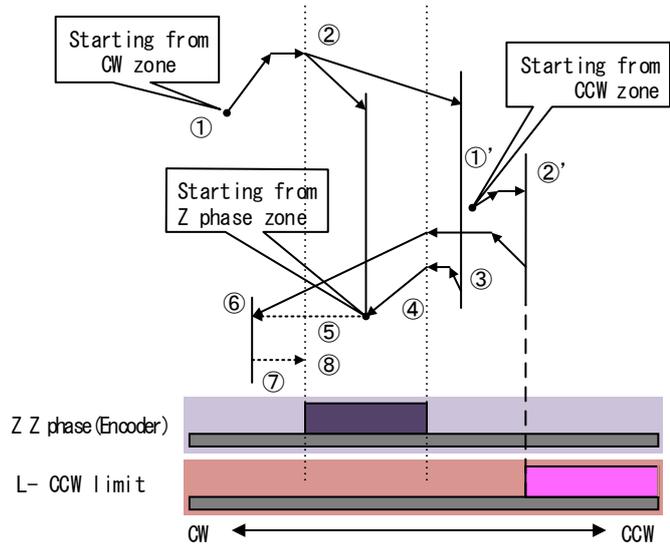
- ① Detection starts to CCW direction with trapezoidal drive.
- ② Decelerate and stop when encoder the Z phase (hereinafter referred to as "Z phase") is detected.
- ③ Reverse to CW direction and start detection with trapezoidal drive.
- ④ Decelerate and stop with Z phase detection.
- ⑤ Start moving in low speed to the Z phase non-detection area.
- ⑥ Stop at the Z phase none-detection area.
- ⑦ Reverse to CCW direction and move in low speed.
- ⑧ Stop at Z phase detection.

Starting from CCW zone

- ①' Detection starts to CCW direction with trapezoidal drive.
- ②' Stop when CCW limit is detected.
- ③ Reverse to CW direction and start trapezoidal drive.
- ④ Decelerate and stop with Z phase detection.
- ⑥ Stop at the Z phase none-detection area.
- ⑦ Reverse to CCW direction and move in low speed.
- ⑧ Stop at Z phase detection.

Starting from Z phase zone

- ⑤ Start moving in low speed to the Z phase non-detection area.
- ⑥ Stop at the Z phase none-detection area.
- ⑦ Reverse to CCW direction and move in low speed.
- ⑧ Stop at Z phase detection.



12

A return direction is judged with the zone sensor (DATUM), and set the edge of Z phase encoder within the zone sensor as the origin position.



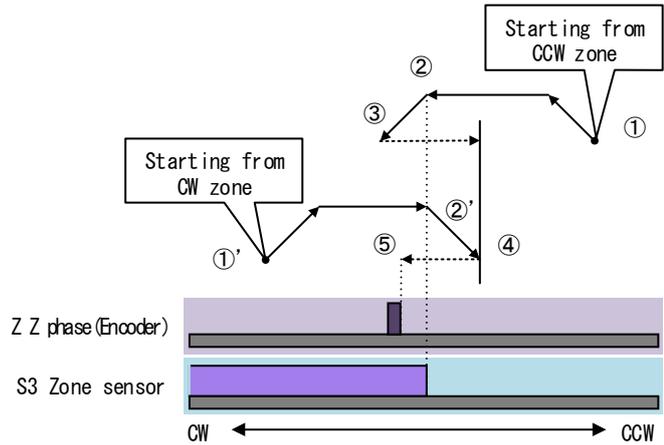
For a stage without encoder, this method cannot be selected.

Starting from CCW zone

- ① Detection starts to CW direction with trapezoidal drive.
- ② Decelerate and stop when the zone sensor is detected.
- ③ Reverse to CCW direction and move in low speed.
- ④ Reverse to CW direction after moving through zone sensor.
- ⑤ Stop at initial encoder Z phase detection after zone sensor detection.

Starting from CW zone

- ①' Detection starts to CCW direction with trapezoidal drive.
- ②' Decelerate and stop after moving through the zone sensor.
- ④ Reverse to CW direction and move in low speed.
- ⑤ Stop at initial encoder Z phase detection after zone sensor detection.



13

The edge of encoder Z phase located in origin proximity sensor (NORG) is the origin position.



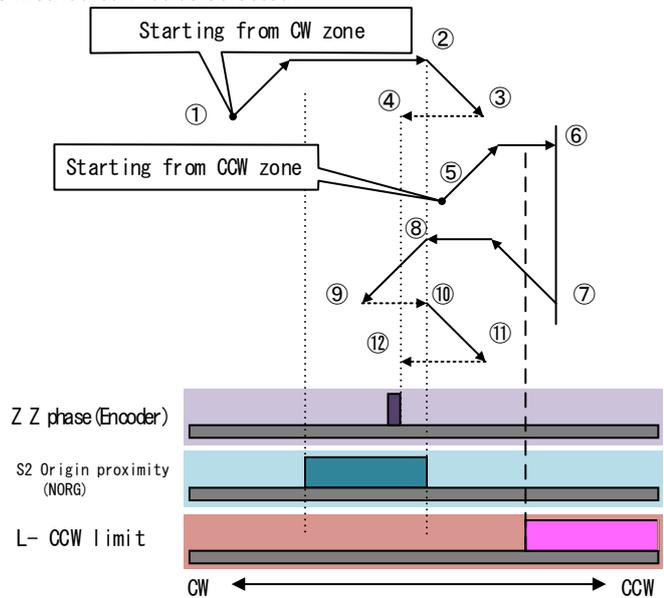
For a stage with no encoder, this method cannot be selected.

Starting from CW zone

- ① Detection starts to CCW direction with trapezoidal drive.
- ② Decelerate and stop after moving through the origin proximity.
- ③ Reverse to CW direction and move in slow speed.
- ④ After origin proximity detection, it stops at the initial encoder Z phase.

Starting from CCW zone

- ⑤ Detection starts to CCW direction with trapezoidal drive.
- ⑥ Stop when CCW limit is detected.
- ⑦ Reverse to CW direction and start trapezoidal drive.
- ⑧ Decelerate and stop after moving through the origin proximity.
- ⑨ Reverse to CCW direction and move in low speed.
- ⑩ Decelerate and stop again after moving through the origin proximity.
- ⑪ Reverse to CW direction and move in slow speed.
- ⑫ After origin proximity detection, it stops at the initial encoder Z phase detection.



14

The edge of encoder Z phase in proximity of CW limit is set to the origin position.



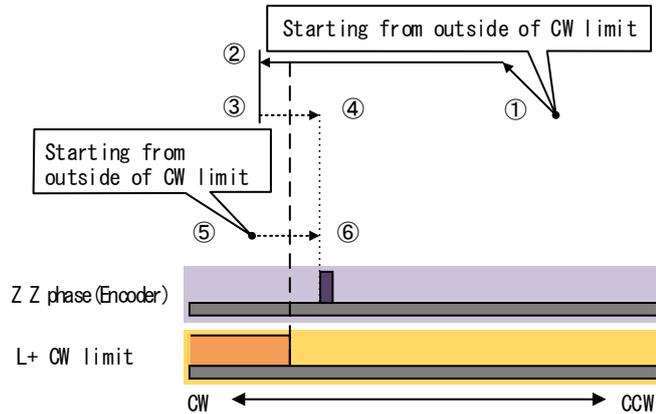
For a stage with no encoder, this method cannot be selected.

Starting from outside of CW limit

- ① Detection starts to CW direction with trapezoidal drive.
- ② Stop when CW limit is detected.
- ③ Reverse to CCW direction and move in low speed.
- ④ Stop at the initial encoder Z phase detection position after moving through the CW limit.

Starting from inside of CW limit

- ⑤ Move in low speed to CCW direction.
- ⑥ Stop at the initial encoder Z phase detection position after moving through the CW limit.



15

The edge of encoder Z phase in proximity of CCW limit is set to the origin position.



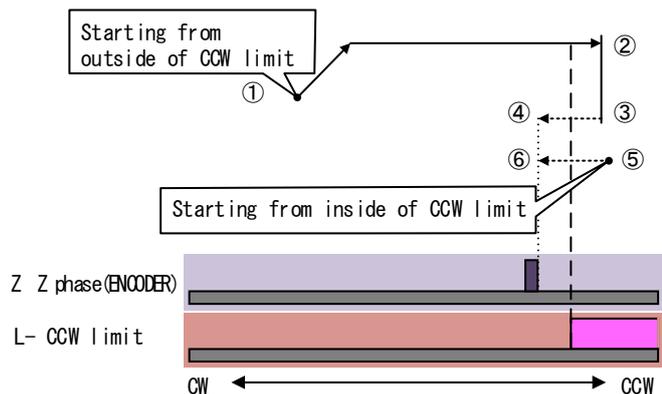
For a stage with no encoder, this method cannot be selected.

Starting from outside of CCW limit

- ① Detection starts to CCW direction with trapezoidal drive.
- ② Stop when CCW limit is detected.
- ③ Reverse to CW direction and move in low speed.
- ④ Stop at the initial encoder Z phase detection position after moving through the CCW limit.

Starting from inside of CCW limit

- ⑤ Move at low speed to CW direction.
- ⑥ Stop at the initial encoder Z phase detection position after moving through the CCW limit.



3-10. ARIES Touch Panel "PYXIS"

3-10-1. Connection and Operation

Connect PYXIS and ARIES with the exclusive PIXIS cable, and turn the power of ARIES ON. After launched, "Main" screen is displayed.

***Do not connect cables after the power is turned ON.**

Each function becomes available with the mode change button.

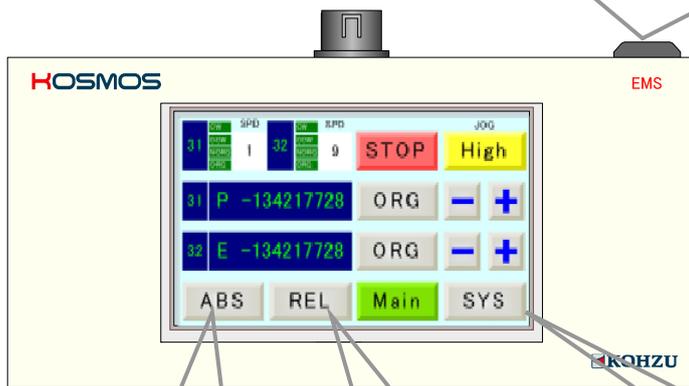
The driving method is a fixed S-shaped drive.

***When the ARIES version is before 1.1.1, some functions are different.**

For information of PYXIS before version 1.1.1, please refer to Rev 1.10 of this manual.

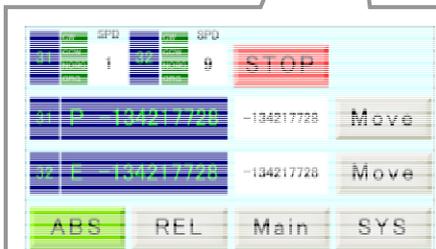
Emergency Stop Switch

Push the emergency stop switch to stop all driving axes. To release, after releasing the switch, push RESET on the touch panel.



"Main" Screen (Initial Start Screen)

Origin return and Jog operation can be performed. For details, see "3-10-2. Main Screen Details" (page 41).



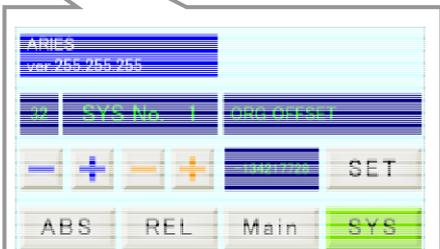
"ABS" Screen

Absolute position drive can be performed. For details, see "3-10-3. "ABS" Screen Details" (page 42).



"REL" Screen

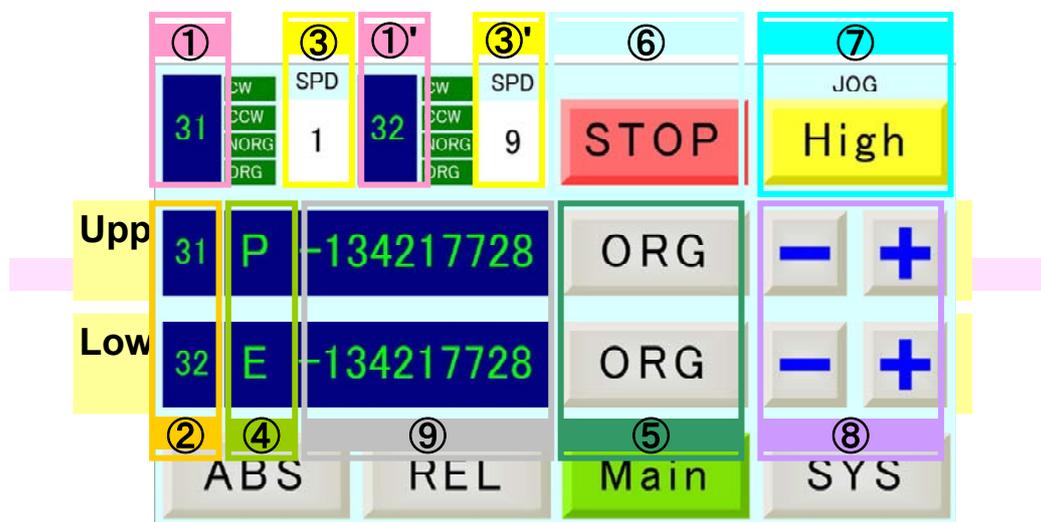
Relative position drive can be performed. For details, see "3-10-4. "REL" Screen Details" (page 42).



"SYS" Screen

Parameter setting for each axis can be performed. For details, see "3-10-5. "SYS" Screen Details" (page 43).

3-10-2. "Main" Screen Details

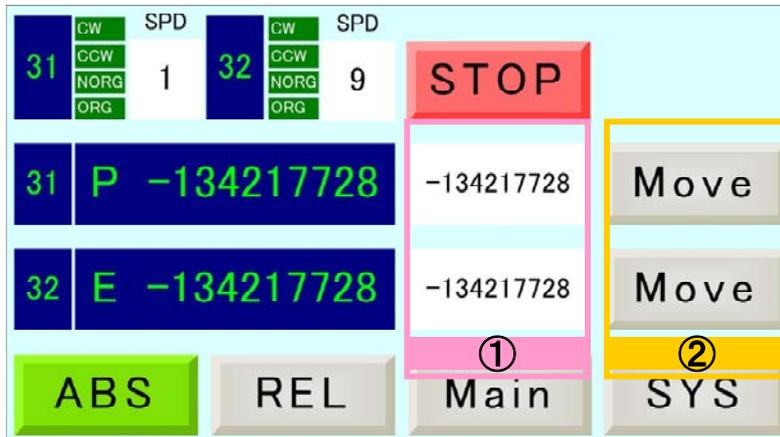


- ①①' Axis Number Cell: Touch a cell to display the numeric keypad. Axis number can be set with the numeric keypad.
- ② Axis Number Display: Numbers set in ① are displayed. ① corresponds to the upper level and ①' to the lower level.
- ③③' Speed Table Cell: Touch a cell to display the numeric keypad. Axis number can be set with the numeric keypad. ③ corresponds to the upper level and ③' to the lower level.
- ④ Position Display Mode Cell: Touch a cell to switch between P (pulse display) and E (encoder display).
- ⑤ Origin Return Button: Push the button to start origin return of applicable axes.
- ⑥ Stop Button: Stops driving axes.
- ⑦ JOG Mode Button: Displays a speed pattern in JOG mode. Touch a grid to toggle the mode through "High", "Low" and "1PLS".



- ⑧ Jog Button: Continuous drive is performed to each direction on the mode set in ⑦. Release the button to stop.
- ⑨ Position Display Cell: Touch a cell to display the numeric keypad. Use the numeric keypad to write position coordinate.

3-10-3. "ABS" Screen Details

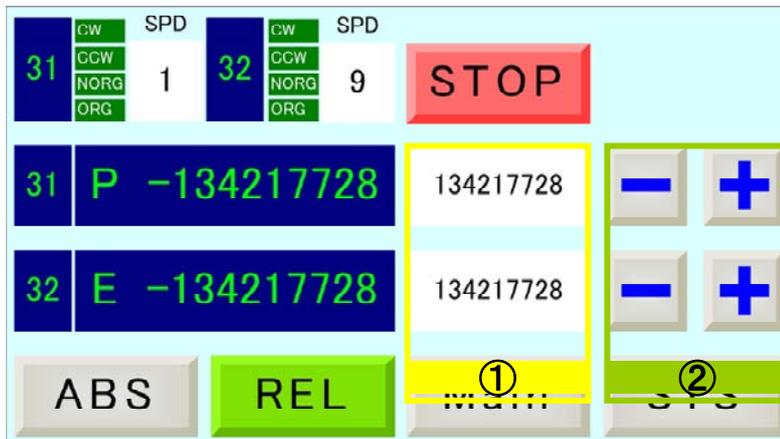


① Target Position Cell: Touch a cell to display the numeric keypad.
Target position (absolute position motor pulse management) can be set with the numeric keypad.

② Drive Button: Starts moving to the target position set in ①.

* Others are same functions with the "Main" screen.

3-10-4. "REL" Screen Details

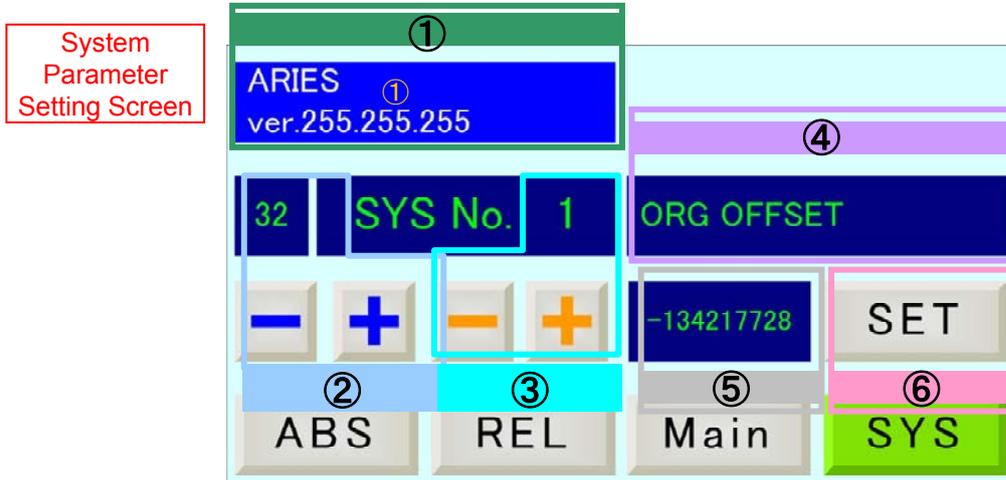


① Moving Amount Cell: Touch a cell to display the numeric keypad.
Target position (relative position motor pulse management) can be set with the numeric keypad.

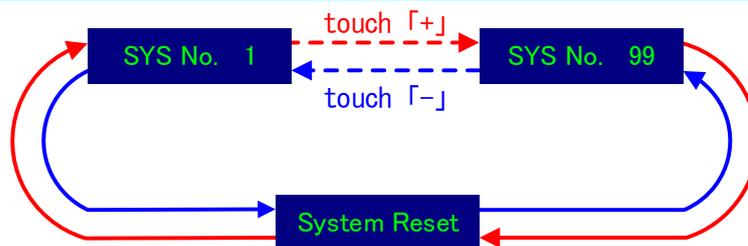
② Drive Button: Starts moving to + or - direction for the moving amount set in ①.

* Others are same functions with the "Main" screen.

3-10-5. "SYS" Screen Details



- ① ARIES Information: Displays a version of ARIES.
- ② Axis Number Cell: Touch a cell to display the numeric keypad. Axis number can be set with the numeric keypad. Also, + button and - button can be used to change the axis number.
- ③ Parameter No. Cell: Touch a cell to display the numeric keypad. Parameter numbers can be set with the numeric keypad. Also, + button and - button can be used to change the parameter number. When - is touched from SYS No.1 or + is touched from SYS No.99, it becomes the SYSTEM RESET display. When "1" is set in the screen, the corresponding axis's parameter is reset to the default value.



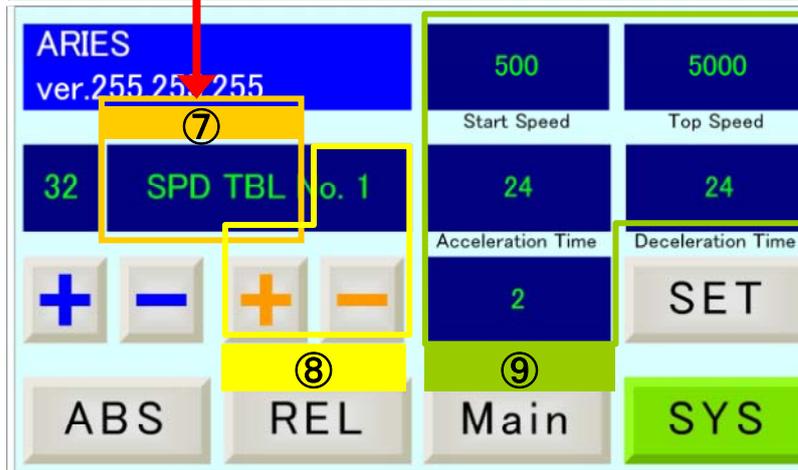
- ④ Parameter Name Display: Displays the parameter name selected in ③.
- ⑤ Parameter Set Value Cell: Touch a cell to display the numeric keypad. Parameter setting values can be set with the numeric keypad.
 - * It does not get reflected without touching the SET button.
 - Touch the SET button to write the parameters.
 - * For each parameter, see "4-6-1 System Setting List" (page 113).
- ⑥ SET Button (CAUTION): Parameter setting values changed in ⑤ are written to the system.

*Push and hold + or - button in ② or ③ to increment the number by +4 or decrement by -4.

System
Parameter
Setting Screen



Speed
Table
Setting Screen



⑦ "SYS No." and "SPD TBL No." Switch Cell:
Every time a cell is touched, the System Parameter Set Screen and the Speed Table Set Screen toggle.

⑧ Speed Table No. Cell:
Touch a cell to display the numeric keypad.
Speed table No. can be set with the numeric keypad.
Also, + button and - button can be used to make changes.
The Speed Table No.10 and 11 correspond to High and Low in Jog operation respectively.

⑨ Speed Table Parameter Cell:
Touch each cell "Start Speed", "Top Speed", "Acceleration Time", "Deceleration Time", and "Acc&Dec Pattern" to display the numeric keypad, and you can enter values.
Touch the SET button to write all speed parameters.

3-10-6. "PYXIS" Display Error List



EMG STOP

When an emergency stop signal is detected, it is displayed in the PYXIS screen.

After solving a cause of emergency stop, push the Reset button on the screen or issue the REM command to release.



Motionnet Error

Displayed when changes occur in the Motionnet device configuration like some of LYNX powers become OFF while axes are driving.

Push the Reset button on the screen or issue the RAX command to release.



DRIVE ERROR

Displayed when driving stops by error stopping like a limit signal detection, etc.



DURING DRIVE

Displayed when a drive command is provided to driving axes again.



RANGE OUTSIDE

Displayed when a value outside the setting range in each setting parameter is attempted to input.

Push the reset button, and enter a correct value.



SOFT LIMIT OVER

Displayed when driving stops because a soft limit is reached.

3-11. General I/O

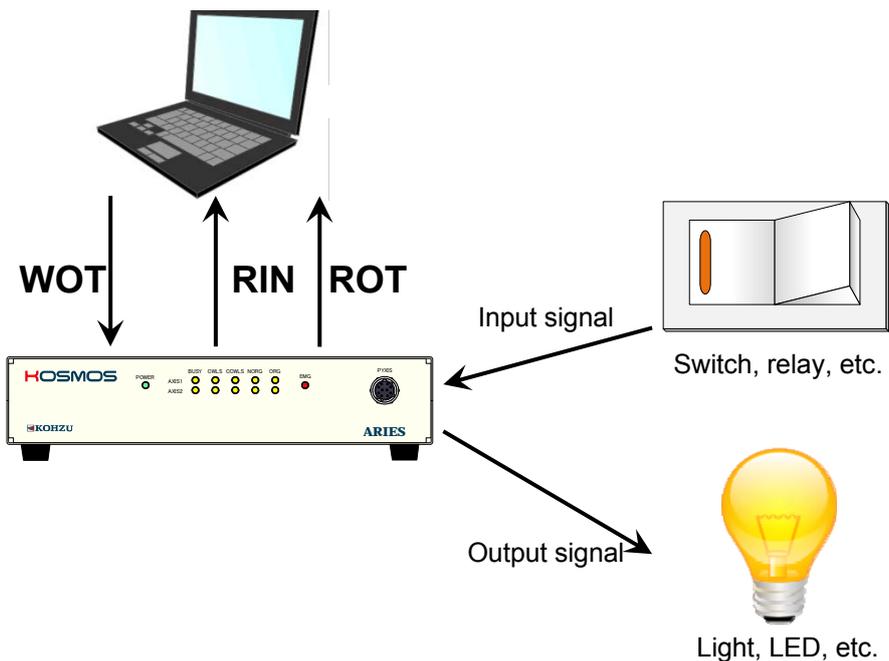
For ARIES, digital interface with eight input terminals and eight output terminals are prepared for general I/O.

Using the input terminals, relays for various control circuits, and condition of operation switches, measurement devices, etc. can be read. The output terminals can be used for interface of lights, LED, and relay control output.

Input/output signal controls of the general I/O are conducted by commands from PC or PYXIS.

For details, see **RIN** (page 76), **ROT** (page 80), and **WOT** (page 101) in "4.4. Command Details".

*For connectible devices, see "5-1. Specification" (page 122) and "5-3. Input/Output Signal Circuit Diagram" (page 128), and select supported devices.



4. Remote Control

4-1. Proceeding with Installation and Preparation

To control from a computer, this device supports Ethernet (TCP/IP) and RS-232C communication. For communication method selection, see "2-4. Rotary Switch for Communication Setting" (page 15).

RS-232C Communication:

Select the communication method while the power is OFF.

(Depending on the communication speed to use the rotary switch for communication setting, set to 0 to 4)

Connect a RS-232C cable (**cross cable**) to the RS-232C connector.

Ethernet(TCP/IP) Communication:

Select the communication method while the power is OFF.

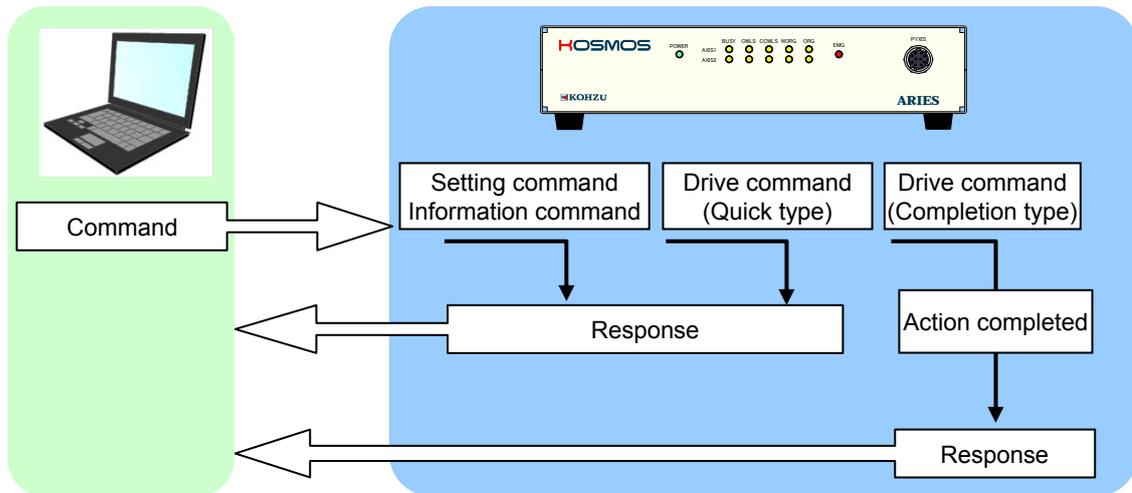
(Set the rotary switch for communication setting to 5)

Connect a LAN cable (**straight cable and cross cable**) (CAT5e or above is recommended) to the LAN port.

4-1-1. Transmitting/Receiving

The controller returns one response for one sent command.

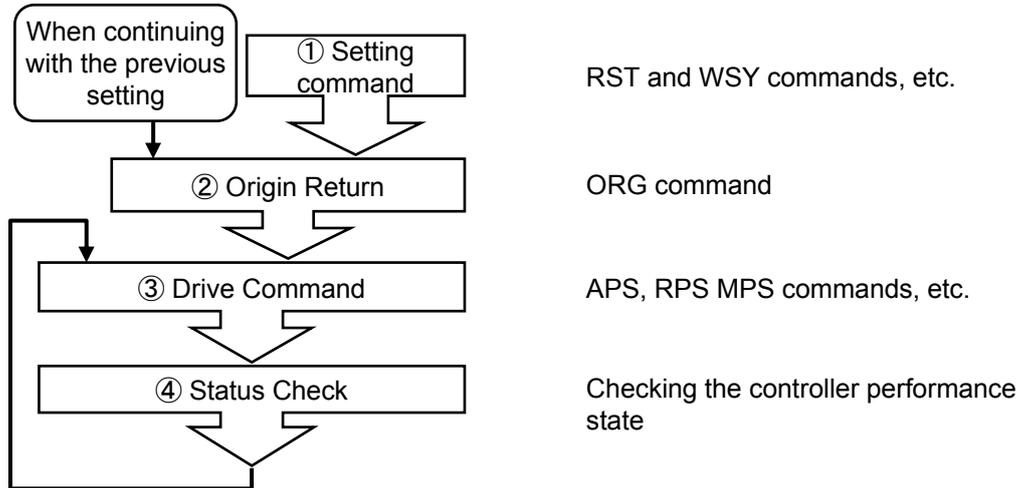
The response timing varies according to the type of command or selection of response method.



- ① **Setting command** The commands as **RST** and **WSY** used for setting immediately return a response.
- ② **Drive command** For drive-related commands, one of 2 types of response method can be selected.
 - 1.Returns a response after completion of operation. (Completion type)
 - 2.Returns a response immediately after receiving a command. Completion of operation can be checked with the **STR** (status check) command. (Quick type)
- ③ **Information command** Requested information are returned for a command.

4-1-2, Remote Control Procedures

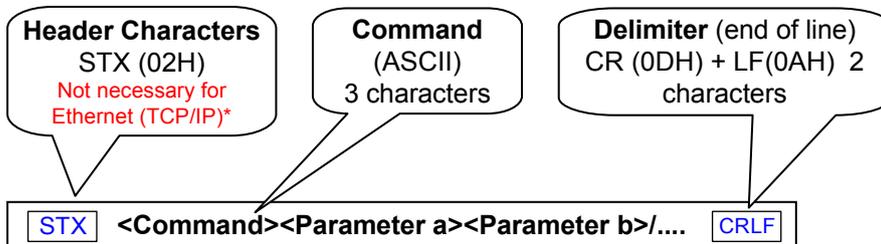
When using for the first time and using by changing settings, it is necessary to send the setting command first.



4-1-3. Command Format

Generally, a command consists of header characters (STX) and command, parameters and delimiter (CRLF).

General Command



*If header characters are used for Ethernet (TCP/IP), it becomes a command error.

| | | | | | | | | | | | |
|-------------|-------|----|----|----|----|----|----|----|----|----|--------|
| Sequence | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11, 12 |
| Command | [STX] | W | R | P | 2 | / | 1 | 0 | 0 | 0 | [CRLF] |
| Hexadecimal | 02 | 57 | 52 | 50 | 32 | 2F | 31 | 30 | 30 | 30 | 0D,0A |



Characters which can be used in a command are numerical values (0 to 9), upper case alphabet (A to Z) and symbols (/ , ?).



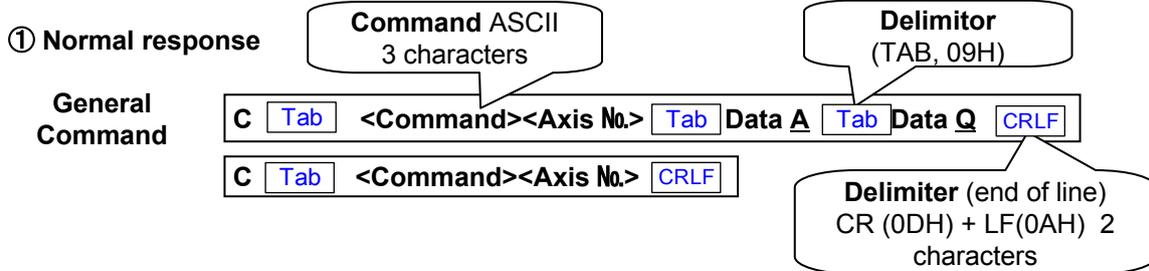
A space (20H) cannot be used in a command.



Parameter is always required. It cannot be omitted.

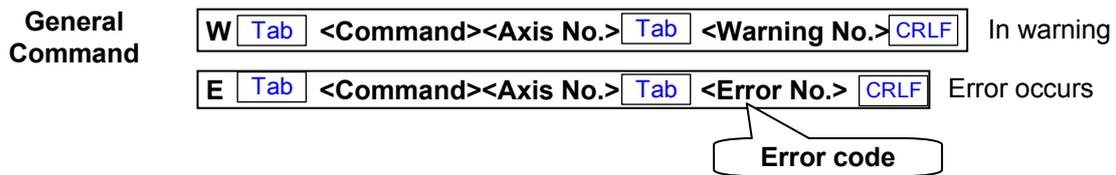
4-1-4. Response

Format for response is as follows. When an error occurs, error response is returned.
Because a response is different per command, see the page of each command for details.



For multiple response data, they are separated by TAB.

② Error response



③ Spontaneous transmission

ARIES spontaneously transmits an error code or warning code to PC for the following cases.

Transmission Causes of Error Code

- An emergency stop signal is detected (Error No.5)
- Disconnection of any LYNX connections is verified while some axes are driving (for example, power OFF, etc.) (Error No.6)

```
E [Tab] SYS [Tab] <Error No. 5 or 6 > [CRLF] When an error occurs
```

Transmission Causes of Warning Code

- A connection of LYNX is newly detected while all axes are stopped (Warning No.51), or a connected LYNX is no longer detected (Warning No.52)

```
W [Tab] SYS [Tab] <Warning No. 51 or 52 > [CRLF] In warning
```

4-1-5. Characters to Use

Characters shown in the table below can be used for communication.

| | 0* | 1* | 2* | 3* | 4* | 5* | 6* | 7* | 8* to F* |
|----|------------|----|----------|----------|----------|----------|----|----|----------|
| *0 | x | x | x | 0 | x | P | x | x | x |
| *1 | x | x | x | 1 | A | Q | x | x | x |
| *2 | STX | x | x | 2 | B | R | x | x | x |
| *3 | x | x | x | 3 | C | S | x | x | x |
| *4 | x | x | x | 4 | D | T | x | x | x |
| *5 | x | x | x | 5 | E | U | x | x | x |
| *6 | x | x | x | 6 | F | V | x | x | x |
| *7 | x | x | x | 7 | G | W | x | x | x |
| *8 | x | x | x | 8 | H | X | x | x | x |
| *9 | Tab | x | x | 9 | I | Y | x | x | x |
| *A | LF | x | x | x | J | Z | x | x | x |
| *B | x | x | + | x | K | x | x | x | x |
| *C | x | x | x | x | L | x | x | x | x |
| *D | CR | x | - | x | M | x | x | x | x |
| *E | x | x | . | x | N | x | x | x | x |
| *F | x | x | / | ? | O | x | x | x | x |



Lower letters (a to z) cannot be used.

4-2. Ethernet (TCP/IP) Communication

The host function/client function/Telnet function can be selected (ARIES version 1.4.0 or later)

Default setting on each item required for setting Ethernet (TCP/IP) and available commands are shown in the list next.

Ethernet (TCP/IP) related setting item list

| Function | Default setting | Command | |
|---|---|---------|------|
| | | Write | Read |
| Host/Client/Telnet setting | Host (Set value 0) | WHC | RHC |
| Set IP Address of ARIES | 192.168.1.120 | WIP | RIP |
| Set subnet mask | 255.0.0.0 | WSN | RSN |
| Set a port number* | 12321 | WPT | RPT |
| Client limit setting | No limit (Set value of client No.1 777.0.0.0) | WCL | RCL |
| Specify the host IP address | 192.168.1.102 | PIP | RPI |
| Set the default gateway | Not setting (Set value 999.0.0.0) | WGW | RGW |
| Set a password (Write only) | KOSMOS | WPS | - |
| Set a number of application connections | 32 | WAP | RAP |

*The port number when ARIES is setting a host, and the port number when setting a client are the same.

4-2-1. Flow from Ethernet (TCP/IP) Related Parameter Setting to Connection

Depending on selection on the host function/client function/Telnet function, necessary setting items are different.

For each parameter setting, it is recommended to connect a LAN cable directly to PC or use the method to do with RS-232C communication.

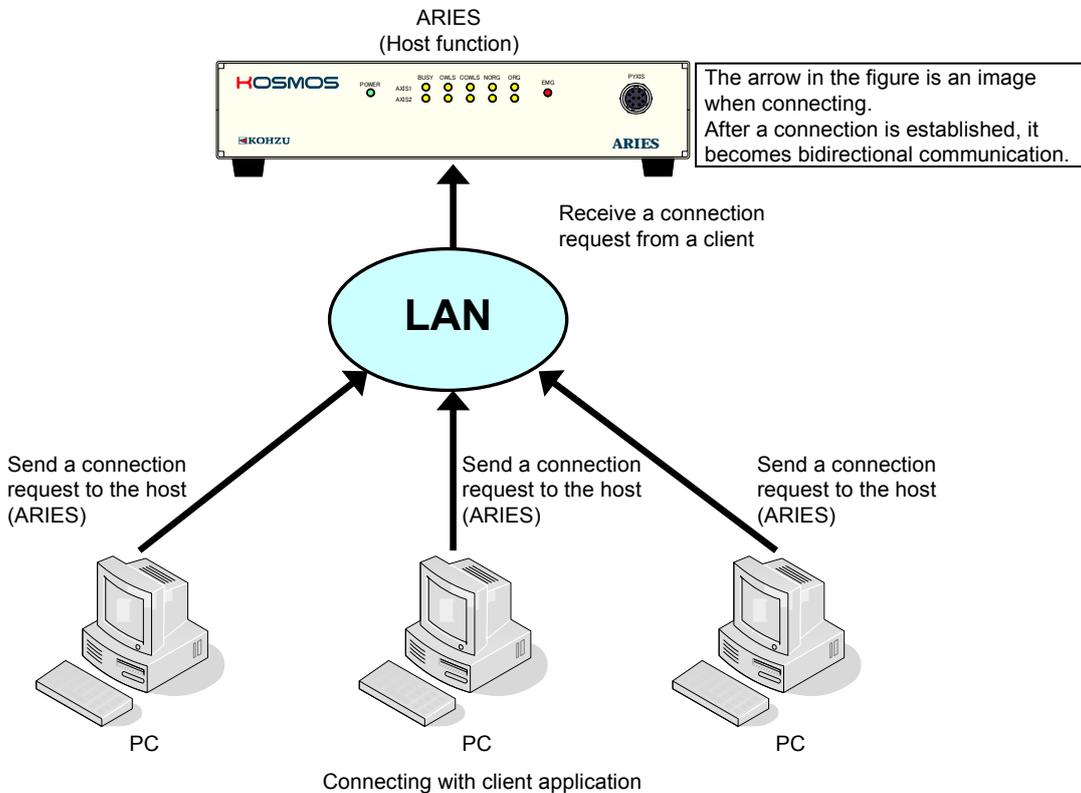
Setting steps when ARIES is a host

When ARIES is set as a host, ARIES waits for a connection request from a client.

Also, connection is possible with multiple clients

(Client limit can be set with the **WCL** command).

Connection image for when ARIES is a host



Setting steps

- ① Select the host function with the **WHC** command. (Default is set)
- ② Set the IP address of ARIES with the **WIP** command.
- ③ As necessary, set a port number, subnet mask, default gateway, client limit, and a number of connection applications.
- ④ Connect with the client application.

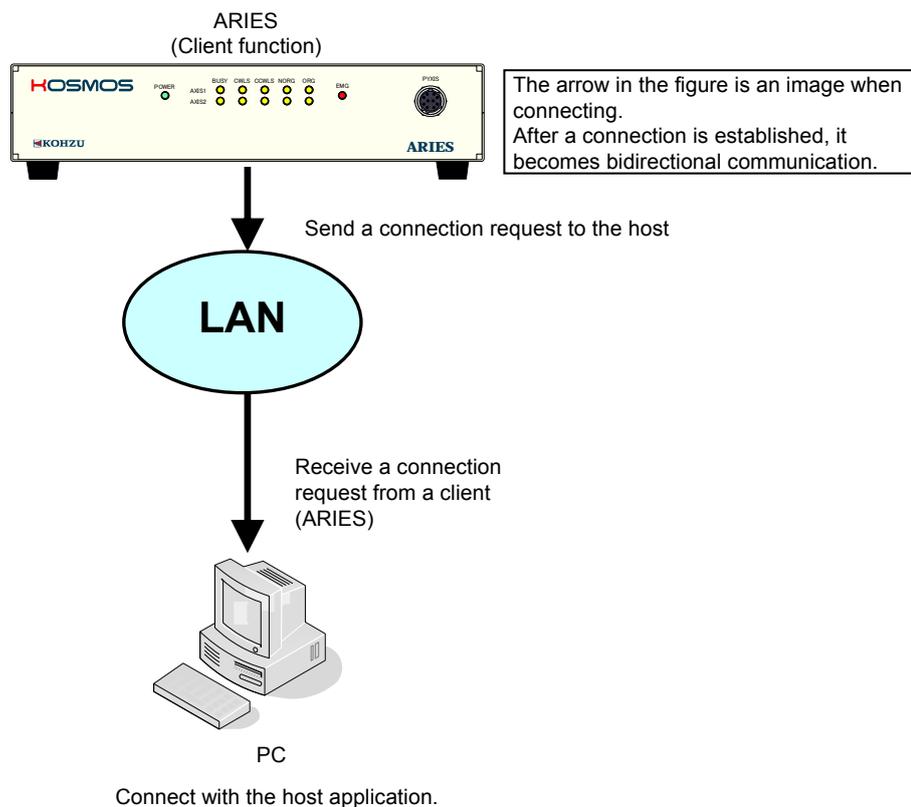
The port number of ARIES is the value set with the **WPT** command. (Default value 12321)

For client application, perform a connection request for the ARIES' port number. (In case of host mode)

Setting steps when ARIES is a client

When ARIES is set as a client, ARIES keeps sending a connection request for the host PC.
Only one host PC can control ARIES.

Connection image when ARIES is a client



Setting steps

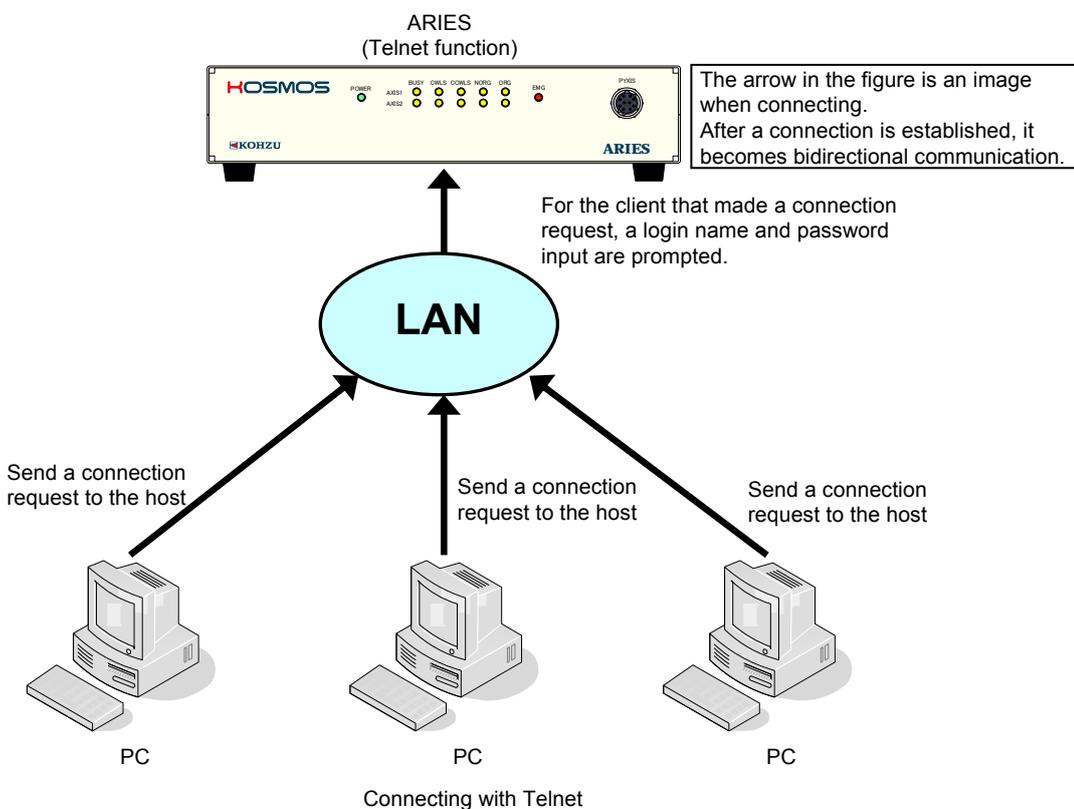
- ① Select the client function with the **WHC** command.
- ② Select the IP address of ARIES with the **WIP** command.
- ③ Specify the IP address of ARIES' connection destination (PC) with the **PIP** command.
- ④ As necessary, set a port number, subnet mask, default gateway, and a number of connection applications.
- ⑤ Connect with the host application.

The port number of ARIES is the value set with the **WPT** command. (Default value 12321)
For the port number of client application, set to the port number that ARIES performs a connection request.

Setting steps When ARIES is Telnet

When ARIES is set as a Telnet, ARIES waits for a connection request from a client just like at the host function, the application to connect is limited to Telnet.
When a connection request comes from a client with Telnet, a prompt for login name and password input is displayed.
Also, connection is possible with multiple clients. (Client limit can be set with the **WCL** command)

Connection image when ARIES is Telnet



Setting steps

- ① Select the Telnet function with the **WHC** command. (Port number 23 is used)
- ② Set the IP address of ARIES with the **WIP** command.
- ③ As necessary, set subnet mask, default gateway, client limit, a number of connection applications, and password.
- ④ Execute connection with Telnet.
Connect with a login name "USER" and password "KOSMOS" (default), and disconnect with "bye".
*Please maintain the maximum security for password.

4-2-2. Cautions when Multiple Clients are Connected

- **Sending destination of the ARIES response**

When a command is received from a client with ARIES while multiple clients are connected, a response is sent for the sending source's client.

- **Code sending destination that ARIES sends spontaneously**

ARIES has a function to send error code or warning code spontaneously when detecting an emergency stop signal.

(See "4-5-1. Error Code and Warning Code List" (page 111))

When multiple clients are connected, a code sent from ARIES spontaneously is sent to all connected clients.

- **Cases when a response is not returned**

Even when a driving command that response is set to the complete method is published, no response is returned to the client that issued a driving command if other clients stop the applicable axis.

- **Number of application connections**

The maximum number of application connections is 32 regardless of the number of client connections.

It becomes no response for the 33rd or later application connection.

4-2-3. Other Cautions

- **Activation of Telnet**

In Windows, it is necessary to activate the Telnet function of Windows.

- **Telnet connection with th host function**

It is possible to perform Telnet connection with the host function if the port number is set to 23. However, a login name and password are not prompted. (Client limit setting is recommended)

4-3. Command List

The commands that can be used in ARIES are shown in the table below. For details, see a page of each command.

| Command | | | Page |
|----------------|-------------|---|--------------------|
| Type | Description | Function | |
| SYS setting | MPI | Multi-axis Simultaneous Drive Speed Setting | 61 |
| | RST | System reset | 85 |
| | WSY | System setting Write | 107 |
| Drive | APS | Absolute Position Drive | 58 |
| | FRP | Free Rotation Drive | 59 |
| | MPS | Multi-axis Simultaneous Drive | 62 |
| | ORG | Origin Return Drive | 64 |
| | OSC | Repeated Oscillation Movement | 65 |
| | RPS | Relative Position Drive | 82 |
| | SPS | Linear Interpolation Drive | 89 |
| | STP | Motor Stop | 90 |
| | Coordinate | RDE | Encoder Value Read |
| RDP | | Present Position Read | 72 |
| WRE | | Encoder Value Write | 104 |
| WRP | | Present Position Write | 105 |
| Information | IDN | Version Read | 60 |
| | RAX | Device Configuration Read | 69 |
| | ROG | Origin Return Check | 79 |
| | RSY | System Setting Read | 87 |
| | STR | Status Read | 91 |
| Speed Table | RTB | Speed Table Read | 88 |
| | WTB | Speed Table Write | 108 |
| General I/O | RIN | General Input Read | 76 |
| | ROT | General Output Read | 80 |
| | WOT | General Output Write | 101 |
| Emergency Stop | REM | Emergency Stop Release | 73 |
| Servo | RAL | Alarm Reset Signal Output | 67 |
| | RSV | Servo Related Status Read | 86 |
| Trigger | TFR | Optional Timing Trigger Output | 93 |
| | TRS | Trigger Signal Output Select | 94 |

■ :Drive command
■ :Setting command (Write)
■ :Setting command (Read)

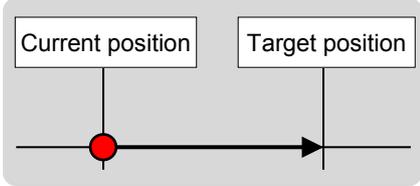
| Command | | | Page |
|------------|-----------------------|--|------|
| Type | Description | Function | |
| TCP/IP | PIP | Specify IP Address of Host PC Write | 66 |
| | RAP | Set a number of application connections Read | 68 |
| | RCL | Set Client Limit Read | 70 |
| | RGW | Set Default Gateway Read | 74 |
| | RHC | Set Host/client/Telnet Read | 75 |
| | RIP | Set IP Address of ARIES Read | 77 |
| | RMC | Set MAC AddressRead | 78 |
| | RPI | Specify Host IP Address Read | 81 |
| | RPT | Set Port Number Read | 83 |
| | RSN | Set Subnet Mask Read | 84 |
| | WAP | Set Number of Application Connection Write | 95 |
| | WCL | Set Client Limit Write | 96 |
| | WGW | Set Default Gateway Write | 98 |
| | WHC | Set Host/client/Telnet Write | 99 |
| | WIP | Set IP Address of ARIES Write | 100 |
| | WPS | Set Telnet Password Write | 102 |
| | WPT | Set Port Number* Write | 103 |
| WSN | Set Subnet Mask Write | 106 | |

■ :Drive command
■ :Setting command (Write)
■ :Setting command (Read)

4-4. Command Details

The commands that can be used in ARIES are shown next. (Alphabetical order)

***The header characters (STX) are not required for Ethernet (TCP/IP).**

| APS | Absolute Position Drive | | | | | | | | | | | | | | | | | | | | |
|---|---|------------------------------|---------------|---------|---|-------|---|---|--|---|-----------------|--------|--|---|-----------------|------------------------------|--|---|-----------------|----------------------------|--|
| <p>【Function】 Moves to a target position with absolute position management.</p> | | | | | | | | | | | | | | | | | | | | | |
| <p>【Format】 STX APS a/b/c/d CRLF</p> <p style="text-align: center;">No. of parameters = 4</p> |  | | | | | | | | | | | | | | | | | | | | |
| <p> A space cannot be used between characters. No parameter can be omitted.</p> | | | | | | | | | | | | | | | | | | | | | |
| <p>Command parameters</p> | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #ADD8E6;"> <th style="width: 10%;"></th> <th style="width: 30%;">Function</th> <th style="width: 30%;">Setting</th> <th style="width: 30%;">Remarks</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">a</td> <td>Axis No.</td> <td style="text-align: center;">1 to 32</td> <td></td> </tr> <tr> <td style="text-align: center;">b</td> <td>Speed table No.</td> <td style="text-align: center;">0 to 9</td> <td></td> </tr> <tr> <td style="text-align: center;">c</td> <td>Movement amount</td> <td style="text-align: center;">-134,217,728 to +134,217,727</td> <td></td> </tr> <tr> <td style="text-align: center;">d</td> <td>Response method</td> <td style="text-align: center;">0: When completed 1: Quick</td> <td></td> </tr> </tbody> </table> | | | Function | Setting | Remarks | a | Axis No. | 1 to 32 | | b | Speed table No. | 0 to 9 | | c | Movement amount | -134,217,728 to +134,217,727 | | d | Response method | 0: When completed 1: Quick | |
| | Function | Setting | Remarks | | | | | | | | | | | | | | | | | | |
| a | Axis No. | 1 to 32 | | | | | | | | | | | | | | | | | | | |
| b | Speed table No. | 0 to 9 | | | | | | | | | | | | | | | | | | | |
| c | Movement amount | -134,217,728 to +134,217,727 | | | | | | | | | | | | | | | | | | | |
| d | Response method | 0: When completed 1: Quick | | | | | | | | | | | | | | | | | | | |
| <p>【Response】 Returns status information. *Return timing varies depending on the response method.</p> | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #FFD700;"> <th style="width: 15%;">Status</th> <th>Response data</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Normal</td> <td>C Tab APS <Axis No.> CRLF</td> </tr> <tr> <td rowspan="2" style="text-align: center;">Error</td> <td>W Tab APS <Axis No.> Tab <Warning No.> CRLF</td> </tr> <tr> <td>E Tab APS <Axis No.> Tab <Error No.> CRLF</td> </tr> </tbody> </table> | | Status | Response data | Normal | C Tab APS <Axis No.> CRLF | Error | W Tab APS <Axis No.> Tab <Warning No.> CRLF | E Tab APS <Axis No.> Tab <Error No.> CRLF | | | | | | | | | | | | | |
| Status | Response data | | | | | | | | | | | | | | | | | | | | |
| Normal | C Tab APS <Axis No.> CRLF | | | | | | | | | | | | | | | | | | | | |
| Error | W Tab APS <Axis No.> Tab <Warning No.> CRLF | | | | | | | | | | | | | | | | | | | | |
| | E Tab APS <Axis No.> Tab <Error No.> CRLF | | | | | | | | | | | | | | | | | | | | |
| <p>For <Error No.> and <Warning No.>, see "4-5. Error Code" (page 110).</p> | | | | | | | | | | | | | | | | | | | | | |
| <p>【Example】 Moves No.1 axis with speed table No.0 to 1,000 pulses position.</p> | | | | | | | | | | | | | | | | | | | | | |
| STX APS1/0/1000/0 CRLF | | | | | | | | | | | | | | | | | | | | | |
| <p>【Remarks】</p> | | | | | | | | | | | | | | | | | | | | | |
| <p> A stop during driving is done with the STP command.</p> | | | | | | | | | | | | | | | | | | | | | |

FRP

Free Rotation Drive

【Function】 Performs continuous driving until the stop command (STR) is issued.

【Format】 `STX FRP a/b/c CRLF` No. of parameters = 3



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|--------------------|----------------------------------|---------|
| a | Axis No. | 1 to 2 | |
| b | Speed table No. | 0 to 9 | |
| c | Rotating direction | 0: CW direction 1: CCW direction | |

【Response】 Returns status information. *Returns immediately after receiving the command.

| Status | Response data |
|--------|--|
| Normal | <code>C Tab FRP <Axis No.> CRLF</code> |
| Error | <code>E Tab FRP <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Example】

Performs free rotation drive on No.1 axis to CW direction with speed table No.0.

`STX FRP1/0/0 CRLF`

【Remarks】



A stop during driving is done with the STP command.

IDN

Version Read

【Function】 Returns the model name of the controller body and the version of the program.

【Format】 `STX IDN CRLF` No. of parameters = 0

【Response】

| Status | Response data |
|--------|--|
| Normal | <code>C Tab IDN Tab <Model name> Tab <Major version> Tab <Minor version> Tab <Release version> CRLF</code> |

【Response example】 `C Tab IDN Tab ARIES Tab 1 Tab 0 Tab 0 CRLF`

Major version: Main program version information

Minor version: Information on specification addition and changed program version information

Release version: Other program version information

MPI

Multi-axis Position Drive Speed Setting

【Function】 Sets a drive method and speed necessary for the multi-axis simultaneous drive (MPS) command.

【Format】 `STX MPI a/b/c/d CRLF` No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|---|---------|
| a | Designated MPS axis 1 to 4 | |
| b | Axis No. 1 to 32 | |
| c | Driving Type 0: Absolute position drive 1: Relative position drive | |
| d | Speed Table 0 to 9 | |

【Response】 Returns status information. *Returns immediately after receiving the command.

| Status | Response data |
|--------|--|
| Normal | <code>C Tab MPI Tab <Axis No.> CRLF</code> |
| Error | <code>E Tab MPI Tab <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

*Backup of set parameters is not performed if the power is turned OFF.

*When using the MPS command after turning the power ON, always set axis information with the MPI command.

Setting contents of MPI are valid until writing is performed next time.

MPS

Multi-axis Position Drive

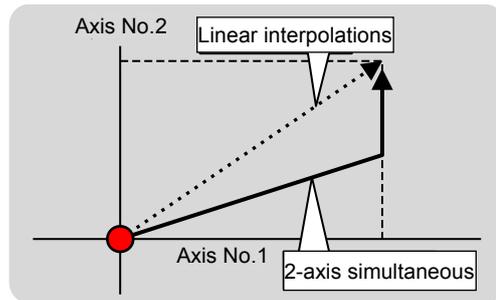
1/2

【Function】

Performs simultaneous drive up to 4 axes.

【Explanation】

In the Multi-Axis Position Drive (MPS), when moving speed differs, time to take for moving differs also, and its orbit is a folding line as shown in the figure on the right.



【Format】

MPS a/b/c/d/i

Specifying for 2-axis No. of parameters = 5

MPS a/b/c/d/e/f/i

Specifying for 3-axis No. of parameters = 7

MPS a/b/c/d/e/f/g/h/i

Specifying for 4-axis No. of parameters = 9



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|--------------------------|--|
| a | 1st axis No. | 1 to 4 Specified with the MPI command |
| b | 1st axis target position | -134,217,728 to +134,217,727 * |
| c | 2nd axis No. | 1 to 4 Specified with the MPI command |
| d | 2nd axis target position | -134,217,728 to +134,217,727 * |
| e | 3rd axis No. | 1 to 4 Specified with the MPI command |
| f | 3rd axis target position | -134,217,728 to +134,217,727 * |
| g | 4th axis No. | 1 to 4 Specified with the MPI command |
| h | 4th axis target position | -134,217,728 to +134,217,727 * |
| i | Response method | 0: When completed 1: Quick |

*In case of the relative position drive method, set the moving target position within a range that the difference with the current position does not exceed -134,217,728 to +134,217,727.

【Remarks】



A stop during driving is conducted with the STP command.

【Response】 Returns status information.*

*Return timing varies depending on the response method.

| Status | Response data |
|--------|---|
| Normal | C [STX] MPS <1st axis No.> [CRLF] |
| Error | W [STX] MPS <1st axis No.> [STX] <Warning No.> [CRLF] |
| | E [STX] MPS <1st axis No.> [STX] <Error No.> [CRLF] |

For <Error No.> and <Warning No.>, see "4-5. Error Code" (page 110).

【Example】

To drive the 1st and 2nd axis simultaneously with the MPS command.

*When using the MPS command after turning the power ON, always set axis information with the MPI command.
Setting contents of MPI are valid until writing is performed next time.

①: Determine the 1st and 2nd axis with the MPI command, and set parameters to each MPS axis with the MPI command.

1. MPS Set the 1st axis to absolute position drive and set for moving with the speed table No.5.

MPS 1st axis = Axis No.10

[STX] MPI1/10/0/5 [CRLF]

2. MPS Set the 2nd axis to absolute position drive and set for moving with the speed table No.8.

MPS 2nd axis = Axis No.20

[STX] MPI2/20/0/8 [CRLF]

②: Execute the MPS command.

[STX] MPS1/1000/2/2000/0 [CRLF]

*Set a required number of axes with the MPI command and execute the MPS command for 3-axis simultaneous drive and 4-axis simultaneous drive.

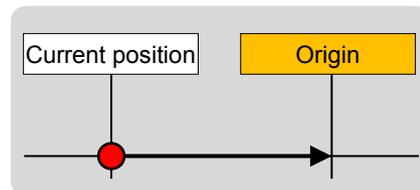
ORG

Return to Origin Drive

【Function】 Performs origin position detection according to a selected method.
15 selections are possible for origin return method.
For the origin return method, see "4-6. System Settings" (Page 113).
For details, see "3-9. Origin Return Method" (page 30).

【Format】 `[STX] ORG a/b/c [CRLF]`

No. of parameters = 3



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-----------------|----------------------------|
| a | Axis No. | 1 to 32 |
| b | Speed table No. | 0 to 9 |
| c | Response method | 0: When completed 1: Quick |

【Response】 Returns status information. *Return timing varies depending on the response method.

| Status | Response data |
|--------|---|
| Normal | C [Tab] ORG <Axis No.> [CRLF] |
| Error | E [Tab] ORG <Axis No.> [Tab] <Error No.> [CRLF] |

For <Error No.>, see "4-5. Error Code" (page 110).

【Example】

Make No.1 axis return to origin with the speed table No.5.

`[STX] ORG1/5/0 [CRLF]`

【Remarks】



A stop during driving is done with the STP command.

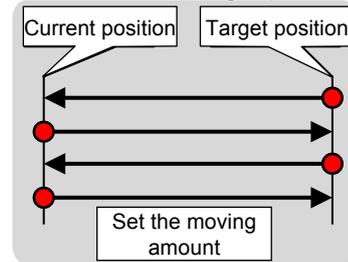
OSC

Repetitive Oscillation Drive

【Function】 Oscillation movement is performed between the current and target position.

【Format】 `STX` OSC `a/b/c/d/e/f` `CRLF`

No. of parameters = 6



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks | |
|----------|---------------------|------------------------------|--------------|
| a | Axis No. | 1 to 32 | |
| b | Speed table No. | 0 to 9 | |
| c | Movement amount | -134,217,728 to +134,217,727 | |
| d | No. of oscillations | 1 to 65,534 | |
| e | Stop time | 0 to 65,534 [msec] | See * below. |
| f | Response method | 0: When completed 1: Quick | |

*Stop time is valid in unit of 10msec.

Deviation for stop time is +10msec at maximum.

【Response】 Returns status information.* Return timing varies depending on the response method.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> OSC <code><Axis No.></code> <code>CRLF</code> |
| Error | <code>W</code> <code>Tab</code> OSC <code><Axis No.></code> <code>Tab</code> <code><Warning No.></code> <code>CRLF</code> |
| | <code>E</code> <code>Tab</code> OSC <code><Axis No.></code> <code>Tab</code> <code><Error No.></code> <code>CRLF</code> |

For `<Error No.>` and `<Warning No.>`, see "4-5. Error Code" (page 110).

【Remarks】



A stop during driving is done with the STP command.

PIP

Specifying IP Address of Host Write

【Function】 Sets IP address of a host PC that ARIES connects to.
Default is "192,168,1,102".

【Format】 `STX` PIP `a/b/c/d` `CRLF` No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|----------|
| a | Address1 | 0 to 255 |
| b | Address2 | 0 to 255 |
| c | Address3 | 0 to 255 |
| d | Address4 | 0 to 255 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> PIP <code>Tab</code> a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> PIP <code>Tab</code> a <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

RAL

Alarm Reset Signal Output

【Function】 Outputs alarm reset signal. (for servo driver)

【Format】 `STX RAL a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------|
| a | Axis No. | 1 to 32 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RAL a CRLF</code> |
| Error | <code>E Tab RAL a Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

RAP

No. of Application Connections Setting Read

【Function】 Reads the setting on the number of application connections.

【Format】 `STX RAP CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RAP Tab a CRLF</code> |
| Error | <code>E Tab RAP Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|-----------------------------------|---------|
| a | Number of application connections | 1 to 32 |

RAX

Device Configuration Read

【Function】 Reads a number of connected axes and devices that can be controlled.

【Format】 `[STX] RAX [CRLF]` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C [Tab] RAX [Tab] a [Tab] b [Tab] c01 c02 c03 c04 c05 c06 c07 c08 [Tab]</code> <code>c09 c10 c11 c12 c13 c14 c15 c16 [Tab] c17 c18 c19 c20 c21 c22 c23 c24 [Tab]</code> <code>c25 c26 c27 c28 c29 c30 c31 c32 [Tab] c33 c34 c35 c36 c37 c38 c39 c40 [Tab]</code> <code>c41 c42 c43 c44 c45 c46 c47 c48 [Tab] c49 c50 c51 c52 c53 c54 c55 c56 [Tab]</code> <code>c57 c58 c59 c60 c61 c62 c63 c64 [CRLF]</code> |
| Error | <code>E [Tab] RAX [Tab] <Error No.> [CRLF]</code> |

ARIES before Program Version 1.1.1 has response data a and b only.

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|---------------------------------------|------------------------------------|
| a | Total number of devices | 2 to 64 |
| b | Number of axes that can be controlled | 2 to 32 |
| cXX | Device function (XX=01 to 64) | 0: No connection 1: Axis device |

c01 to c32 are for ARIES and LYNX, and c33 to c64 are for option products.

【Example】

When ten LYNX are connected to ARIES (Total: 22 axes) and the Device No. settings of LYNX are 02, 04, 06, 08, 0A, 0C, 0E, 10, 12, and 14, the RAX command responses are as follows.

```
C RAX 22 22 11111111 11111111 11111100 00000000
00000000 00000000 00000000 00000000
```

For details, see "2-5. Device No. Setting Switch" (page 16).

RCL

Client Restriction Setting Read

【Function】 Reads a client's IP address restriction to connect at Telnet or Ethernet (TCP/IP) function of ARIES is a host.

【Format】 `STX RCL a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|------------|---------|
| a | Client No. | 1 to 5 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RCL Tab a Tab b Tab c Tab d Tab e CRLF</code> |
| Error | <code>E Tab RCL Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|------------|--|
| a | Client No. | 1 to 5 |
| b | Address1 | 0 to 255, 777, 999 See "Setting for 777 and 999" below. |
| c | Address2 | 0 to 255 |
| d | Address3 | 0 to 255 |
| e | Address4 | 0 to 255 |

【Setting for 777 and 999】

- When 777 is set on Address1 for Client No.1, the limitation on the client is "None". (Default setting)
- When not using a corresponding client No. Address1 is "999".

RDE

Encoder Value Read

【Function】 Reads the connected encoder value.

【Format】 `STX RDE a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------|
| a | Axis No. | 1 to 32 |

【Response】 Returns the current encoder value.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RDE a Tab b CRLF</code> |
| Error | <code>E Tab RDE a Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|---------------|---------|
| a | Axis No. | 1 to 32 |
| b | Encoder value | |

【Example】

Read the encoder position of No.2 axis.

Command: `STX RDE2 CRLF`



Response: `C Tab RDE2 Tab 123456 CRLF`

RDP

Current Position Read

【Function】 Reads the current motor pulse value.

【Format】 `STX RDP a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------|
| a | Axis No. | 1 to 32 |

【Response】 Returns the current motor pulse value.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RDP a Tab b CRLF</code> |
| Error | <code>E Tab RDP a Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|-------------------|---------|
| a | Axis No. | 1 to 32 |
| b | Motor pulse value | |

【Example】

Read the current position of No.2 axis.

Command: `STX RDP2 CRLF`



Response: `C Tab RDP2 Tab 123456 CRLF`

REM

Emergency Stop Release

【Function】 Releases software lock of emergency stop signal.

【Format】 `STX REM CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | C <code>Tab</code> REM <code>CRLF</code> |
| Error | E <code>Tab</code> REM <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

***Caution**

Always solve causes of emergency stop before executing REM.

RGW

Default Gateway Setting Read

【Function】 Reads the default gateway setting.

【Format】 `STX RGW CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RGW Tab a Tab b Tab c Tab d CRLF</code> |
| Error | <code>E Tab RGW Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|----------|----------|
| a | Address1 | 0 to 255 |
| b | Address2 | 0 to 255 |
| c | Address3 | 0 to 255 |
| d | Address4 | 0 to 255 |

RHC

Host/Client/Telnet Setting Read

【Function】 Reads the host/client/Telnet setting.

【Format】 `STX RHC CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RHC Tab a CRLF</code> |
| Error | <code>E Tab RHC Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|------------------------------------|-----------------------------------|---------|
| a Host/Client/Telnet setting | 0: Host 1: Client 2: Telnet | |

RIN

General Input Read

【Function】 Reads the status of general I/O input pin.

【Format】 `STX` RIN `CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | C <code>Tab</code> RIN <code>Tab</code> a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>Tab</code> e <code>Tab</code> f <code>Tab</code> g <code>Tab</code> h <code>CRLF</code> |
| Error | E <code>Tab</code> RIN <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|---------------|------------|
| a | State of IN-0 | 0:OFF 1:ON |
| b | State of IN-1 | 0:OFF 1:ON |
| c | State of IN-2 | 0:OFF 1:ON |
| d | State of IN-3 | 0:OFF 1:ON |
| e | State of IN-4 | 0:OFF 1:ON |
| f | State of IN-5 | 0:OFF 1:ON |
| g | State of IN-6 | 0:OFF 1:ON |
| h | State of IN-7 | 0:OFF 1:ON |

RIP

IP Address of ARIES Setting Read

【Function】 Reads IP address of ARIES.

【Format】 `STX` RIP `CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|--|
| Normal | <code>C</code> <code>Tab</code> <code>RIP</code> <code>Tab</code> a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> <code>RIP</code> <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| | Function | Setting | Remarks |
|---|----------|----------|---------|
| a | Address1 | 0 to 255 | |
| b | Address2 | 0 to 255 | |
| c | Address3 | 0 to 255 | |
| d | Address4 | 0 to 255 | |

RMC

MAC Address Setting Read

【Function】 Reads MAC address of the controller.

【Format】 `STX RMC CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RMC Tab a Tab b Tab c Tab d Tab e Tab f CRLF</code> |
| Error | <code>E Tab RMC Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | | Setting | Remarks |
|----------|----------|------------|---------|
| a | Address1 | AC (Fixed) | |
| b | Address2 | C6 (Fixed) | |
| c | Address3 | 98 (Fixed) | |
| d | Address4 | 0 to FF | |
| e | Address5 | 0 to FF | |
| f | Address6 | 0 to FF | |

ROG

Return to Origin Check

【Function】 Checks if origin return is complete after the power is turned ON.

【Format】 `STX` ROG `a` `CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|----------|---------|---------|
| a | Axis No. | 1 to 32 | |

【Response】 Returns status information.

| Status | Response data |
|--------|--|
| Normal | <code>C</code> <code>Tab</code> ROG <code>a</code> <code>Tab</code> <code>b</code> <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> ROG <code>a</code> <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| | Function | Setting | Remarks |
|---|---------------------|---------------------------|---------|
| a | Axis No. | 1 to 32 | |
| b | Origin Return Check | 0: Incomplete 1: Complete | |

*When emergency stop signal is input, return to origin state is reset to incomplete status.

ROT

General Output Read

【Function】 Reads the value of status in general I/O output pin.

【Format】 `STX ROT CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab ROT Tab a Tab b Tab c Tab d Tab e Tab f Tab g Tab h CRLF</code> |
| Error | <code>E Tab ROT Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|----------------|------------|
| a | State of Out-0 | 0:OFF 1:ON |
| b | State of Out-1 | 0:OFF 1:ON |
| c | State of Out-2 | 0:OFF 1:ON |
| d | State of Out-3 | 0:OFF 1:ON |
| e | State of Out-4 | 0:OFF 1:ON |
| f | State of Out-5 | 0:OFF 1:ON |
| g | State of Out-6 | 0:OFF 1:ON |
| h | State of Out-7 | 0:OFF 1:ON |

For general I/O, see "3-11. General I/O" (page 46).

RPI

IP Address of Host PC Specification Read

【Function】 Reads the specified setting of IP address of a host PC that ARIES connects to.

【Format】 `STX` RPI `CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> RPI <code>Tab</code> a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> RPI <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| | Function | Setting | Remarks |
|---|----------|----------|---------|
| a | Address1 | 0 to 255 | |
| b | Address2 | 0 to 255 | |
| c | Address3 | 0 to 255 | |
| d | Address4 | 0 to 255 | |

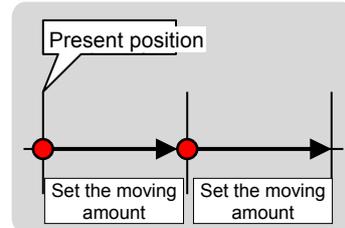
RPS

Relative Position Drive

【Function】 Moves from the present position to a position by set relative movement amount.

【Format】 `[STX] RPS a/b/c/d [CRLF]`

No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-----------------|------------------------------|
| a | Axis No. | 1 to 32 |
| b | Speed table No. | 0 to 9 |
| c | Movement amount | -134,217,728 to +134,217,727 |
| d | Response method | 0: When completed 1: Quick |

【Response】 Returns status information. *Returns immediately after receiving the command.

| Status | Response data |
|--------|--|
| Normal | <code>C [Tab] RPS <Axis No.> [CRLF]</code> |
| Error | <code>W [Tab] RPS <Axis No.> [Tab] <Warning No.> [CRLF]</code> |
| | <code>E [Tab] RPS <Axis No.> [Tab] <Error No.> [CRLF]</code> |

For <Error No.> and <Warning No.>, see "4-5. Error Code" (page 110).

【Example】

1. Move No.1 axis in speed table No.0 with 1,000 pulses.

`[STX] RPS1/0/1000/0 [CRLF]`

【Remarks】



A stop during driving is done with STP command.

RPT

Port Number Setting Read

【Function】 Reads the ARIES port number.

【Format】 `STX RPT CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | C <code>Tab</code> RPT <code>Tab</code> a <code>CRLF</code> |
| Error | E <code>Tab</code> RPT <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | | Setting | Remarks |
|----------|-------------|------------|---------|
| a | Port number | 0 to 65535 | |

RSN

Subnet Mask Setting Read

【Function】 Reads subnet mask of ARIES.

【Format】 `STX` RSN `CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> RSN <code>Tab</code> a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> RSN <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| | Function | Setting | Remarks |
|---|----------|----------|---------|
| a | Address1 | 0 to 255 | |
| b | Address2 | 0 to 255 | |
| c | Address3 | 0 to 255 | |
| d | Address4 | 0 to 255 | |

RST

System Reset

【Function】 Returns the settings inside the controller to default state (default value).

【Format】 `STX RST CRLF` No. of parameters = 0



A space cannot be used between characters. No parameter can be omitted.

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | C <code>Tab</code> RST <code>CRLF</code> |
| Error | E <code>Tab</code> RST <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Remarks】



Approx. 1sec is required to complete the reset after transmitting the RST command.

- Motor excitation ON/OFF (System No.61) and servo motor specification Yes/No (System No.62) are not reset.
- Ethernet (TCP/IP) related settings are not reset.
(See "Ethernet (TCP/IP) related setting item list" in "4-1-6. Ethernet (TCP/IP) Communication")

RSV

Servo Related Status Read

【Function】 Reads servo status.

【Format】 `STX` RSV `a` `CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------|
| a | Axis No. | 1 to 32 |

【Response】 Returns status information.

| Status | Response data |
|--------|--|
| Normal | <code>C</code> <code>Tab</code> RSV <code>a</code> <code>Tab</code> <code>b</code> <code>Tab</code> <code>c</code> <code>Tab</code> <code>d</code> <code>Tab</code> <code>e</code> <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> RSV <code>a</code> <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|--------------------|---------------|
| a | Axis No. | 1 to 32 |
| b | Servo ready | 0:OFF 1:READY |
| c | Servo ON/OFF | 0:OFF 1:ON |
| d | In position signal | 0:OFF 1:ON |
| e | Servo alarm signal | 0:OFF 1:ON |

RSY

System Setting Read

【Function】 Reads the present set value of the system parameters.

【Format】 `STX RSY a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|------------|---|
| a | Axis No. | 1 to 32 |
| b | System No. | 1 to 99 See "4-6. System Settings" (page 113). |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab RSY <Axis No.> Tab <System No.> Tab <Setting value> CRLF</code> |
| Error | <code>E Tab RSY <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Example】

1. Check the excitation output status ON/OFF of No. 1 axis.

`STX RSY1/61 CRLF` → `C Tab RSY1 Tab 61 Tab 1 CRLF` ...Excitation ON

2. Check the origin return method of No. 2 axis.

`STX RSY2/2 CRLF` → `C Tab RSY2 Tab 2 Tab 3 CRLF` ...Setting 3

RTB**Speed Table Read**

【Function】 Reads the current setting value of speed table.

【Format】 `STX` RTB `a/b` `CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|-------------------|---------|---------|
| a Axis No. | 1 to 32 | |
| b Speed table No. | 0 to 11 | |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> RTB <code>a</code> <code>Tab</code> <code>b</code> <code>Tab</code> <code>c</code> <code>Tab</code> <code>d</code> <code>Tab</code> <code>e</code> <code>Tab</code> <code>f</code> <code>Tab</code> <code>g</code> <code>Tab</code> <code>h</code> <code>Tab</code> <code>i</code> <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> RTB <code><Axis No.></code> <code>Tab</code> <code><Error No.></code> <code>CRLF</code> |

For `<Error No.>`, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|------------------------|---|--|
| a Axis No. | 1 to 32 | |
| b Speed table No. | 0 to 11 | |
| c Start speed | 1 to 2,500,000 | |
| d Top speed | 2 to 5,000,000 | |
| e Accelerating Time | 1 to 10,000 | Setting value x 10 [msec] Setting unit differs depending on maximum speed range. (See "3-1-3. Speed Setting Regulations" (page 18)). |
| f Decelerating time | 1 to 10,000 | |
| g Accelerating pattern | 1: Rectangular drive 2: Trapezoidal drive 3: S-shaped drive | |
| h Accelerating pulse | Accelerating pulse number | Number of pulses calculated from the acceleration and deceleration time setting values |
| i Decelerating pulse | Decelerating pulse number | |

SPS

Linear Interpose Drive

【Function】 Performs linear interpose drive of 2 axes or 3 axes.

【Format】 SPS a/b/c/d/g/h 2-axis interpose No. of parameters = 6

SPS a/b/c/d/e/f/g/h 3-axis interpose No. of parameters = 8



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|--------------------------|--|
| a | 1st axis No. | 1 to 32 |
| b | 1st axis target position | -134,217,728 to +134,217,727 |
| c | 2nd axis No. | 1 to 32 |
| d | 2nd axis target position | -134,217,728 to +134,217,727 |
| e | 3rd axis No. | 1 to 32 |
| f | 3rd axis target position | -134,217,728 to +134,217,727 |
| g | Speed Table | 0 to 9 1st speed setting (See * below) |
| h | Response method | 0: When completed 1: Quick |

*Speed of the 2nd and 3rd axis are automatically calculated from the 1st axis speed. When the speed of 2nd and 3rd axes exceeds the maximum speed limit value (SYS No.16), Error 606 is returned. In the case, set to raise the maximum speed limit value (SYS No.16) or lower the speed of the 1st axis.

【Response】 Returns status information.

*Return timing varies depending on the response method.

| Status | Response data |
|--------|---|
| Normal | C <input type="text" value="Tab"/> SPS <1st axis No.> <input type="text" value="CRLF"/> |
| Error | W <input type="text" value="Tab"/> SPS <1st axis No.> <input type="text" value="Tab"/> <Warning No.> <input type="text" value="CRLF"/> |
| | E <input type="text" value="Tab"/> SPS <1st axis No.> <input type="text" value="Tab"/> <Error No.> <input type="text" value="CRLF"/> |

For <Error No.> and <Warning No.>, see "4-5. Error Code" (page 110).

【Remarks】



A stop during driving is done with STP command.

STP

Motor Stop

【Function】 Stops a driving motor.

【Format】 `STX` STP `a/b` `CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|---------------------|--|---------|
| a | Axis No. | 1 to 2 | |
| b | Selecting stop mode | 0: Decelerate and stop 1: Emergency stop | |

【Response】 Returns the setting value.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> STP <Axis No.> <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> STP <Axis No.> <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

STR

Status Read

1/2

【Function】 Checks the status of each axis.

【Format】 `STX` STR a `CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------|
| a | Axis No. | 1 to 32 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C</code> <code>Tab</code> STR a <code>Tab</code> b <code>Tab</code> c <code>Tab</code> d <code>Tab</code> e <code>Tab</code> f <code>Tab</code> g <code>CRLF</code> |
| Error | <code>E</code> <code>Tab</code> STR <Axis No.> <code>Tab</code> <Error No.> <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

| Function | Setting | Remarks |
|----------|------------------------------------|---|
| a | Axis No. | 1 to 32 |
| b | Driving state | 0: Stopped 1: Operating 2: Feedback operating |
| c | EMG signal | 0:OFF 1:ON ON: Detection state |
| d | ORG & NORG signal | 0: ORG⇒OFF NORG⇒OFF 1: ORG⇒OFF NORG⇒ON 2: ORG⇒ON NORG⇒OFF 3: ORG⇒ON NORG⇒ON ON: Detection state |
| e | CW Limit & CCW limit signal | 0: CWL⇒OFF CCWL⇒OFF 1: CWL⇒OFF CCWL⇒ON 2: CWL⇒ON CCWL⇒OFF 3: CWL⇒ON CCWL⇒ON ON: Detection state |
| f | Soft limit state | 0: + Side limit > Current position > - Side limit 1: + Side limit ≤ Current position 2: Current position ≤ - Side limit |
| g | Correction allowable stop range | 0: Out of allowable range 1: Inside allowable range |

STR**Status Read**

2/2

Encoder correction related response data

Shows the state presented by a combination of status b and g per setting of SYS No.41 (Encoder feedback control method).

| | | | | |
|---|--|--|--|---|
| 0: Stopped 1: Operating 2: FB operating | 0: Out side allowable range 1: Inside allowable range | 0: No correction 1: Correct only at positioning 2: Constant correction | | |
| Status b | Status g | SYS No.41 | | |
| | | 0 | 1 | 2 |
| 0 | 0 | Motor is stopped | Motor is stopped | Stopped over the constant FB with outside allowable range and STP, etc. |
| 0 | 1 | / | FB succeeded, and the motor is stopped | Stopped over the constant FB within allowable range and STP, etc. |
| 1 | 0 | Normal operation in progress | Normal operation in progress | Normal operation in progress |
| 2 | 0 | / | FB operating | FB operating |
| 2 | 1 | / | / | Within FB allowable range and waiting |

FB = Feedback (Correction)

TFR

Optional Timing Trigger Output

【Function】 Outputs trigger signal of specified pulse width with optional timing.

【Format】 `STX TFR a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|-----------------|----------------------------|---------|
| a | Pulse width | 1 to 1,000 | [msec] |
| b | Response method | 0: When completed 1: Quick | |

【Response】 Returns the setting value.

| Status | Response data |
|--------|--|
| Normal | C <code>Tab</code> TFR <code>CRLF</code> |
| Error | E <code>Tab</code> TFR <code>Tab</code> <Error No. <code>CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

For details, see "3-4. Trigger Specification" (page 22).

TRS

Trigger Signal Output Selection

【Function】 Selects the output method of trigger signal.

【Format】 `STX TRS a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-----------------------|---|
| a | Axis No. | 1 to 2 Only ARIES connection axis |
| b | Trigger signal output | 0: Pulse synchronization output 1: BUSY signal 2: Constant speed signal 3: Output at start driving & end |

【Response】 Returns status information.

| Status | Response data |
|--------|--|
| Normal | <code>C Tab TRS <Axis No.> CRLF</code> |
| Error | <code>E Tab TRS <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

Trigger signal is only output for the first drive command after the TRS command is issued.

When outputting a trigger signal every time it drives, always issue the TRS command before the drive command.

For details, see "3-4. Trigger Specification" (page 22).

WAP

Number of Connection Applications Setting Write

【Function】 Sets the number of applications that one IP address can connect.
Default is "32".

【Format】 `STX WAP a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-----------------------------------|---------|
| a | Number of application connections | 1 to 32 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WAP CRLF</code> |
| Error | <code>E Tab WAP Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Upper limit on the number of connections】

The maximum number of application connections is 32 regardless of the number of client connections.

It becomes no response for the 33rd or later application connection.

For example, when the number of application connections on one IP address is set to 10, 10 applications can be connected until the third client; however, only up to 2 applications can be connected for the 4th client.

Because of the upper limit of number of application connections is 32, the actual number of clients that can connect to ARIES is also 32.

【Function】 Restricts a client's IP address connecting to ARIES.

【Format】 `STX WCL a/b/c/d/e CRLF` No. of parameters = 5



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|--------------|--------------------|--------------|
| a Client No. | 1 to 5 | |
| b Address1 | 0 to 255, 777, 999 | See * below. |
| c Address2 | 0 to 255 | |
| d Address3 | 0 to 255 | |
| e Address4 | 0 to 255 | |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WCL Tab a Tab b Tab c Tab d Tab e CRLF</code> |
| Error | <code>E Tab WCL Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

*"777" and "999" can be set to Address1 only for Client No.1.

When "777" is set on Address1 for Client No.1, the restriction on the client is "None".
(Default setting)

When not using a corresponding client No., set "999" for Address1.

The number of IP addresses that can be restricted is five.

【Example】

1. Allows a connection of two clients which IP address is "192.168.0.20" and "192.168.0.21", and others are not used.

Allow connections, and others are not used.

Send WCL1/192/168/0/20 ⇒ Allows a connection of address 192.168.0.20.

Send WCL2/192/168/0/21 ⇒ Allows a connection of address 192.168.0.21.

Send WCL3/999/0/0/0 ⇒ Client No.3 is not used.

Send WCL4/999/0/0/0 ⇒ Client No.4 is not used.

Send WCL5/999/0/0/0 ⇒ Client No.5 is not used.

2. No client connection restriction is applied.

Send WCL1/777/0/0/0 ⇒ No client connection restriction

Send WCL2/192/168/0/21 ⇒ Setting invalid

Send WCL3/999/0/0/0 ⇒ Setting invalid

Send WCL4/999/0/0/0 ⇒ Setting invalid

Send WCL5/999/0/0/0 ⇒ Setting invalid

No connection restriction setting has a higher priority than other settings.

When no connection restriction is set, the settings for Client No.2 to 5 are invalid.

WGW

Default Gateway Setting Write

【Function】 Sets the default gateway setting.

【Format】 `STX WGW a/b/c/d CRLF` No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------|---------------|
| a | Address1 | 0 to 255, 999 |
| b | Address2 | 0 to 255 |
| c | Address3 | 0 to 255 |
| d | Address4 | 0 to 255 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WGW Tab a Tab b Tab c Tab d CRLF</code> |
| Error | <code>E Tab WGW Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

**"999" can be set to Address1 only.

When "999" is set on Address1, it is "None". (Default setting)

WHC

Host Client Telnet Setting Write

【Function】 Sets the ARIES function (host/client/Telnet) at Ethernet(TCP/IP) communication.

【Format】 `STX WHC a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|---|-----------------------|
| a | Host/client/Telnet setting 0: Host 1: Client 2: Telnet | Default is "0: Host". |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WHC Tab a CRLF</code> |
| Error | <code>E Tab WHC Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

Login, password, and logout for Telnet connection are as follows.

Login : USER
Password : KOSMOS (Can be changed with WPS)
Logout : bye

WIP

ARIES' IP Address Setting Write

【Function】 Writes IP address of ARIES.
Default is "192,168,1,120".

【Format】 `STX WIP a/b/c/d CRLF` No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|----------|----------|---------|
| a | Address1 | 0 to 255 | |
| b | Address2 | 0 to 255 | |
| c | Address3 | 0 to 255 | |
| d | Address4 | 0 to 255 | |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WIP Tab a Tab b Tab c Tab d CRLF</code> |
| Error | <code>E Tab WIP Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

WOT

General Output Write

【Function】 Writes output status of general I/O output pin.

【Format】 `STX WOT a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|--------------------|------------|---------|
| a | General output No. | 0 to 7 | |
| b | Output status | 0:OFF 1:ON | |

【Response】 Returns the setting value.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WOT Tab a Tab b CRLF</code> |
| Error | <code>E Tab WOT Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

For general I/O, see "3-11. General I/O" (page 46).

WPS

Telnet Password Setting Write

【Function】 Sets the password for Telnet connection.

【Format】 `STX WPS a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|------------------|---|----------------------|
| a | Current password | Default current password is "KOSMOS". | Default is "KOSMOS". |
| b | New password | Eight characters or less with a combination of upper case and lower case characters, and numbers. | |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WPS Tab a Tab b CRLF</code> |
| Error | <code>E Tab WPS Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

*Please maintain the maximum security for password.

WPT

Port Number Setting Write

【Function】 Sets the ARIES port number.
Default is "12321".

【Format】 `STX WPT a CRLF` No. of parameters = 1



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-------------|------------|
| a | Port number | 0 to 65535 |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WPT Tab a CRLF</code> |
| Error | <code>E Tab WPT Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

*The port number when ARIES is set as a host, and the port number when set as a client are the same.

WRE

Encode Value Write

【Function】 Writes the encoder value.

【Format】 `STX WRE a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|-----------|------------------------------|---------|
| a | Axis No. | 1 to 32 | |
| b | Set value | -134,217,728 to +134,217,727 | |

【Response】 Returns the setting value.

| Status | Response data |
|--------|--|
| Normal | <code>C Tab WRE <Axis No.> CRLF</code> |
| Error | <code>E Tab WRE <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

WRP

Current Position Write

【Function】 Writes the current motor pulse value.

【Format】 `STX WRP a/b CRLF` No. of parameters = 2



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|-----------|------------------------------|
| a | Axis No. | 1 to 32 |
| b | Set value | -134,217,728 to +134,217,727 |

【Response】 Returns status information.

| Status | Response data |
|--------|--|
| Normal | <code>C Tab WRP <Axis No.> CRLF</code> |
| Error | <code>E Tab WRP <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

WSN

Subnet Mask Setting Write

【Function】 Writes the subnet mask of ARIES.
Default is "255,0,0,0".

【Format】 `[STX] WSN a/b/c/d [CRLF]` No. of parameters = 4



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| | Function | Setting | Remarks |
|---|----------|----------|---------|
| a | Address1 | 0 to 255 | |
| b | Address2 | 0 to 255 | |
| c | Address3 | 0 to 255 | |
| d | Address4 | 0 to 255 | |

【Response】 Returns status information. *Returns immediately after receiving the command.

| Status | Response data |
|--------|---|
| Normal | <code>C [Tab] WSN a [Tab] b [Tab] c [Tab] d [CRLF]</code> |
| Error | <code>E [Tab] WSN [Tab] <Error No.> [CRLF]</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

WSY

System Setting Write

【Function】 Writes the system setting value.

【Format】 `STX WSY a/b/c CRLF` No. of parameters = 3



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|------------|---|
| a | Axis No. | 1 to 32 |
| b | System No. | 0 to 99 |
| c | Set value | x x x x See "4-6. System Settings" (page 113). |

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | <code>C Tab WSY <Axis No.> Tab <System No.> CRLF</code> |
| Error | <code>E Tab WSY <Axis No.> Tab <Error No.> CRLF</code> |

For <Error No.>, see "4-5. Error Code" (page 110).

WTB**Speed Table Write**

1/2

【Function】 Writes the speed table data.

【Format】 WTB a/b/c/d/e/f/g No. of parameters = 7



A space cannot be used between characters. No parameter can be omitted.

Command parameters

| Function | Setting | Remarks |
|----------|----------------------|---|
| a | Axis No. | 1 to 32 |
| b | Speed table No. | 0 to 11 |
| c | Start speed | 1 to 2,500,000 |
| d | Top speed | 2 to 5,000,000 |
| e | Accelerating Time | 1 to 10,000 |
| f | Decelerating time | 1 to 10,000 |
| g | Accelerating pattern | 1: Rectangular drive 2: Trapezoidal drive 3: S-shaped drive |

Setting value x 10 [msec]
The setting range differs depending on the maximum speed range.
Also, the deceleration time cannot be set to twice or more of an acceleration time.
(See "3-1-3. Speed Setting Regulations" (page 18)).

【Response】 Returns status information.

| Status | Response data |
|--------|---|
| Normal | C <input type="text" value="Tab"/> WTB a <input type="text" value="Tab"/> b <input type="text" value="Tab"/> c <input type="text" value="Tab"/> d <input type="text" value="Tab"/> e <input type="text" value="Tab"/> f <input type="text" value="Tab"/> g <input type="text" value="CRLF"/> |
| Error | E <input type="text" value="Tab"/> WTB a <input type="text" value="Tab"/> <Error No.> <input type="text" value="CRLF"/> |

For <Error No.>, see "4-5. Error Code" (page 110).

【Response data】

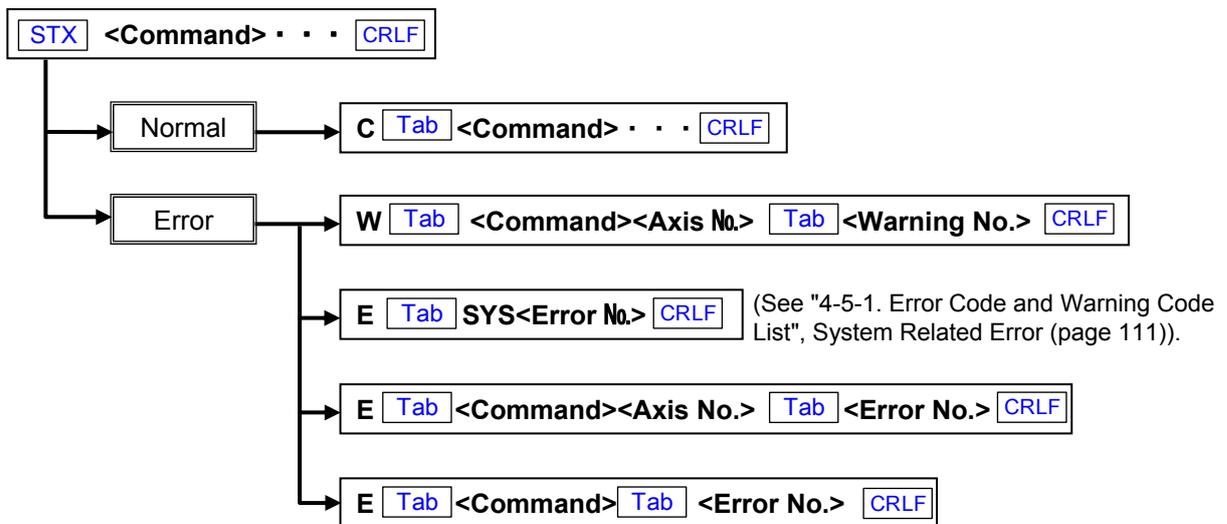
| Function | | Setting | Remarks |
|----------|-------------------------|---|--|
| a | Axis No. | 1 to 32 | |
| b | Speed table No. | 0 to 11 | |
| c | Start speed | 1 to 2,500,000 | |
| d | Top speed | 2 to 5,000,000 | |
| e | Accelerating Time | 1 to 10,000 | Setting value x 10 [msec] Setting unit differs depending on maximum speed range. (See "3-1-3. Speed Setting Regulations" (page 18)). |
| f | Decelerating time | 1 to 10,000 | |
| g | Accelerating pattern | 1: Rectangular drive 2: Trapezoidal drive 3: S-shaped drive | |
| h | Accelerating pulse | Accelerating pulse number | Number of pulses calculated from the acceleration and deceleration time setting values |
| i | Decelerating pulse | Decelerating pulse number | |

4-5. Error Code

If an error is confirmed when transmitting a command, the controller returns a response with an error code.

Normally, **C** is attached at the first character, and when an error happens, **E** or **W** is attached and an error code is returned.

After a driving error happened, its error code can be verified with the **STR** command (status read).



4-5-1. Error Code and Warning Code List

System related error ①

| Error No. | Description | Remarks |
|-----------|---|--|
| 1 | No STX at the beginning of the command. | Only when using RS-232C |
| 3 | Characters other than specified characters and figures are included. | |
| 4 | No applicable command. | |
| 5 | An emergency stop signal is detected. | Spontaneously transmitted from ARIES, and it can be released with the REM command. |
| 6 | When a connection shutdown (including electric disconnection) of Motionnet device is verified during driving, emergency stop was performed. | Spontaneously transmitted from ARIES, and it can be released with the RAX command. |

Parameter error

| Error No. | Description | Remarks |
|-----------|--|--|
| 100 | Total number of parameters is incorrect. | |
| 10n | Parameter value on the nth parameter is out of range. | n=1 to 9 |
| 120 | Number of axes specified in a parameter exceeds controllable number of axes. | Determined according to the number of connections of slave controllers, and the total number of controllable drive axes. |
| 121 | Applicable SYS No. is none. | |

Drive related error ①

| Error No. | Description | Remarks |
|-----------|---|--|
| 304 | CW limit is activated during driving and the drive stopped. | |
| 305 | CCW limit is activated during driving and the drive stopped. | |
| 306 | One of axes entered limit during multi-axis driving (MPS, SPS) and the drive stopped. | |
| 307 | Both CW limit and CCW limit are in. | |
| 308 | Tried to drive when the motor is not excited. | |
| 309 | Tried to operate while axes are driving. | |
| 310 | Tried to drive when the coordinate at the moving destination exceeds the rang (-134,217,728 to +134,217,727). | |
| 311 | Tried to rewrite the pulse counter value of driving axis. | |
| 312 | Tried to rewrite the encoder counter value of driving axis. | |
| 313 | Tried to rewrite the system parameter of driving axis. | |
| 314 | Because emergency stop is detected, driving axes are stopped. | |
| 315 | Because alarm is detected, driving axes are stopped. | |
| 316 | - side soft limit is more than + side soft limit. | |
| 317 | Due to + side soft limit, the drive is stopped. | |
| 318 | Due to - side soft limit, the drive is stopped. | |
| 319 | One of axes entered in the soft limit during multi-axis driving (MPS and SPS), and operation is stopped. | |
| 320 | The moving amount of main axis is 0 between the linear interpolations. | |
| 321 | Tried to operation when the servo ready signal is not ON. | |
| 322 | When a connection shutdown (including electric disconnection) of Motionnet device is verified during driving, emergency stop was performed. | Transmitted simultaneously with Error No.6. |
| 323 | During a stop control with the STP command, STP was reissued. | |
| 324 | One of axes during multi-axis driving (MPS, SPS), and the drive is stopped due to alarm detection. | |
| 399 | Abnormal stop occurred due to unexpected error. | This is returned when abnormal stop occurred due to a factor besides Error Code 5, 6, 304 to 324. Please contact the sales agent, commercial firm and our sales department from which you purchased our product |

Feedback error

| Error No. | Description | Remarks |
|-----------|--|---------|
| 401 | Though the number of retry counts exceeded in feedback control, the encoder feedback did not complete. | |

Drive related error ②

| Error No. | Description | Remarks |
|-----------|--|----------|
| 500 | Tried to drive with the MPS command while the MPI command is not issued. | |
| 50n | Tried to drive with the MPS command while the drive parameter corresponding to the n axis of the MPS command is not set. | n=1 to 4 |
| 505 | The coordinate at the movement destination of the MPS 1st axis is out of range (-134,217,728 to +134,217,727). | |
| 506 | The coordinate at the movement destination of the MPS 2nd axis is out of range (-134,217,728 to +134,217,727). | |
| 507 | The coordinate at the movement destination of the MPS 3rd axis is out of range (-134,217,728 to +134,217,727). | |
| 508 | The coordinate at the movement destination of the MPS 4th axis is out of range (-134,217,728 to +134,217,727). | |
| 510 | 3 or more axes specified for simultaneous drive are the same. | |
| 511 | 1st and 2nd axes specified for simultaneous drive are the same. | |
| 512 | 1st and 3rd axes specified for simultaneous drive are the same. | |
| 513 | 1st and 4th axes specified for simultaneous drive are the same. | |
| 514 | 2nd and 3rd axes specified for simultaneous drive are the same. | |
| 515 | 2nd and 4th axes specified for simultaneous drive are the same. | |
| 516 | 3rd and 4th axes specified for simultaneous drive are the same. | |

Speed table error

| Error No. | Description | Remarks |
|-----------|--|---------|
| 601 | The acceleration time written with the WTB command is large. | |
| 602 | The acceleration time written with the WTB command is small. | |
| 603 | The deceleration time written with the WTB command is large. | |
| 604 | The deceleration time written with the WTB command is small. | |
| 605 | Start speed is set exceeding 50% of the maximum speed. | |
| 606 | Maximum speed on the 2nd and 3rd axis between linear interpolations (SPS command) exceeds the limit value (SYS No.16). | |
| 607 | Tried to set the maximum speed exceeding the limit value (SYS No.16). | |

See "3-1-3. Speed Setting Regulations" (page 18).

See SPS in "4-4. Command Details" (page 89).

Trigger type error

| Error No. | Description | Remarks |
|-----------|--|---|
| 700 | Tried to change the trigger type system parameter (SYS No.51 to 56) during trigger output. | |
| 701 | TRS command is issued for driving axes. | |
| 702 | Trigger output doesn't stop after exceeding the setting time. | |
| 703 | Trigger output stopped before exceeding the setting time. | Please contact the sales agent, commercial firm and our sales department from which you purchased our product |

Emergency stop error

| Error No. | Description | Remarks |
|-----------|---|---|
| 800 | Tried to execute a command during emergency stop. | Can be restored by issuing the REM command. |
| 801 | Tried to release emergency stop while causes of emergency stop are not removed. | Remove causes of emergency stop, and then issue the REM command to restore. |
| 802 | Tried to execute a command while all axes are stopped due to Motionnet device's connection shutdown (including electric disconnection). | Can be restored by issuing the RAX command. |

System related error ②

| Error No. | Description | Remarks |
|-----------|--|---------|
| 901 | Issued the WIP command or RIP command while some axes are still driving. | |

Warning

| Warning No. | Description | Remarks |
|-------------|---|---------------------------------------|
| 51 | Motionnet device configuration increase is verified. | Spontaneously transmitted from ARIES. |
| 52 | Motionnet device configuration increase is verified. | Spontaneously transmitted from ARIES. |
| 350 | The moving destination position exceeds the soft limit (This warning is returned when the destination position exceeds the soft limit when the soft limit is valid, and the return method of drive command is "Quick"). | Driving reaches up to the soft limit. |

4-6: System Settings

4-6-1. System Setting List

It is necessary to perform system setting depending on a model to be used.

Conduct setting with **WSY** and **RSY** commands.

* System number is common with other KOSMOS series.

| System No. | Symbol | Function | Setting range | Default value | Remarks |
|------------|----------------------|---|--|---------------|--|
| 1 | ORG OFFESET | Coordinate value after return to origin/Origin offset value | -134,217,728 to +134,217,727 | 0 | See "3-9. Origin Return Method" (page 30). |
| 2 | ORG TYPE | Origin Return Method | 1 to 15 | 4 | |
| 3 | ORG SCAN SPEED | Origin search speed | 1 to 5,000,000 | 500 | |
| 6 | PM PRESCALE | Returns 0 when pulse value prescale/set value is exceeded. | 0 to 134,217,727 | 0 | |
| 7 | PM ROTATE CHANGE | Change of motor rotating direction | 0: Normal 1: Reverse | 0 | |
| 8 | LIMIT SWAP | Limit signal switch | 0: Standard 1: Switch | 0 | |
| 9 | PM CLOCK | Pulse output method switch | 1: 1CLK 2: 2CLK | 2 | |
| 10 | PM LOGIC | Pulse output logic switch | 0: Positive logic 1: Negative logic | 0 | |
| 11 | BACKLUSH PULSE | Backlash correction pulse number | 0 to 134,217,727 | 0 | |
| 12 | BACKLUSH TYPE | Backlash correction method | 0 to 4 | 0 | For details, see "3-3. Backlash Correction" (page 20). |
| 13 | SOFT LIMIT SET | Soft limit setting | 0: Invalid 1: Valid | 0 | |
| 14 | SOFT LIMIT POSITION+ | + side soft limit position | -134,217,728 to +134,217,727 | +134,217,727 | |
| 15 | SOFT LIMIT POSITION- | - side soft limit position | -134,217,728 to +134,217,727 | -134,217,728 | |
| 16 | TOP SPEED LIMIT | Maximum speed limit value | 2 to 5,000,000 | 50,000 | |
| 21 | LIMIT LOGIC | Change of limit signal logic | 0: NC 1: NO | 0 | |
| 22 | NORG SIGNAL LOGIC | Change of NORG sensor signal logic | 0: NO 1: NC | 0 | |
| 23 | ORG SIGNAL LOGIC | Change of ORG sensor signal logic | 0: NO 1: NC | 0 | |
| 31 | ENC MULTIPLICITY | Encoder value multiplication | 1: 1 multiplication 2: 2 multiplication 4: 4 multiplication | 4 | |
| 32 | ENC PRESCALE | Encoder value prescale | 0 to 134,217,727 | 0 | |
| 33 | ENC CALC NUM | Motor pulse/encoder resolution ratio | 1 to 134,217,727 | 1 | |
| 34 | ENC CALC DEN | | 1 to 134,217,727 | 1 | |
| 35 | ENC ROTATE CHANGE | Change of encoder adding direction | 0: Standard 1: Reverse | 0 | |
| 36 | ENC Z LOGIC | Logic switch of the encoder Z phase | 0: Positive logic 1: Negative logic | 1 | |
| 37 | PM&ENC SYNC WRITE | Set the encoder coordinate at origin return to 0. | 0: Not execute 1: Execute | 1 | |
| 38 | ENC FILTER | Filter switch of the encoder signal | 0: With filter (MAX13MHz) 1: No filter (MAX20MHz) | 0 | |
| 41 | FEEDBACK TYPE | Feedback control method | 0: No correction 1: Correct only at positioning 2: Normal correction | 0 | |
| 42 | PERMIT RANGE | Encoder pulse allowable range | 0 to 10,000 | 1 | |
| 43 | RETRY COUNT | No. of retries at feedback | 1 to 10,000 | 100 | |
| 44 | FEEDBACK WAIT TIME | Feedback waiting time (msec) | 1 to 10,000 | 100 | |

* NC → Normal close
NO → Normal open

| System No. | Symbol | Function | Setting range | Default value | Remarks |
|------------|---------------------|--|---|---------------|--|
| 51 | TRIGGER SOURCE | Selection of trigger signal source | 0: Motor pulse 1: Encoder pulse (1 multiplication) 2: Encoder pulse (2 multiplication) 3: Encoder pulse (4 multiplication) | 0 | |
| 52 | TRIGGER EDGE | Edge selection of trigger signal | 0: Rising 1: Falling | 0 | |
| 53 | TRIGGER PM PITCH | Division ratio of trigger signal (for motor pulse synchronization) | 1 to 100,000 | 1 | |
| 54 | TRIGGER ENC PITCH | Division ratio of trigger signal (for encoder pulse synchronization) | 1 to 100,000 | 1 | |
| 55 | TRIGGER PULSE WIDTH | Pulse width of trigger output | 1: 1 μ sec 2: 10 μ sec 3: 100 μ sec 4: 1000 μ sec | 3 | |
| 56 | TRIGGER LOGIC | Logic switch of trigger output | 0: Positive logic 1: Negative logic | 0 | |
| 61 | EXCITATION | Motor excitation ON/OFF | 0: OFF 1: ON | * | See "3-6. Stepping Motor Excitation and Servo ON/OFF Specification" (page 27). |
| 62 | SERVO USED | Motor selection | 0: Pulse motor 1: Servo motor | 0 | |
| 63 | ALARM VARID/INVARID | Alarm input signal Valid/Invalid Setting | 0: Invalid 1: Valid | 0 | |
| 65 | MICROSTEP SELECT | Selection of micro-step M1/M2 | 0: M1 1: M2 | 0 | |
| 99 | STOP TYPE | Stopping method with limit signal | 0: Decelerate and stop 1: Emergency stop | 1 | |

4-6-2. System Setting Details

System No.1 ORG OFFSET (Origin offset)

After completion of origin return drive, driving for set pulse is performed and the stop position is regarded as 0 (origin).

Default value 0

Setting range -134,217,728 to 134,217,727

System No.2 ORG TYPE (Origin detection method)

An origin detection method is selected. For details, see "3-9. Origin Return Method" (page 30).

Default value 3

Setting range 1 to 15

System No.3 ORG SCAN SPEED (Speed for origin search)

When origin return drive is executed, speed to determine final positioning is set.

Default value 500

Setting range 1 to 5,000,000

System No.6 PM PRESCALE (Motor pulse value prescale)

When a set value is exceeded, the motor pulse value is returned to '0'.

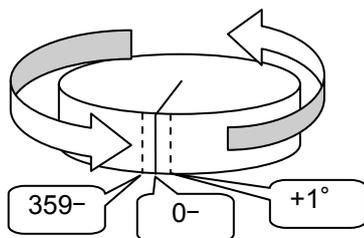
Default value 0

Setting range 0 to -134,217,727

Example

When setting the coordinate value to 0° by rotating 360° using the stage of 360° = 3600 pulse rotation type, set the movement amount equivalent to one round (in this case 3600 pulses) minus "1" (3600 pulses - 1 pulse = 3599 pulses)

This rewrites the current position information from 360° to 0° .



System No.7 PM ROTATE CHANGE (Change motor rotation direction)

A relationship between pulse command direction and motor rotation direction is changed.

Default value 0

0: Regular rotation: A motor drives to CW direction with + direction pulse.

1: Reverse rotation: A motor drives to CCW direction with + direction pulse.

System No.8 LIMIT SWAP (Switch limit signal)

CW limit sensor and CCW limit switch are swapped.

Default value 0

0: Normal

1: Switch

System No.9 PM CLOCK (Switch pulse output method)

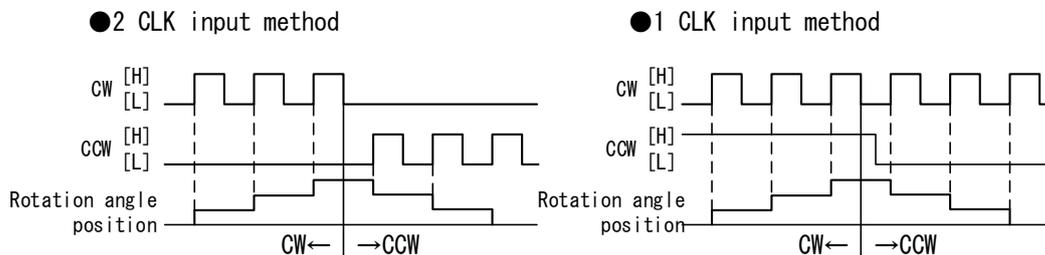
A pulse output method for a driver is changed.

Default value 2

1: 1CLK

2: 2CLK

Timing diagram



System No.10 PM LOGIC (Switch pulse output logic)

Output pulse logic is set.

Default value 0

0: Positive logic

1: Negative logic

System No.11 BACKLASH PULSE (Backlash correction pulse)

Number of pulses to perform backlash correction is set.

Default value 0

Setting range 0 to 134,217,727

System No.12 BACKLASH TYPE (Backlash correction method)

A backlash correction method is set.

Default value 0

0: Backlash correction invalid

1: When reverting from CCW direction to CW direction, correction reciprocation drive of correction pulse number before moving.

2: When reverting from CW direction to CCW direction, correction reciprocation drive of correction pulse number before moving.

3: When moving to CCW direction, correction reciprocation drive of correction pulse number after moving.

4: When moving to CW direction, correction reciprocation drive of correction pulse number after moving.

System No.13 SOFT LIMIT SET (Soft limit setting)

Invalid/valid of soft limit function is selected.

Default value 0

0: Invalid

1: Valid

System No.14 SOFT LIMIT POSITION+ (+ side soft limit position)

+ side soft limit position when the soft limit function is valid is set.

Default value +134,217,727

Setting range -134,217,728 to +134,217,727

System No.15 SOFT LIMIT POSITION- (- side soft limit position)

- side soft limit position when the soft limit function is valid is set.

Default value -134,217,728

Setting range -134,217,728 to +134,217,727

System No.16 TOP SPEED LIMIT (Maximum speed limit value)

Maximum speed limit that can be set with WTB command is set.

Default value 50,000

Setting range 2 to 5,000,000

System No.21 LIMIT LOGIC (Change limit signal logic)

CW and CCW limit signal logics are changed.

Default value 0

0: NC: Normal close

1: NO: Normal open

System No.22 NORG SIGNAL LOGIC (Change NORG sensor signal logic)

NORG signal logic is changed.

Default value 0

0: NO: Normal open

1: NC: Normal close

System No.23 ORG SIGNAL LOGIC (Change ORG sensor signal logic)

ORG signal logic is changed.

Default value 0

0: NO: Normal open

1: NC: Normal close

System No.31 ENC MULTYPLICITY (Encoder value multiplication)

Set an encoder resolution ratio.

Default value 4

1: 1 multiplication (Standard x 1)

2: 2 multiplication (Standard x 2)

4: 4 multiplication (Standard x 4)

System No.32 ENC PRESCALE (Encoder value prescale)

When a set value is exceeded, the encoder value is returned to '0'.

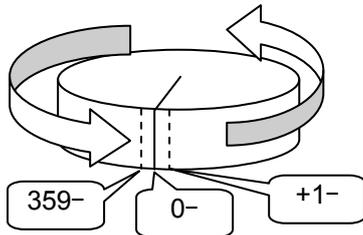
Default value 0

Setting range 0 to 134,217,727

Example

When setting the coordinate value to 0° by rotating 360° using the stage of 360° = 3600 pulse rotation type, set the encoder value equivalent to one round (in this case 3600 pulses) minus "1". (3600 pulses - 1 pulse = 3599 pulses)

This overwrites the encoder value from 360° to 0° .



System No. 33 and 34 ENC CALC NUM /DEN (Motor pulse/encoder resolution ratio)

When performing encoder feedback, it is necessary to set the resolution ratio (moving amount/1 pulse) of motor pulse and encoder pulse, The encoder resolution ratio and command pulse solution ratio are set in this item.

Default value 1

Setting range 1 to 134,217,727

Example: When the motor pulse resolution is 0.1 μ m/1 pulse and encoder resolution is 1 μ m/1 pulse, **the resolution ratio of the motor pulse/encoder is 1:10.**

In this case, set **1** for System No.33 and **10** for System No.34.

System No. 35 ENC ROTATE CHANGE (Change of encoder addition direction)

The addition direction of encoder counter is set.

Default value 0

0: Normal

1: Reverse

System No. 36 ENC Z LOGIC (Switch logic of encoder Z phase)

Logic of encoder Z phase pulse is switched.

Default value 1

0: Positive logic

1: Negative logic

System No. 37 ENC SYNC WRITE (Reset the encoder value during origin return)

When origin return is completed, the encoder value is reset to 0 also.

Default value 1

0: Do not perform encoder value reset

1: Perform encoder value reset

System No.38 ENC FILTER (Filter switch of encoder signal)

A filter availability for encoder signal is set.

Default value 0

0: With filter (The upper limit of encoder input frequency is 13MHz)

1: No filter (The upper limit of encoder input frequency is 20MHz)

System No.41 FEEDBACK TYPE (Encoder feedback control method)

Set an encoder feedback control method.

Default value 0

0: Not correct

1: Correct (only in positioning)

2: Correct (constant)

System No.42 PERMIT RANGE (Encoder pulse allowable range)

Encoder feedback allowable range is set.

Default value 1

Setting range 0 to 10,000

System No.43 RETRY COUNT (Number of retries for feedback)

The number of retries during encoder feedback execution is set.

(The number of feedback retries after feedback operation, if it does not reach a target position)

*When feedback does not complete even after exceeding the number of retries, a control finishes.

In this case, feedback state can be verified with STR command.

Default value 100

Setting range 10,000

System No.44 FEEDBACK WAIT TIME (Wait time(msec) for feedback)

Correction wait time (msec) during encoder feedback execution is set.

***Setting effective unit is per 10msec and the maximum error is a set value + 10msec.**

(When feedback operation does not complete in the first try, the number of retries set in System No.43 is performed. This sets the wait time to the next feedback retry)

*By setting the wait time, the time for inertia moment oscillation generated from the first operation to settle is set; therefore, error detection of start position necessary for the next feedback operation becomes less.

Default value 100

Setting range 1 to 10,000

System No.51 TRIGGER SOURCE (Select trigger signal source)

Required synchronization pulse when outputting trigger signal is selected.

Default value 0

0: Motor pulse value

1: Encoder pulse value (1 multiplication)

2: Encoder pulse value (2 multiplication)

3: Encoder pulse value (4 multiplication)

System No.52 TRIGGER EDGE (Select trigger signal edge)

Required synchronization pulse edge when outputting trigger signal is selected.

Default value 0

0: Rising

1: Falling

System No.53 TRIGGER PM PITCH (For division ratio/motor pulse synchronization of trigger signal)

Required synchronization pulse division ratio when outputting trigger signal is set.

Default value 1

Setting range 1 to 100,000

System No.54 TRIGGER ENC PITCH (In case of division ratio/encoder pulse synchronization of trigger signal)

Required synchronization pulse division ratio when outputting trigger signal is set.

Default value 1

Setting range 1 to 100,000

System No.55 TRIGGER PULSE WIDTH (Pulse width of trigger output signal)

Pulse width of trigger output signal is set.

Default value 3

1: 1 μ sec

2: 10 μ sec

3: 100 μ sec

4: 1000 μ sec

System No.56 TRIGGER LOGIC (Switch logic of trigger output)

Logic of trigger output signal is set.

Default value 0

0: Positive logic

1: Negative logic

System No.61 EXCITATION (Motor excitation ON/OFF)

System No.62 SERVO USED (ON/OFF of servo motor specification)

With SYS No.62, select the stepping motor specification or servo motor specification.

For details, see "3-6. Stepping Motor Excitation and Servo ON/OFF Specification" (page 27).

Servo motor selected -> SYS No.61 Initial value 0: OFF

Stepping motor selected -> SYS No.61 Initial value 1: ON

| | System No62 = 0 (Stepping motor specification) | System No62 = 1 (Servo motor specification) |
|-----------------|---|--|
| System No61 = 0 | Excitation OFF | Servo OFF |
| System No61 = 1 | Excitation ON | Servo ON |

System No.63 ALARM VARID/INVARID (Set alarm signal Valid/Invalid)

Select Invalid/Valid of alarm input signal function when the servo motor is connected.

Default value 0

0: Invalid

1: Valid

System No.65 MICROSTEP SELECT (Select micro step M1/M2)

When the driver box "TITAN-A II" is connected, the micro-step mode can be selected from 2 patterns (M1/M2).

Default value 0

0: M1 is selected

1: M2 is selected

System No.99 STOP TYPE (Stop method with limit signal)

Stop method in limit signal detection is set.

Default value 0

0: Decelerate and stop

(In case of deceleration and stop, be cautious when using this method, because the mechanism drive limit point is reached causing damage).

1: Emergency stop

5. Specification

5-1. Specification

| | | ARIES | LYNX |
|-----------------------------------|---|--|--|
| General Specifications | Product | Motor controller (Master controller) *1 | Motor controller (Slave controller) *1 |
| | External dimensions (mm) | W213.4xH52.4xD290 | |
| | Link control method | Motionnet® | |
| | Number of axes controlled | 2 to 32 axes (ARIES: 2 axes, LYNX: 2 axes added with 1 unit expansion. MAX expansion is 15). | |
| | Input power | AC 90 to 240 V 50Hz/60Hz | |
| | Consumption power | 35VA MAX (For AC100V supply) | 25VA MAX (For AC100V supply) |
| | Operating environment | Operating temperature: 0 to 40° C, Operating humidity: 30 to 85% (should be no condensation) | |
| | Weight | 1.45kg | 1.25kg |
| Performance Specifications | Driving Function | Absolute position drive, relative position drive, multi-axis simultaneous drive (MAX 4 axes), origin return drive, linear interpolation drive (MAX 3 axes), repeated reciprocating drive, backlash correction drive, feedback drive, and continuous drive | |
| | Speed control | <ul style="list-style-type: none"> • Drive pulse frequency: 1pps to 5Mpps • Acceleration/deceleration pattern: Trapezoidal drive (asymmetric possible), S-shape drive (asymmetric possible), rectangular drive • Others: 10 types of speed table | |
| | Set Movement Amount | -134,217,728 to +134,217,727 pulses | |
| | Origin Return Method | 15 methods (ORG, NORG, CW limit, CCW limit, combination of Z phase) | |
| | Output signal | <ul style="list-style-type: none"> • CW direction pulse, CCW direction pulse, current OFF signal, and trigger signal (differential signal output) • Servo ON signal, alarm reset signal [Open collector output] absolute maximum rating 80V/30mA • General output signal [Open connector output] absolute maximum rating 40V/100mA | |
| | Input signal | <ul style="list-style-type: none"> • Sensor signal (CW limit, CCW limit, NORG "Origin proximity", and ORG "Origin") (Photo-coupler input of 12V pull up) • Servo signal (Alarm, servo ready and imposition), • General input signal and emergency stop signal (photo-coupler input of 24V pull up) • Encoder signal (A phase, B phase, and Z phase) (differential signal input) Input frequency (4 multiplication conversion): MAX 13MHz (When filter is invalid: MAX 20MHz) | |
| | Display monitor | Sensor status, BUSY state, and emergency stop status LED | |
| | Trigger function (Output synchronized one of 1 and 2 axis) *2 | <ul style="list-style-type: none"> • Drive pulse or encoder pulse synchronization signal (Thinning setting possible) • BUSY signal (Signal during driving) • Constant speed signal • One shot output at driving start and end (Pulse width setting possible) • One shot output in command (TFR) issuing timing (Pulse width setting possible) | |
| | Communication interface | RS-232C and Ethernet(TCP/IP) | |
| | Optional | PYXIS (ARIES touch panel) | |

*1. The motor driver is a separate body.

*2. ARIES only

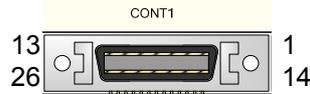
5-2. Connector

The pin arrangement figure is from the connector side.

5-2-1. Motor Connecting Connector

Connector type: 10226-5202PL (3M)

Compatible connector: IEEE1284(MDR) half pitch connector (Male 26 pin)



13 12 11 10 9 8 7 6 5 4 3 2 1
26 25 24 23 22 21 20 19 18 17 16 15 14

| Pin | Terminal name | Signal Name |
|-----|---------------|--|
| 1 | PMx_CW(PLS)+ | CW pulse or command pulse (differential output) + |
| 2 | PMx_CCW(DIR)+ | CCW pulse or direction specifying pulse (differential output) + |
| 3 | PMx_COFF+ | Current OFF (differential output) + |
| 4 | PMx_D.SEL+ | Step division number switch (differential output) + [For TITAN-A II] |
| 5 | GND (5V) | GND(for 5V) |
| 6 | +24V | +24V output |
| 7 | +24V | +24V output |
| 8 | PMx_CWLS | CW limit sensor (Open when detected) |
| 9 | PMx_CCWLS | CCW limit sensor (Open when detected) |
| 10 | PMx_NORG | NORG limit sensor (Close when detected) |
| 11 | PMx_ORG | ORG limit sensor (Close when detected) |
| 12 | GND (24V) | GND(for 24V) |
| 13 | GND (24V) | GND(for 24V) |
| 14 | PMx_CW(PLS)- | CW pulse or command pulse (differential output) - |
| 15 | PMx_CCW(DIR)- | CCW pulse direction specifying pulse (differential output) - |
| 16 | PMx_COFF- | Current OFF (differential output) - |
| 17 | PMx_D.SEL- | Step division number switch (differential output) - [For TITAN-A II] |
| 18 | GND (5V) | GND(for 5V) |
| 19 | +24V | +24V output |
| 20 | +24V | +24V output |
| 21 | PMx_ALM | Alarm (Servo motor connected) (Normal close) |
| 22 | PMx_INP | Imposition (Servo motor connected) (Normal open) |
| 23 | PMx_SVRDY | Servo ready (Servo motor connected) (Normal open) |
| 24 | PMx_SVON | Servo ON (Servo motor connected) |
| 25 | PMx_ALM_RES | Alarm reset (Servo motor connected) |
| 26 | GND (24V) | GND(for 24V) |

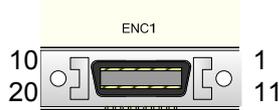
*PMx_CW(PLS) \pm of pin 1 and 14 is Mx_CW (CW pulse) when System No.9 "Pulse output method switch" is 2CLK, and PMx_PLS (Command pulse) when it is 1CLK.

*PMx_CCW(PLS) \pm of pin 2 and 15 is Mx_CCW (CCW pulse) when System No.9 "Pulse output method switch" is 2CLK, and PMx_DIR (Direction specifying signal) when it is 1CLK.

5-2-2. Encoder Connector

Connector model type: 10220-5202PL (3M)

Compatible connector: IEEE1284(MDR) half pitch connector (Male 20 pin)



10 9 8 7 6 5 4 3 2 1

20 19 18 17 16 15 14 13 12 11

| Pin | Terminal name | Signal Name |
|-----|---------------|--|
| 1 | +5V | +5V output |
| 2 | GND (+5V) | GND(for +5V) |
| 3 | ENCx_A+ | Encoder A phase (differential input) + |
| 4 | ENCx_B+ | Encoder B phase (differential input) + |
| 5 | ENCx_Z+ | Encoder Z phase (differential input) + |
| 6 | Not used | |
| 7 | Not used | |
| 8 | Not used | |
| 9 | Not used | |
| 10 | Not used | |
| 11 | +5V | +5V output |
| 12 | GND (+5V) | GND(for +5V) |
| 13 | ENCx_A- | Encoder A phase (differential input) - |
| 14 | ENCx_B- | Encoder B phase (differential input) - |
| 15 | ENCx_Z- | Encoder Z phase (differential input) - |
| 16 | Not used | |
| 17 | Not used | |
| 18 | Not used | |
| 19 | Not used | |
| 20 | Not used | |

* ENCx corresponds to ENC1 and ENC2.

5-2-3. I/O Connector

Connector model type: 10220-0200EL (3M)

Compatible connector: IEEE1284(MDR) half pitch connector (Male 20 pin)



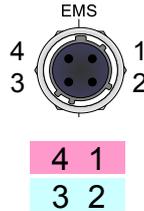
10 9 8 7 6 5 4 3 2 1
20 19 18 17 16 15 14 13 12 11

| Pin | Terminal name | Signal Name |
|-----|---------------|---------------------|
| 1 | OUT0 | General output No.0 |
| 2 | OUT1 | General output No.1 |
| 3 | OUT2 | General output No.2 |
| 4 | OUT3 | General output No.3 |
| 5 | OUT4 | General output No.4 |
| 6 | OUT5 | General output No.5 |
| 7 | OUT6 | General output No.6 |
| 8 | OUT7 | General output No.7 |
| 9 | GND (+24V) | GND(for +24V) |
| 10 | GND (+24V) | GND(for +24V) |
| 11 | IN0 | General input No.0 |
| 12 | IN1 | General input No.1 |
| 13 | IN2 | General input No.2 |
| 14 | IN3 | General input No.3 |
| 15 | IN4 | General input No.4 |
| 16 | IN5 | General input No.5 |
| 17 | IN6 | General input No.6 |
| 18 | IN7 | General input No.7 |
| 19 | +24V | +24V output |
| 20 | +24V | +24V output |

For general I/O, see "3-11. General I/O" (page 46).

5-2-4. Emergency Stop Signal Input Connector

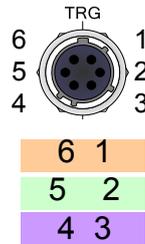
Connector model type: HR10A-7R-4S(73) (HIROSE)
 Compatible connector: HR10A-7P-4P(73) (HIROSE)



| Pin | Terminal name | Signal Name |
|-----|---------------|--|
| 1 | +24V | +24V output |
| 2 | EMG_IN | Emergency stop signal input (Normal close) |
| 3 | GND (+24V) | GND(for +24V) |
| 4 | Not used | |

5-2-5. Trigger Signal Output Connector

Connector model type: HR10A-7R-6S(73) (HIROSE)
 Compatible connector: HR10A-7P-6P(73) (HIROSE)

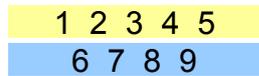
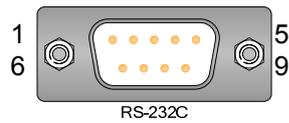


| Pin | Terminal name | Signal Name |
|-----|---------------|--|
| 1 | TRG+ | Trigger signal (differential output) + |
| 2 | TRG- | Trigger signal (differential output) - |
| 3 | GND (+5V) | GND(for +5V) |
| 4 | Reserved | Connection prohibited |
| 5 | Reserved | Connection prohibited |
| 6 | Reserved | Connection prohibited |

Pin 4, 5, and 6 will be used in future version up.

5-2-6. RS-232C Connector

Connector model type: RDEB-9P-LN(4-40)(55) (HIROSE)
Compatible connector: D-sub connector (9 pin, female, inch screw)

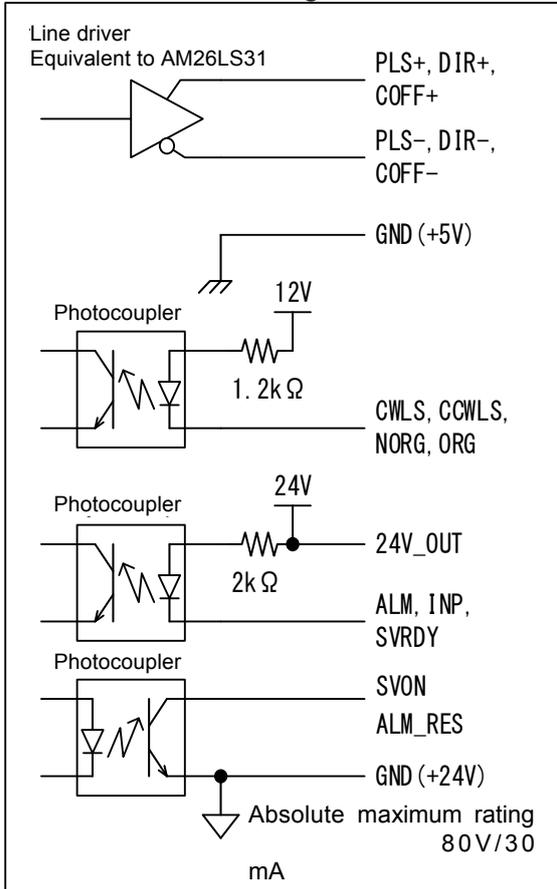


| Pin | Terminal name | Signal Name |
|-----|---------------|-------------------------|
| 1 | Not used | |
| 2 | RXD | RS-232C input terminal |
| 3 | TXD | RS-232C output terminal |
| 4 | Not used | |
| 5 | SGND | GND(for +5V) |
| 6 | Not used | |
| 7 | RTS | Connection prohibited |
| 8 | CTS | Connection prohibited |
| 9 | Not used | |

* 7 pin - 8 pin is short circuited inside.

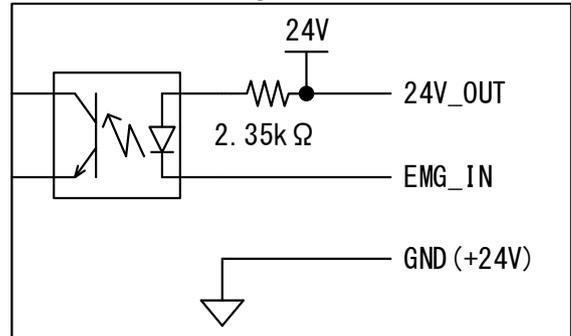
5-3. Input/Output Signal Circuit Diagram

CONT 1 and 2 signal interface

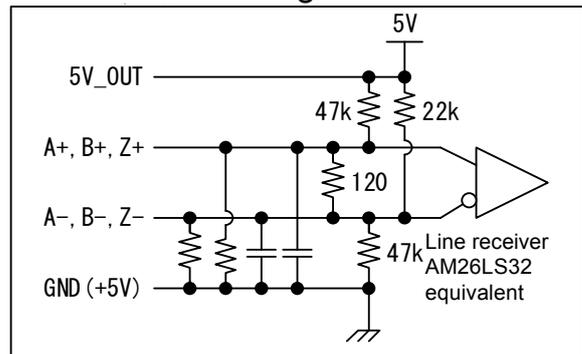


Ground of CWLS, CCWLS, NORG and ORG is GND (+24V)

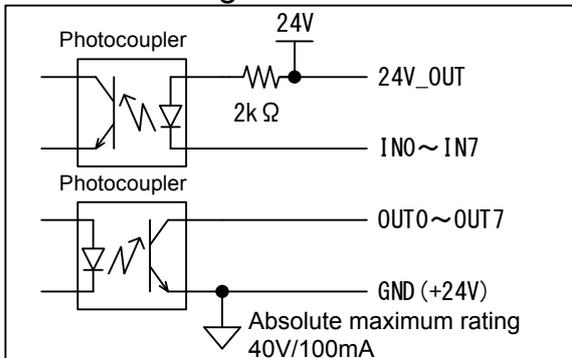
ENG signal interface



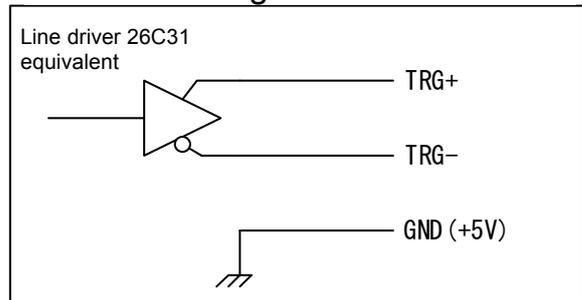
ENC1 and 2 signal interface



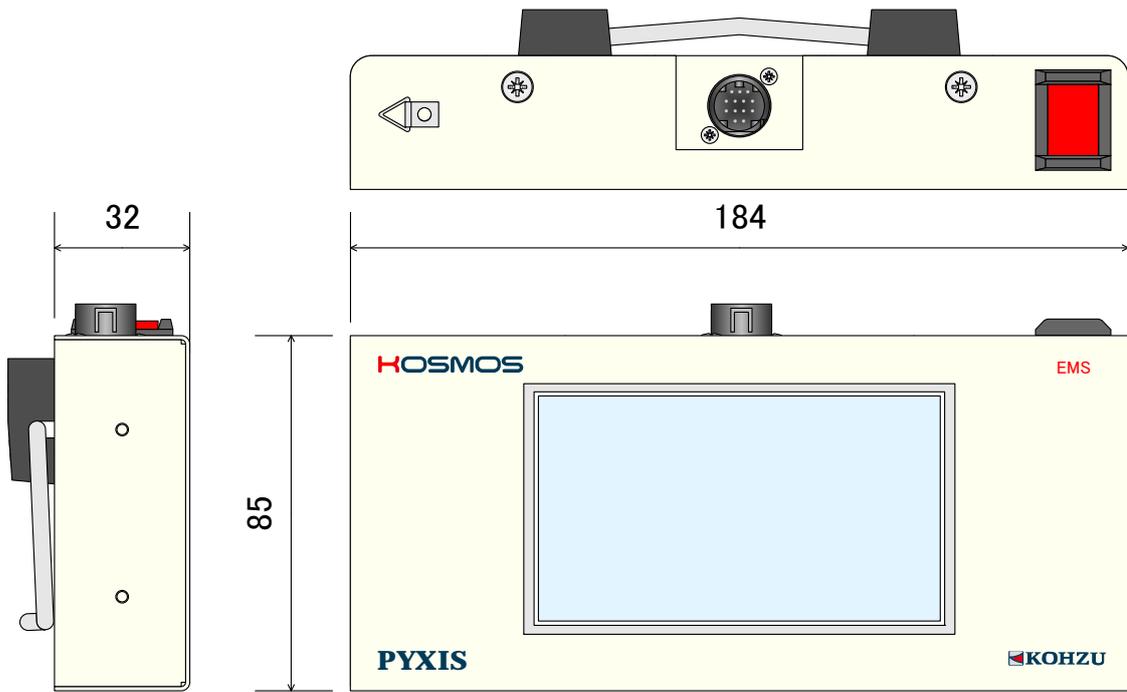
I/O signal interface



TRG signal interface



■ PYXIS appearance dimensions



6. Maintenance and Service

6-1. Troubleshooting

■ Power can not be turned ON.

- ◇ Is the power cord pulled out or loosened?
 - Plug the power cord into the main body securely.
- ◇ Is the fuse on the rear panel missing or disconnected?
 - Insert or replace with a new fuse.
 - (If a fuse disconnection occurs frequently, internal damage may be the cause)
- ◇ Is power conducted to the outlet?
 - Plug the power cord of other electric appliance into the outlet to check if it works.
 - Check electrification with a voltmeter such as a tester.
- ◇ Is the power cord broken en route?
 - Check conductivity between both ends of the cord with a tester.

■ The stage does not move.

- ◇ Do you hear rotation sound? Do you hear abnormal sound?
 - Step out may be the cause. Change the speed, and try adjusting the output current of the driver.
- ◇ (When you hear rotating sound) Is the motor rotating?
 - If the device has been used for a long period of time, it is rare but the coupling of the motor shaft may be loose.
- ◇ (When you don't hear rotating sound) Is the limit display ON?
 - It is stopped by the limit switch. Move in the reverse direction, and move out of the limit zone.
- ◇ (When you don't hear rotating sound) Is the motor cable pulled out or loose?
 - (In case of the motor cable) Securely insert the stage connector and the driver BOX connection connector.
 - (In case of the driver cable) Securely insert the controller connection connector and the driver BOX connection connector.
- ◇ (For multi-axis specification) Are all axes not moving?
 - When some axes move but others do not move, change the connection connector of each axis (motor) to determine if the problem is on the main body or on the motor.

■ Origin return operation cannot be performed.

- ◇ Doesn't the motor operate completely?
 - Check if it operates with other driving methods.
- ◇ (If it stops at position except for the origin) Is the origin return method correct for the sensor configuration?
 - See "3-9. Origin Return Method" (page 30), and set to match the stage's sensor configuration.
 - For a part of standard stage, it is necessary to set the origin return method to 3 in the system setting.
- ◇ (If it stops at position except for the origin) Is the origin sensor installed correctly?
 - Adjust the origin sensor.
 - When a movement range is small, the limit sensor range and origin sensor range may overlap.
 - In the case, because it does not operate correctly, adjust the origin sensor range to be out of the limit range.
 - When using the origin proximity sensor and origin sensor, consider each positional relationship.
 - If the origin is out of the origin proximity sensor range, origin return cannot be performed correctly.
 - Make an adjustment of the origin position.
- ◇ (If it stops at position except for the origin) Is the logic of the origin sensor set properly?
 - Switch the input logic of the sensor (Normal open and normal close).

■ Positional deviation happens.

- ◇ Are the settings like movement volume correct?
→ Check each setting according to the Operation Manual.
- ◇ Is the motor properly operating? Do you hear abnormal sound?
Step out may be the cause; therefore, change the speed or adjust the output current of the driver.
- ◇ Is the load exceeding the rating?
→ Check the load. Also, try to lower the speed.
- ◇ Is the axis in the limit range?
→ Stopping position and counter value are not guaranteed when it is within the limit range.
Use it out of the limit range.
- ◇ Is the assembly between the motor and driving part correct?
→ If the device has been used for a long period of time, the coupling of the motor axis may become loose.

■ Remote control (communication) does not operate correctly.

- ◇ Is the communications cable pulled out or loose?
→ Insert the connector of the communication cable properly into the connector of the main body.
- ◇ Are communication parameter settings done correctly?
→ Check by referring to "2-4. Rotary Switch for Communication Setting" (page 15).
(Turn the power of ARIES and LYNX OFF and conduct dip switch setting).
- ◇ Is correct communication cable used?
→ Check the arrangement of the connector pins on the communication cable.
- ◇ During communication, is an error code sent?
→ Take measures for the error on the host computer.
- ◇ Are there any errors in the control program on the host computer?
→ Check the program. Please note that errors such as distinction between upper and lower case letters and setting of the delimiter code frequently occur.
→ Are commands transmitted and received properly? Make sure to receive data for commands that give responses (for example, reading status, etc.)
- ◇ Check with the stage control application, "Chamonix".
We have application available that can be operated easily.
→ When application operates normally, it is possible that software on user's side may not be written correctly.
- ◇ Is communication forcibly interrupted in mid-stream?
→ Turn the power ON again.

■ Others

- ◇ The emergency stop signal doesn't become OFF.
→ The following causes are possible.
 - The emergency stop plug may not be connected.
 - The emergency stop switch of PYXIS may be ON.
 - Motionnet® cable may not be connected properly.
 - The terminal plug may not be connected.

6-2. Maintenance

■ Maintenance of Controller

- When used in a dusty room, perform internal cleaning periodically.
- When not using or storing for a long period of time, always pull the power cable out of outlet, and also remove other cables, etc.

- Maintenance service shall be carried out only by our company.

6-3. Warranty and Service

If the product fails within the warranty period, we provide a free repair according to the regulations of our company.

Warranty period One year from the date of shipment

■ Request for a repair within warranty period

Please contact the sales agent, commercial firm or our sales department from which you purchased our product.

■ Request a repair after warranty period has expired

Even if the warranty period has elapsed, when the sales agent or commercial firm is apparent, please contact them, first. Repairs shall be carried out depending on failure with fee.

■ Maintenance for repairing parts

We will carry most parts for repair within a period specified by us after discontinuing production. Please understand that repairs requiring parts for which the warranty period has elapsed may be rejected.

Also, the condition may not be satisfied due to some reasons of distribution manufacturer of parts.

6-4. Contacts

If you have question about our products, please call or send email to the Sales department of our company.

Revision History

| Printed Date | Rev.No. | Contents of revision |
|--------------|---------|---|
| 2014/04/01 | 1.10 | Initial version (Support ARIES version 1.1.1 or before) |
| 2014/08/25 | 1.20 | Along the version up (version 1.2.2) of ARIES, the following contents are changed. |
| | | RAX command specification is changed. |
| | | Operation specification of PYXIS is changed. |
| | | Added a function that error codes and warning codes are transmitted spontaneously from ARIES. |
| | | Added Montionnet error for a cause of emergency stop. |
| 2015/08/01 | 1.30 | Added function explanation of host/client/Telnet of Ethernet(TCP/IP) setting. |
| 2016/01/06 | 1.40 | Operation Manual Restructured |
| 2016/02/26 | 1.41 | Remoto command up date |
| | | |
| | | |
| | | |
| | | |

Recording Column

Purchased Date Year Month Date

Purchased from

Person in charge TEL

Production No.

Special note

| | | |
|---|---|--|
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |
| ▪ | ▪ | |

ARIES LYNX



Kohzu Precision Co., Ltd.

Headquarters

Zip code: 215-8521

2-6-15 Kurihira Asao-ku, Kawasaki City
Kanagawa, JAPAN

Tel : +81-44-981-2131

Fax : +81-44-981-2181

Email : sale@kohzu.co.jp

Web Site : <http://www.kohzu.co.jp/>

Osaka branch

Zip code: 532-0004

Shin Osaka Nishiura Bldg. 202

2-7-38 Nishi Miyahara Yodogawa-ku,
Osaka City, Osaka JAPAN

Tel: +81-6-6398-6610

Fax: +81-6-6398-6620

Project KOSMOS