KOHZU

operation
manual
Rev1.43

Multi-Axis Controller

KOSMOS series
Model: ARIES/LYNX

RoHS

User's Manual

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

ARIES/LYNX

Kohzu Precision Co., Ltd.

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

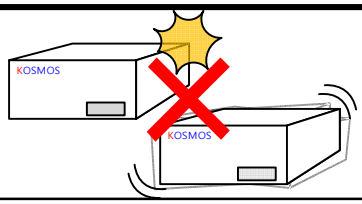
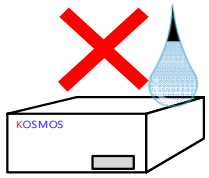
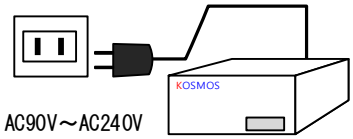
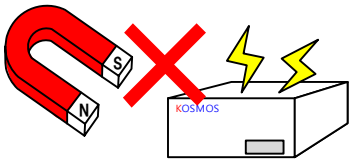
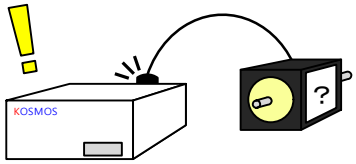
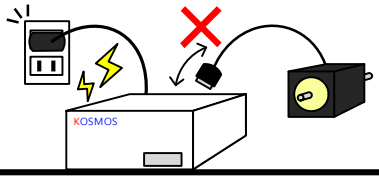
⊘			Do not apply severe shock to the product and avoid using in a place with vibration.
⊘			Liquid or chemical splashes on this device are dangerous and cause failures. Never use this device in the place above phenomena may occur.
⚠			Use 90-240V AC (50/60Hz) as a power supply. *Confirm ratings of the power cable. *Always ground FG (frame ground).
⊘			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.
⊘			Do not disassemble or modify the product.
⚠			Pay close attention when connecting the motor driven stage or a motor other than those specified by our company.
⚠			When the controller's power supply is turned ON, do not pull out or insert cables.

Table of Contents

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.

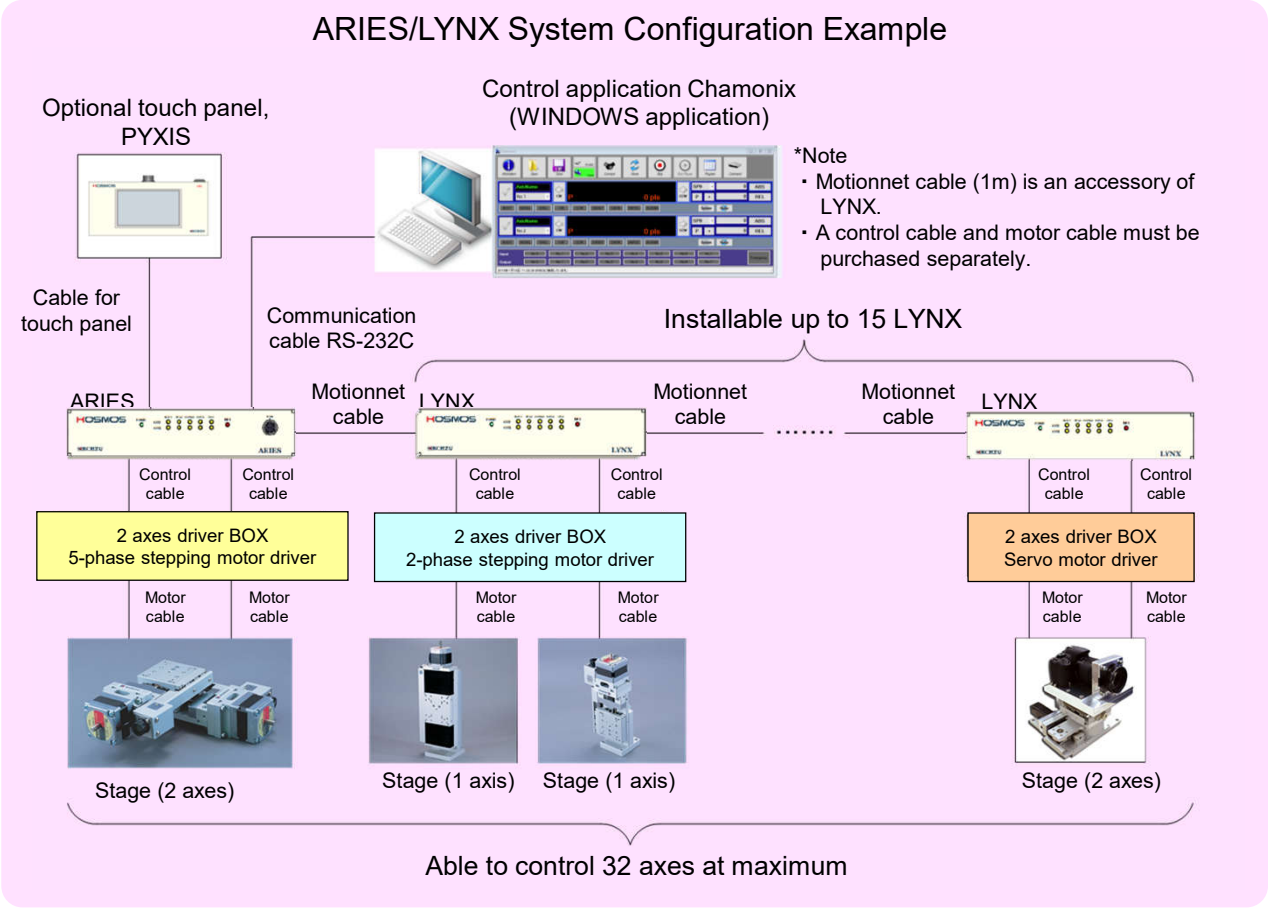
- Origin return method can be selected from 15 kinds (+ORG OFFSET).

- 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

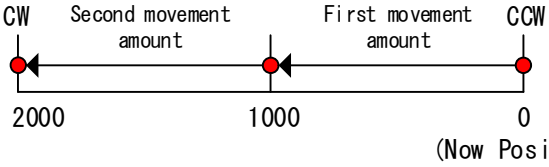
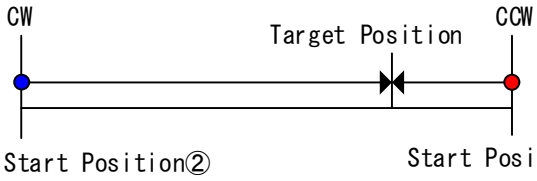
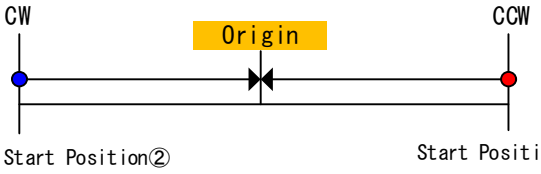


■ Outside of product range

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

Relative Position Movement (4 axes simultaneous start is possible)	Moves toward the designated direction from the present position by a set value.  Example : Move to CW angle(1000 pulse)at two times.
Absolute Position Drive (4 axes simultaneous start is possible)	Moves to the designated target position.  Example : Start position① or start position② move to target position.
Origin Return Movement	Performs origin return with the specified origin return method.  Example : Start position① or ② move return Origin position.

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 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

Stage side Connector shape	Length	Cable type	
		Fixed cable	Moving cable
Round type connector	3m	CB1503	RCB1503
	5m	CB1505	RCB1505
	10m	CB1510	RCB1510

*The encoder cable is an ordered product.
Other types of cable (for 10-lead and square connector) can also be manufactured.
For details, please contact our sales department.

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

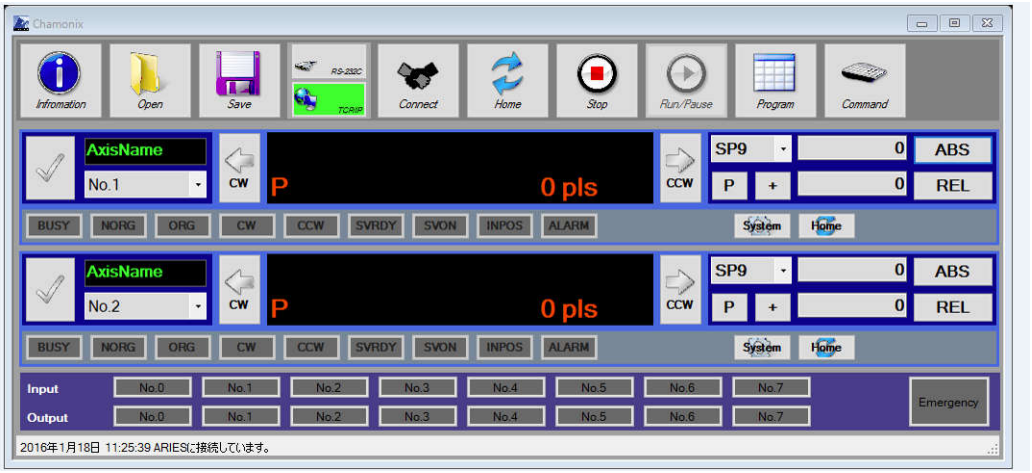
The following optional products are available to make this product more convenient to use.
Purchase as necessary or download.
For questions about the following products, please contact your retainer or our sales department.

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"

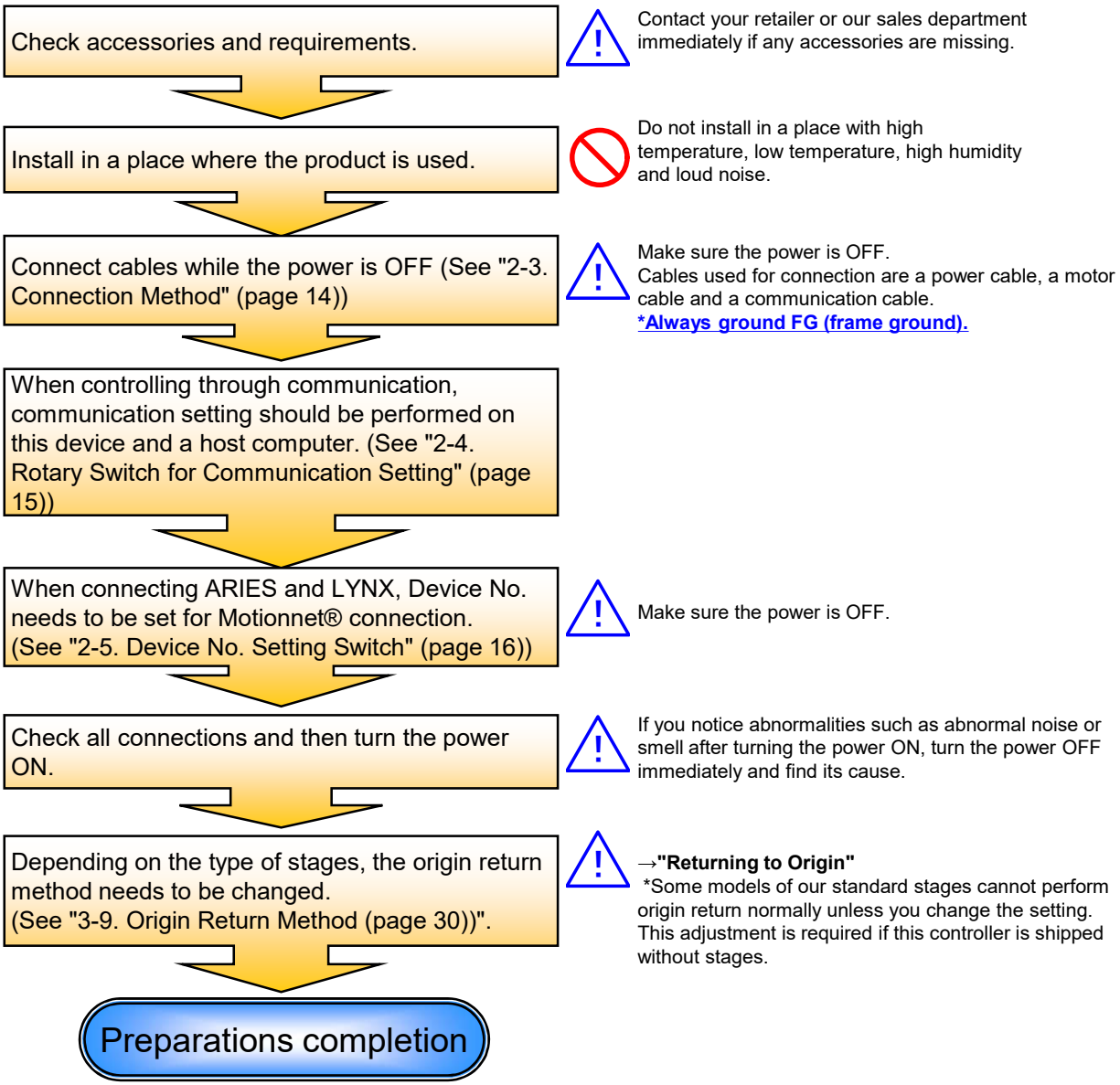
This application enable you to control all functions of ARIES and LYNX from PC.
Please download from our company's HP.



2. Installation and Preparation

2-1. Proceeding with Installation and Preparation

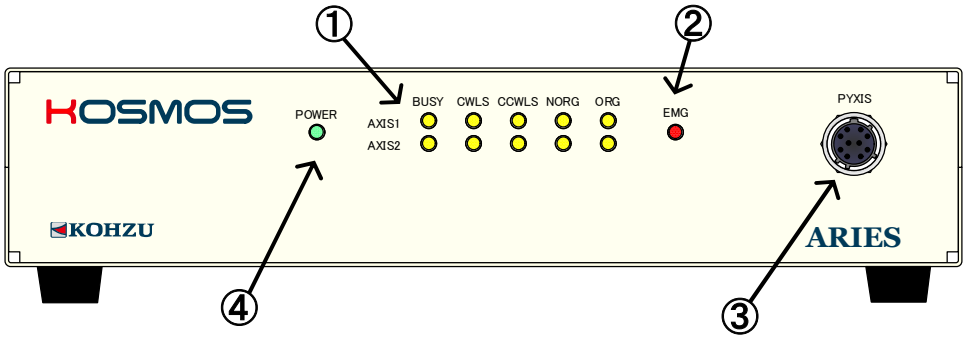
Install the product in the following order.



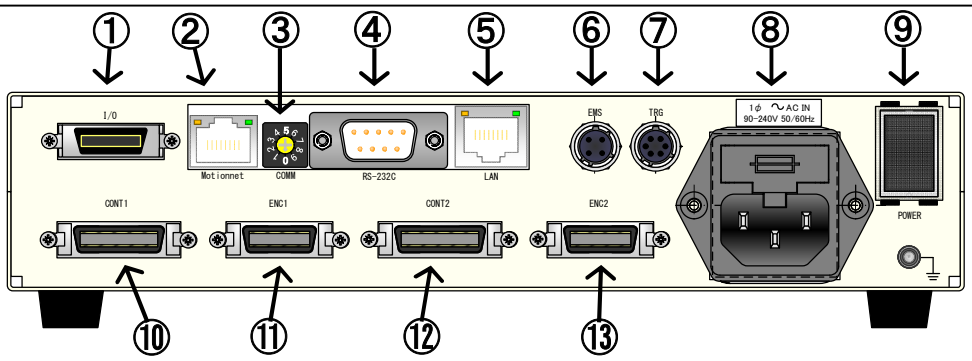
It takes about 1 second for launching to complete, after the power is turned ON.

2-2-1. Part Names

2-2-1. Part Names of ARIES



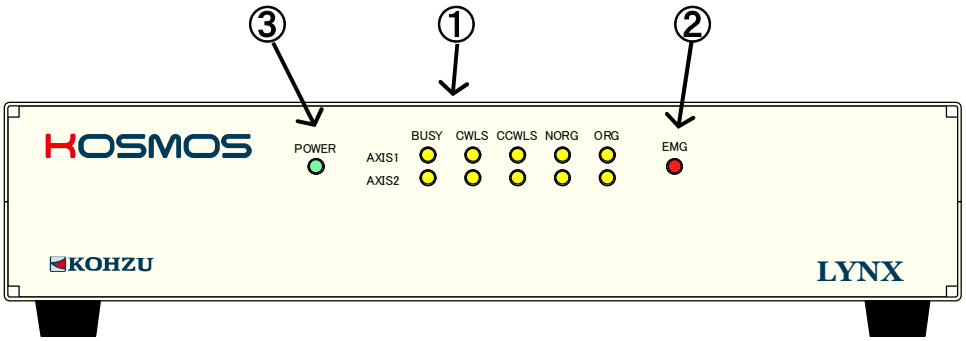
① Limit and Position Sensor Display LED
Status of each position sensor and driving status are displayed.
BUSY: Turns ON yellow during motor driving.
CWLS: When the CW limit sensor is in detection status, it turns ON yellow.
CCWLS: When the CCW limit sensor is in detection status, it turns ON yellow.
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

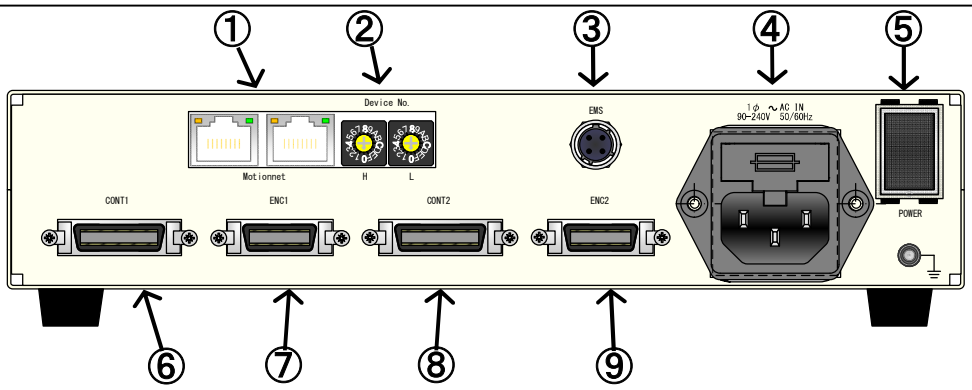
2-2-2. Part Names of LYNX



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

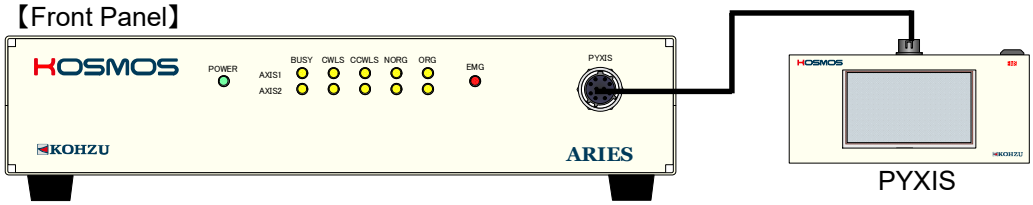
⑧ 2nd Axis Motor Control Pulse Output Connector

⑨ 2nd Axis Encoder Signal Input Connector

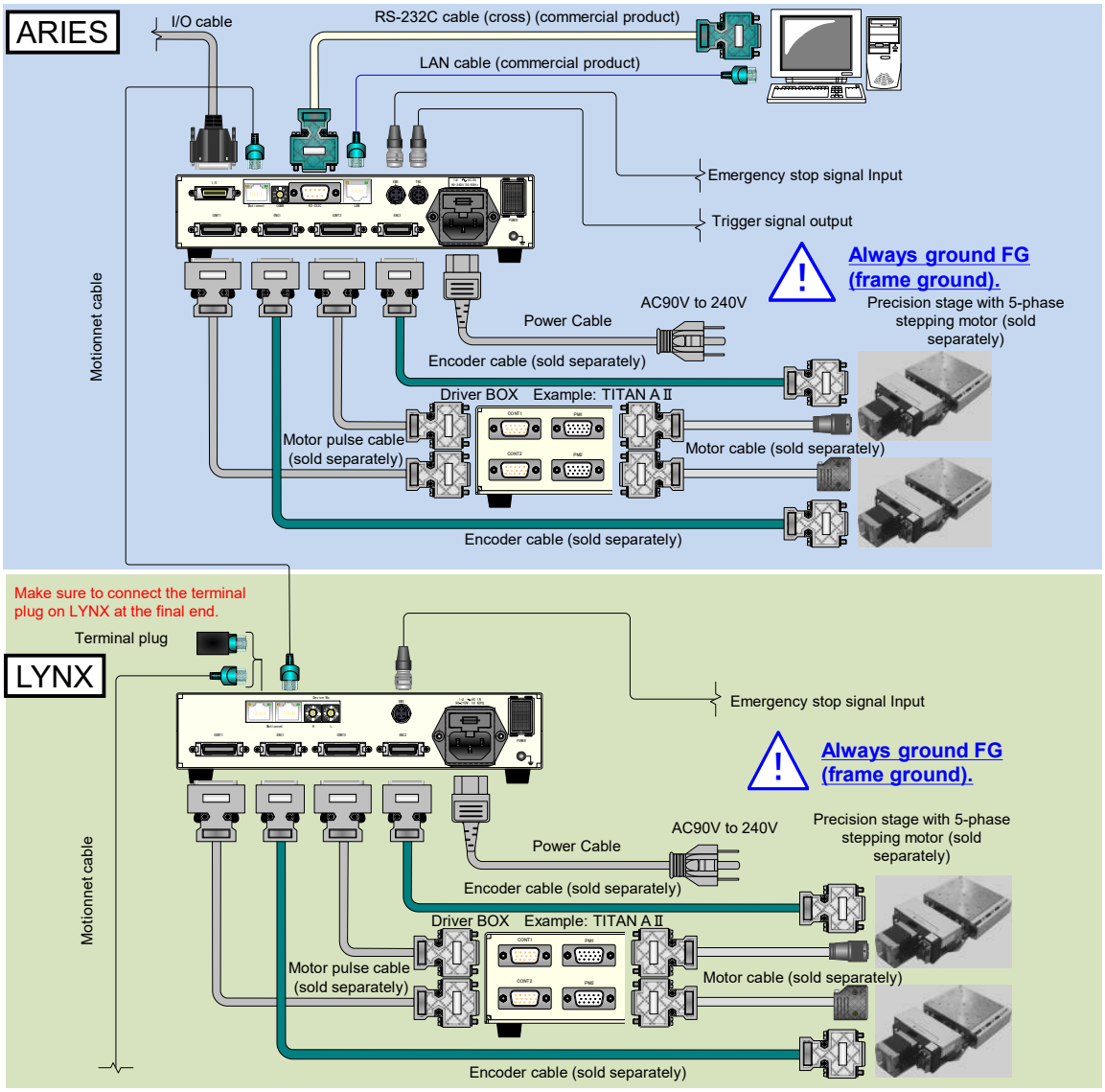
2-3. Connection Method

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.**

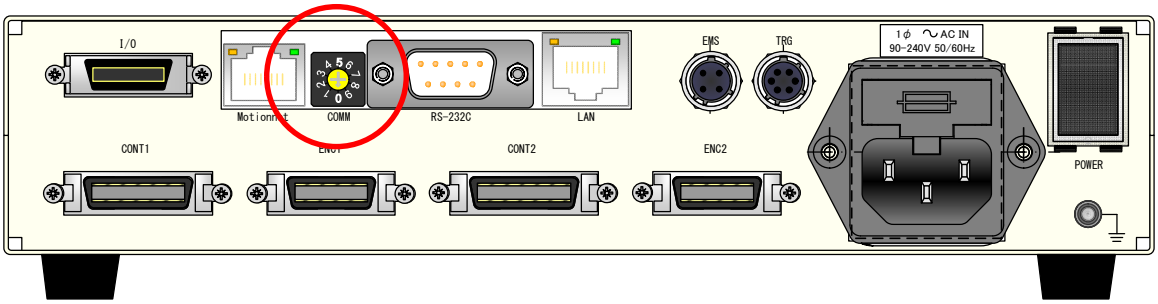
2-4. Rotary Switch for Communication Setting

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)

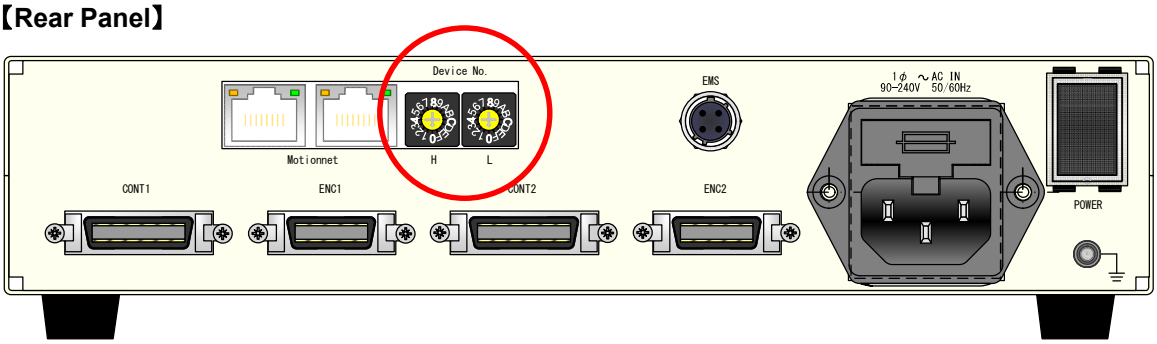
Communication mode	Communications settings	
	RS-232C speed (baud)	LAN
0	9600	*
1	19200	*
2	38400	*
3	57600	*
4	115200	*
5	*	LAN
6	*	*
7	*	*
8	*	*
9	*	*

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.

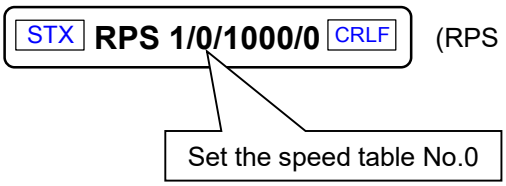
■ Speed table *Setting value shown in the next table are default values.

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 →



(RPS command example)

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.

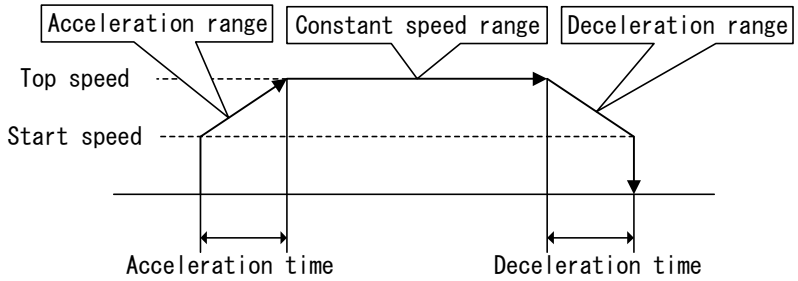
*As a setting value becomes larger, a setting unit becomes larger for the maximum speed and acceleration/deceleration time.

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].

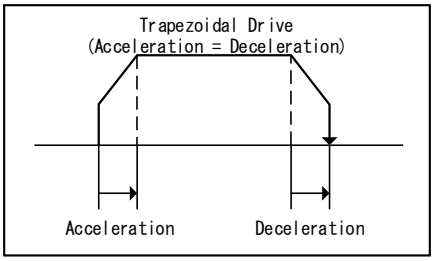
3-2. Acceleration Pattern

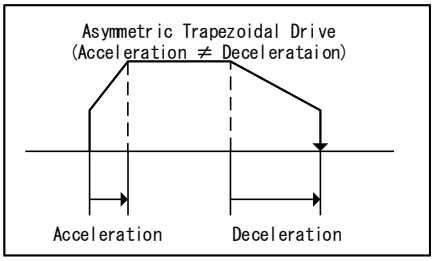
When moving an object, it cannot be moved in high speed abruptly due to inertial force.
In case of a stepping motor also, it normally starts in low speed and then achieve high speed with gradual acceleration.



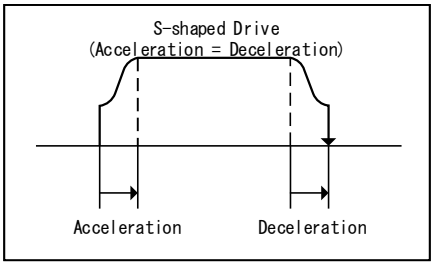
By setting the **start speed (low speed), maximum speed, acceleration time and deceleration time,** ARIES and LYNX calculate the acceleration/deceleration rate internally, and series of acceleration/deceleration operation are conducted automatically.

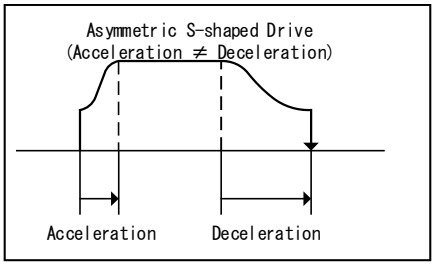
Trapezoidal Drive and Asymmetric Trapezoidal Drive
A method to increase and decrease acceleration and deceleration at a constant acceleration and deceleration ratio is called **a trapezoidal drive.**
This product also supports an **asymmetric trapezoidal drive** that acceleration and deceleration can 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.

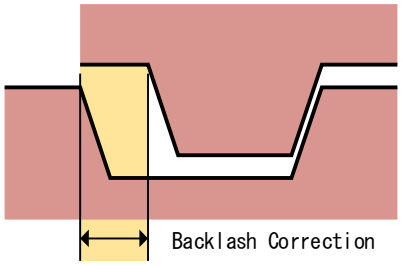




Rectangular drive
Rectangular drive is a method of driving at the maximum speed from the beginning to the end without accelerating or decelerating.

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:

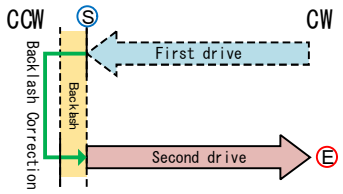
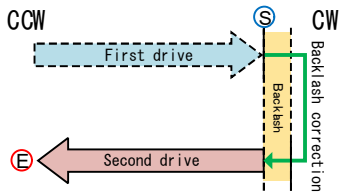
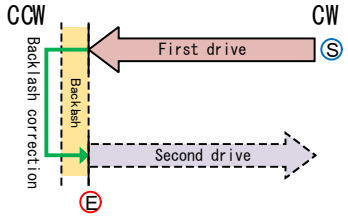
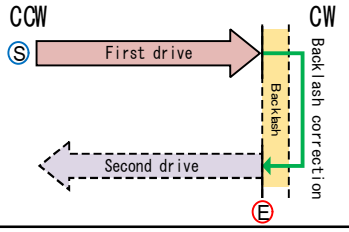
① Set correction amount with System No.11 (backlash correction pulse setting).
② Set a method with System No.12 (backlash correction method setting).
③ Execute backlash correction control along with each drive command execution.

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.

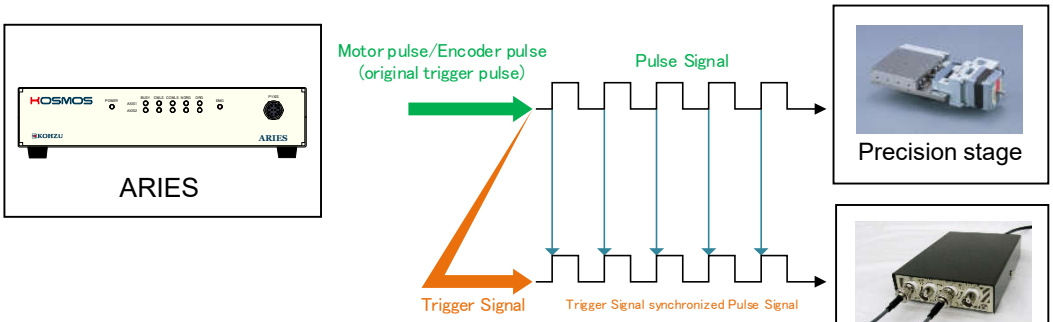
3-3-2. Details of Correction Method

1		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.
2		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.
3		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.
4		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.

In the table above, Ⓢ indicates the drive start position and Ⓔ 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.



Output the trigger signal (trigger signal output can set a division ratio within the range 1 to 100,000) that synchronized with the motor pulse or encoder pulse.

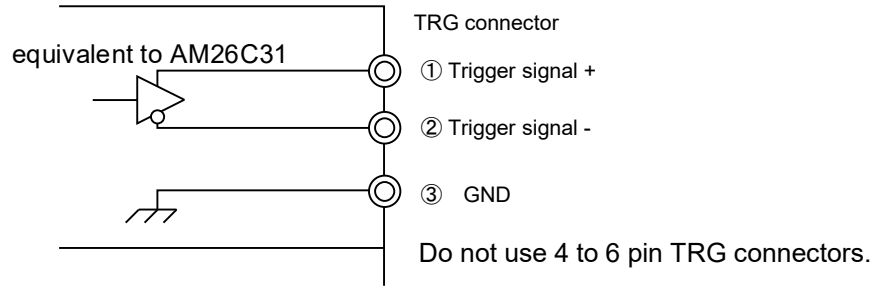
(Option)

*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

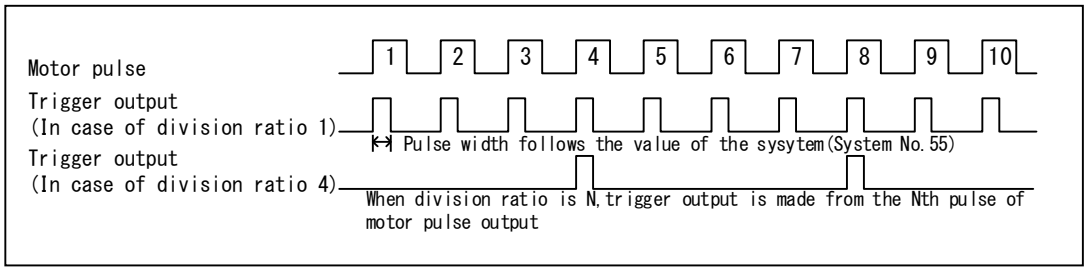
A summary of the trigger output function provided by ARIES is explained next.

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

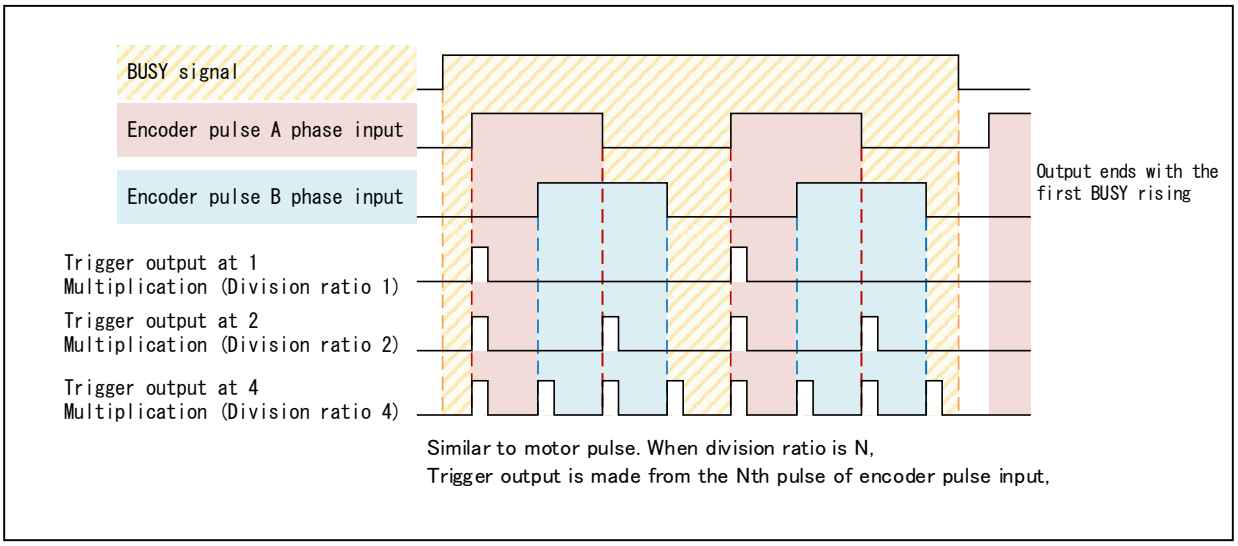
There are 2 types, "Output synchronized with motor pulse" and "Output synchronized with encoder pulse".
Both can be set with division ratio (1 to 100,000).
The trigger signal source to synchronize follows the system parameter (System No.51).
The trigger pulse width follows the system parameter (System No.55).

①-1. Output synchronized with motor pulse



①-2. Output synchronized with encoder pulse

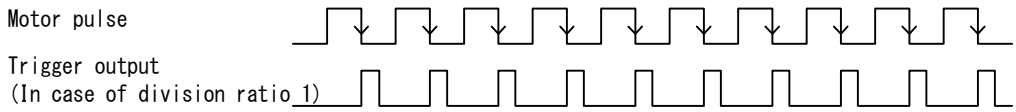
Trigger pulse can be output for 1, 2 and 4 multiplication respectively.
Pulse output is performed with the count timing according to a multiplication number. (No distinction for CW/CCW direction)
Output period of trigger is while BUSY signal is active.
(Though BUSY signal becomes active at encoder correction driving, no trigger signal is output).



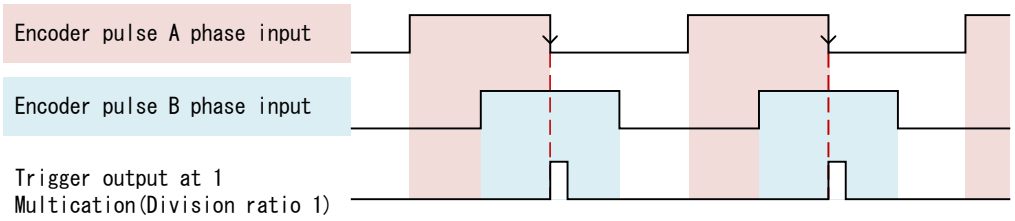
② Rising/falling edge selection

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



For encoder synchronization, trigger output synchronization with 1 multiplication is only valid,

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)

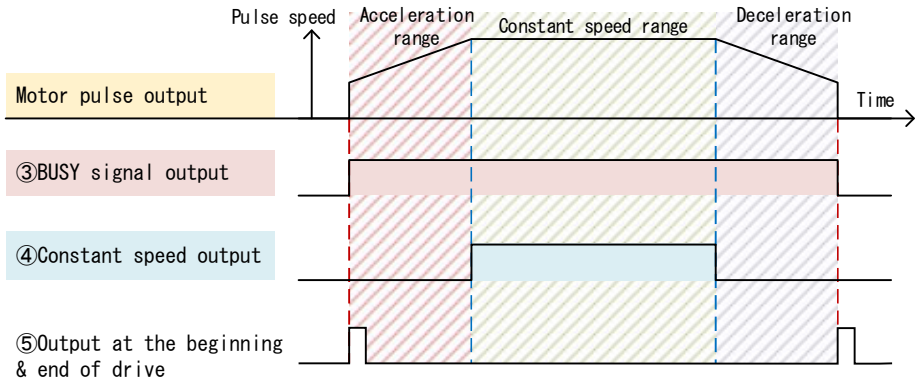
③ BUSY signal output (See the figure below)

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".

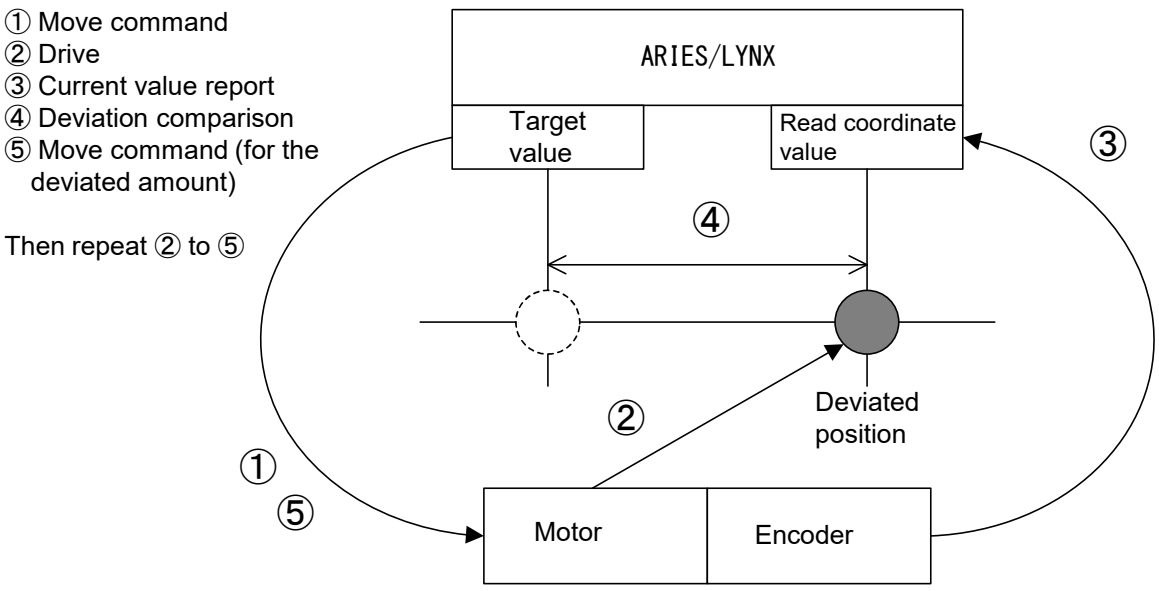
3-8. Encoder Correction

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

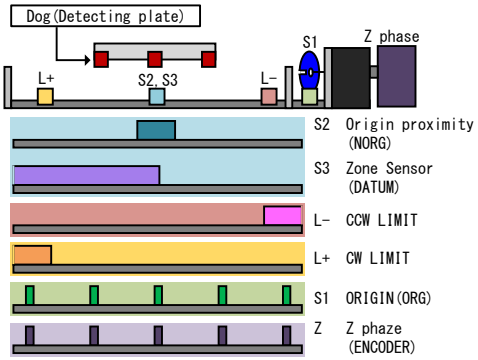
Example: When the motor pulse resolution is 0.1μm/1 pulse and encoder resolution is 1μm/1 pulse, the resolution ratio of the motor pulse/encoder is 1:10.
In this case, set 1 for System No.33 and 10 for System No.34.

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.

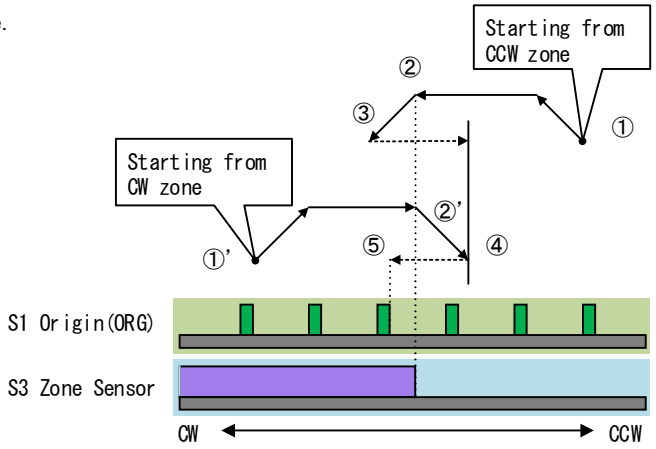
1 A return direction is judged with the zone sensor (DATUM), and set the edge of the first origin sensor (ORG) within the range sensor as the origin position.

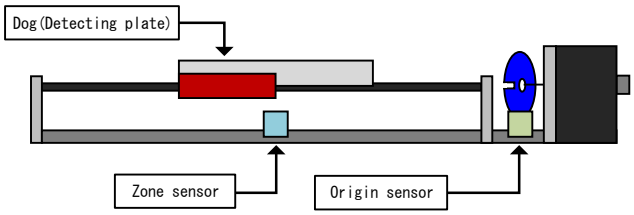
Starting from CCW zone

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.





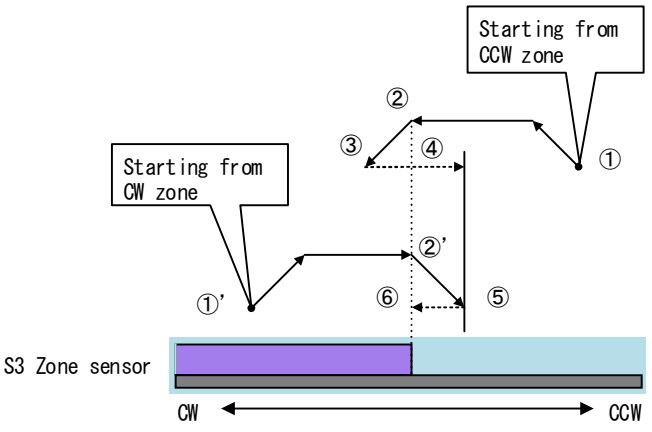
2 The edge of zone sensor (DATUM) is the origin position.

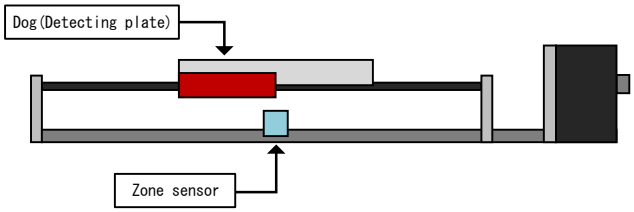
Starting from CCW zone

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.

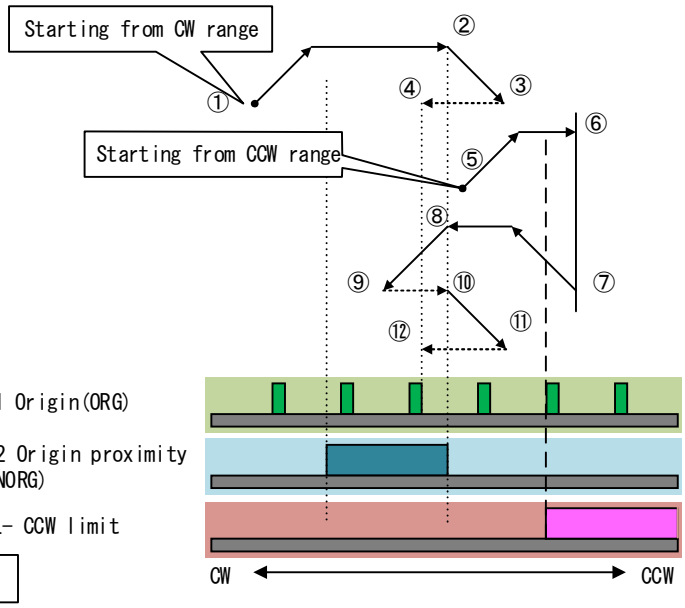
For a stage in which the origin sensor exists in the motor axis, it is necessary to select this method.

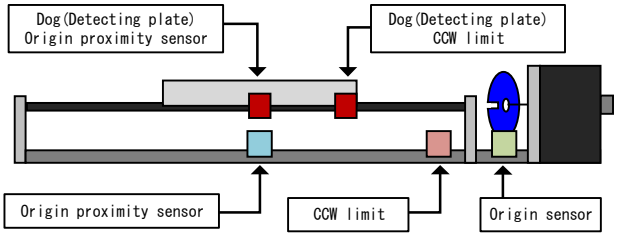
Starting from CW zone

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.
*When starting from the origin proximity zone, execute from ①.

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.





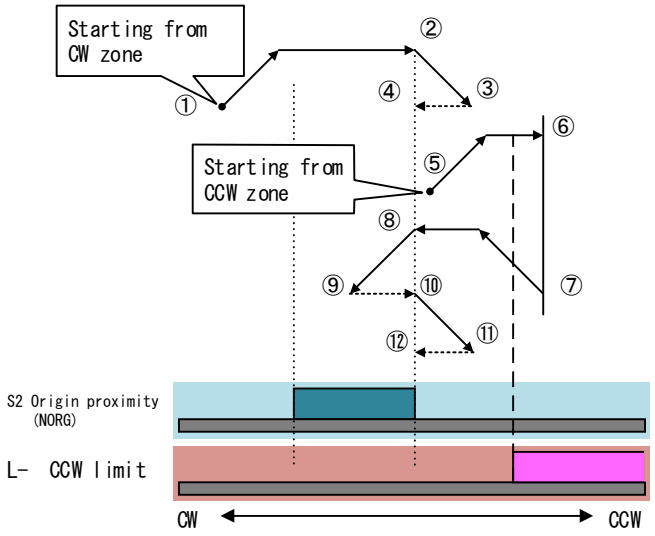
4 The edge of region proximity sensor (NORG) is the origin position.
(Our company's standard method)

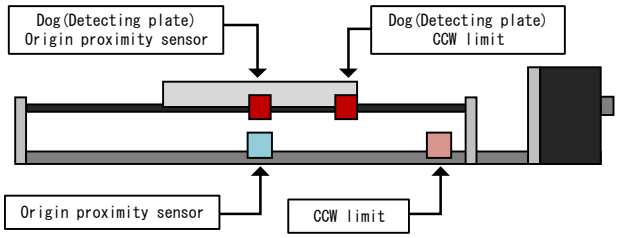
Starting from CW zone

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.
④Stop when the origin proximity is detected.
*When starting from the origin proximity zone, execute from ①.

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.





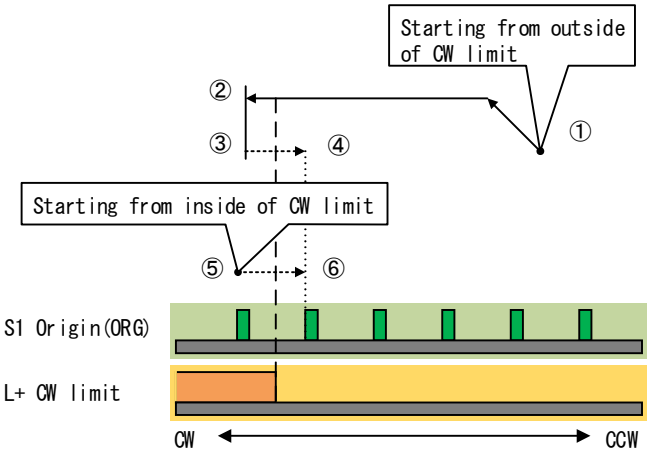
5 Origin sensor (ORG) in proximity of the CW limit is the origin position.

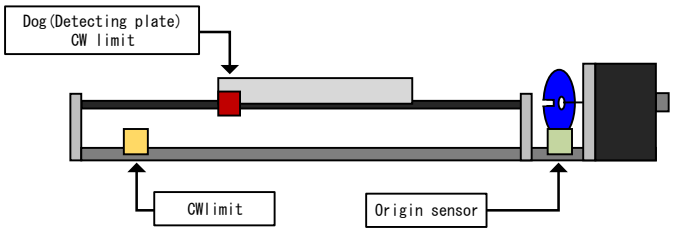
Starting from outside of CW limit

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.





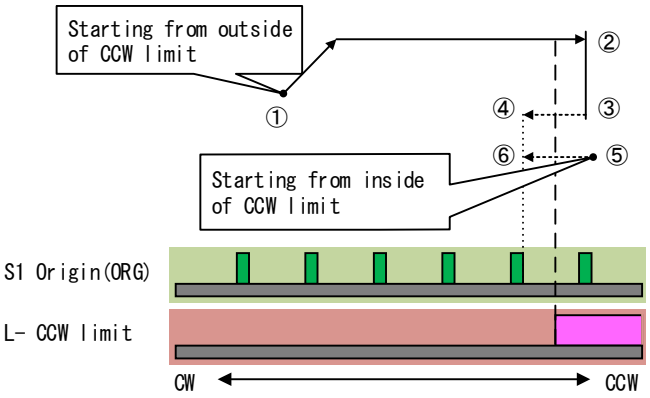
6 Origin sensor (ORG) in proximity of CCW limit is the origin position.

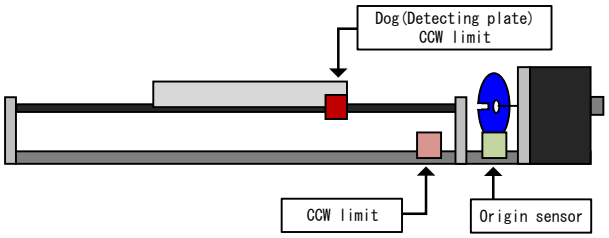
Starting from outside of CCW limit

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.





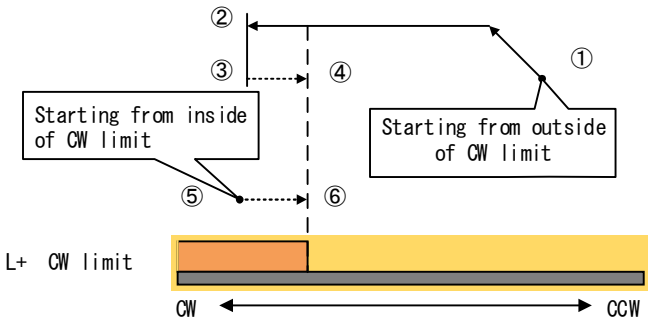
7 The edge of CW limit is set to the origin position.

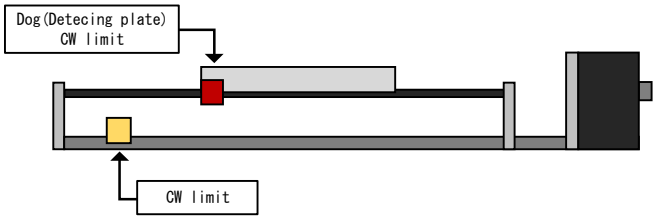
Starting from outside of CW limit

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.





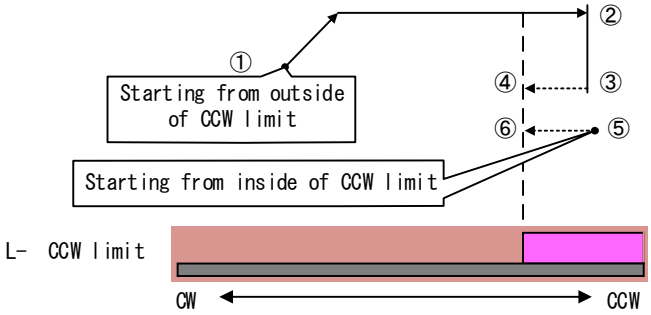
8 The edge of CCW limit is set to the origin position.

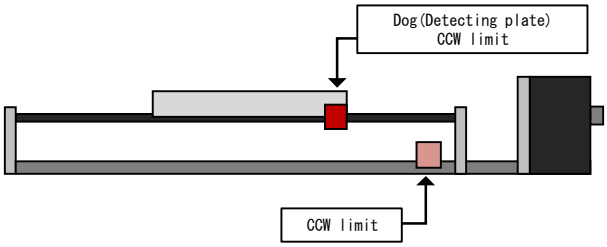
Starting from outside of CCW limit

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.

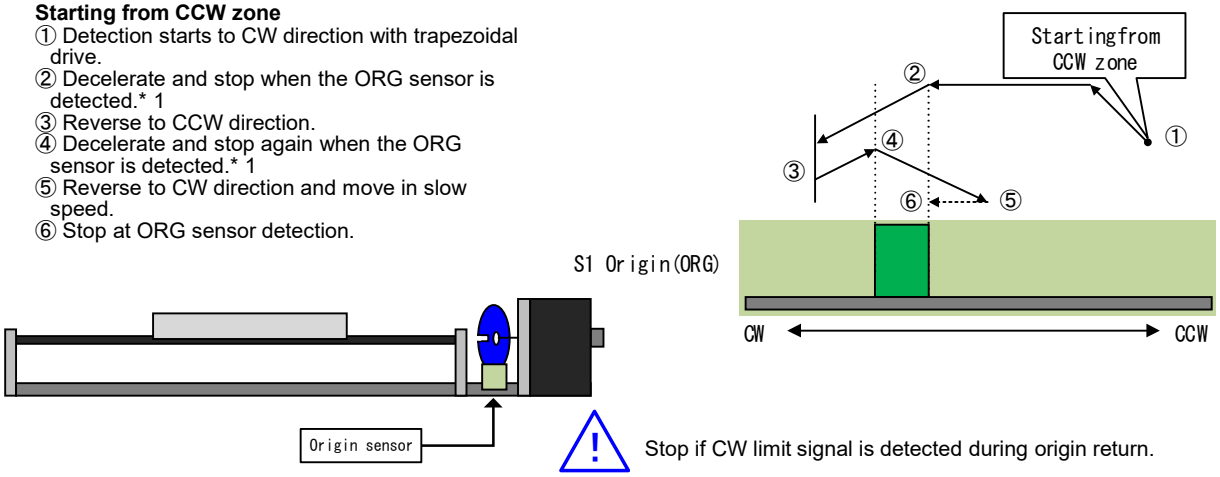




9 The edge of origin sensor is the origin position.

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.



Stop if CW limit signal is detected during origin return.

*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.

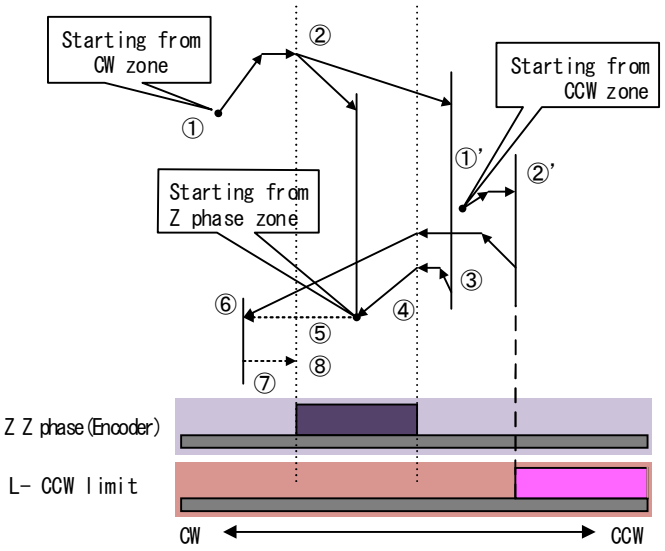
11 The encoder Z phase within the moving range is the origin position.

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 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.



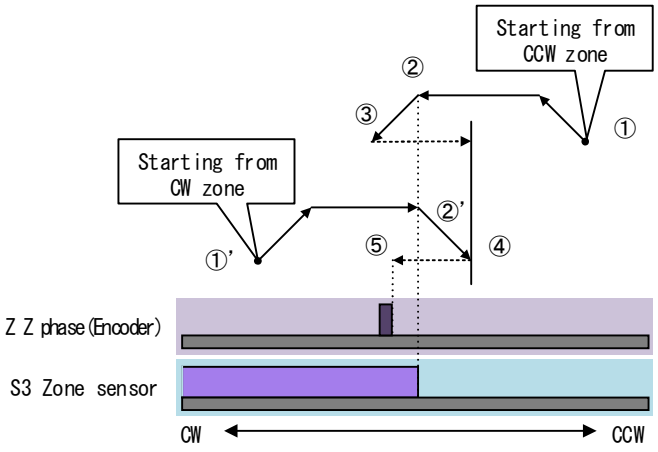
12

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.



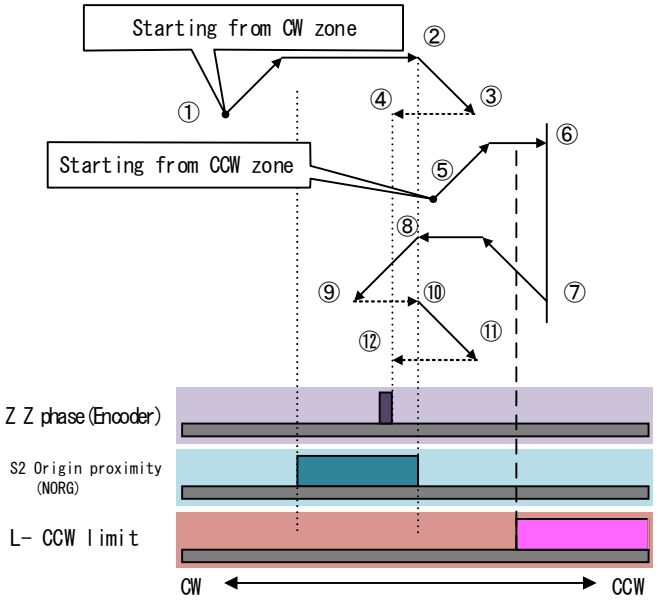
13

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.

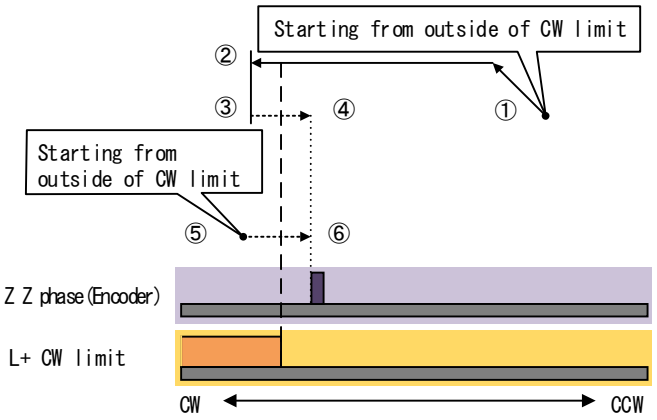


14 The edge of encoder Z phase in proximity of CW limit is set to the origin position.

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.

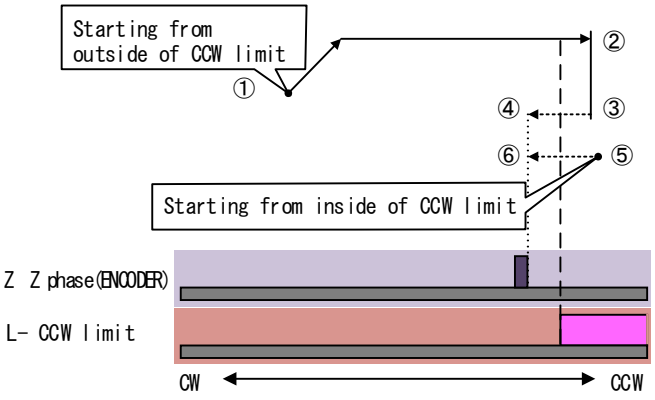


15 The edge of encoder Z phase in proximity of CCW limit is set to the origin position.

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.
④ Stop at the initial encoder Z phase detection position after moving through the CCW limit.

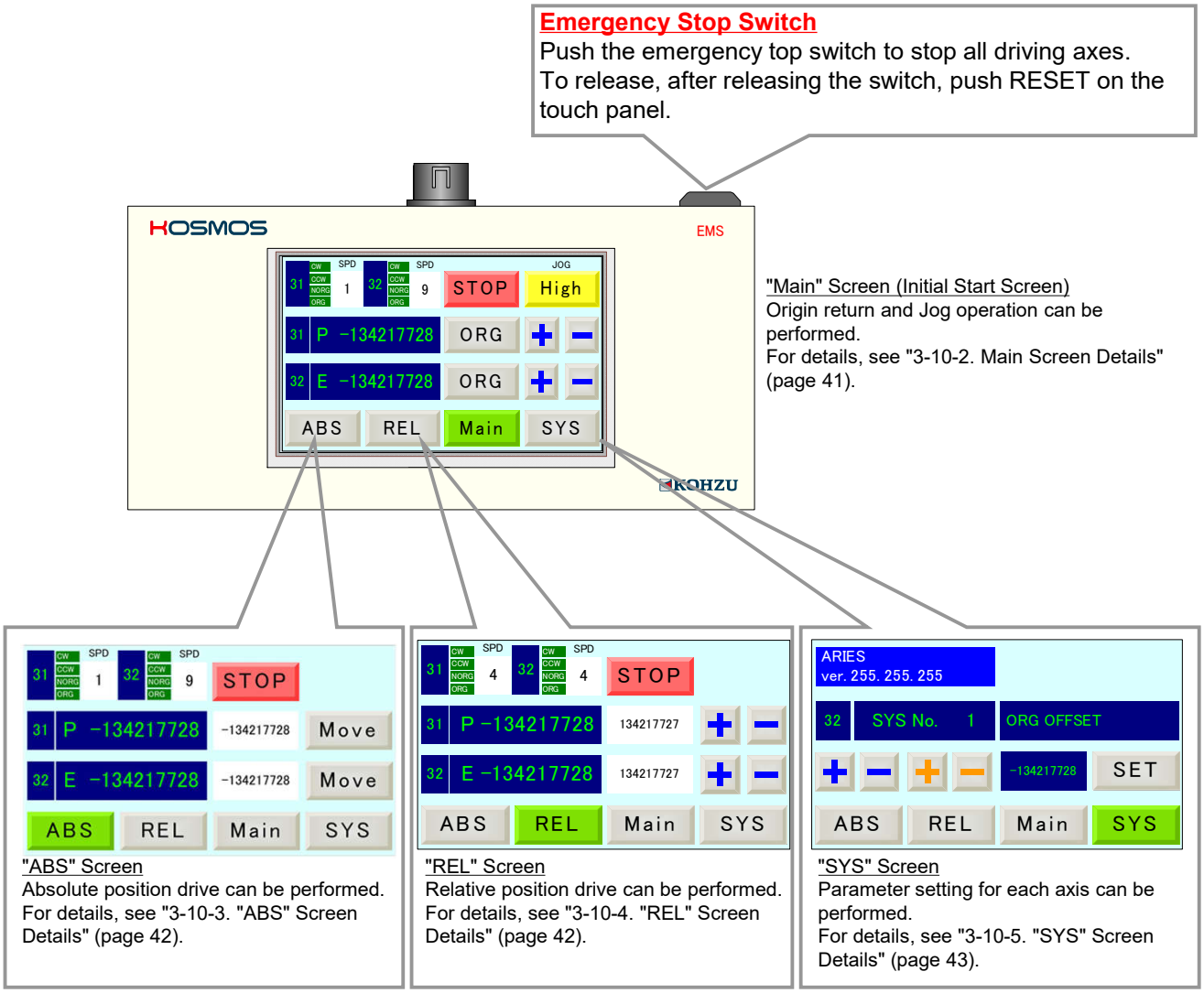


3-10. ARIES Touch Panel "PYXIS"

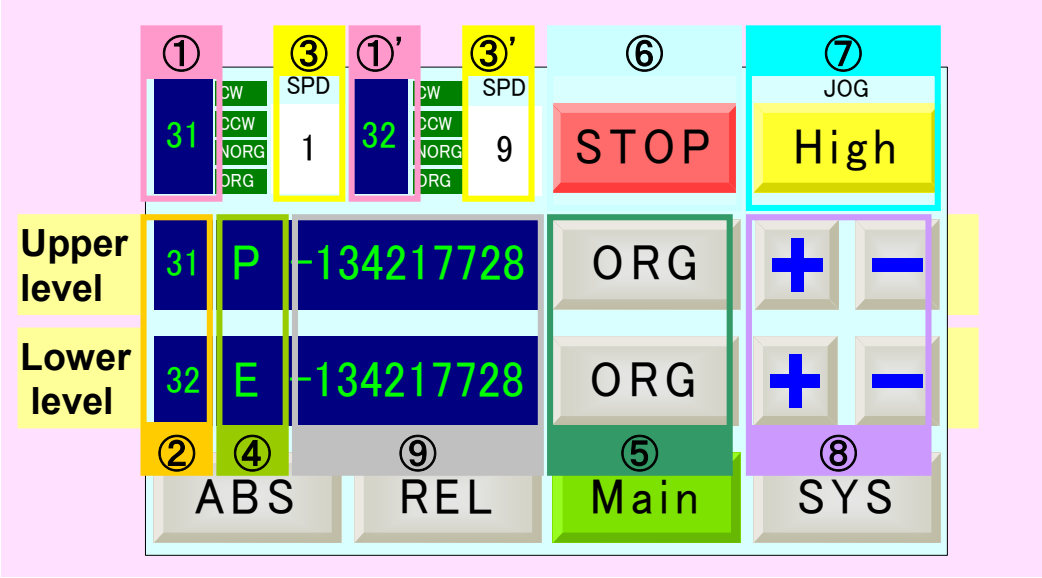
3-10-1. Connection and Operation

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.



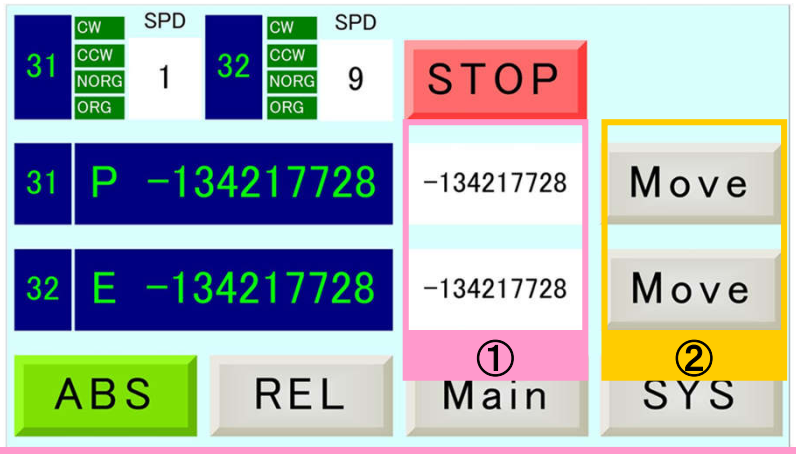
3-10-2. "Main" Screen Details



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

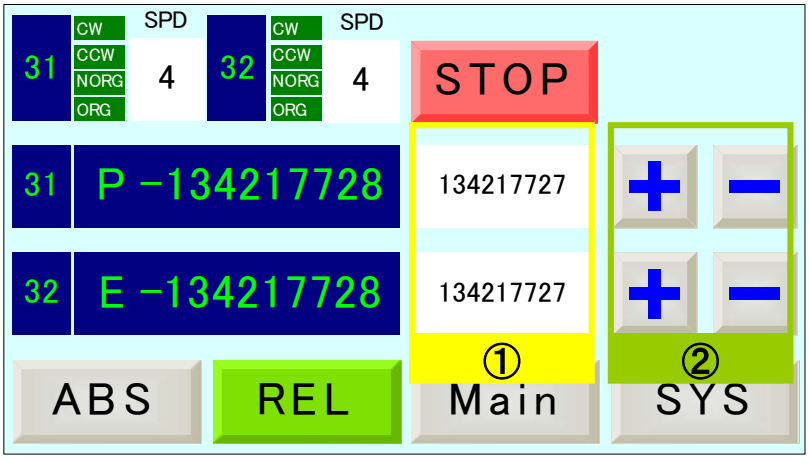


① Target Position Cell: Touch a cell to display the numeric keypad.
Target position (absolute position motor pulse management) can be set with the numeric keypad.

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



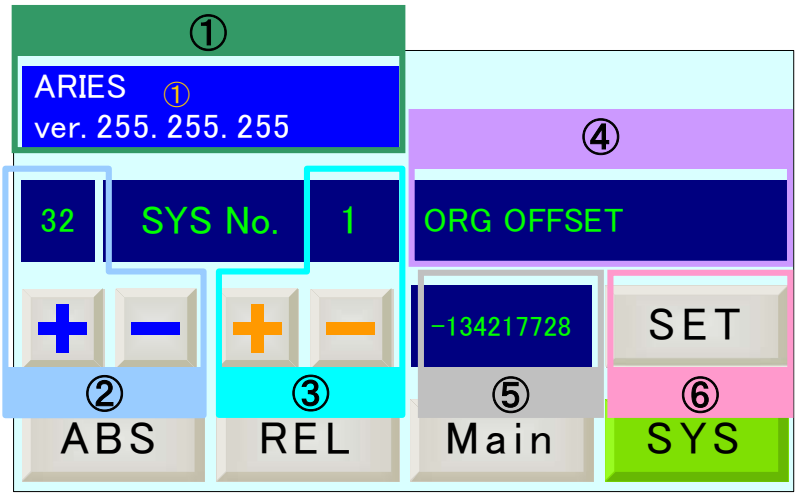
① Moving Amount Cell: Touch a cell to display the numeric keypad.
Target position (relative position motor pulse management) can be set with the numeric keypad.

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

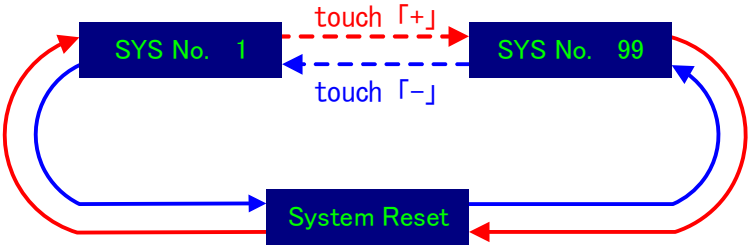
* Others are same functions with the "Main" screen.

3-10-5. "SYS" Screen Details

System Parameter Setting Screen



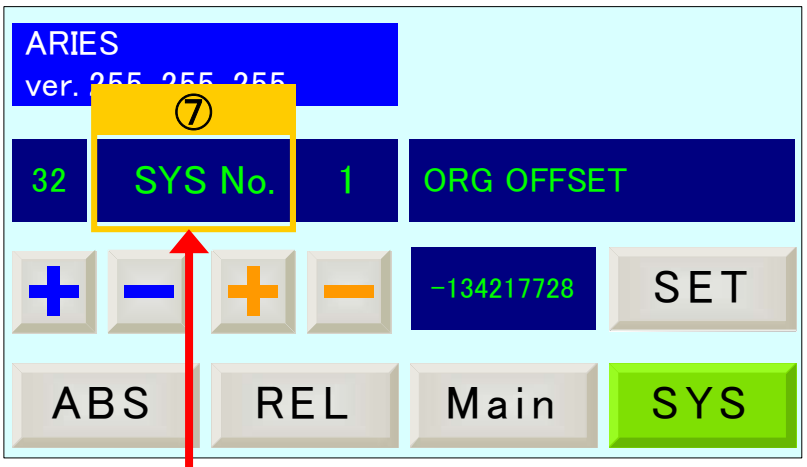
① ARIES Information:	Displays a version of ARIES.
② Axis Number Cell:	Touch a cell to display the numeric keypad. Axis number can be set with the numeric keypad. Also, + button and - button can be used to change the axis number.
③ Parameter No. Cell:	Touch a cell to display the numeric keypad. Parameter 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.



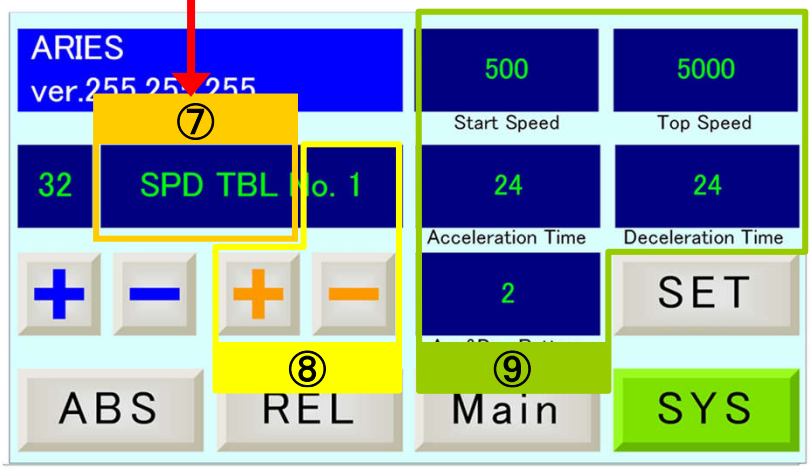
④ Parameter Name Display:	Displays the parameter name selected in ③.
⑤ Parameter Set Value Cell:	Touch a cell to display the numeric keypad. Parameter setting values can be set with the numeric keypad. * It does not get reflected without touching the SET button. Touch the SET button to write the parameters. * 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

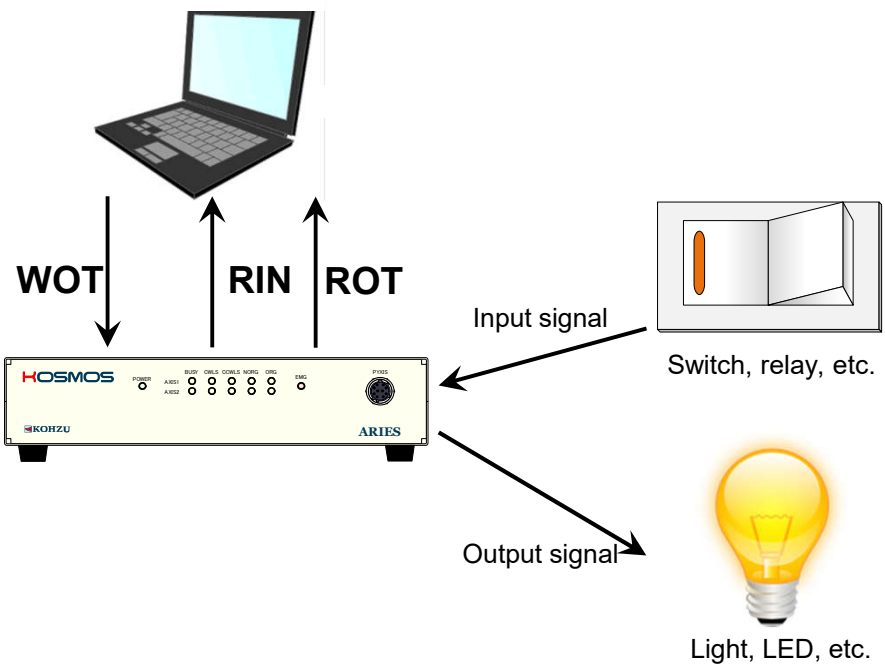
Displayed when driving stops because a soft limit is reached.

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. 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:

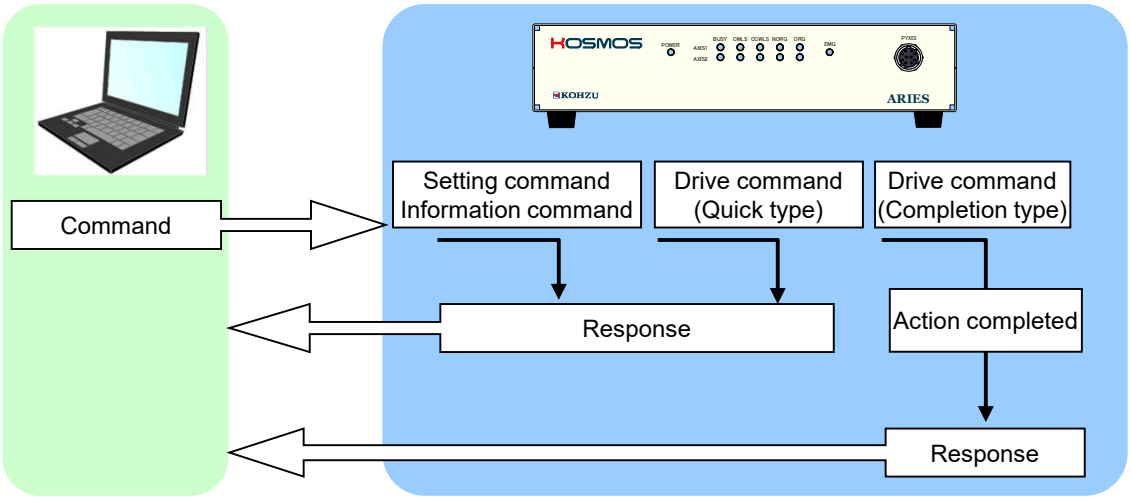
Select the communication method while the power is OFF.
(Depending on the communication speed to use the rotary switch for communication setting, set to 0 to 4)
Connect a RS-232C cable (cross cable) to the RS-232C connector.

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.



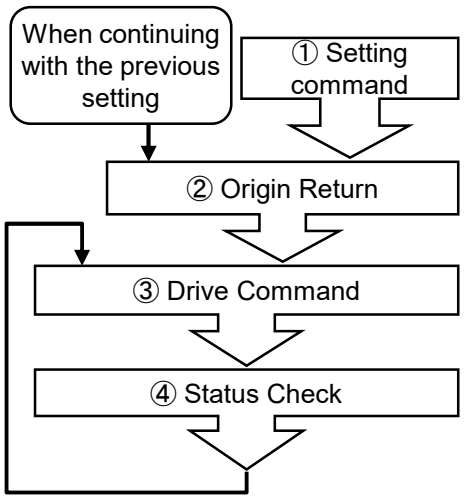
① Setting command The commands as **RST** and **WSY** used for setting immediately return a response.

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.



RST and WSY commands, etc.

ORG command

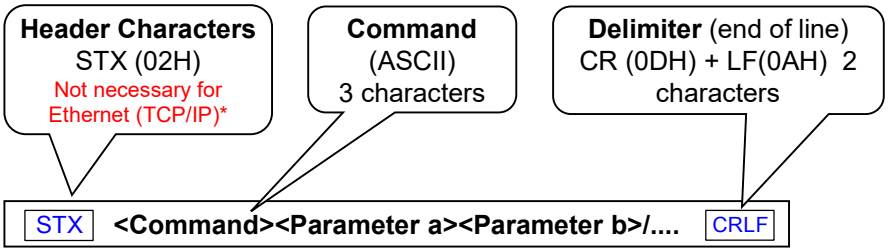
APS, RPS MPS commands, etc.

Checking the controller performance state

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 (/, ?).

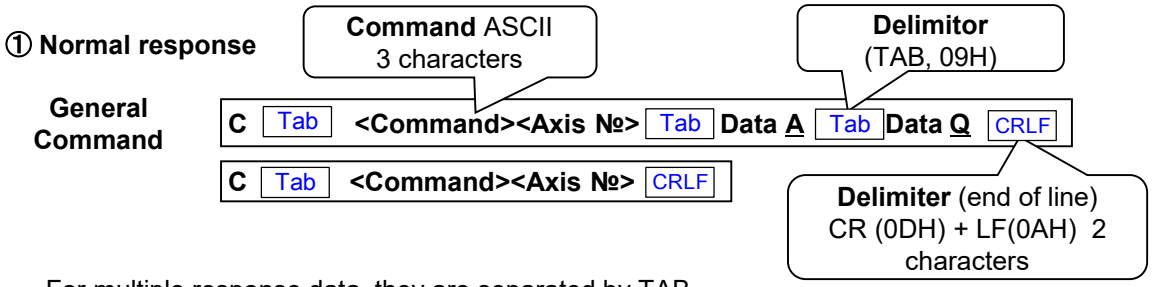
A space (20H) cannot be used in a command.

Parameter is always required. It cannot be omitted.

4-1-4. Response

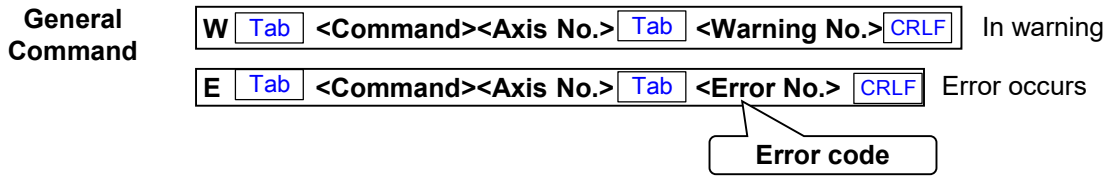
Format for response is as follows. When an error occurs, error response is returned.
Because a response is different per command, see the page of each command for details.

① Normal response



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 № 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 № 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.

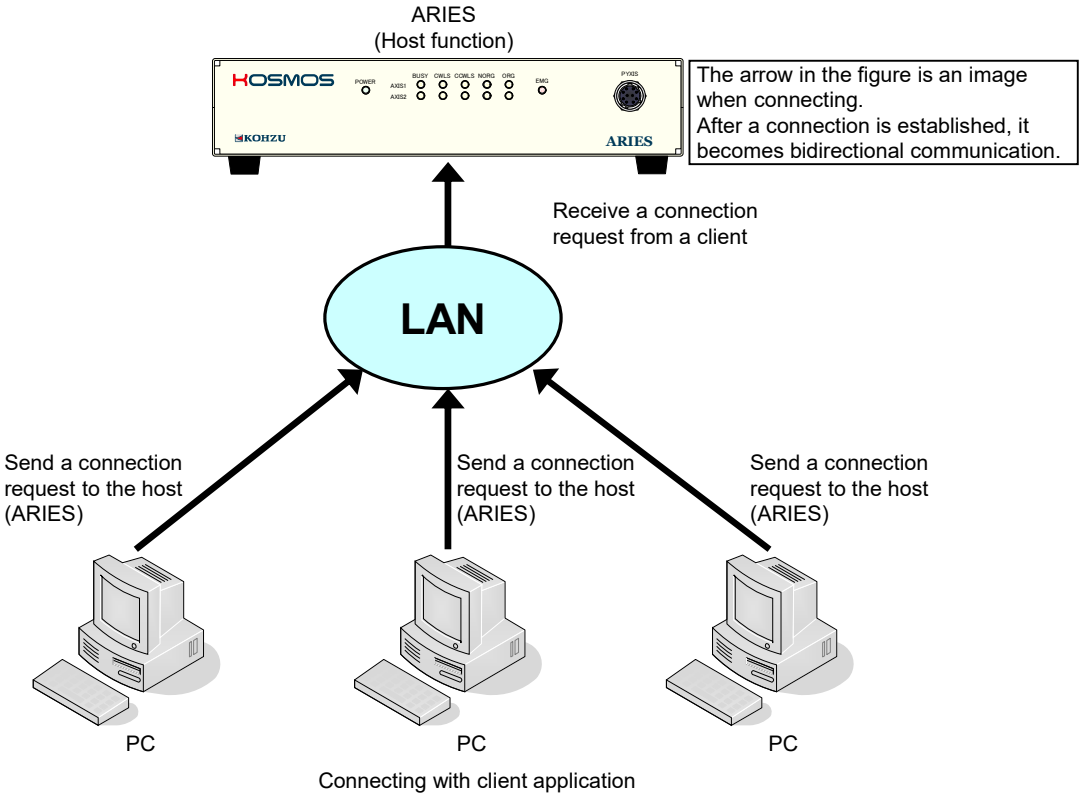
4-2-1. Flow from Ethernet (TCP/IP) Related Parameter Setting to Connection

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 able 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



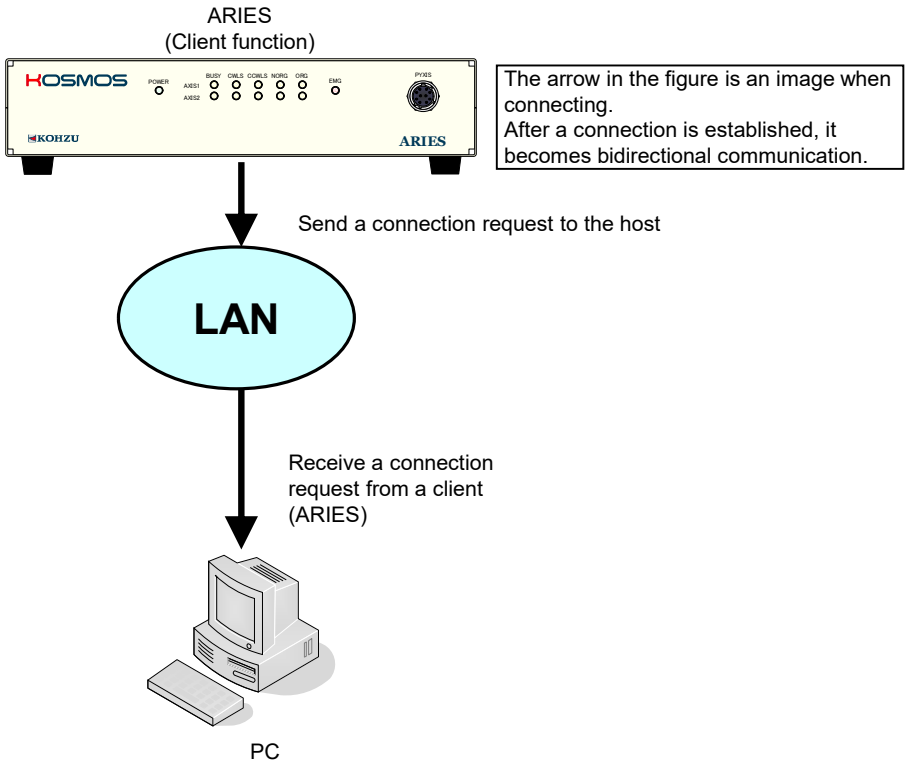
Setting steps
①Select the host function with the **WHC** command. (Default is set)
②Set the IP address of ARIES with the **WIP** command.
③As necessary, set a port number, subnet mask, default gateway, client limit, and a number of connection applications.
④Connect with the client application.

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

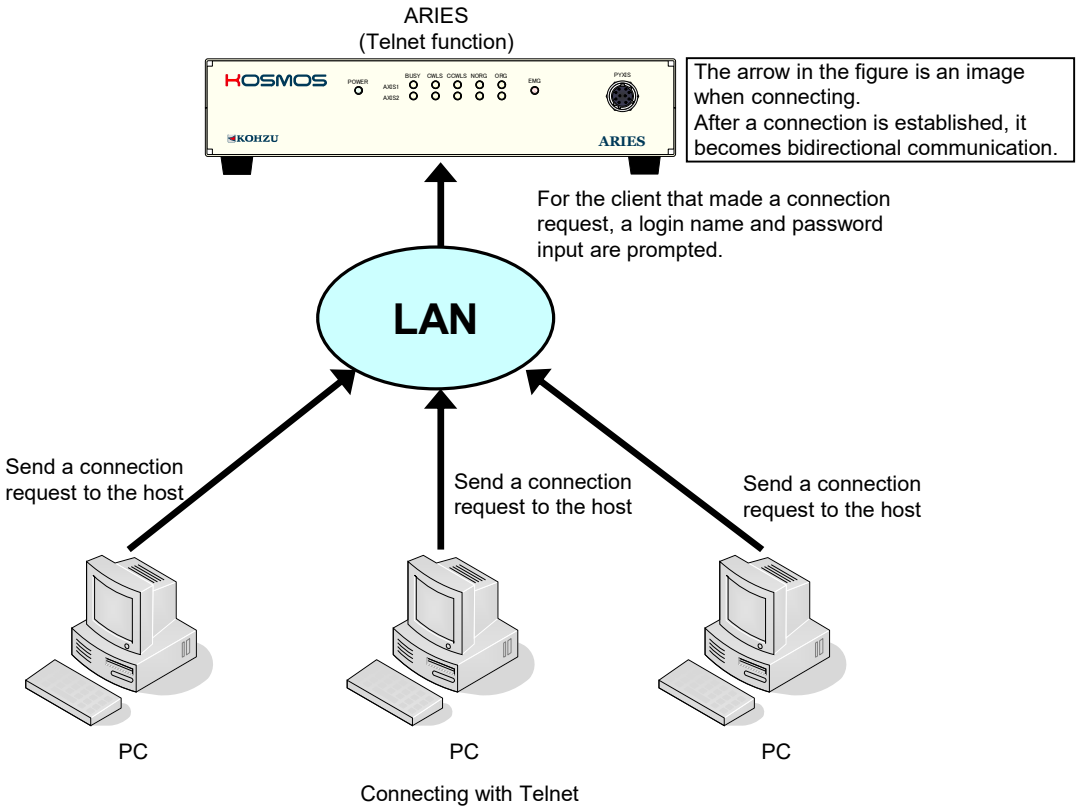
① Select the client function with the **WHC** command.
② Select the IP address of ARIES with the **WIP** command.
③ Specify the IP address of ARIES' connection destination (PC) with the **PIP** command.
④ As necessary, set a port number, subnet mask, default gateway, and a number of connection applications.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



Connecting with 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	71
	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

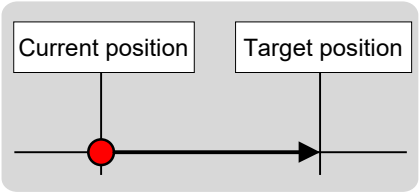
The commands that can be used in ARIES are shown next. (Alphabetical order)

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

APS

Absolute Position Drive

【Function】Moves to a target position with absolute position management.



【Format】 STX APS 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. *Return timing varies depending on the response method.

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

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

【Example】

Moves No.1 axis with speed table No.0 to 1,000 pulses position.

STX **APS1/0/1000/0** CRLF

【Remarks】

A stop during driving is done with the STP command.

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 32	
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	**C** Tab **FRP** <Axis No.> CRLF
Error	**E** Tab **FRP** <Axis No.> Tab <Error No.> CRLF

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	**C** [Tab] **IDN** [Tab] <Model name> [Tab] <Major version> [Tab] <Minor version> [Tab] <Release version> [CRLF]

【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	**C** Tab **MPI** Tab <Designated MPS axis> CRLF
Error	**E** Tab **MPI** Tab <Designated MPS axis> Tab <Error No.> CRLF

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

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

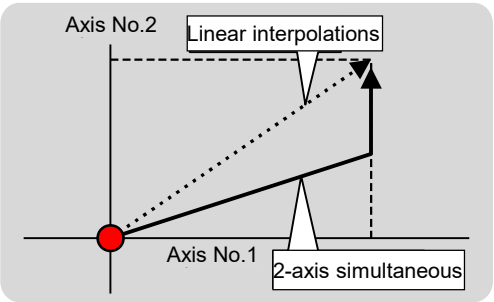
*When using the MPS command after turning the power ON, always set axis information with the MPI command.
Setting contents of MPI are valid until writing is performed next time.

MPS

Multi-axis Position Drive

【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】

STX MPS a/b/c/d/i CRLF	Specifying for 2-axis	No. of parameters = 5
STX MPS a/b/c/d/e/f/i CRLF	Specifying for 3-axis	No. of parameters = 7
STX MPS a/b/c/d/e/f/g/h/i CRLF	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** Tab **MPS** <1st axis No.> CRLF
Error	**W** Tab **MPS** <1st axis No.> Tab <Warning No.> CRLF
	E Tab **MPS** <1st axis No.> Tab <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.

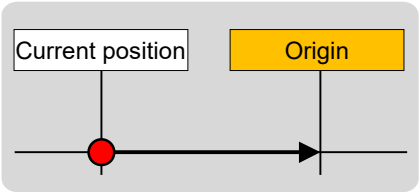
ORG

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

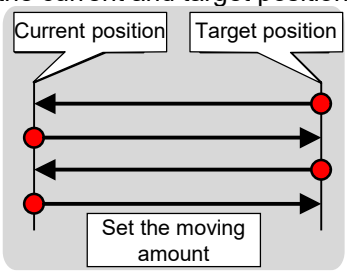
【Remarks】

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	**C** Tab **OSC** <Axis No,> CRLF
Error	**W** Tab **OSC** <Axis No.> Tab <Warning No.> CRLF
	E Tab **OSC** <Axis No.> Tab <Error No.> CRLF

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	**C** Tab **PIP** Tab a Tab b Tab c Tab d CRLF
Error	**E** Tab **PIP** Tab a Tab <Error No.> CRLF

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	**C** Tab **RAL** a CRLF
Error	**E** Tab **RAL** a Tab <Error No.> CRLF

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	**C** [Tab] **RAP** [Tab] a [CRLF]
Error	**E** [Tab] **RAP** [Tab] <Error No.> [CRLF]

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

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	**C** Tab **RCL** Tab a Tab b Tab c Tab d Tab e CRLF
Error	**E** Tab **RCL** Tab <Error No.> CRLF

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	**C** Tab **RDE** a Tab b CRLF
Error	**E** Tab **RDE** a Tab <Error No.> CRLF

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	**C** Tab **RDP** a Tab b CRLF
Error	**E** Tab **RDP** a Tab <Error No.> CRLF

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** [Tab] **REM** [CRLF]
Error	**E** [Tab] **REM** [Tab] <Error No.> [CRLF]

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	**C** Tab **RGW** Tab a Tab b Tab c Tab d CRLF
Error	**E** Tab **RGW** Tab <Error №> CRLF

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	**C** Tab **RHC** Tab a CRLF
Error	**E** Tab **RHC** Tab <Error №> CRLF

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** Tab **RIN** Tab a Tab b Tab c Tab d Tab e Tab f Tab g Tab h CRLF
Error	**E** Tab **RIN** Tab <Error №> CRLF

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	**C** Tab **RIP** Tab a Tab b Tab c Tab d CRLF
Error	**E** Tab **RIP** Tab <Error No.> CRLF

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	**C** Tab **RMC** Tab a Tab b Tab c Tab d Tab e Tab f CRLF
Error	**E** Tab **RMC** Tab <Error No.> CRLF

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	**C** Tab **ROG** a Tab b CRLF
Error	**E** Tab **ROG** a Tab <Error №> CRLF

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	**C** [Tab] **ROT** [Tab] a [Tab] b [Tab] c [Tab] d [Tab] e [Tab] f [Tab] g [Tab] h [CRLF]
Error	**E** [Tab] **ROT** [Tab] <Error №> [CRLF]

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	**C** [Tab] **RPI** [Tab] a [Tab] b [Tab] c [Tab] d [CRLF]
Error	**E** [Tab] **RPI** [Tab] <Error №> [CRLF]

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

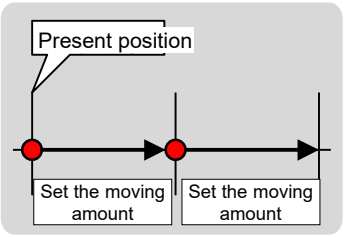
【Response data】

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	**C** Tab **RPS** <Axis No.> CRLF
Error	**W** Tab **RPS** <Axis No.> Tab <Warning No.> CRLF
	E Tab **RPS** <Axis No.> Tab <Error No.> CRLF

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** Tab **RPT** Tab a CRLF
Error	**E** Tab **RPT** Tab <Error №> CRLF

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	**C** [Tab] **RSN** [Tab] a [Tab] b [Tab] c [Tab] d [CRLF]
Error	**E** [Tab] **RSN** [Tab] <Error No.> [CRLF]

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 system parameter 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** Tab **RST** CRLF
Error	**E** Tab **RST** Tab <Error No.> CRLF

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

【Remarks】

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

Items to be reset

・The system parameters for each axis, the velocity table, position coordinate information, encoder count value, and home return completion status (ROG) are reset.

Items that are not reset

・ 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 "4-2. 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	**C** Tab **RSV** a Tab b Tab c Tab d Tab e CRLF
Error	**E** Tab **RSV** a Tab <Error No.> CRLF

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	**C** Tab **RSY** <Axis No.> Tab <System No.> Tab <Setting value> CRLF
Error	**E** Tab **RSY** <Axis No.> Tab <Error No.> CRLF

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	**C** Tab **RTB** a Tab b Tab c Tab d Tab e Tab f Tab g Tab h Tab i CRLF
Error	**E** Tab **RTB** <Axis No.> Tab <Error No.> 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	

SPS

Linear Interpose Drive

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

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

STX SPS a/b/c/d/e/f/g/h CRLF 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** Tab **SPS** <1st axis No.> CRLF
Error	**W** Tab **SPS** <1st axis No.> Tab <Warning No.> CRLF
	E Tab **SPS** <1st axis No.> Tab <Error No.> 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.	0 to 32	“0”: All axes are stopped
b	Selecting stop mode	0: Decelerate and stop 1: Emergency stop	

【Response】 Returns the setting value.

Status	Response data
Normal	**C** Tab **STP** <Axis No.> CRLF
Error	**E** Tab **STP** <Axis No.> Tab <Error No.> CRLF

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	**C** Tab **STR** a Tab b Tab c Tab d Tab e Tab f Tab g CRLF
Error	**E** Tab **STR** <Axis No.> Tab <Error No.> CRLF

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** Tab **TFR** CRLF
Error	**E** Tab **TFR** Tab <Error No. CRLF

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	**C** Tab **TRS** <Axis No.> CRLF
Error	**E** Tab **TRS** <Axis No.> Tab <Error No.> CRLF

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	**C** Tab **WAP** CRLF
Error	**E** Tab **WAP** Tab <Error No.> CRLF

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.

WCL

Client Restriction Setting Write 1/2

【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	**C** Tab **WCL** Tab a Tab b Tab c Tab d Tab e CRLF
Error	**E** Tab **WCL** Tab <Error No.> CRLF

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.

WCL

Client Restriction Setting Write 2/2

【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	See * below.
b	Address2	0 to 255	
c	Address3	0 to 255	
d	Address4	0 to 255	

【Response】Returns status information.

Status	Response data
Normal	**C** Tab **WGW** Tab a Tab b Tab c Tab d CRLF
Error	**E** Tab **WGW** Tab <Error No.> CRLF

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	**C** Tab **WHC** Tab a CRLF
Error	**E** Tab **WHC** Tab <Error No.> CRLF

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	**C** Tab **WIP** Tab a Tab b Tab c Tab d CRLF
Error	**E** Tab **WIP** Tab <Error No.> CRLF

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	**C** Tab **WOT** Tab a Tab b CRLF
Error	**E** Tab **WOT** Tab <Error No.> CRLF

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	**C** Tab **WPS** Tab a Tab b CRLF
Error	**E** Tab **WPS** Tab <Error No.> CRLF

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	**C** Tab **WPT** Tab a CRLF
Error	**E** Tab **WPT** Tab <Error No.> CRLF

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	**C** Tab **WRE** <Axis No.> CRLF
Error	**E** Tab **WRE** <Axis No.> Tab <Error No.> CRLF

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	**C** Tab **WRP** <Axis No.> CRLF
Error	**E** Tab **WRP** <Axis No.> Tab <Error No.> CRLF

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	**C** [Tab] **WSN** a [Tab] b [Tab] c [Tab] d [CRLF]
Error	**E** [Tab] **WSN** [Tab] <Error No.> [CRLF]

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	**C** Tab **WSY** <Axis №> Tab <System №> CRLF
Error	**E** Tab **WSY** <Axis No.> Tab <Error No.> CRLF

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

WTB

Speed Table Write

【Function】 Writes the speed table data.

【Format】 STX WTB a/b/c/d/e/f/g CRLF 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 10,00	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)).
f	Decelerating time	1 to 10,00	
g	Accelerating pattern	1: Rectangular drive 2: Trapezoidal drive 3: S-shaped drive	

【Response】Returns status information.

Status	Response data
Normal	C Tab WTB a Tab b Tab c Tab d Tab e Tab f Tab g Tab h Tab i CRLF
Error	E Tab WTB a Tab <Error No.> CRLF

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

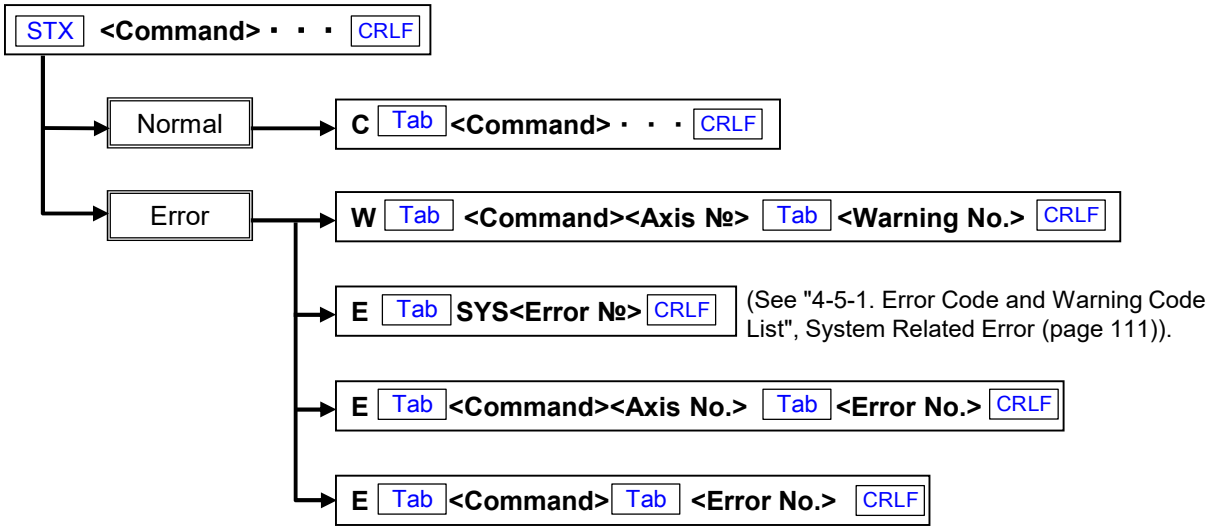
【Response data】

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 10,00	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 10,00	
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).



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

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.	See "3-1-3. Speed Setting Regulations" (page 18).
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).	See SPS in "4-4. Command Details" (page 89).
607	Tried to set the maximum speed exceeding the limit value (SYS No.16).	

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.	Please contact the sales agent, commercial firm and our sales department from which you purchased our product
703	Trigger output stopped before exceeding the setting time.	

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 to Motionnet device's connection shutdown (including electric disconnection). due	Can be restored by issuing the RAX command.
803	Tried to send the following command before receiving a reply.	

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	Speed for origin scan	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 MULTYPLICITY	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) 4: 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: 1µsec 2: 10µsec 3: 100µsec 4: 1000µsec	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　4
Setting range　1 to 15

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

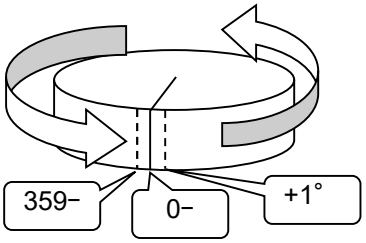
When origin return drive is executed, speed to determine final positioning is set.
Default value　500
Setting range　1 to 5,000,000

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)

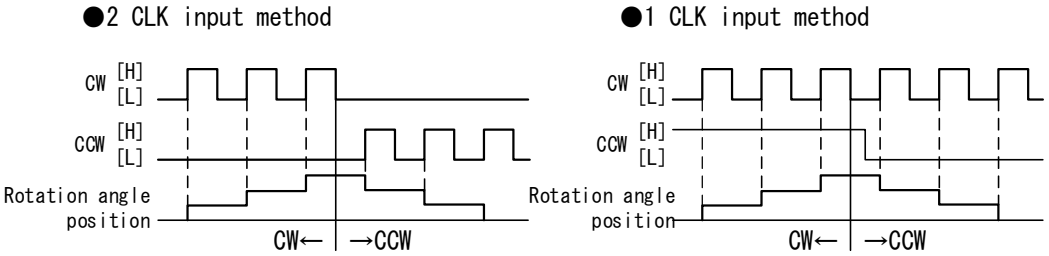
A relationship between pulse command direction and motor rotation direction is changed.
Default value　0
0: Regular rotation: A motor drives to CW direction with + direction pulse.
1: Reverse rotation: A motor drives to CCW direction with + direction pulse.

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 SPEEED 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

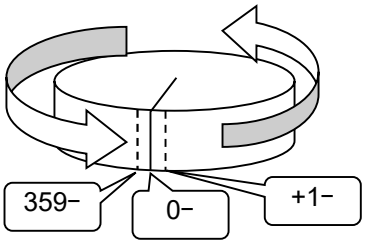
System No.22 NORG SIGNAL LOGIC （Change NORG sensor signal logic）
NORG signal logic is changed.
Default value 0
0: NO: Normal open
1: NC: Normal close

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 0.1μm/1 pulse and encoder resolution is 1μm/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 ration/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: 1μsec
2: 10μsec
3: 100μsec
4: 1000μsec

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 1
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	25VA MAX（For AC100V supply）	10VA 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	・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	・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	・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	・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)	

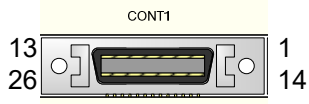
*1. The motor driver is a separate body.
*2. ARIES only

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

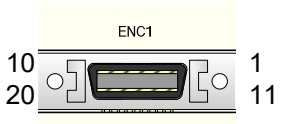
Pin	Terminal name	Signal Name
1	PMx_CW(PLS)＋	CW pulse or command pulse (differential output) +
2	PMx_CCW(DIR)＋	CCW pulse or direction specifying pulse (differential output) +
3	PMx_COFF＋	Current OFF (differential output) +
4	PMx_D.SEL＋	Step division number switch (differential output) + [For TITAN-A 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)± 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)± 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)



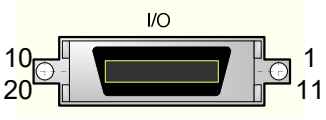
10 9 8 7 6 5 4 3 2 1
20 19 18 17 16 15 14 13 12 11

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)



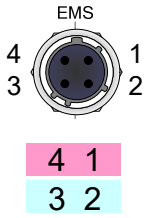
10 9 8 7 6 5 4 3 2 1
20 19 18 17 16 15 14 13 12 11

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

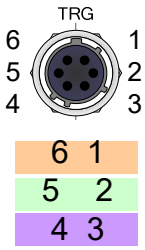
Connector model type: HR10A-7R-4S(73) (HIROSE)
Compatible connector: HR10A-7P-4P(73) (HIROSE)



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)

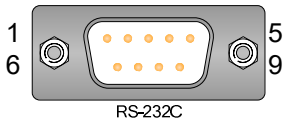


Pin	Terminal name	Signal Name
1	TRG＋	Trigger signal (differential output) +
2	TRG－	Trigger signal (differential output) -
3	GND (+5V)	GND(for +5V)
4	Reserved	Connection prohibited
5	Reserved	Connection prohibited
6	Reserved	Connection prohibited

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)



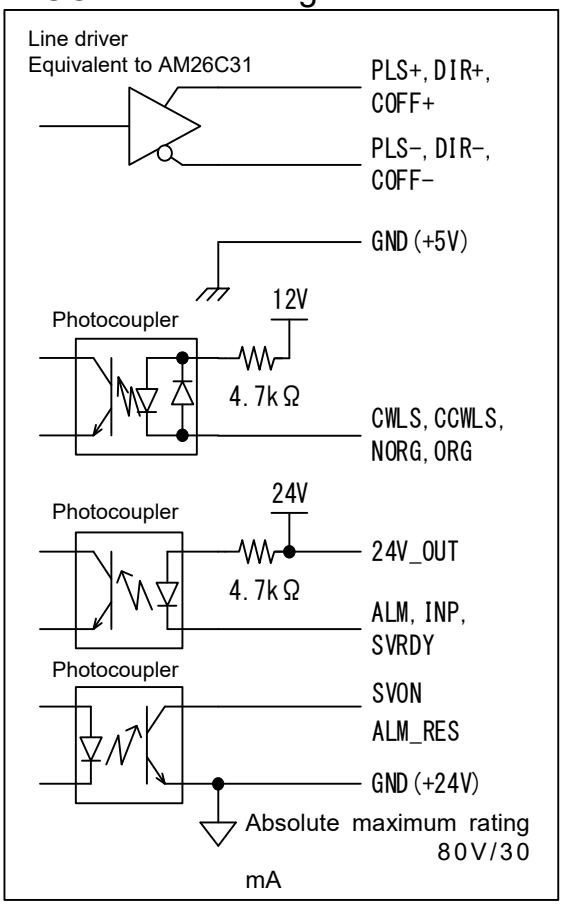
1 2 3 4 5
6 7 8 9

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.

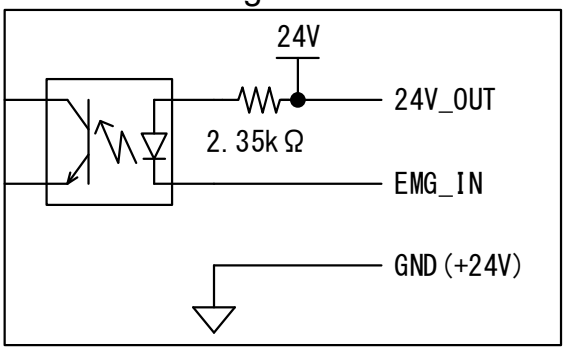
5-3. Input/Output Signal Circuit Diagram

CONT 1 and 2 signal interface

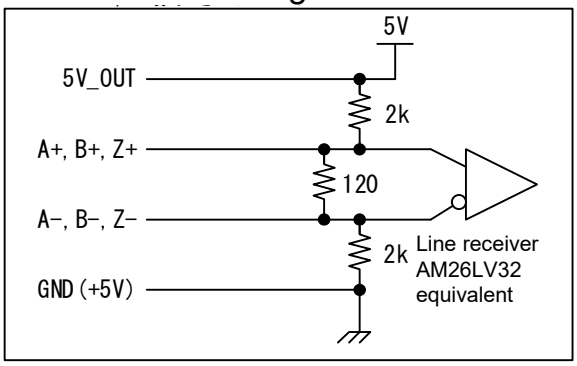


Ground of CWLS, CCWLS, NORG and ORG is GND (+24V)

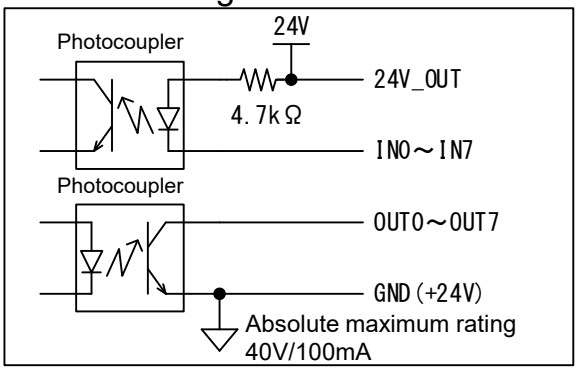
ENG signal interface



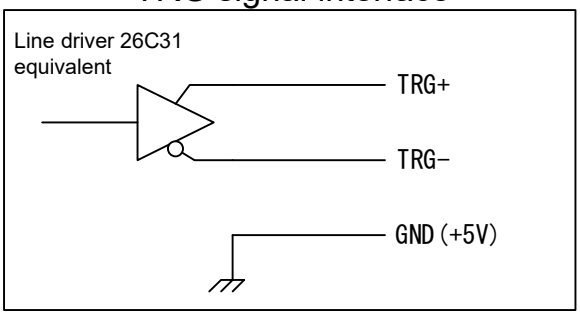
ENC1 and 2 signal interface



I/0 signal interface



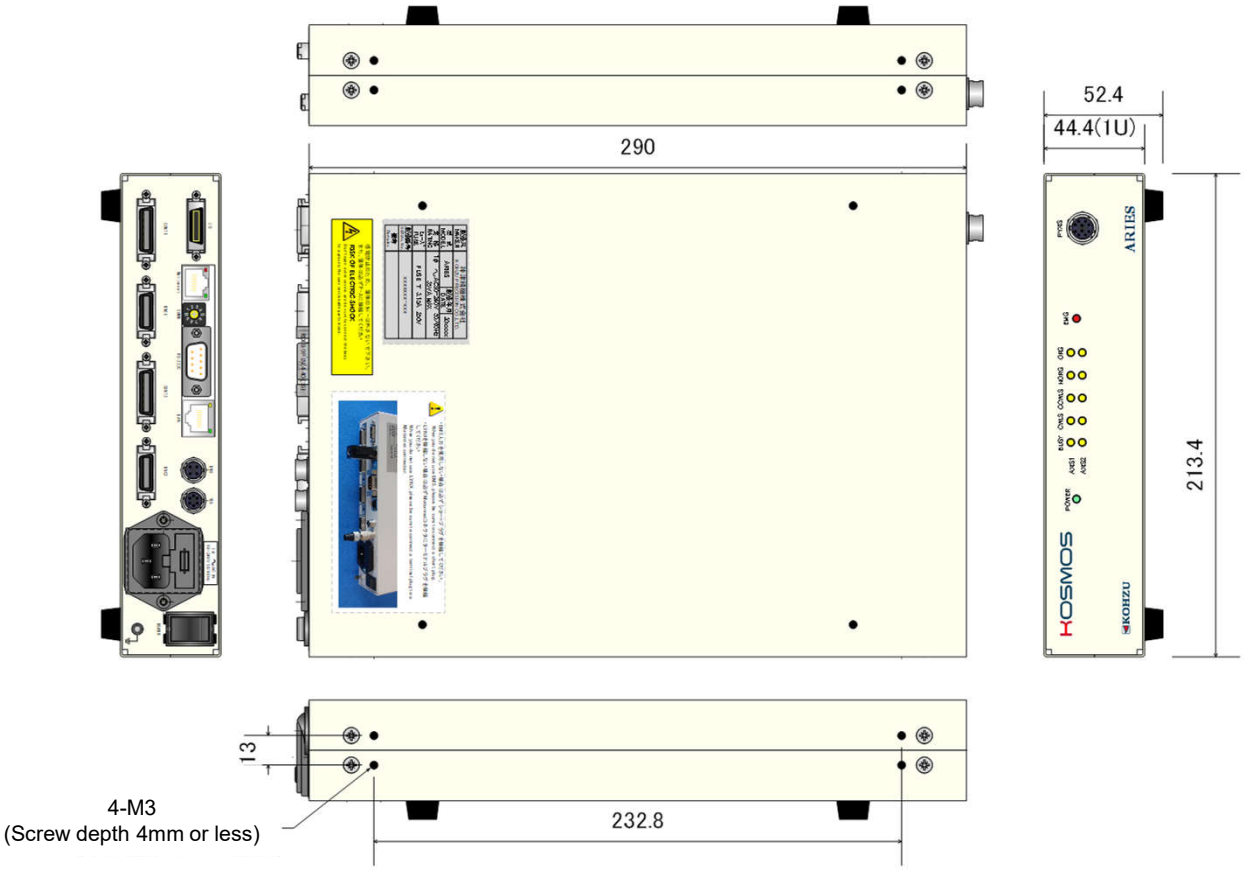
TRG signal interface



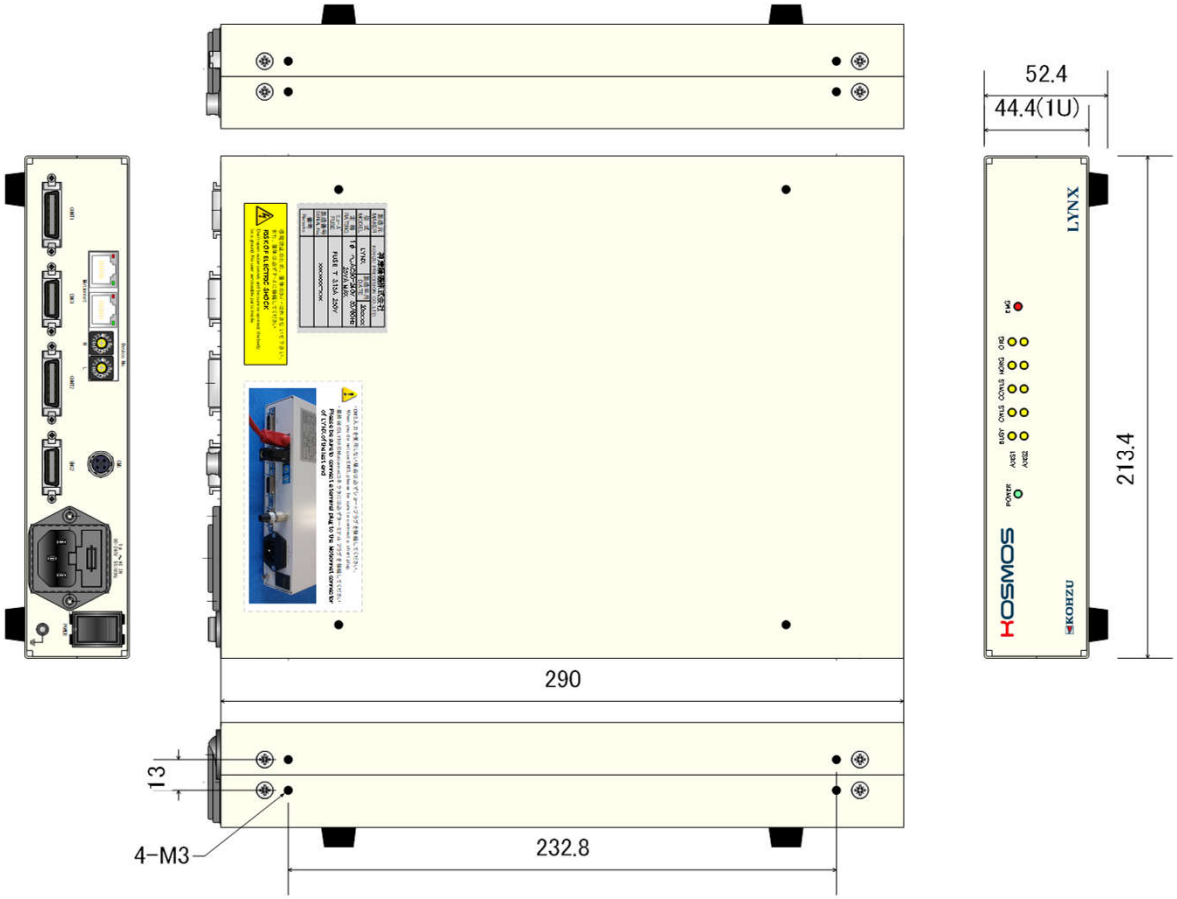
The circuit on this page applies to ARIES manufactured after December 2019 and LYNX manufactured after April 2020.
For ARIES / LYNX before that, refer to the instruction manual of Rev.1.42 or earlier.

5-4. Appearance Dimensions

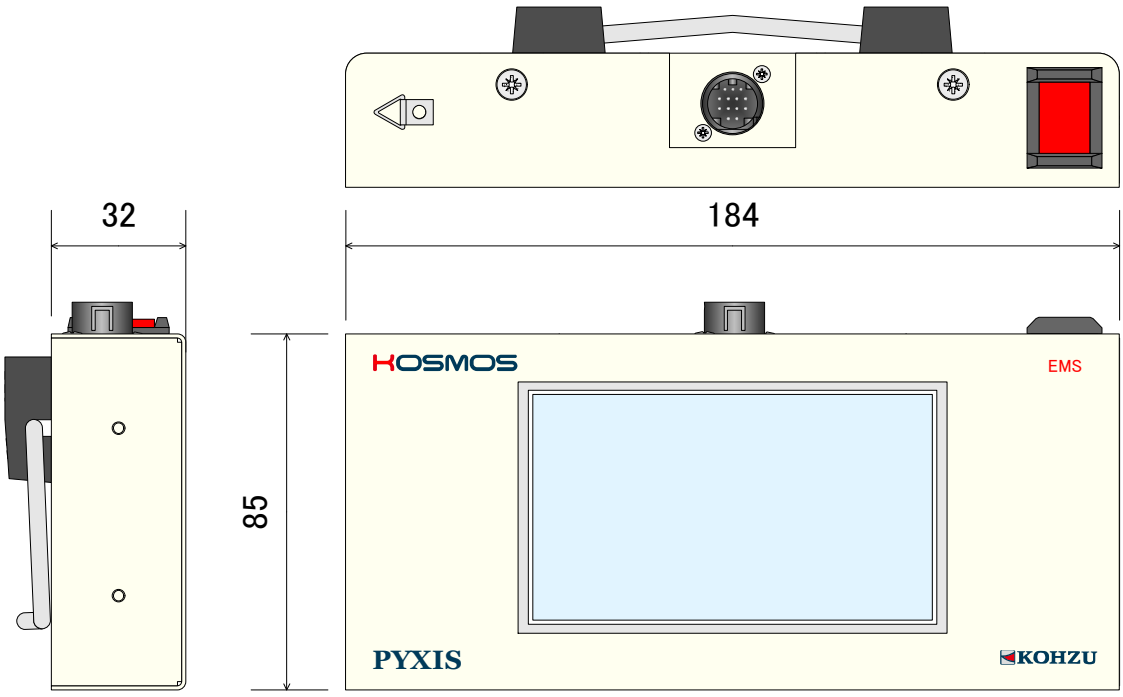
■ ARIES appearance dimensions



■ LYNX appearance dimensions



■ 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 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 a be re 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 forcedly 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
2020/04/23	1.42	Corrected the description of accessories./Correction of errors
2021/08/13	1.43	Update input / output signal circuit diagram and correct typographical errors

Recording Column

Purchased Date Year Month Date

Purchased from

Person in charge TEL

Production No.

Special note

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▪ ▪	

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