AF
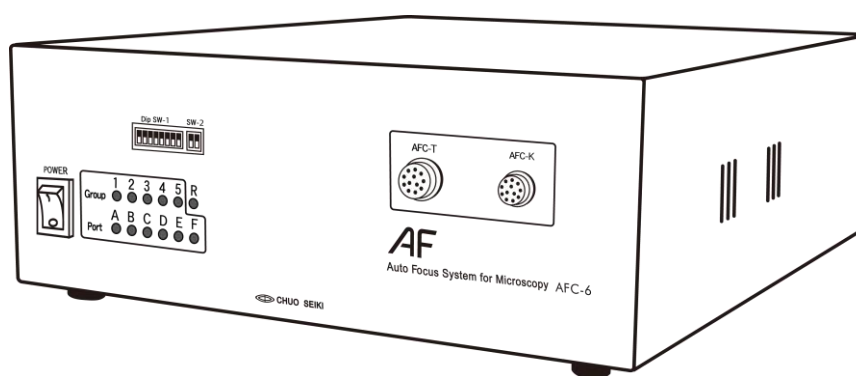
Auto Focus System for Microscopy **AFC-6**

Auto Focus Controller

AFC-6

INSTRUCTION MANUAL

- Parameters -

CHUO PRECISION INDUSTRIAL CO.,LTD.

Introduction

Thank you for purchasing our Auto Focus Controller AFC.

AFC is an exclusive controller for our Auto Focus Microscopes and Auto Focus Units. This INSTRUCTION MANUAL provides specifications, operational methods and precautions for AFC. Please read this manual thoroughly before using this product. In order to deliver sufficient information for the full understandings of the functions and performance of this product, we hope the users find this manual helpful.

Outline of this manual

AFC-6 instruction manual consists of following five sections.

Section 1	AFC Main Unit
Section 2	Parameters
Section 3	Communication Commands
Section 4	I/O Ports
Section 5	Operation Box

Please read each section carefully to understand the product and for the proper use before using AFC for the first time.

Section 1   AFC Main Unit

Describes product specifications and main functions of AFC-6.

Section 2   Parameters

Describes control parameters of AFC-6.

Section 3   Communication Commands

Description for controlling AFC-6 with communication.

Section 4   I/O Ports

Description for controlling AFC-6 with I/O port connection.

Only limited functions are controllable.

Section 5   Operation Box

Description for controlling AFC-6 with operation box.

Expressions used in this manual

■Abbreviations

Following abbreviations are used in this manual. Please refer to the following list and replace as appropriate.

AF	: Auto Focus
AFC	: Auto Focus controller
Auto Focus mode	: Collective term for following Auto Focus movements;
	SC0, SC1, SC2, SC3, SC4, SC5, SC6, SC7, AF0, AF2, PF, PFH, PN and PNH
AF mode	: Auto Focus mode
Search	: Search for AF signal
Peak detection	: Peak detection of AF signal
AF driving section	: Driving section to move lens tube to z-axis direction
Pattern driving section	: Driving section to project AF patterns (*not included in some models)

■Typestyle

Bold (gothic) typefaces are used to call attention or emphasize in this instruction manual.

■Numerical values

Decimal values are used in principle. "0x" is added before the first digit of a numerical value when hexadecimal values are used. For instance, "1000" in a decimal system are expressed as "0x03E8" in a hexadecimal system.

■Hardware

Hardware, such as keys, LED and switches of AFC, Auto Focus Microscope, Auto Focus Unit, are expressed in the following ways: [···] **KEY,** [···] **LED, and** [···] **SWITCH**.

Examples :   [**Home**] **KEY**
              [**A**] **LED**
   [**POWER**] **SWITCH**

■Communications

Communications are performed via RS-232C. In RS-232C communications, data sent from an external device to AFC is referred to as "**command**." Data sent from AFC to an external device is simply referred to as "**data**". For expressions of commands and data, special characters are used in addition to regular alphanumeric characters. These are control characters called delimiters which indicate the break (end) of commands or data. Delimiters used in AFC are ASCII code characters 10 (0x0A) and 13 (0x0D), which are referred to as "Line Feed" (L_F) and "Carriage Return" (C_R) respectively.

■I/O ports

The I/O ports of AFC are normally maintained at TTL level (+5V). This state is called TTL level (+ 5V) or H level in this manual. When keeping input port at COMMON level (0V), it is referred to as input to I / O port or setting to L level.

⚠ Precautions

Never do the following actions as it may cause a malfunction.
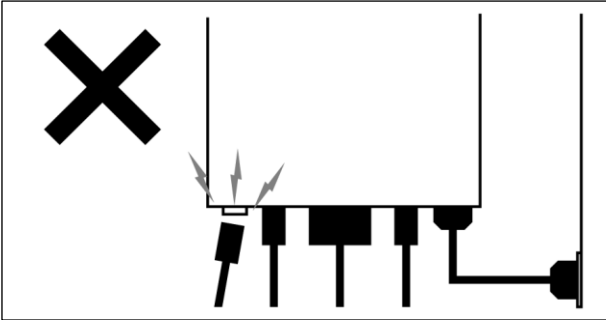
●Do not use other than the provided power cable.

●Never disconnect the connector while the power is turned on.   Turn off the power before connecting and disconnecting the connector.

●Place the device where AC inlet is accessible when connecting.
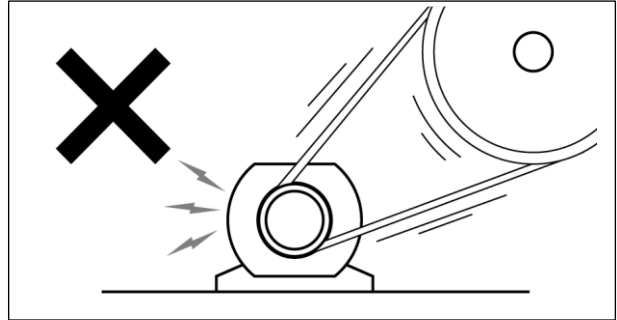
●Use the AC100-240V (50/60Hz) power source.

●Do not use the product near a large generator or heavy electrical appliances, or equipment radiating strong electro-magnetic fields in the neighborhood, as it may cause a malfunction to the product.

●As this product is composed of precision parts, avoid physical impact and minimize vibration when in use.
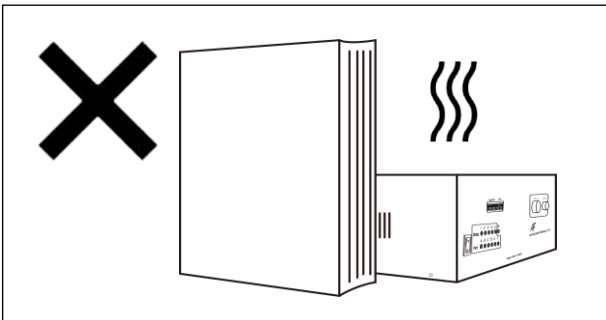
●The product generates considerable heat while it is charged with electricity. Never block the heat discharge slit. Do not use in a place where ventilation is insufficient.

●Use the product at least 100 mm away from surrounding objects.
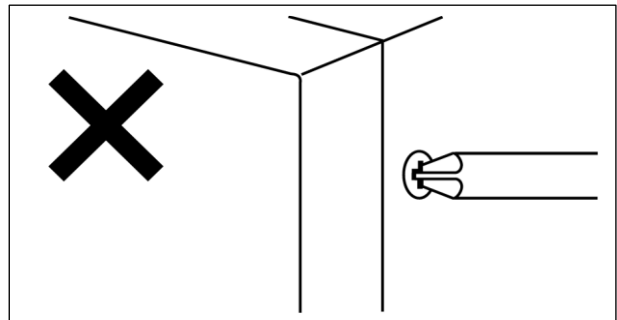
●Do not disassemble or modify the product.

●To prevent scratches, use soft cloth to wipe only the surface when cleaning the device.

●Do not open the cabinet. Do not modify the product by replacing parts. It may cause a fire, electric shock or malfunction.
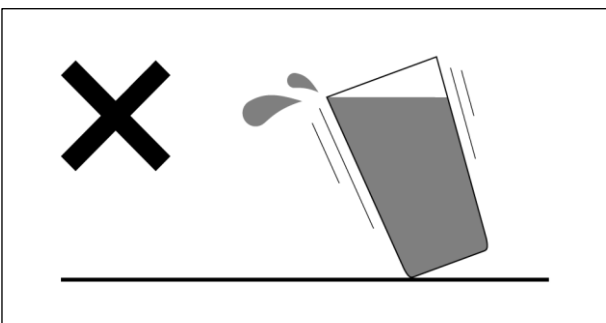
●Install on a flat surface.

●Avoid contact with water. It is extremely dangerous when the device gets wet.

2-phase Stepper motor
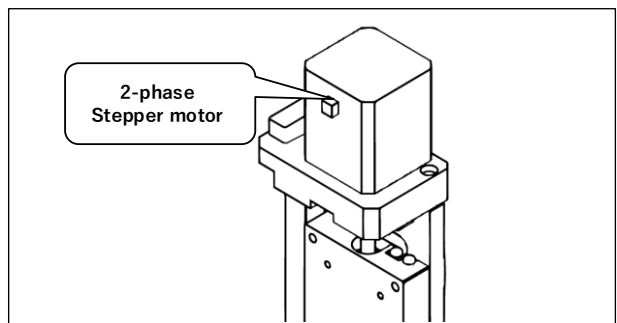
●The motor that can be used with this product is 2-phase stepper motor. Any motor different from this type (e.g. 5-phase stepper mortor, servomotor) cannot be driven.

Section 2

Parameters

Contents

1. Outline

Parameters are items for setting in order to execute various functions of Auto Focus controller. There are two major parameters; port parameters and system parameters.

(1) Port parameters

Port parameters enable customized setting of each port for objective lenses with different magnification and different samples.

There are total of 30 ports for each group of 1 to 5 with 6 ports allocated from A to F

Group	Port					
	A	B	C	D	E	F
1	1A	1B	1C	1D	1E	1F
2	2A	2B	2C	2D	2E	2F
3	3A	3B	3C	3D	3E	3F
4	4A	4B	4C	4D	4E	4F
5	5A	5B	5C	5D	5E	5F

For example, each parameters are manageable when various samples are differentiated in groups and objective lens with different magnification are allocated from port A to F.

(2) System parameters

System parameters are common parameters to all ports.

2. Parameter list

Following parameters are used to control AFC-6. These parameters can be set by using operation box or by communication commands (P command). Please do not access to parameter numbers of which parameters are not assigned to. Changing of these parameter settings might cause malfunctions and failure.

(1) Port parameters

No.	Parameter	Functional overview
001	FSP	FAR search point coordinates
002	STOP	STOP coordinates of AF driving unit after returning to HOME (STOP point coordinates)
003	MSP	Selecting starting direction of search operation for Auto Focus operation (SC0, SC1, SC4)
004	NSP	NEAR search point coordinates
005	Peak_Back	Return distance from position where search operation completed to peak detection operation starting position
006	2nd_Area	Search area of Auto Focus operation (SC1, SC3, SC4, SC5) *Select from 2nd_Area_Table
007	SC6-7_Pulse	Search area of Auto Focus operation (SC6, SC7)
008	NEAR_Limit	NEAR soft limit of AF driving unit
021	BPF	Level adjustment amplifier gain for BPF input signal
022	Balance	Balance adjustment amplifier gain for AF signals (Ach/Bch)
023	Pattern-INF	Coordinates of pattern driving unit
024	CCD-INF_TRIG	Signal obtain cycle of line sensor
031	Search_Target	Determination voltage of completing search operation
032	Peak_Target	Determination voltage ratio of completing peak detection operation
033	CCD_Speed	Drive frequency of line sensor 0:1MHz, 1:2MHz
034	BPFilter	Selecting BPF (bandpass filter) 0:20KHz, 1:40KHz, 2:80KHz, 3:160KHz
035	INT_Count	Number of line sensor frames obtained
041	Home_Speed	Basic travel speed *Select from Speed_Table
042	Jog_Speed	Jog travel speed *Select from Speed_Table
043	S-Speed	Travel speed of search operation *Select from Speed_Table
044	P-Speed	Travel speed of peak detection operation *Select from Speed_Table
045	AF-Speed	Travel speed of AF step operation *Select from Speed_Table
046	AF-Step	Travel distance of AF step operation *Select from AF-Step_Table
051	Epsilon	Focus determination tolerance factor 1
052	2nd_Epsilon	Focus determination tolerance factor 2
053	3rd_Epsilon	Hybrid_Command execution determination factor

054	JJC	Number of continuous focus for just focus determination during AF trace operation
055	RET	Maximum number of mono-directional continuous travel during AF trace operation
056	HNC	Maximum number of hunting during AF trace operation
061	One-Shot_Mode	Switching of one-shot mode 0:OFF, 1:ON
062	One-Shot_Pulse	Direction and travel distance after just focus determination in one-shot mode
063	JF	Number of continuous focus for just focus determination during one-shot mode
071	Hybrid_Mode	Switching of hybrid mode 0:Standard, 1: MSP, 2: AF-Step, 3:Hybrid
072	High_Level	High level determination voltage in hybrid mode
073	Low_Level	Low level determination voltage in hybrid mode
074	Hybrid_Command	Selecting Auto Focus operation when resuming automatically in hybrid mode 0:AF0, 1:AF2, 2:SC0, 3:SC1, 4:SC2, 5:SC3, 6:SC4, 7:SC5, 8:SC6, 9:SC7
075	AF-StepRankUP	Maximum limit of table rank for AF step operation in hybrid mode *Select from AF-Step_Table
076	B_count	Maximum number of continuous AF step operation during hybrid mode
077	Epsmode	Selecting focus determination tolerance factor for AF-StepRankUP condition in hybrid mode 0:Epsilon, 1:2nd_Epsilon
078	Hyb_count	Maximum number of continuously executing Hybrid_Command in hybrid mode
079	Timer_T1	Wait time for executing Hybrid_Command in hybrid mode
101	Target_Point	Setting targeted focus position used for AF automatic adjustment
102	Pattern_Step	Travel distance of pattern driving unit for AF automatic adjustment
103	In-position_Area	Setting targeted settling area of Target_Point for AF automatic adjustment (AJP)
104	Agc	Selecting INT/AGC target value for AF automatic adjustment (AJP) 0:INT=0/AGC=5, 1:INT=1/AGC=4
105	BpfSrch	Selecting Auto Focus operation for AF automatic adjustment (AJP) 0:AF0, 1:SC0

(2) System parameters

No.	Parameter	Functional overview
601	Adjust-Parm	Permit data table writing 0: permit writing, 1: forbid writing
602	Baud_Rate	Selecting communication baud rate of RS-232C (Valid when DipSW 1-5 is ON) 0:600, 1:2400, 2:4800, 3:9600, 4:19200, 5:38400
603	Re-PushAF	Permit registering [Search] key of operation box during Auto Focus operation or when error occurs 0: permit register, 1: forbid register
607	Address_Mode	Add coordinates of AF driving unit when returning just focus (hexadecimal) 0: unadded, 1: added
608	AF-Direct	Add direction of travel when returning just focus 0: unadded, 1: added
609	Msk_msg5	Inhibit old command warning (LW) display 0: uninhibited, 1: inhibited
621	CCD_Count	Selecting line sensor method 0: 1 line sensor method, 1: 2 line sensor method
622	HAGC_H	High-level determination voltage of input amplifier gain for sensor signal
623	HAGC_L	Low-level determination voltage of input amplifier gain for sensor signal
624	H_Range	High-level determination voltage of AF signal during AF trace operation
625	L_Range	Low-level determination voltage of AF signal during AF trace operation
641	Limit_Logic	Selecting limit logic of AF driving unit (Valid when DipSW 1-1 is ON) 0: normal open, 1: normal close
643	Motor-Div	Setting resolution of AF driving unit(step/rev) 0:3200, 1:3200, 2:3200, 3:6400, 4:12800
644	SX_Speed	Travel speed of pattern driving unit
645	SX_RST	Cycle for automatic HOME return of pattern driving unit
646	SX_Limit_Logic	Selecting limit logic of pattern driving unit (Valid when DipSW 1-2 is ON) 0: normal open, 1: normal close, 2: not in use
661	RES	Cycle for automatic HOME return of AF driving unit
662	2CK	Selecting starting direction for peak detection of Auto Focus operation (SC2, SC3, SC5)
664	Init_Mode	Selecting with/without HOME return operation of AF driving unit when power is turned on 0: with HOME return, 1: without HOME return
681	CCD-INF1_A-BCHG	Setting range of sensor signal for 1MHz (switching process of Ach/Bch)
682	CCD-INF1_A-F	Setting range of sensor signal for 1MHz (Ach side front trimming position)
683	CCD-INF1_A-R	Setting range of sensor signal for 1MHz (Ach side rear trimming position)
684	CCD-INF1_B-F	Setting range of sensor signal for 1MHz (Bch side front trimming position)
685	CCD-INF1_B-R	Setting range of sensor signal for 1MHz (Bch side rear trimming position)

691	CCD-INF2_A-BCHG	Setting range of sensor signal for 2MHz (switching process of Ach/Bch)
692	CCD-INF2_A-F	Setting range of sensor signal for 2MHz (Ach side front trimming position)
693	CCD-INF2_A-R	Setting range of sensor signal for 2MHz (Ach side rear trimming position)
694	CCD-INF2_B-F	Setting range of sensor signal for 2MHz (Bch side front trimming position)
695	CCD-INF2_B-R	Setting range of sensor signal for 2MHz (Bch side rear trimming position)

Speed_Table

No.	Parameter	Functional overview
701	SpTb00-L	Speed of Speed_TableNo.0 low speed
702	SpTb00-H	Speed of Speed_TableNo.0 high speed
703	SpTb00-T	Acceleration/deceleration time of Speed_TableNo.0
704	SpTb01-L	Speed of Speed_TableNo.1 low speed
705	SpTb01-H	Speed of Speed_TableNo.1 high speed
706	SpTb01-T	Acceleration/deceleration time of Speed_TableNo.1
707	SpTb02-L	Speed of Speed_TableNo.2 low speed
708	SpTb02-H	Speed of Speed_TableNo.2 high speed
709	SpTb02-T	Acceleration/deceleration time of Speed_TableNo.2
710	SpTb03-L	Speed of Speed_TableNo.3 low speed
711	SpTb03-H	Speed of Speed_TableNo.3 high speed
712	SpTb03-T	Acceleration/deceleration time of Speed_TableNo.3
713	SpTb04-L	Speed of Speed_TableNo.4 low speed
714	SpTb04-H	Speed of Speed_TableNo.4 high speed
715	SpTb04-T	Acceleration/deceleration time of Speed_TableNo.4
716	SpTb05-L	Speed of Speed_TableNo.5 low speed
717	SpTb05-H	Speed of Speed_TableNo.5 high speed
718	SpTb05-T	Acceleration/deceleration time of Speed_TableNo.5
719	SpTb06-L	Speed of Speed_TableNo.6 low speed
720	SpTb06-H	Speed of Speed_TableNo.6 high speed
721	SpTb06-T	Acceleration/deceleration time of Speed_TableNo.6
722	SpTb07-L	Speed of Speed_TableNo.7 low speed
723	SpTb07-H	Speed of Speed_TableNo.7 high speed
724	SpTb07-T	Acceleration/deceleration time of Speed_TableNo.7
725	SpTb08-L	Speed of Speed_TableNo.8 low speed
726	SpTb08-H	Speed of Speed_TableNo.8 high speed
727	SpTb08-T	Acceleration/deceleration time of Speed_TableNo.8
728	SpTb09-L	Speed of Speed_TableNo.9 low speed
729	SpTb09-H	Speed of Speed_TableNo.9 high speed
730	SpTb09-T	Acceleration/deceleration time of Speed_TableNo.9
731	SpTb10-L	Speed of Speed_TableNo.10 low speed
732	SpTb10-H	Speed of Speed_TableNo.10 high speed

733	SpTb10-T	Acceleration/deceleration time of Speed_TableNo.10
734	SpTb11-L	Speed of Speed_TableNo.11 low speed
735	SpTb11-H	Speed of Speed_TableNo.11 high speed
736	SpTb11-T	Acceleration/deceleration time of Speed_TableNo.11
737	SpTb12-L	Speed of Speed_TableNo.12 low speed
738	SpTb12-H	Speed of Speed_TableNo.12 high speed
739	SpTb12-T	Acceleration/deceleration time of Speed_TableNo.12
740	SpTb13-L	Speed of Speed_TableNo.13 low speed
741	SpTb13-H	Speed of Speed_TableNo.13 high speed
742	SpTb13-T	Acceleration/deceleration time of Speed_TableNo.13
743	SpTb14-L	Speed of Speed_TableNo.14 low speed
744	SpTb14-H	Speed of Speed_TableNo.14 high speed
745	SpTb14-T	Acceleration/deceleration time of Speed_TableNo.14
746	SpTb15-L	Speed of Speed_TableNo.15 low speed
747	SpTb15-H	Speed of Speed_TableNo.15 high speed
748	SpTb15-T	Acceleration/deceleration time of Speed_TableNo.15
749	SpTb16-L	Speed of Speed_TableNo.16 low speed
750	SpTb16-H	Speed of Speed_TableNo.16 high speed
751	SpTb16-T	Acceleration/deceleration time of Speed_TableNo.16
752	SpTb17-L	Speed of Speed_TableNo.17 low speed
753	SpTb17-H	Speed of Speed_TableNo.17 high speed
754	SpTb17-T	Acceleration/deceleration time of Speed_TableNo.17
755	SpTb18-L	Speed of Speed_TableNo.18 low speed
756	SpTb18-H	Speed of Speed_TableNo.18 high speed
757	SpTb18-T	Acceleration/deceleration time of Speed_TableNo.18
758	SpTb19-L	Speed of Speed_TableNo.19 low speed
759	SpTb19-H	Speed of Speed_TableNo.19 high speed
760	SpTb19-T	Acceleration/deceleration time of Speed_TableNo.19
761	SpTb20-L	Speed of Speed_TableNo.20 low speed
762	SpTb20-H	Speed of Speed_TableNo.20 high speed
763	SpTb20-T	Acceleration/deceleration time of Speed_TableNo.20
764	SpTb21-L	Speed of Speed_TableNo.21 low speed
765	SpTb21-H	Speed of Speed_TableNo.21 high speed
766	SpTb21-T	Acceleration/deceleration time of Speed_TableNo.21
767	SpTb22-L	Speed of Speed_TableNo.22 low speed
768	SpTb22-H	Speed of Speed_TableNo.22 high speed
769	SpTb22-T	Acceleration/deceleration time of Speed_TableNo.22
770	SpTb23-L	Speed of Speed_TableNo.23 low speed
771	SpTb23-H	Speed of Speed_TableNo.23 high speed
772	SpTb23-T	Acceleration/deceleration time of Speed_TableNo.23
773	SpTb24-L	Speed of Speed_TableNo.24 low speed

774	SpTb24-H	Speed of Speed_TableNo.24 high speed
775	SpTb24-T	Acceleration/deceleration time of Speed_TableNo.24
776	SpTb25-L	Speed of Speed_TableNo.25 low speed
777	SpTb25-H	Speed of Speed_TableNo.25 high speed
778	SpTb25-T	Acceleration/deceleration time of Speed_TableNo.25
779	SpTb26-L	Speed of Speed_TableNo.26 low speed
780	SpTb26-H	Speed of Speed_TableNo.26 high speed
781	SpTb26-T	Acceleration/deceleration time of Speed_TableNo.26
782	SpTb27-L	Speed of Speed_TableNo.27 low speed
783	SpTb27-H	Speed of Speed_TableNo.27 high speed
784	SpTb27-T	Acceleration/deceleration time of Speed_TableNo.27
785	SpTb28-L	Speed of Speed_TableNo.28 low speed
786	SpTb28-H	Speed of Speed_TableNo.28 high speed
787	SpTb28-T	Acceleration/deceleration time of Speed_TableNo.28
788	SpTb29-L	Speed of Speed_TableNo.29 low speed
789	SpTb29-H	Speed of Speed_TableNo.29 high speed
790	SpTb29-T	Acceleration/deceleration time of Speed_TableNo.29
791	SpTb30-L	Speed of Speed_TableNo.30 low speed
792	SpTb30-H	Speed of Speed_TableNo.30 high speed
793	SpTb30-T	Acceleration/deceleration time of Speed_TableNo.30
794	SpTb31-L	Speed of Speed_TableNo.31 low speed
795	SpTb31-H	Speed of Speed_TableNo.31 high speed
796	SpTb31-T	Acceleration/deceleration time of Speed_TableNo.31

2nd_Area_Table

No.	Parameter	Functional overview
901	2ndTb00	Number of pulses specified in 2nd_Area_TableNo.0
902	2ndTb01	Number of pulses specified in 2nd_Area_TableNo.1
903	2ndTb02	Number of pulses specified in 2nd_Area_TableNo.2
904	2ndTb03	Number of pulses specified in 2nd_Area_TableNo.3
905	2ndTb04	Number of pulses specified in 2nd_Area_TableNo.4
906	2ndTb05	Number of pulses specified in 2nd_Area_TableNo.5
907	2ndTb06	Number of pulses specified in 2nd_Area_TableNo.6
908	2ndTb07	Number of pulses specified in 2nd_Area_TableNo.7

AF-Step_Table

No.	Parameter	Functional overview
921	AMTb00	Number of pulses traveled specified in AF-Step_TableNo.0
922	AMTb01	Number of pulses traveled specified in AF-Step_TableNo.1
923	AMTb02	Number of pulses traveled specified in AF-Step_TableNo.2
924	AMTb03	Number of pulses traveled specified in AF-Step_TableNo.3
925	AMTb04	Number of pulses traveled specified in AF-Step_TableNo.4
926	AMTb05	Number of pulses traveled specified in AF-Step_TableNo.5
927	AMTb06	Number of pulses traveled specified in AF-Step_TableNo.6
928	AMTb07	Number of pulses traveled specified in AF-Step_TableNo.7

3. Parameter details

⑴ Port parameters

■ 001: FSP (FAR search point)

Set FAR search point coordinates of Auto Focus operation.

Valid for SC0 and SC2.

No.	Item	Range	Initial value
001	FAR search point coordinates	512 - 16,777,215	Refer to following initial values

Function

Set coordinates using FAR limit (coordinate 512) as reference.

Search area is set by this parameter and parameter No. 004: NSP.

Location when communication command [FSP] is executed.

Relationship between FSP (this parameter) and NSP is as follows.

$FSP < NSP$ (Unable to set $FSP \geqq NSP$)

Initial value

Group	Port					
	A	B	C	D	E	F
1	11,200	11,200	11,200	11,200	11,200	11,200
2	11,200	11,200	11,200	11,200	11,200	11,200
3	11,200	11,200	11,200	11,200	11,200	11,200
4	11,200	11,200	11,200	11,200	11,200	11,200
5	11,200	11,200	11,200	11,200	11,200	11,200

■ 002: STOP (STOP point)

Set STOP coordinates of AF driving unit after returning to HOME.

No.	Item	Range	Initial value
002	STOP coordinates of AF driving unit after returning to HOME (STOP point coordinates)	512 - 16,777,215	Refer to following initial values

Function

Set coordinates using FAR limit (coordinate 512) as reference.

AF driving unit moves to the position of this parameter after the controller unit is turned on when parameter No. 664: Init_Mode is set to "0".

Location when communication command [RST], [RSTX] and [STP] are executed.

AF driving unit stops at NEAR limit position if the value of this parameter is greater than NEAR limit (hard/soft) position.

Initial value

Group	Port					
	A	B	C	D	E	F
1	12,800	12,800	12,800	12,800	12,800	12,800
2	12,800	12,800	12,800	12,800	12,800	12,800
3	12,800	12,800	12,800	12,800	12,800	12,800
4	12,800	12,800	12,800	12,800	12,800	12,800
5	12,800	12,800	12,800	12,800	12,800	12,800

■   003: MSP (multi select point)

Select starting direction of search operation for Auto Focus operation.

Valid for SC0, SC1 and SC4.

No.	Item	Range	Initial value
003	Selecting starting direction of search operation for Auto Focus operation (SC0, SC1, SC4)	512 - 16,777,215	Refer to following initial values

Function

Starting direction of search operation is determined by comparing the value of this parameter with starting position of each Auto Focus operation.

Starting direction of search operation for each Auto Focus operation is as follows.

・Auto Focus operation SC0 and SC4

① Current coordinates of AF driving unit ≤ MSP (value of this parameter)

Starts search operation towards NEAR direction after traveling to FAR search point from current position.

② Current coordinates of AF driving unit > MSP (value of this parameter)

Starts search operation towards FAR direction after traveling to NEAR search point from current position.

・Auto Focus operation SC1

① Previous detected just focus coordinates ≦ MSP (value of this parameter)

Starts search operation towards NEAR direction after traveling from current position to previous detected just focus coordinates and then to FAR search point.

② Previous detected just focus coordinates> MSP (value of this parameter)

Starts search operation towards FAR direction after traveling from current position to previous detected just focus coordinates and then to NEAR search point.

Initial value

Group	Port					
	A	B	C	D	E	F
1	458,752	458,752	458,752	458,752	458,752	458,752
2	458,752	458,752	458,752	458,752	458,752	458,752
3	458,752	458,752	458,752	458,752	458,752	458,752
4	458,752	458,752	458,752	458,752	458,752	458,752
5	458,752	458,752	458,752	458,752	458,752	458,752

■ 004: NSP (NEAR search point)

Set NEAR search point coordinates for Auto Focus operation.

Valid for SC0 and SC2.

No.	Item	Range	Initial value
004	NEAR search point coordinates	512 - 16,777,215	Refer to following initial values

Function

Set coordinates using FAR limit (coordinate 512) as reference.

Search area is set by this parameter and parameter No. 001: FSP.

Location when communication command [NSP] is executed.

Relationship between NSP (this parameter) and FSP is as follows.

FSP < NSP (Unable to set FSP ≧ NSP)

Initial value

Group	Port					
	A	B	C	D	E	F
1	14,400	14,400	14,400	14,400	14,400	14,400
2	14,400	14,400	14,400	14,400	14,400	14,400
3	14,400	14,400	14,400	14,400	14,400	14,400
4	14,400	14,400	14,400	14,400	14,400	14,400
5	14,400	14,400	14,400	14,400	14,400	14,400

■   005: Peak_Back

Set return distance to starting position of peak detection operation with respect to the position where search operation of Auto Focus has completed.

Valid for SC0, SC1 and SC4.

No.	Item	Range	Initial value
005	Return distance from position where search operation completed to peak detection operation starting position	0 - 65,535	Refer to following initial values

Function

This parameter sets return distance (travel distance) in number of pulses.

Starting position of peak detection is as follows.

・ When set value is "0"

　　Starting position of peak detection operation is the position where search operation completes.

・ When the set value is "1-65,535"

　　Starting position of peak detection operation is number of set pulses away from the position search operation has completed.

　　Travels to opposite direction of search operation.

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	5	10	10
2	0	0	0	5	10	10
3	0	0	0	5	10	10
4	0	0	0	5	10	10
5	0	0	0	5	10	10

■ 006: 2nd_Area

Set search area of Auto Focus operation.

Valid for SC1, SC3, SC4 and SC5.

No.	Item	Range	Initial value
006	Search area of Auto Focus operation (SC1, SC3, SC4, SC5) *Select from 2nd_Area_Table	0 - 7	Refer to following initial values

Function

Select table number of 2nd_Area_Table for this parameter. Search area is registered in data area for each table number of 2nd_Area_Table. Please refer to 2nd_Area_Table (P73) for data table.

Search area of each Auto Focus operation is as follows.

・Auto Focus operation SC1 and SC3

Previous detected just focus coordinates (reference coordinates) ± 2nd_Area_TableNo.x

(x is the value of this parameter)

・Auto Focus operation SC4 and SC5

Current coordinates of AF driving unit (reference coordinates) ± 2nd_Area_TableNo.x

(x is the value of this parameter)
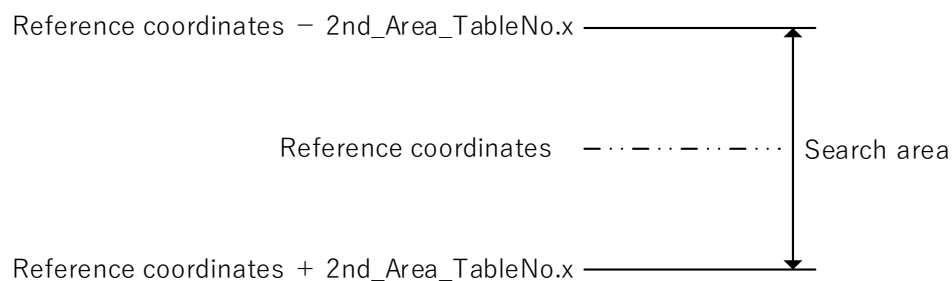
Initial value

Group	Port					
	A	B	C	D	E	F
1	4	3	2	1	0	0
2	4	3	2	1	0	0
3	4	3	2	1	0	0
4	4	3	2	1	0	0
5	4	3	2	1	0	0

■ 007: SC6-7_Pulse

Set search area of Auto Focus operation.

Valid for SC6 and SC7.

No.	Item	Range	Initial value
007	Search area of Auto Focus operation (SC6, SC7)	0 - 65,535	Refer to following initial values

Function

This parameter sets number of pulses using current coordinates as reference.

Search area of each Auto Focus operation is as follows.

・Auto Focus operation SC6

   Current coordinates <-> current coordinates + value of this parameter

・Auto Focus operation SC7

   Current coordinates <-> current coordinates - value of this parameter

Initial value

Group	Port					
	A	B	C	D	E	F
1	1,500	1,500	1,500	1,500	1,500	1,500
2	1,500	1,500	1,500	1,500	1,500	1,500
3	1,500	1,500	1,500	1,500	1,500	1,500
4	1,500	1,500	1,500	1,500	1,500	1,500
5	1,500	1,500	1,500	1,500	1,500	1,500

■ 008: NEAR_Limit

Set NEAR soft limit of AF driving unit.

No.	Item	Range	Initial value
008	NEAR soft limit of AF driving unit	512 - 16,777,215	Refer to following initial values

Function

Set coordinates using FAR limit (coordinate 512) as reference.

Decelerates from nearby NEAR_Limit and stops at this parameter value.

Communication returns "LN" when detecting NEAR soft limit.

Relationship between NEAR_Limit (this parameter) and parameter No.004:NSP is as follows.

NSP < NEAR_Limit

Initial value

Group	Port					
	A	B	C	D	E	F
1	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000
2	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000
3	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000
4	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000
5	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000	16,000,000

■　021:BPF（bandpass filter volume）

Adjust level of input signal of BPF（bandpass filter）circuit used for Auto Focus.

No.	Item	Range	Initial value
021	Level adjustment amplifier gain for BPF input signal	0 - 31	Refer to following initial values

Function

Increasing value of this parameter leads to increased input signal level, and decreasing value leads to decreased input signal.

＊Amplifier gain changes at the same magnification ratio for both AF signals of Ach side and Bch side（unable to set separately）.

Initial value

Group	Port					
	A	B	C	D	E	F
1	14	10	12	16	18	18
2	14	10	12	16	18	18
3	14	10	12	16	18	18
4	14	10	12	16	18	18
5	14	10	12	16	18	18

■   022: Balance

Balance level difference of two internal signal process used for Auto Focus.

No.	Item	Range	Initial value
022	Balance adjustment amplifier gain for AF signals (Ach/Bch)	0 - 63	Refer to following initial values

Function

Gain adjustment is performed on Ach AF signal to balance with Bch AF signal.

 * Unable to perform appropriate Auto Focus operation when unbalanced.

Initial value

Group	Port					
	A	B	C	D	E	F
1	31	31	31	31	31	31
2	31	31	31	31	31	31
3	31	31	31	31	31	31
4	31	31	31	31	31	31
5	31	31	31	31	31	31

■ 023: Pattern-INF (pattern info)

Set coordinates of pattern driving unit.

No.	Item	Range	Initial value
023	Coordinates of pattern driving unit	512 - 65,535	Refer to following initial values

Function

Pattern driving unit travels to designated value (coordinates) when current port value is changed.

Initial value

Group	Port					
	A	B	C	D	E	F
1	900	900	900	900	900	900
2	900	900	900	900	900	900
3	900	900	900	900	900	900
4	900	900	900	900	900	900
5	900	900	900	900	900	900

■   024: CCD-INF_TRIG (CCD info trigger)

Set signal obtain cycle of line sensor.

No.	Item	Range	Initial value
024	Signal obtain cycle of line sensor	0 - 65,535	Refer to following initial values

Supplement information

Setting value 1 is equivalent to 0.5μs.

For example, setting value of 2,000 is equivalent to 1ms. Set value at 6,000 if desired setting is 3ms.

Initial value

Group	Port					
	A	B	C	D	E	F
1	6,000	6,000	6,000	6,000	6,000	6,000
2	6,000	6,000	6,000	6,000	6,000	6,000
3	6,000	6,000	6,000	6,000	6,000	6,000
4	6,000	6,000	6,000	6,000	6,000	6,000
5	6,000	6,000	6,000	6,000	6,000	6,000

■ 031:Search_Target

Set determination voltage of completing Auto Focus search operation.

Valid for SC0, SC1, SC4, SC6 and SC7.

No.	Item	Range	Initial value
031	Determination voltage of completing search operation	0 - 3,300	Refer to following initial values

Supplement information

Unit for setting value is mV.

Initial value

Group	Port					
	A	B	C	D	E	F
1	1,980	1,980	1,980	1,980	1,980	1,980
2	1,980	1,980	1,980	1,980	1,980	1,980
3	1,980	1,980	1,980	1,980	1,980	1,980
4	1,980	1,980	1,980	1,980	1,980	1,980
5	1,980	1,980	1,980	1,980	1,980	1,980

■　032: Peak_Target

Set determination voltage ratio (%) for completing peak detection operation of Auto Focus operation.

Valid for SC0, SC1, SC4, SC6 and SC7.

No.	Item	Range	Initial value
032	Determination voltage ratio of completing peak detection operation	0 - 100	Refer to following initial values

Function

Peak detection operation is completed when following determination formula is satisfied.

Determination formula: $A + B \leqq Peak \times$ value of this parameter／100

A　　　　: AF signal on Ach side

B　　　　: AF signal on Bch side

Peak　　 : Maximum value of AF signal（A＋B）

Supplement information

Unit for setting value is %.

Initial value

Group	Port					
	A	B	C	D	E	F
1	75	75	75	75	75	75
2	75	75	75	75	75	75
3	75	75	75	75	75	75
4	75	75	75	75	75	75
5	75	75	75	75	75	75

■ 033: CCD_Speed

Set drive frequency of line sensor.

No.	Item	Range	Initial value
033	Drive frequency of line sensor 0:1MHz, 1:2MHz	0 - 1	Refer to following initial values

Supplement information

Please note when changing this parameter as following parameters will be affected.

   Parameter No.681-685

   Parameter No.691-695

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■   034: BPFilter (bandpass filter)

Select bandpass filter used for AF signal processing.

No.	Item	Range	Initial value
034	Selecting BPF (bandpass filter) 　　0:20KHz, 1:40KHz, 2:80KHz, 3:160KHz	0 - 3	Refer to following initial values

Supplement information

Necessary to select bandpass filter matched with AF signal.

AF signal depends on parameter No.033:CCD_Speed and AF pattern.

Basic settings are as follows.

・When setting value of CCD_Speed is "0"

　　Select "1" for this parameter.

・When setting value of CCD_Speed is "1"

　　Select "2" for this parameter

＊Select "0" or "3" when using costumed AF pattern.

Initial value

Group	Port					
	A	B	C	D	E	F
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1

■   035: INT_Count

Set number of line sensor frames obtained.

No.	Item	Range	Initial value
035	Number of line sensor frames obtained	1 - 7	Refer to following initial values

Function

Set focus detection cycle in units of frames during AF trace operation.

*Increased number of frames results in stabilized Auto Focus operation and longer interval for focus determination. It leads to unstable Auto Focus operation and shorter focus determination interval when number of frames are decreased.

Initial value

Group	Port					
	A	B	C	D	E	F
1	2	2	2	2	2	2
2	2	2	2	2	2	2
3	2	2	2	2	2	2
4	2	2	2	2	2	2
5	2	2	2	2	2	2

■ 041: Home_Speed

Set basic travel speed of AF driving unit.

No.	Item	Range	Initial value
041	Basic travel speed *Select from Speed_Table	0 - 31	Refer to following initial values

Function

Select table number from Speed_Table for this parameter. Travel speed is registered in data area for each table number of Speed_Table. Please refer to Speed_Table (P70) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	12	12	12	12	12	12
2	12	12	12	12	12	12
3	12	12	12	12	12	12
4	12	12	12	12	12	12
5	12	12	12	12	12	12

■ 042: Jog_Speed

Set travel speed of AF driving unit when using operation box.

Valid for JOG and STP.

No.	Item	Range	Initial value
042	Jog travel speed * Select from Speed_Table	0 - 31	Refer to following initial values

Function

Select table number from Speed_Table for this parameter. Travel speed is registered in data area for each table number of Speed_Table. Please refer to Speed_Table (P70) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	27	25	21	19	19	19
2	27	25	21	19	19	19
3	27	25	21	19	19	19
4	27	25	21	19	19	19
5	27	25	21	19	19	19

■   043: S-Speed (search speed)

Set travel speed for AF driving unit during search operation of Auto Focus operation.

No.	Item	Range	Initial value
043	Travel speed of search operation *Select from Speed_Table	0 - 31	Refer to following initial values

Function

Select table number from Speed_Table for this parameter. Travel speed is registered in data area for each table number of Speed_Table. Please refer to Speed_Table (P70) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	12	12	10	7	6	6
2	12	12	10	7	6	6
3	12	12	10	7	6	6
4	12	12	10	7	6	6
5	12	12	10	7	6	6

■ 044: P-Speed (peak speed)

Set travel speed for AF driving unit during peak detection operation of Auto Focus operation.

No.	Item	Range	Initial value
044	Travel speed of peak detection operation *Select from Speed_Table	0 - 31	Refer to following initial values

Function

Select table number from Speed_Table for this parameter. Travel speed is registered in data area for each table number of Speed_Table. Please refer to Speed_Table (P70) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	12	10	6	4	3	3
2	12	10	6	4	3	3
3	12	10	6	4	3	3
4	12	10	6	4	3	3
5	12	10	6	4	3	3

■   045: AF-Speed

Set travel speed for AF driving unit during AF step operation of Auto Focus operation.

No.	Item	Range	Initial value
045	Travel speed of AF step operation *Select from Speed_Table	0 - 31	Refer to following initial values

Function

Select table number from Speed_Table for this parameter. Travel speed is registered in data area for each table number of Speed_Table. Please refer to Speed_Table (P70) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	4	3	2	1	0	0
2	4	3	2	1	0	0
3	4	3	2	1	0	0
4	4	3	2	1	0	0
5	4	3	2	1	0	0

■   046: AF-Step

Set travel distance (number of steps) for AF driving unit during AF trace operation of Auto Focus operation.

No.	Item	Range	Initial value
046	Travel distance of AF step operation *Select from AF-Step_Table	0 - 7	Refer to following initial values

Function

Select table number from AF-Step_Table for this parameter. Travel distance (number of steps) are registered in data area for each table number of AF-Step_Table. Please refer to AF-Step_Table (P73) for data table.

Initial value

Group	Port					
	A	B	C	D	E	F
1	4	2	1	0	0	0
2	4	2	1	0	0	0
3	4	2	1	0	0	0
4	4	2	1	0	0	0
5	4	2	1	0	0	0

■   051: Epsilon

Set focus determination tolerance factor 1 for focus determination of Auto Focus operation.

No.	Item	Range	Initial value
051	Focus determination tolerance factor 1	1 - 7	Refer to following initial values

Function

The focus determination tolerance factor means the range focus (just focus range) of Auto Focus operation. This factor has a range of 1 to 7. The range is the widest when the setting value is 1, and the narrowest when the setting value is 7.

The setting conditions for Focus determination tolerance factors are as follows.

$$3rd\_Epsilon \; \leqq \; 2nd\_Epsilon \; \leqq \; Epsilon$$

Epsilon   : value of this parameter
2nd_Epsilon   : parameter No.052
3rd_Epsilon   : parameter No.053

Initial value

Group	Port					
	A	B	C	D	E	F
1	4	4	4	4	4	4
2	4	4	4	4	4	4
3	4	4	4	4	4	4
4	4	4	4	4	4	4
5	4	4	4	4	4	4

■ 052: 2nd_Epsilon

Set focus determination tolerance factor 2 for focus determination of Auto Focus operation.

No.	Item	Range	Initial value
052	Focus determination tolerance factor 2	1 - 7	Refer to following initial values

Function

The focus determination tolerance factor means the range focus (just focus range) of Auto Focus operation. This factor has a range of 1 to 7. The range is the widest when the setting value is 1, and the narrowest when the setting value is 7.

The setting conditions for Focus determination tolerance factors are as follows.

$$3rd\_Epsilon \leqq 2nd\_Epsilon \leqq Epsilon$$

Epsilon	: parameter No.051
2nd_Epsilon	: value of this parameter
3rd_Epsilon	: parameter No.053

Supplement information

When count of AF step operation reaches value of parameter No.055: RET or parameter No.056: HNC during AF trace operation, focus determination tolerance factor changes from parameter No.051: Epsilon to this parameter.

Initial value

Group	Port					
	A	B	C	D	E	F
1	3	3	3	3	3	3
2	3	3	3	3	3	3
3	3	3	3	3	3	3
4	3	3	3	3	3	3
5	3	3	3	3	3	3

■ 053: 3rd_Epsilon

Set Hybrid_Command execution determination factor of Auto Focus operation.

Valid when setting value of parameter No.071:Hybrid_Mode is 3(Hybrid).

No.	Item	Range	Initial value
053	Hybrid_Command execution determination factor	1 - 7	Refer to following initial values

Function

Executes Auto Focus operation set by parameter No.074:Hybrid_Command when focus condition is not satisfied during Auto Focus operation.

The focus determination tolerance factor means the range focus (just focus range) of Auto Focus operation. This factor has a range of 1 to 7. The range is the widest when the setting value is 1, and the narrowest when the setting value is 7.

The setting conditions for Focus determination tolerance factors are as follows.

$3rd\_Epsilon \leqq 2nd\_Epsilon \leqq Epsilon$

Epsilon   : parameter No.051
2nd_Epsilon   : parameter No.052
3rd_Epsilon   : value of this parameter

Initial value

Group	Port					
	A	B	C	D	E	F
1	2	2	2	2	2	2
2	2	2	2	2	2	2
3	2	2	2	2	2	2
4	2	2	2	2	2	2
5	2	2	2	2	2	2

■ 054: JJC (just focus judge count)

Set number of continuous focus for just focus determination during AF trace operation.

No.	Item	Range	Initial value
054	Number of continuous focus for just focus determination during AF trace operation	1 - 65,535	Refer to following initial values

Supplement information

Just focus is achieved when number of continuous focus reaches the value of this parameter.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■   055: RET (retry)

Set maximum number of mono-directional continuous travel for AF step operation during AF trace operation.

No.	Item	Range	Initial value
055	Maximum number of mono-directional continuous travel during AF trace operation	1 - 65,535	Refer to following initial values

Function

Focus determination tolerance factor changes from parameter No.051: Epsilon to No.052: 2nd_Epsilon when count of mono-directional AF step operation reaches value of this parameter during AF trace operation.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■ 056: HNC (hunting count)

Set maximum number of hunting for AF step operation during AF trace operation.

No.	Item	Range	Initial value
056	Maximum number of hunting during AF trace operation	1 - 65,535	Refer to following initial values

Function

Focus determination tolerance factor changes from parameter No.051: Epsilon to No.052: 2nd_Epsilon when count of hunting of AF step operation reaches value of this parameter during AF trace operation.

Supplement information

Travel direction of AF step operation is continuously switched for hunting.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■ 061: One-Shot_Mode   < parameter for one-shot mode >

Switch AF trace operation to one-shot mode.

No.	Item	Range	Initial value
061	Switching of one-shot mode 0:OFF, 1:ON	0 - 1	Refer to following initial values

Function

One-shot mode is when AF trace operation is completed in single shot.

AF trace operation will be terminated when number of continuous focus for just focus determination reaches value of parameter No.063: JF.

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■   062: One-Shot_Pulse   < parameter for one-shot mode >

Set direction and travel distance of AF driving unit after just focus determination in one-shot mode.

Valid when setting value of parameter No.061:One-Shot_Mode is "1".

No.	Item	Range	Initial value
062	Direction and travel distance after just focus determination in one-shot mode	-32,768 - 32,767	Refer to following initial values

Function

This parameter sets travel distance in number of pulses.

Operation of AF driving unit is as follows.

・When setting value is "0"

   AF driving unit does not move from STOP position (this parameter is invalid).

・When setting value is "1 - 32,767"

   AF driving unit travels from STOP position to NEAR direction for number of set pulses.

・When setting value is "-32,768 - -1"

   AF driving unit travels from STOP position to FAR direction for number of set pulses.

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■　063: JF (just focus judge count in one-shot mode)　　　　　　　

Set number of continuous focus for just focus determination during one-shot mode.

Valid when setting value of parameter No.061:One-Shot_Mode is "1".

No.	Item	Range	Initial value
063	Number of continuous focus for just focus determination during one-shot mode	1 - 65,535	Refer to following initial values

Function

AF trace operation will be terminated when number of continuous focus for just focus determination reaches value of this parameter.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■ 071: Hybrid_Mode

Mode switching of hybrid mode during AF trace operation.

No.	Item	Range	Initial value
071	Switching of hybrid mode 0:Standard, 1: MSP, 2: AF-Step, 3:Hybrid	0 - 3	Refer to following initial values

Function

Modes for hybrid mode are as follows:

・When setting value is "0"

    Standard: Normal mode (hybrid mode OFF)

・When setting value is "1"

    MSP   : Performs Auto Focus operation again when AF signal changes significantly during AF trace operation.

・When setting value is "2"

    AF-Step   : Automatically changes travel distance of AF step operation during AF trace operation.

・When setting value is "3"

    Hybrid   : Combines AF-Step mode and MSP mode.

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■   072: High_Level

Set high level determination voltage in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 1(MSP) or 3(Hybrid).

No.	Item	Range	Initial value
072	High level determination voltage in hybrid mode	0 - 6,600	Refer to following initial values

Function

When both INT and AGC values are 7 to satisfy following determination formula, it is determined as high level. Auto Focus operation will be executed as set in parameter No. 074: Hybrid_Command.

Determination formula: $A + B \geqq$ value of this parameter

A :   AF signal on Ach side
B :   AF signal on Bch side

Supplement information

Unit for setting value is mV.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5,610	5,610	5,610	5,610	5,610	5,610
2	5,610	5,610	5,610	5,610	5,610	5,610
3	5,610	5,610	5,610	5,610	5,610	5,610
4	5,610	5,610	5,610	5,610	5,610	5,610
5	5,610	5,610	5,610	5,610	5,610	5,610

■ 073: Low_Level   \

Set low level determination voltage in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 1(MSP) or 3(Hybrid).

No.	Item	Range	Initial value
073	Low level determination voltage in hybrid mode	0 - 6,600	Refer to following initial values

Function

When both INT and AGC values are 0 to satisfy following determination formula, it is determined as low level. Auto Focus operation will be executed as set in parameter No. 074: Hybrid_Command.

Determination formula: A + B \< value of this parameter

A :   AF signal on Ach side

B :   AF signal on Bch side

Supplement information

Unit for setting value is mV.

Initial value

Group	Port					
	A	B	C	D	E	F
1	2,640	2,640	2,640	2,640	2,640	2,640
2	2,640	2,640	2,640	2,640	2,640	2,640
3	2,640	2,640	2,640	2,640	2,640	2,640
4	2,640	2,640	2,640	2,640	2,640	2,640
5	2,640	2,640	2,640	2,640	2,640	2,640

■ 074: Hybrid_Command   \

Select Auto Focus operation when resuming automatically in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 1(MSP) or 3(Hybrid).

No.	Item	Range	Initial value
074	Selecting Auto Focus operation when resuming automatically in hybrid mode 　0:AF0, 1:AF2, 2:SC0, 3:SC1, 4:SC2, 5:SC3, 6:SC4, 7:SC5, 8:SC6, 9:SC7	0 - 9	Refer to following initial values

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■   075: AF-StepRankUP

Change travel distance for AF step operation in hybrid mode

Valid when setting value of parameter No.071:Hybrid_Mode is 2(AF-Step) or 3(Hybrid).

No.	Item	Range	Initial value
075	Maximum limit of table rank for AF step operation in hybrid mode *Select from AF-Step_Table	0 - 7	Refer to following initial values

Function

Select table number from AF-Step_Table for this parameter. Travel distance (number of steps) is registered in data area for each table number of AF-Step_Table. Please refer to AF-Step_Table (P73) for data table.

If this parameter is valid, AF-Step_Table table number (x in AF-Step_TableNo.x) will be incremented when focus tolerance area exceeds focus determination tolerance factor as set by parameter No.077:Epsmode. Initial value of table number x is setting value of parameter No. 046: AF-Step, and maximum limit of increment is set by this parameter.

*When this parameter value $\leq$ AF-Step, there is no change in travel distance of AF step operation.

Initial value

Group	Port					
	A	B	C	D	E	F
1	4	4	3	2	1	1
2	4	4	3	2	1	1
3	4	4	3	2	1	1
4	4	4	3	2	1	1
5	4	4	3	2	1	1

■   076: B_count

Set Maximum number of continuous AF step operation to execute Hybrid_Command during hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Modeis 3(Hybrid).

No.	Item	Range	Initial value
076	Maximum number of continuous AF step operation during hybrid mode	0 - 65,535	Refer to following initial values

Function

When number of continuous AF step operation reaches value of this parameter during AF trace operation, it is determined as low signal level (Low). Auto Focus operation will be executed as set in parameter No. 074:Hybrid_Command.

Initial value

Group	Port					
	A	B	C	D	E	F
1	1,000	1,000	1,000	1,000	1,000	1,000
2	1,000	1,000	1,000	1,000	1,000	1,000
3	1,000	1,000	1,000	1,000	1,000	1,000
4	1,000	1,000	1,000	1,000	1,000	1,000
5	1,000	1,000	1,000	1,000	1,000	1,000

■ 077: Epsmode (Epsilon Mode)

Select focus determination tolerance factor for AF-StepRankUP condition in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 2(AF-Step) or 3(Hybrid).

No.	Item	Range	Initial value
077	Selecting focus determination tolerance factor for AF-StepRankUP condition in hybrid mode 0:Epsilon, 1:2nd_Epsilon	0 - 1	Refer to following initial values

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

■   078: Hyb_count (Hybrid Count)

Set maximum number of continuously executing Hybrid_Command in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 1(MSP) or 3(Hybrid).

No.	Item	Range	Initial value
078	Maximum number of continuously executing Hybrid_Command in hybrid mode	0 - 65,535	Refer to following initial values

Function

Auto Focus operation will be terminated and travels to previous just focus detection position when number of continuous executions of parameter No. 074: Hybrid_Command reaches value of this parameter.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■ 079: Timer_T1

Set Wait time for executing Hybrid_Command in hybrid mode.

Valid when setting value of parameter No.071:Hybrid_Mode is 1(MSP) or 3(Hybrid).

No.	Item	Range	Initial value
079	Wait time for executing Hybrid_Command in hybrid mode	0 - 65,535	Refer to following initial values

Function

Delays executing parameter No.074:Hybrid_Command.

Supplement information

Unit for setting value is ms.

Initial value

Group	Port					
	A	B	C	D	E	F
1	5	5	5	5	5	5
2	5	5	5	5	5	5
3	5	5	5	5	5	5
4	5	5	5	5	5	5
5	5	5	5	5	5	5

■   101: Target_Point

Set targeted focus position used for AF automatic adjustment.

Valid for AJP and AJB.

No.	Item	Range	Initial value
101	Setting targeted focus position used for AF automatic adjustment	512 - 16,777,215	Refer to following initial values

Function

Performs AF automatic adjustment using value of this parameter as reference.

Value of this parameter will be the position of AF driving unit after AF automatic adjustment.

Initial value

Group	Port					
	A	B	C	D	E	F
1	12,800	12,800	12,800	12,800	12,800	12,800
2	12,800	12,800	12,800	12,800	12,800	12,800
3	12,800	12,800	12,800	12,800	12,800	12,800
4	12,800	12,800	12,800	12,800	12,800	12,800
5	12,800	12,800	12,800	12,800	12,800	12,800

■   102: Pattern_Step

Set travel distance (number of steps) of pattern driving unit for AF automatic adjustment.

Valid for AJP.

No.	Item	Range	Initial value
102	Travel distance of pattern driving unit for AF automatic adjustment (AJP)	1 - 100	Refer to following initial values

Function

This parameter sets travel distance in number of pulses.

*Increased travel distance will lead to shorter time for AF automatic adjustment but it will be difficult to fit within settling area. Decreased travel distance will result in longer time for AF automatic adjustment but it will be easier to stay within settling area.

Initial value

Group	Port					
	A	B	C	D	E	F
1	10	10	10	10	10	10
2	10	10	10	10	10	10
3	10	10	10	10	10	10
4	10	10	10	10	10	10
5	10	10	10	10	10	10

■   103: In-position_Area

Set settling area for pattern driving unit of target focus position during AF automatic adjustment.

Valid for AJP.

No.	Item	Range	Initial value
103	Setting targeted settling area of Target_Point for AF automatic adjustment (AJP)	0 - 1,000	Refer to following initial values

Function

This parameter sets number of pulses using parameter No.101: Target_Point as reference.

Settling area is as follows

Target_Point ± In-position_Area (this parameter)

Target_Point − In-position_Area

Target_Point   Settling area

Target_Point + In-position_Area
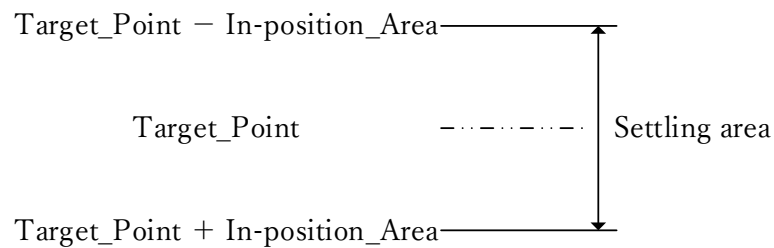
Initial value

Group	Port					
	A	B	C	D	E	F
1	100	100	100	100	100	100
2	100	100	100	100	100	100
3	100	100	100	100	100	100
4	100	100	100	100	100	100
5	100	100	100	100	100	100

■ 104: Agc (Auto Gain Control for auto adjust)　　　　　　　

Select INT/AGC target value for AF automatic adjustment.

Valid for AJF.

No.	Item	Range	Initial value
104	Selecting INT/AGC target value for AF automatic adjustment (AJP) 　0:INT=0/AGC=5, 1:INT=1/AGC=4	0 - 1	Refer to following initial values

Supplement information

Please refer to following for selecting target values.

・When setting value is "0"

　　This setting reduces chances of focusing on back side of thin samples (e.g. film).

・When setting value is "1"

　　Standard setting for Auto Focus operation.

Initial value

Group	Port					
	A	B	C	D	E	F
1	1	1	1	1	1	1
2	1	1	1	1	1	1
3	1	1	1	1	1	1
4	1	1	1	1	1	1
5	1	1	1	1	1	1

■　105: BpfSrch (band pass filter search)　　　　　　　　　

Select Auto Focus operation for AF automatic adjustment.

Valid for AJF.

No.	Item	Range	Initial value
105	Selecting Auto Focus operation for AF automatic adjustment (AJP) 　　0:AF0, 1:SC0	0 - 1	Refer to following initial values

Initial value

Group	Port					
	A	B	C	D	E	F
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0

(2) System parameters

■　601: Adjust-Parm (adjust parameter)

Restrict data table writing.

No.	Item	Range	Initial value
601	Permit data table writing 　　0: permit writing, 1: forbid writing	0 - 1	0

Supplement information

Subjected parameters are as follows.

　　Parameter No.701 – 796 : Speed_Table

　　Parameter No.901 – 908 : 2nd_Area_Table

　　Parameter No.921 – 928 : AF-Step_Table

■　602: Baud_Rate

Select communication baud rate of RS-232C.

No.	Item	Range	Initial value
602	Selecting communication baud rate of RS-232C (Valid when DipSW 1-5 is ON) 　0:600, 1:2400, 2:4800, 3:9600, 4:19200, 5:38400	0 - 5	4

Supplement information

Setting gets effective after restarting the controller unit or executing communication command [RESTA] when changing setting of this parameter.

■ 603: Re-PushAF

Permit registering [Search] key of operation box during Auto Focus operation or when error occurs.

No.	Item	Range	Initial value
603	Permit registering [Search] key of operation box during Auto Focus operation or when error occurs 　　0: permit register, 1: forbid register	0 - 1	1

Supplement information

Please refer to following for operation in respect of setting values.

・When setting value is "0"

　　Executes Auto Focus operation again when [Search] key is pressed during Auto Focus operation.

・When setting value is "1"

　　No operation will be performed when [Search] key is pressed during Auto Focus operation

　　(Please press [Search] key after STOP operation).

■ 607: Address_Mode

Add coordinates of AF driving unit when returning just focus (hexadecimal).

No.	Item	Range	Initial value
607	Add coordinates of AF driving unit when returning just focus (hexadecimal) 　　0: unadded, 1: added	0 - 1	0

Supplement information

Response by setting value is as follows.

・When setting value is "0"

　　Returns "J" upon just focus.

　　　e.g.: $J[C_R][L_F]J[C_R][L_F]J[C_R][L_F]$

・When setting value is "1"

　　Returns coordinates after "J" upon just focus.

　　　e.g.: J[CR][LF]xxxxxxxx[CR][LF]J[CR][LF]xxxxxxxx[CR][LF]J[CR][LF]xxxxxxxx[CR][LF]

　　　　　　J: just focus

　　　　　　xxxxxxxx: coordinates (hexadecimal)

■　608: AF-Direct

Add direction of travel when returning just focus.

No.	Item	Range	Initial value
608	Add direction of travel when returning just focus 0: unadded, 1: added	0 - 1	0

Supplement information

Response by setting value is as follows.

・When setting value is "0"

　　Returns "J" upon just focus regardless of travel direction of AF driving unit.

・When setting value is "1"

　　Returns "JF" upon just focus when AF driving unit is operating towards FAR direction.

　　Returns "JN" upon just focus when AF driving unit is operating towards NEAR direction.

■　609: Msk_msg5 (mask message AFC-5)

Inhibit legacy warning (LW) display added for old command response.

No.	Item	Range	Initial value
609	Inhibit old command warning (LW) display 0: permit, 1: inhibit	0 - 1	0

Supplement information

Response by setting value is as follows.

・When setting value is "0"

　　Add "(LW)" when returning response to old command.

　　　e.g.: DX[C_R] 　　　　　　　: old command (read magnification mode)

　　　　　X10(VW)[C_R][L_F] 　　: response (10x mode)

・When setting value is "1"

　　"(LW)" will be added when returning response to old command.

　　　e.g.: DX[C_R] 　　　　　　　: old command (read magnification mode)

　　　　　X10[C_R][L_F] 　　　　: response (10x mode)

*Please note that support for old commands will be discontinued in the future.

■　621: CCD_Count

Select line sensor method.

*Please note that setting must be complied with sensor box settings.

No.	Item	Range	Initial value
621	Selecting line sensor method 0: 1 line sensor method, 1: 2 line sensor method	0 - 1	1

Supplement information

Sensor box has 1 line sensor method and 2 line sensor method. Set this parameter according to sensor box.

■ 622: HAGC_H (hardware auto gain control high)

Set high-level determination voltage of input amplifier gain for sensor signal.

No.	Item	Range	Initial value
622	High-level determination voltage of input amplifier gain for sensor signal	0 - 1,200	360

Function

AF signal gain adjustment area is as follows.

HAGC_L < Amplifier output signal (AF signal) < HAGC_H

HAGC_L:　　　　parameter No.623

HAGC_H:　　　　value of this parameter

Supplement information

Unit for setting value is mV.

■ 623: HAGC_L (hardware auto gain control low)

Set low-level determination voltage of input amplifier gain for sensor signal.

No.	Item	Range	Initial value
623	Low-level determination voltage of input amplifier gain for sensor signal	0 - 1,200	200

Function

AF signal gain adjustment area is as follows.

HAGC_L < Amplifier output signal (AF signal) < HAGC_H

HAGC_L:　　　　value of this parameter

HAGC_H:　　　　parameter No.622

Supplement information

Unit for setting value is mV.

■　624: H_Range (High Range of AF-signal)

Set high-level determination voltage of AF signal during AF trace operation.

No.	Item	Range	Initial value
624	High-level determination voltage of AF signal during AF trace operation	0 - 6,600	4,950

Function

AF signal gain adjustment area during AF trace operation is as follows.

L_Range < (AF signal on Ach side＋AF signal on Bch side) < H_Range

L_Range:　　　　parameter No.625
H_Range:　　　　value of this parameter

Supplement information

Unit for setting value is mV.

■　625: L_Range (Low Range of AF-signal)

Set low-level determination voltage of AF signal during AF trace operation.

No.	Item	Range	Initial value
625	Low-level determination voltage of AF signal during AF trace operation	0 - 6,600	2,640

Function

AF signal gain adjustment area during AF trace operation is as follows.

L_Range < (AF signal on Ach side＋AF signal on Bch side) < H_Range

L_Range:　　　　value of this parameter
H_Range:　　　　parameter No.624

Supplement information

Unit for setting value is mV.

■ 641: Limit_Logic

Select limit logic of AF driving unit.

No.	Item	Range	Initial value
641	Selecting limit logic of AF driving unit (Valid when DipSW 1-1 is ON) 　0: normal open, 1: normal close	0 - 1	0

Supplement information

Please set this parameter complied with limit logic of AF driving unit. Both FAR and NEAR limit will be detected when connected with incorrect setting. Please note it may cause malfunction in AF driving unit.

■ 643: Motor-Div (Motor Division)

Set resolution (number of steps per motor revolution) of AF driving unit.

No.	Item	Range	Initial value
643	Setting resolution of AF driving unit(step/rev) 　0:3200, 1:3200, 2:3200, 3:6400, 4:12800	0 - 4	3

■ 644: SX_Speed

Set travel speed of pattern driving unit.

No.	Item	Range	Initial value
644	Travel speed of pattern driving unit	0 - 65,535	630

Supplement information

Unit for setting value is pps.

■ 645: SX_RST

Set cycle for automatic HOME return of pattern driving unit.

No.	Item	Range	Initial value
645	Cycle for automatic HOME return of pattern driving unit	0 - 65,535	100

Function

Operation of pattern driving unit is as follows.

・When setting value is "0"

    Pattern driving unit does not perform automatic HOME return (this parameter is invalid).

・When setting value is "1 - 65,535"

    When number of operations of pattern driving unit reaches value of this parameter, it automatically returns HOME and travels to value of Parameter No. 023: Pattern-INF.

■ 646: SX_Limit_Logic

Select limit logic of pattern driving unit.

No.	Item	Range	Initial value
646	Selecting limit logic of pattern driving unit (Valid when DipSW 1-2 is ON) 0: normal open, 1: normal close, 2: not in use	0 - 2	0

Supplement information

Please set this parameter complied with limit logic of pattern driving unit. Both FAR and NEAR limit will be detected when connected with incorrect setting. Please note it may cause malfunction in pattern driving unit. Select "2" when it is not connected to pattern driving unit.

■   661: RES

Set cycle for automatic HOME return of AF driving unit.

No.	Item	Range	Initial value
661	Cycle for automatic HOME return of AF driving unit	0 - 65,535	0

Function

Operation of AF driving unit is as follows.

・When setting value is "0"

   AF driving unit does not perform automatic HOME return (this parameter is invalid).

・When setting value is "1 - 65,535"

   When number of times of autofocus command* reaches value of this parameter, AF driving unit automatically returns HOME immediately after the next autofocus command and performs Auto Focus operation.

    *Includes executing Auto Focus operation from operation box, adjustment software and I/O ports.

■ 662: 2CK

Select starting direction for peak detection of Auto Focus operation.

Valid for SC2, SC3 and SC5.

No.	Item	Range	Initial value
662	Selecting starting direction of peak detection for Auto Focus operation (SC2, SC3, SC5)	0 - 1	0

Function

Starting direction of peak detection for each Auto Focus operation is as follows.

Auto Focus operation SC2, SC5

・When setting value is "0"

   Starts peak detection operation towards NEAR direction after traveling to FAR side search point from current position.

・When setting value is "1"

   Starts peak detection operation towards FAR direction after traveling to NEAR side search point from current position.

Auto Focus operation SC3

・When setting value is "0"

   Travel from current position to previous detected just focus position, then to FAR side search point and starts peak detection operation towards NEAR direction.

・When setting value is "1"

   Travel from current position to previous detected just focus position, then to NEAR side search point and starts peak detection operation towards FAR direction.

■   664: Init_Mode (initialized mode)

Select with/without HOME return operation of AF driving unit when controller unit power is turned on.

No.	Item	Range	Initial value
664	Selecting with/without HOME return operation of AF driving unit when power is turned on 0: with HOME return, 1: without HOME return	0 - 1	0

Function

Operation regarding to setting value is as follows.

・When setting value is "0"

AF driving unit performs HOME return after controller unit is turned on. This operation is same with communication command [RST].

・When setting value is "1"

AF driving unit does not perform HOME return after controller unit is turned on. Please note coordinate display changes to "262,143" even AF driving unit does not travel in this operation.

Supplement information

Pattern driving unit always performs HOME return regardless of setting of this parameter.

■   681 - 695: CCD-INF (sensor signal trimming parameter)

Set for trimming process of sensor signal imported to the controller.

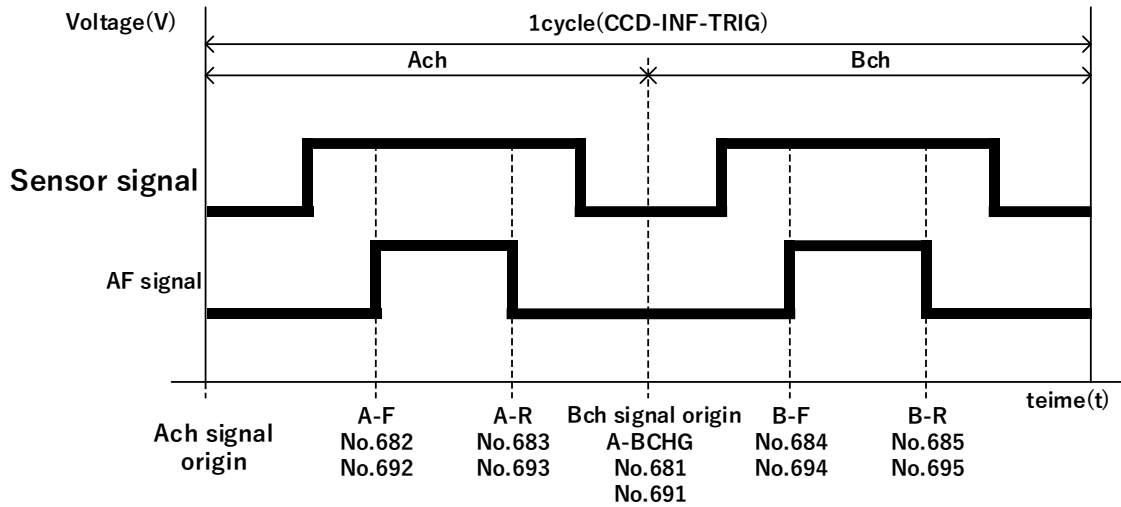*Oscilloscope needs to be connected to set these parameters.

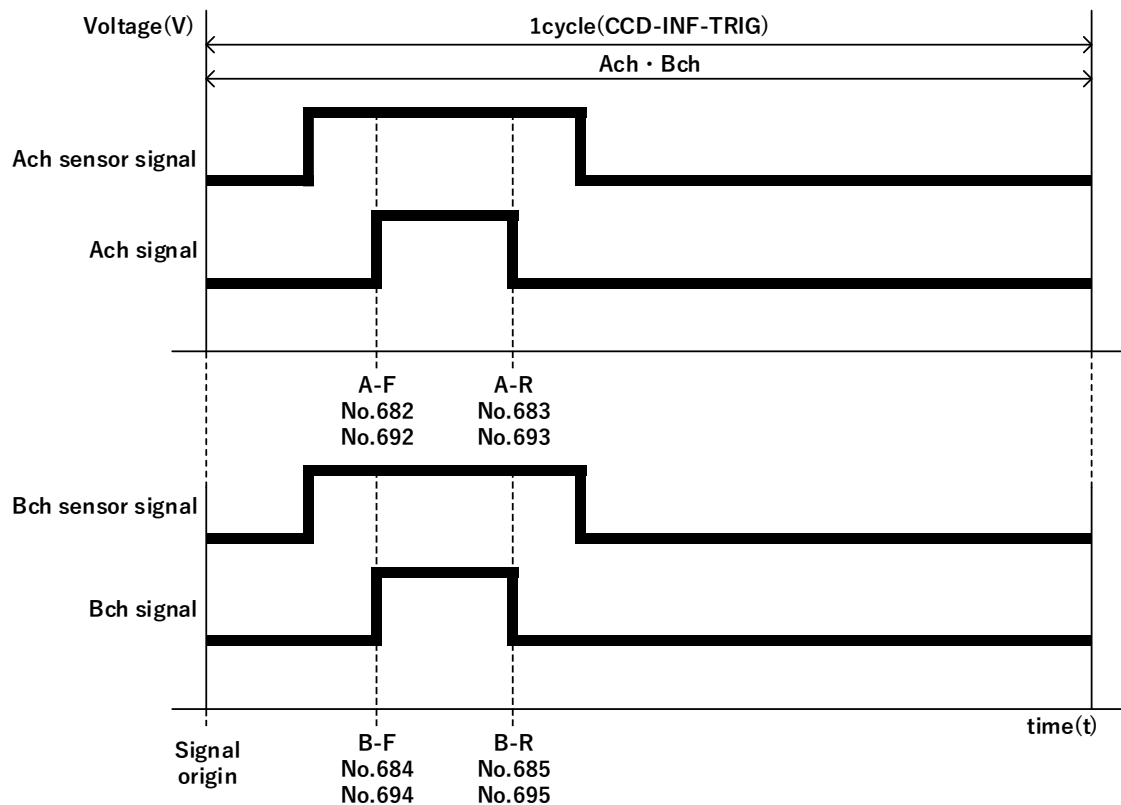| No.	Item	parameter 名	Range	Initial value
681	Setting range of sensor signal for 1MHz (switching process of Ach/Bch)	CCD-INF1_A-BCHG		2,000
682	Setting range of sensor signal for 1MHz (Ach side front trimming position)	CCD-INF1_A-F		400
683	Setting range of sensor signal for 1MHz (Ach side rear trimming position)	CCD-INF1_A-R		1,500
684	Setting range of sensor signal for 1MHz (Bch side front trimming position)	CCD-INF1_B-F		400
685	Setting range of sensor signal for 1MHz (Bch side rear trimming position)	CCD-INF1_B-R	0 - 65,535	1,500
691	Setting range of sensor signal for 2MHz (switching process of Ach/Bch)	CCD-INF2_A-BCHG		1,000
692	Setting range of sensor signal for 2MHz (Ach side front trimming position)	CCD-INF2_A-F		200
693	Setting range of sensor signal for 2MHz (Ach side rear trimming position)	CCD-INF2_A-R		750
694	Setting range of sensor signal for 2MHz (Bch side front trimming position)	CCD-INF2_B-F		200
695	Setting range of sensor signal for 2MHz (Bch side rear trimming position)	CCD-INF2_B-R		750

Function

Parameter used for sensor signal trimming changes depending on setting values of Parameter No. 033: CCD_Speed and Parameter No. 621: CCD_Count. Parameters used for each setting value are as follows.

・When both CCD_Speed and CCD_Count are "0" (driving frequency 1MHz, 1 line sensor method)
   Use parameter No.681-685.
・When CCD_Speed is "1" and CCD_Count is "0" (driving frequency2 MHz, 1 line sensor method)
   Use parameter No.691-695.
・When CCD_Speed is "0" and CCD_Count is "1" (driving frequency 1MHz, 2 line sensor method)
   Use parameter No.682-685 (parameter No.681 is not in use).
・When both CCD_Speed and CCD_Count are "1" (driving frequency 2MHz, 2 line sensor method)
   Use parameter No.692-695 (parameter No.691 is not in use).

● Timing chart of 1 line sensor method

Voltage(V) 1cycle(CCD-INF-TRIG)

Ach | Bch

Sensor signal

AF signal

teime(t)

| Ach signal origin | A-F No.682 No.692 | A-R No.683 No.693 | Bch signal origin A-BCHG No.681 No.691 | B-F No.684 No.694 | B-R No.685 No.695 |

● Timing chart of 2 line sensor method

Voltage(V) 1cycle(CCD-INF-TRIG)

Ach・Bch

Ach sensor signal

Ach signal

| A-F No.682 No.692 | A-R No.683 No.693 |

Bch sensor signal

Bch signal

time(t)

| Signal origin | B-F No.684 No.694 | B-R No.685 No.695 |

Supplement information

Setting value of 1 is equivalent to 0.5μs.

Increased value in the front section narrows signal range and decreased value increases signal range.

Increased rear value increases signal range and decreased value decreases signal range conversely.

It is necessary to set an appropriate range while monitoring waveform with oscilloscope.

■ 701 - 796: Speed_Table

Data table for travel speed of AF driving unit.

Table numbers are 0-31. Set low/high speed travel and acceleration/deceleration time for each table number.

Unit for setting value is pps for speed and ms for time.

*Relationship between low speed and high speed is as follows.

Low speed ≦ high speed (Unable to set low speed > high speed)

No.	Item		parameter name	Range	Initial value
701	Speed_TableNo.0	Low speed	SpTb00-L	10 - 500,000	64
702		High speed	SpTb00-H	10 - 500,000	64
703		Acceleration/deceleration time	SpTb00-T	1 - 1,000	10
704	Speed_TableNo.1	Low speed	SpTb01-L	10 - 500,000	128
705		High speed	SpTb01-H	10 - 500,000	128
706		Acceleration/deceleration time	SpTb01-T	1 - 1,000	10
707	Speed_TableNo.2	Low speed	SpTb02-L	10 - 500,000	256
708		High speed	SpTb02-H	10 - 500,000	256
709		Acceleration/deceleration time	SpTb02-T	1 - 1,000	10
710	Speed_TableNo.3	Low speed	SpTb03-L	10 - 500,000	512
711		High speed	SpTb03-H	10 - 500,000	512
712		Acceleration/deceleration time	SpTb03-T	1 - 1,000	10
713	Speed_TableNo.4	Low speed	SpTb04-L	10 - 500,000	1,024
714		High speed	SpTb04-H	10 - 500,000	1,024
715		Acceleration/deceleration time	SpTb04-T	1 - 1,000	10
716	Speed_TableNo.5	Low speed	SpTb05-L	10 - 500,000	2,048
717		High speed	SpTb05-H	10 - 500,000	2,048
718		Acceleration/deceleration time	SpTb05-T	1 - 1,000	10
719	Speed_TableNo.6	Low speed	SpTb06-L	10 - 500,000	3,200
720		High speed	SpTb06-H	10 - 500,000	3,200
721		Acceleration/deceleration time	SpTb06-T	1 - 1,000	10
722	Speed_TableNo.7	Low speed	SpTb07-L	10 - 500,000	6,400
723		High speed	SpTb07-H	10 - 500,000	6,400
724		Acceleration/deceleration time	SpTb07-T	1 - 1,000	10
725	Speed_TableNo.8	Low speed	SpTb08-L	10 - 500,000	6,400
726		High speed	SpTb08-H	10 - 500,000	8,000
727		Acceleration/deceleration time	SpTb08-T	1 - 1,000	10
728	Speed_TableNo.9	Low speed	SpTb09-L	10 - 500,000	6,400
729		High speed	SpTb09-H	10 - 500,000	9,600

730		Acceleration/deceleration time	SpTb09-T	1 - 1,000	10
731		Low speed	SpTb10-L	10 - 500,000	6,400
732	Speed_TableNo.10	High speed	SpTb10-H	10 - 500,000	12,800
733		Acceleration/deceleration time	SpTb10-T	1 - 1,000	10
734		Low speed	SpTb11-L	10 - 500,000	6,400
735	Speed_TableNo.11	High speed	SpTb11-H	10 - 500,000	16,000
736		Acceleration/deceleration time	SpTb11-T	1 - 1,000	10
737		Low speed	SpTb12-L	10 - 500,000	6,400
738	Speed_TableNo.12	High speed	SpTb12-H	10 - 500,000	19,200
739		Acceleration/deceleration time	SpTb12-T	1 - 1,000	10
740		Low speed	SpTb13-L	10 - 500,000	6,400
741	Speed_TableNo.13	High speed	SpTb13-H	10 - 500,000	25,600
742		Acceleration/deceleration time	SpTb13-T	1 - 1,000	10
743		Low speed	SpTb14-L	10 - 500,000	6,400
744	Speed_TableNo.14	High speed	SpTb14-H	10 - 500,000	32,000
745		Acceleration/deceleration time	SpTb14-T	1 - 1,000	10
746		Low speed	SpTb15-L	10 - 500,000	6,400
747	Speed_TableNo.15	High speed	SpTb15-H	10 - 500,000	38,400
748		Acceleration/deceleration time	SpTb15-T	1 - 1,000	10
749		Low speed	SpTb16-L	10 - 500,000	16
750	Speed_TableNo.16	High speed	SpTb16-H	10 - 500,000	32
751		Acceleration/deceleration time	SpTb16-T	1 - 1,000	100
752		Low speed	SpTb17-L	10 - 500,000	16
753	Speed_TableNo.17	High speed	SpTb17-H	10 - 500,000	64
754		Acceleration/deceleration time	SpTb17-T	1 - 1,000	100
755		Low speed	SpTb18-L	10 - 500,000	32
756	Speed_TableNo.18	High speed	SpTb18-H	10 - 500,000	64
757		Acceleration/deceleration time	SpTb18-T	1 - 1,000	100
758		Low speed	SpTb19-L	10 - 500,000	32
759	Speed_TableNo.19	High speed	SpTb19-H	10 - 500,000	128
760		Acceleration/deceleration time	SpTb19-T	1 - 1,000	100
761		Low speed	SpTb20-L	10 - 500,000	64
762	Speed_TableNo.20	High speed	SpTb20-H	10 - 500,000	1,600
763		Acceleration/deceleration time	SpTb20-T	1 - 1,000	100
764		Low speed	SpTb21-L	10 - 500,000	64
765	Speed_TableNo.21	High speed	SpTb21-H	10 - 500,000	3,200
766		Acceleration/deceleration time	SpTb21-T	1 - 1,000	100
767	Speed_TableNo.22	Low speed	SpTb22-L	10 - 500,000	128

768		High speed	SpTb22-H	10 - 500,000	1,600
769		Acceleration/deceleration time	SpTb22-T	1 - 1,000	100
770		Low speed	SpTb23-L	10 - 500,000	128
771	Speed_TableNo.23	High speed	SpTb23-H	10 - 500,000	3,200
772		Acceleration/deceleration time	SpTb23-T	1 - 1,000	100
773		Low speed	SpTb24-L	10 - 500,000	256
774	Speed_TableNo.24	High speed	SpTb24-H	10 - 500,000	3,200
775		Acceleration/deceleration time	SpTb24-T	1 - 1,000	100
776		Low speed	SpTb25-L	10 - 500,000	256
777	Speed_TableNo.25	High speed	SpTb25-H	10 - 500,000	6,400
778		Acceleration/deceleration time	SpTb25-T	1 - 1,000	100
779		Low speed	SpTb26-L	10 - 500,000	512
780	Speed_TableNo.26	High speed	SpTb26-H	10 - 500,000	3,200
781		Acceleration/deceleration time	SpTb26-T	1 - 1,000	100
782		Low speed	SpTb27-L	10 - 500,000	512
783	Speed_TableNo.27	High speed	SpTb27-H	10 - 500,000	6,400
784		Acceleration/deceleration time	SpTb27-T	1 - 1,000	100
785		Low speed	SpTb28-L	10 - 500,000	1,024
786	Speed_TableNo.28	High speed	SpTb28-H	10 - 500,000	6,400
787		Acceleration/deceleration time	SpTb28-T	1 - 1,000	100
788		Low speed	SpTb29-L	10 - 500,000	1,024
789	Speed_TableNo.29	High speed	SpTb29-H	10 - 500,000	12,800
790		Acceleration/deceleration time	SpTb29-T	1 - 1,000	100
791		Low speed	SpTb30-L	10 - 500,000	2,048
792	Speed_TableNo.30	High speed	SpTb30-H	10 - 500,000	6,400
793		Acceleration/deceleration time	SpTb30-T	1 - 1,000	100
794		Low speed	SpTb31-L	10 - 500,000	2,048
795	Speed_TableNo.31	High speed	SpTb31-H	10 - 500,000	12,800
796		Acceleration/deceleration time	SpTb31-T	1 - 1,000	100

■   901 - 908: 2nd_Area_Table

Data table for 2nd_ Area.

Table numbers are 0-7 and value is set by number of pulses.

No.	Item	parameter name	Range	Initial value
901	Number of pulses specified in 2nd_Area_TableNo.0	2ndTb00		64
902	Number of pulses specified in 2nd_Area_TableNo.1	2ndTb01		128
903	Number of pulses specified in 2nd_Area_TableNo.2	2ndTb02	0 - 65,535	320
904	Number of pulses specified in 2nd_Area_TableNo.3	2ndTb03		640
905	Number of pulses specified in 2nd_Area_TableNo.4	2ndTb04		1,280
906	Number of pulses specified in 2nd_Area_TableNo.5	2ndTb05		2,560
907	Number of pulses specified in 2nd_Area_TableNo.6	2ndTb06		6,400
908	Number of pulses specified in 2nd_Area_TableNo.7	2ndTb07		12,800

■   921 - 928: AF-Step_Table

Data table for AF-Step.

Table numbers are 0-7 and value is set by number of pulses.

No.	Item	parameter name	Range	Initial value
921	Number of pulses traveled specified in AF-Step_TableNo.0	AMTb00		1
922	Number of pulses traveled specified in AF-Step_TableNo.1	AMTb01		2
923	Number of pulses traveled specified in AF-Step_TableNo.2	AMTb02	0 - 65,535	4
924	Number of pulses traveled specified in AF-Step_TableNo.3	AMTb03		8
925	Number of pulses traveled specified in AF-Step_TableNo.4	AMTb04		16
926	Number of pulses traveled specified in AF-Step_TableNo.5	AMTb05		32
927	Number of pulses traveled specified in AF-Step_TableNo.6	AMTb06		64
928	Number of pulses traveled specified in AF-Step_TableNo.7	AMTb07		128

Warranty and repair

■Warranty period

Repair services are available for free of charge in the event of technical failure under warranty period in accordance with CHUO regulations.

> **Warranty period   1 year from shipment**

Repair costs will not be covered for following cases.

- Due to improper use, inappropriate repair or remodeling the product
- Due to applying external shock after purchasing the product
- Due to fire, earthquake, flood, lightning or other natural disasters
- Due to environmental pollution or by applying abnormal voltage
- For defects predetermined by CHUO not to apply this warranty
- Due to any use not following this instruction manual

■Repair service during warranty period

Please contact the authorized distributors or company of purchase for repair service.

■Repair service for out-of-warranty products

Contact the authorized distributors or company of purchase for out-of-warranty products. Repair services will be provided with charges depending on conditions. Please provide the following information in order to prepare and deliver effective repair services.

- Date of purchase, product name and manufacturing number
- Details of how the product is used
- Specific description of defects
- Matters that may be the cause of defect

Please note in advance that there may be cases that CHUO is unable to provide repair services.

All descriptions and specifications in this manual are subject to change without prior notice.

Please note in advance that products are also subject to change without prior notice.

Auto Focus Controller AFC-6　INSTRUCTION MANUAL

- parameters -　Ver. 1.0

Oct. 31, 2019 YUA.

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