Spectroradiometer CS-2000

Communication Specifications



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	TGDS (Target Data Set)	
	TGDR (Target Data Read)	
	TGDD (Target Data Delete)	
	TGAD (Target All Data Delete)	
	IDDR (Identification Data Read)	
	STSR (Aperture Stop Status Read)	
	RMTS (Remote Mode Select)	
	MSWE (Measuring Switch Enable)	
	DTCR (Date/Time of Calibration Read)	
	UCCS (User Calibration Channel Select)	
	UCCR (User Calibration Channel Read)	
	UCPS (User Calibration Parameter Set)	
	UCPR (User Calibration Parameter Read)	
	UCCD (User Calibration Channel Delete)	
	LNSS (Close-up Lens Status Select)	
	LNSR (Close-up Lens Status Read)	
	ALFS (Attachment Lens Compensation Factor Set)	
	ALFR (Attachment Lens Compensation Factor Read)	
	NDFS (External ND Filter Select)	
	NDFR (External ND Filter Read)	
	NFCS (ND Filter Compensation Factor Set)	
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1 Communication Settings

Communication with the CS-2000 is performed via a USB1.1 CDC (communications device class). Therefore, communication with a PC can be performed with the instrument configured as using a COM port. The standard settings are as follows:

Baud rate	9,600
Data length	8 bits
Parity	None
Stop bits	1
Flow control	None
Delimiter	CR (0x0D), LF (0x0A), or CR+LF (0x0D 0x0A)

Installation of the USB driver for connecting the CS-2000 is performed using the file kmsecs2000.inf. This file is installed on the computer when the CS-S10w software included with the CS-2000 as a standard accessory is installed.

When the CS-2000 is connected to the computer and the Found New Hardware Wizard appears, specify the folder in which CS-S10w was installed as the driver location.

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2 Error-check codes

Code	Meaning	
OK00	Command was processed normally	
ER00	Invalid command string or number of parameters received.	
ER02	Measurement error	
ER05	No user calibration values	
ER10	Over measurement range	
ER17	Parameter error	
ER20	No data	
ER30	Flash memory error	
ER51	CCD Peltier abnormality	
ER52	Temperature count abnormality	
ER71	Outside synchronization signal range	
ER81	Shutter operation abnormality	
ER82	Internal ND filter operation malfunction	
ER83	Measurement angle abnormality	
ER99	Program abnormality	

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Error-check codes

3 Command details

MEAS (<u>Meas</u> ure)				
Function				
Performs only measurement (measurement data are not output)				
Inpu	ut/Output Format			
	PC		CS-2000	
(Norr	mal measurement)			
"MEA	AS,1" + Delimiter code	\Rightarrow	(Instrument performs pre-measurement.)	
		⇔	" Error-check code ,1"	
			+ Delimiter code	
			(Instrument starts actual measurement.)	
		⇔	" Error-check code " + Delimiter	
			code	
			(Measurement completed.)	
(Can	celed measurement)			
W ME 7	AS,1" + Delimiter code	_	(Instrument performs pre-measurement.)	
MEA	AS,1 + Delimiter Code	\Rightarrow		
		\Leftrightarrow	"Error-check code ,1"	
			+ Delimiter code	
			(Instrument starts actual measurement.)	
"MEA	AS,0" + Delimiter code	\Rightarrow	(Measurement is canceled.)	
		(" Error-check code " + Delimiter	
			code	
		<u>-</u>		
Con	nmand Parameters			
	Meaning	Detail	s/range	
	Command parameter	_	ncel measurement art measurement	
Res	ponse Parameters	1.00		
	Meaning	Detail	s/range	
1	Measurement time	002 to	002 to 242: 3-character string indicating measurement	
time in seconds determined by pre-measurement				
	lanation			
Performs measurement. Measurement starts when MEAS,1 is input. A pre-measurement is taken to determine the required measurement time (and notification of this time is sent from the CS-2000 to the PC) and then the actual measurement begins automatically. When measurement has been completed, the instrument returns an error-check code (OK00 if measurement was completed successfully). To cancel a measurement in progress, MEAS,0 can be input after the pre-measurement has been completed.				
No commands will be accepted during pre-measurement. During actual measurement, commands other than MEAS,0 will result in a response of ER00.				
During actual measurement, commands other than MEAS,0 will result in a response of ER00.				

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Code	Meaning	
OK00	Command was processed normally	
ER10	Over measurement range	
ER17	Parameter error (including receipt of MEAS,0 when measurement is not in progress)	
ER83	ER83 Measurement area abnormality	

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ME	MEDR (<u>Me</u> asurement <u>D</u> ata <u>R</u> ead)				
	Function				
I	Reads measurement data from instrument.				
Inp	ut/Output Format				
	PC	CS-2000			
(For	normal measurement)				
W MTE	DR,[],[2,[3" + Delimiter code	₽			
MIL	DK, [[], [2], [2] + [Dellimiter code]				
		⟨□ " Error-check code ,[I"			
		+ Delimiter code			
Co	mmand Parameters				
CU	Meaning	Details/range			
1	Data mode	0: Measurement conditions			
	Data mede	Spectral data			
		2: Colorimetric data			
2	Data format	0: Alphanumeric			
		Hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string)			
3	Data block number	Stored data block number to be read.			
	Data blook Hambol	Stored data block Hallibor to be read.			
		For spectral data:			
		01: 100 pieces of data from 380 to 479nm 02: 100 pieces of data from 480 to 579nm			
		03: 100 pieces of data from 580 to 679nm			
		04: 101 pieces of data from 680 to 780nm			
		For colorimetric data: 00: All colorimetric data			
		01: X,Y,Z			
		02: x, y, Lv			
		03: u',v',Lv			
		04: Τ, Δuv, Lv			
		05: λd, Pe,Lv			
		11: X10,Y10,Z10 12: x10, y10, Lv10			
		13: u'10,v'10,Lv10			
		14: T10, Δuv10, Lv10			
		15: λd10, Pe10,Lv10			
		100: Le 101: Lv			
Re	sponse Parameters	101. LV			
	Meaning	Details/range			
1	Output data	When Data mode=0 (Measurement conditions):			
		Speed mode:			
		0: Normal			
		1: Fast 2: Multi			
		2: Multi 3: Manual			
		Sync mode:			
		0: No sync			
		1: Internal sync			
		2: External sync Integration time:			
	1	megration time.			

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	9-character text value	in units of µsec
	Internal ND filter:	_
	0: Off	1: O n
	Close-up lens:	
	0: None	1: Attached
	External ND filter:	
	0: None	1: Attached
	Measurement angle:	
	0: 1°	1: 0.2°
	2: 0.1°	
	User calibration channel:	
	00 (No user calibration	n) to 10
	When Data mode=1 (Specti	
	Data are output in blocks of	
	block 4, which is a block of	
	Each piece of data is 8-byte	
	floating data converted to A	SCII code), separated by
	commas.	
	When Data mode=2 (Colori	metric data):
	For each data block number	
	follows:	
	00: All colorimetric data are	output in the following
	order:	
	Le, Lv, X, Y, Z, x, y, u', v	/', T, ∆uv, λd, Pe, X10,
	Y10, Z10, x10, y10, u'10), v'10, T10, ∆uv10, λd10,
	Pe10	
	01: X,Y,Z	
	02: x , y , Lv	
	03: u',v',Lv	
	04: T, ∆uv, Lv	
	05: λ d, Pe,Lv	
	11: X10,Y10,Z10	
	12: x10, y10, Lv10	
	13: u'10,v'10,Lv10	
	14: T10, ∆uv10, Lv10	
	15: λd10, Pe10,Lv10	
	100: Le	
	100. Le 101: Lv	
		(4 byte fleeting date
	Data are 8-byte ASCII data converted to ASCII code); c	
	For parameters other than 0	
	order of the variables stated	
	order of the variables stated	above.

Explanation

Data are read from the instrument.

Data are output as comma-delimited.

When measurement button is enabled:

- Reading all 4 blocks of spectral data or reading any set of colorimetric data clears the measurement data from the instrument's buffer.
- If an error occurs during measurement, the corresponding error-check code is output but no measurement data are output. When the error-check code is read, measurement data are cleared from the instrument's buffer.

Error-ch	Error-check codes				
Code	Meaning				
OK00	Command was processed normally				
ER00	Invalid command string or number of parameters received.				
ER02	Measurement error (only when measurement button is enabled)				
ER10	Over measurement range (only when measurement button is enabled)				
ER17	Parameter error				
ER20 No data					

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ER51	CCD Peltier abnormality (only when measurement button is enabled)	
ER52	Temperature count abnormality (only when measurement button is enabled)	
ER71	ER71 Outside synchronization signal range (only when measurement button is enabled)	
ER83	Measurement area abnormality (only when measurement button is enabled)	

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SPMS (<u>Sp</u> eed <u>M</u> ode <u>S</u> et)					
Function					
S	Sets speed mode of the instrument.				
Inpu	ıt/Output Format				
	PC		CS-2000		
(For	Speed mode of Normal or Fast)				
"SPM	S,[]" + Delimiter code	\Rightarrow			
		⇔	" Error-check code " + Delimiter code		
(For	Speed mode of Multi)				
"SPM	S,[],[2]" + Delimiter code	\Rightarrow			
		(" Error-check code " + Delimiter code		
(For	Speed mode of Manual)				
"SPM	S,1,3,4" + Delimiter code	\Rightarrow			
		(" Error-check code " + Delimiter code		
Con	nmand Parameters	-			
	Meaning	Detai	ls/range		
1	Speed mode	0: No 1: Fa 2: Mu 3: Ma	ist ulti		
2	Integration time for Speed mode: 2 (Multi)		16: Integration time in seconds to ensure stable surements using Multi mode		
[3]	Integration time for Speed mode: 3 (Manual)	0000 value	05000 to 120000000: 9-character alphanumeric for integration time in µsec. Use leading 0 if ssary to achieve length of 9 characters.		
4	Internal ND filter On/Off for Speed mode: 3 (Manual)	0: Of 1: Or			
Res	ponse Parameters				
	Meaning	Detai	ls/range		
Ехр	lanation				
Sets Speed mode of instrument. Settings are stored in flash memory, and are therefore maintained even if instrument is switched off. When Speed mode is set to 3 (Manual), the On/Off setting for the internal ND filter is not reflected immediately upon receipt of this command. The setting is reflected at the time of measurement. After measurement, the internal ND filter is left in the last used position (to minimize unnecessary movement of the ND filter).					
	Code Meaning				

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OK00	Command was processed normally
ER00	Invalid command string or number of parameters received. For Speed mode = 0 or 1, integration time was also input. For Speed mode = 2, integration time was not input. For Speed mode = 3, integration time and/or internal ND filter On/Off was not input
ER17	Parameter error Speed mode set to a value outside of the range 0 to 3 (inclusive) Integration time was set to a value outside the setting range.
ER30	Flash memory error

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SPMR	R (<u>Sp</u> eed <u>M</u> ode <u>R</u> ead)			
Function				
Rea	Reads speed mode of the instrument.			
Input/	Output Format			
	PC		CS-2000	
(For Sp	eed mode of Normal or Fast)			
"SPMR	" + Delimiter code	⇨		
	<u></u>	•	NI Tamana alamahan Jalu	
		\	" Error-check code ,1" + Delimiter code	
			· [Definiter Code]	
(For Sp	eed mode of Multi)			
"SPMR	" + Delimiter code	\Rightarrow		
		(" Error-check code ,1,2"	
		•	+ Delimiter code	
			Delimited code	
(For Sp	eed mode of Manual)			
"SPMR	" + Delimiter code	\Rightarrow		
		\(\rightarrow	" Error-check code ,[1,3,4"	
		4	+ Delimiter code	
			+ Delimiter code	
Comn	nand Parameters	-		
١	Meaning	Detail	s/range	
Respo	onse Parameters	Ė		
ſ	Meaning	Detail	s/range	
1 8	Speed mode	0: N c		
		1: Fa 2: Mu		
		3: Ma		
	ntegration time for Speed mode: 2		16: Integration time in seconds to ensure stable urements using Multi mode	
· · · ·	ntegration time for Speed mode: 3		05000 to 120000000: 9-character alphanumeric	
	Manual)	value	for measurement time in µsec. Use leading 0 if sarry to achieve length of 9 characters.	
	nternal ND filter On/Off for Speed mode: 3 (Manual)	0: Off 1: On		
Expla	nation			
	ads Speed mode of instrument.			
Error-	-check codes			
Code	Meaning			
OK00	Command was processed normal	lly		
ER30	Flash memory error			

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SCN	/IS (<u>S</u> yn <u>c M</u> ode <u>S</u> et)							
	Function							
S	Sets sync (synchronization) mode of the instrument.							
Inpu	Input/Output Format							
	PC		CS-2000					
(For	Sync mode of No sync or External sync)	1						
"SCM	S,[]" + Delimiter code	\Rightarrow						
		•	Error-check code " + Delimiter					
(For	Sync mode of Internal)							
"SCM	S,[],[2" + Delimiter code	\Rightarrow						
			Error-check code " + Delimiter					
Con	nmand Parameters	1						
	Meaning	Details/r	ange					
1	Sync mode	0: No sy 1: Interr 2: Exter						
2	Synchronization frequency for Sync mode: 1 (Internal sync)	2000 to 20000: Synchronization frequency for internal sync. 5-digit value of 100x actual value (Actual range: 20.00 to 200.00Hz) If value is not 5 digits, value should be preceded by a space (20h) to make it 5 digits.						
Res	ponse Parameters							
	Meaning	Details/r	ange					
Ехр	lanation							
To obtain stable measurements of periodic light sources, it is necessary to set the integration time according to the periodic frequency of the light source. When Sync mode is set to 1 (Internal sync), the integration time is set according to the synchronization frequency that is input as the second parameter. When Sync mode is set to 2 (External sync), the integration time is set according to the synchronization signal input via the external sync terminal.								
Erro	Error-check codes							
Code Meaning								
OK (Command was processed normally							
ER(Invalid command string or number	of paramet	ers received.					
ER:	Sync mode set to a value outside o	Parameter error Sync mode set to a value outside of the range 0 to 2 (inclusive) Synchronization frequency was set to a value outside the setting range.						

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SCN	SCMR (<u>S</u> yn <u>c</u> <u>M</u> ode <u>R</u> ead)						
Fun	Function						
R	eads	sync (synchronization) mode of the ir	nstrume	ent.			
Inpu	Input/Output Format						
		PC		CS-2000			
(For S	Sync	mode of No sync or External sync)	-				
"SCM	ÍR" +	Delimiter code	\Rightarrow				
				" Error-check code ,1" + Delimiter code			
(For S	Sync	mode of Internal)					
"SCM	IR" +	Delimiter code	\Rightarrow				
			" Error-check code ,[1,2" + Delimiter code				
Con	nma	nd Parameters					
	Mea	aning	Details/range				
Res	pon	se Parameters					
	Mea	aning	Deta	ils/range			
1	Syn	c mode	1: In	o sync ternal sync xternal sync			
2	Synchronization frequency for Sync mode: 1 (Internal sync)		2000 to 20000: Synchronization frequency for internal sync. 5-digit value of 100× actual value (Actual range: 20.00 to 200.00Hz) If value is not 5 digits, value will be preceded by a space (20h) to make it 5 digits.				
Ехр	lana	tion					
When Sync mode is set to 1 (Internal sync), the synchronization frequency will also be output as th second parameter.							
Error-check codes							
Cod	de	Meaning					
OK	00	Command was processed normally					
ER(00	Invalid command string or number of	of para	meters received.			
ER30 Flash memory error							

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BAL	BALS (<u>Ba</u> ck <u>l</u> ight Control <u>S</u> et)						
Fun	Function						
S	Sets control of external display backlight during measurement.						
Input/Output Format							
	PC	CS-2000					
"BAI	LS,[1,[2]" + Delimiter code	⇒					
		⟨□ `` Error-check code " + Delimiter					
		code					
Con	nmand Parameters						
	Meaning	Details/range					
1	External display backlight normally on/off	0: Off 1: On					
2	External display backlight on/off during measurement	0: Off 1: On					
Response Parameters							
	Meaning	Details/range					
Fyn	lanation						

Explanation

Controls whether the backlight for the external display (LCD) on the rear of the instrument is on or off normally and during measurement.

Parameter [1] controls whether the backlight is normally on or off. When set to off, the backlight will be lit only when the menu is being used; when measurement values are shown or during measurement, the backlight will be off. When using multiple instruments, this allows the backlight to be switched off so that it does not affect the measurements being taken by other instruments. Parameter [2] controls whether the backlight is on or off during measurement. This allows the backlight to be switched off only while a measurement is being taken. But since if the backlight is switched off it is difficult to determine when measurement has been completed, the backlight can be set to on.

Error-ch	Error-check codes						
Code	Meaning						
OK 0 0	Command was processed normally						
ER00	Invalid command string or number of parameters received.						
ER17	Parameter error (Parameter set to a value outside the setting range of 0 or 1.)						

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BALI	BALR (<u>Ba</u> ck <u>lig</u> ht Control <u>R</u> ead)						
Func	Function						
Re	Reads the setting for control of external display backlight during measurement.						
Input	t/Oı	utput Format					
		PC		CS-2000			
"BALF	R" +	Delimiter code	⇒	,			
				" Error-check code ,[1, 2 " + Delimiter code			
Com	maı	nd Parameters	-				
	Mea	aning	Deta	ails/range			
Resp	ons	se Parameters	<u> </u>				
	Mea	aning	Deta	ails/range			
1	Exte	ernal display backlight normally off	0: C				
2		ernal display backlight on/off during asurement	0: C 1: C				
Expla	ana	tion					
ins	Reads the setting for control of whether the backlight for the external display (LCD) on the rear of the instrument is on or off normally and during measurement. For further information, please see the BALS command.						
Erro	Error-check codes						
Cod	le	Meaning					
OK0	OK00 Command was processed normally						
ER0	Invalid command string or number of parameters received.						

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CSN	CSMS (<u>C</u> olor <u>S</u> pace <u>M</u> ode <u>S</u> et)							
Fun	Function							
S	Sets the color space to be displayed on the instrument's LCD.							
Inpu	ıt/Output Format							
	PC	CS-2000						
"CSM	S,[]" + [Delimiter code]	↔						
		⟨□ " Error-check code " + Delimiter code Cod						
Con	nmand Parameters							
	Meaning	Details/range						
囯	Color space mode	0: Lv, x, y 1: Lv, u', v' 2: Lv, T, Δuv 3: X, Y, Z 4: λd, Pe 5: Spectral graph						
Res	ponse Parameters							
	Meaning	Details/range						
Ехр	lanation							
S	ets the color space to be displayed on the	LCD at the rear of the instrument.						
Erro	Error-check codes							
Cod	Code Meaning							
OK00 Command was processed normally								
ER(Invalid command string or number of	of parameters received.						
ER1	Parameter error Color space mode set to a value outside of the range 0 to 5 (inclusive)							

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CSN	CSMR (<u>C</u> olor <u>S</u> pace <u>M</u> ode <u>R</u> ead)						
Fun	Function						
R	eads the color space to be displayed on t	he instrument's LCD.					
Inpu	ut/Output Format						
	PC CS-2000						
"CSM	IR" + <i>Delimiter code</i>	⇒					
	← " Error-check code ,[1" + Delimiter code						
Con	nmand Parameters						
	Meaning	Details/range					
Res	ponse Parameters						
	Meaning	Details/range					
1	Color space mode 0: Lv, x, y 1: Lv, u', v' 2: Lv, T, Δuv 3: X, Y, Z 4: λd, Pe 5: Spectral graph						
Exp	lanation						
R	Reads the color space to be displayed on the LCD at the rear of the instrument.						
Erro	r-check codes						
Co	de Meaning						
OK	Command was processed normall	y					
ER00 Invalid command string or number of parameters received.							

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DIM	DIMS (<u>Di</u> splay <u>M</u> ode <u>S</u> et)					
Fun	Function					
S	ets th	e display mode (absolute or difference	e) for t	the instrument's LCD.		
Inpι	ıt/Oı	ıtput Format				
		PC		CS-2000		
"DIM	IS , 1 "	+ Delimiter code	\Rightarrow			
	□ " Error-check code " + Delimiter code]					
Con	nmai	nd Parameters				
	Mea	aning	Deta	ils/range		
1	Disp	olay mode		bsolute data display ifference data display		
Res	pons	se Parameters				
	Mea	aning	Details/range			
Ехр	lana	tion				
		e display mode (absolute or difference is stored in flash ROM, so it is mainta				
Erro	Error-check codes					
Co	de Meaning					
OK (00	Command was processed normally				
ER(00	Invalid command string or number of parameters received.				
ER.	17	Parameter error Display mode set to a value other than 0 or 1.				

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DIM	DIMR (<u>Di</u> splay <u>M</u> ode <u>R</u> ead)							
Fun	Function							
R	eads	the display mode (absolute or differen	ice) foi	r the instrument's LCD.				
Inpu	ıt/Oı	utput Format						
		PC		CS-2000				
"DIM	R" +	Delimiter code	⇒					
			4	" Error-check code ,1"				
				+ Delimiter code				
Con	ımaı	nd Parameters						
	Mea	aning	Details/range					
Res	pons	se Parameters						
	Mea	aning	Detai	ils/range				
1	Disp	olay mode	0: A b	osolute data display				
			1: Difference data display					
Exp	lana	tion						
R	Reads the display mode (absolute or difference) for the LCD at the rear of the instrument.							
Erro	ror-check codes							
Cod	de	Meaning						
OK(00	Command was processed normally						
ER(00	ER00 Invalid command string or number of		meters received.				

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OBS	SS (<u>C</u>	<u>Obs</u> erver <u>S</u> et)				
Fun	Function					
S	ets th	e observer mode.				
Inpu	ıt/Oı	utput Format				
		PC		CS-2000		
"OBS	S,1″	' + Delimiter code	\Rightarrow			
			₽	" Error-check code " + Delimiter code		
Con	nmai	nd Parameters				
	Mea	aning	Detai	ils/range		
1	Obs	server	0: 2° 1: 10			
Res	pons	se Parameters				
	Mea	aning	Detai	ils/range		
Ехр	lana	tion				
		e CIE observer mode for colorimetric c is stored in flash ROM, so it is maintai				
Erro	Error-check codes					
Co	de	e Meaning				
OK(00	Command was processed normally				
ER	00	Invalid command string or number of parameters received.				
ER	17	Parameter error Observer mode set to a value other than 0 or 1.				

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OBS	OBSR (<u>Obs</u> erver <u>R</u> ead)							
Fun	Function							
R	Reads the observer mode.							
Inpu	ut/Oı	utput Format						
		PC		CS-2000				
"OBS	SR" +	Delimiter code		⇒				
			<	<pre> □ " Error-check code ,1" + Delimiter code </pre>				
Con	nma	nd Parameters						
	Mea	aning	De	etails/range				
Res	pon	se Parameters	•					
	Mea	aning	De	etails/range				
1	Obs	server	0: 1:	2° 10°				
Exp	lana	ition	<u>.</u>					
R	Reads the CIE observer mode for colorimetric calculations. Setting is stored in flash ROM.							
Erro	or-ch	neck codes						
Code Meaning								
OK	OK00 Command was processed normally							
ER	ER00 Invalid command string or number of parameters received.			rameters received.				

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STD	STDS (<u>St</u> ore <u>D</u> ata <u>S</u> et)					
Fun	Function					
S	tores	current measurement data to memory	/ numb	er.		
Inpu	ıt/Οι	ıtput Format				
		PC		CS-2000		
"STE	S,1"	' + Delimiter code	⇒			
			(" Error-check code " + Delimiter code		
Con	nmaı	nd Parameters				
	Mea	aning	Detail	s/range		
1	Mer	mory number to store data in	00 to	99		
Res	pon	se Parameters				
	Mea	aning	Detail	s/range		
Exp	lana	tion				
		the just-measured data to the specific already exists in that memory number				
Erro	Error-check codes					
Co	de	Meaning				
OK	Command was processed normally					
ER	00	Invalid command string or number of parameters received.				
ER.	17	Parameter error Memory number set to a value outside the range of 00 to 99.				
ER	20	No data No measurement data available for copying to memory number.				

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	OR (<u>St</u> ored Measurement <u>D</u> ata <u>R</u>	cady			
Fun	Function				
R	leads stored measurement data from inst	rument.			
Inpı	ut/Output Format				
	PC	CS-2000			
(For	normal measurement)				
"MET	DR,[1,[2],[3],[4" + Delimiter code] ⇒			
MET	Detimited code	! →			
		⟨□ " Error-check code ,1"			
		+ Delimiter code			
_					
Con	nmand Parameters	10.00			
E21	Meaning	Details/range			
1	Memory number to read data from	00 to 99			
2	Data mode	0: Measurement conditions			
		Spectral data Colorimetric data			
[a]	Data format				
3	Data format	O: Alphanumeric Hexadecimal (IEEE floating point format: 4-byte)			
		big-endian hexadecimal string)			
4	Data block number	Stored data block number to be read.			
		For appared data:			
		For spectral data: 01: 100 pieces of data from 380 to 479nm			
		02: 100 pieces of data from 480 to 579nm			
		03: 100 pieces of data from 580 to 679nm			
		04: 101 pieces of data from 680 to 780nm			
		For colorimetric data:			
		00: All colorimetric data			
		01: X,Y,Z			
		02: x, y, Lv			
		03: u',v',Lv			
		04: Τ, Δuv, Lv			
		05: λd, Pe,Lv 11: X10,Y10,Z10			
		12: x10, y10, Lv10			
		13: u'10,v'10,Lv10			
		14: T10, Δυν10, Lv10			
		15: λd10, Pe10,Lv10			
		100: Le			
D : :	name Paramatana	101: Lv			
ĸes	ponse Parameters Meaning	Details/range			
1	Output data	When Data mode=0 (Measurement conditions):			
凹		Speed mode:			
		0: Normal			
		1: Fast			
		2: Multi			
		3: Manual			
		Sync mode: 0: No sync			
	T. Control of the Con	1 0.110 0,110			
		1: Internal sync			

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S-character text value in units of µsec							
Internal ND filter:				Integration time:	o in unito of wasa		
Close-up lens: O: Off					e in units of µsec		
Close-up lems: 0: None 1: Attached External ND filter: 0: None 1: Attached Measurement angle: 0: 1° 2: 0.1° 2: 0.1° User calibration channel: 00 (No user calibration) to 10 When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T'10, Δuv10, λd10, Pe10 01: X, Y, Z 02: x, y, Lv 03: u', v', Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Z10 12: X10, Y10, Lv10 13: u'10, v10, Lv10 13: u'10, v10, Lv10 10: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0x00 Command was processed normally ER00 Invalid command string or number of parameters received.					1 · On		
Discrete Section Common Common					1. 011		
O: None					1: Attached		
Measurement angle: 0: 1° 1: 0.2° 2: 0.1° User calibration channel: 00 (No user calibration) to 10 When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10, Y10, Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 13: u'10,v'10,Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received.							
0.1° 1: 0.2° 2: 0.1° User calibration channel: 00 (No user calibration) to 10 When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u', V, Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Z10 12: X10, Y10, Lv10 13: u'10, v'10, Lv10 13: u'10, v'10, Lv10 15: λd10, Pe10, Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning Me					1: Attached		
0.1° 1: 0.2° 2: 0.1° User calibration channel: 00 (No user calibration) to 10 When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u', V, Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Z10 12: X10, Y10, Lv10 13: u'10, v'10, Lv10 13: u'10, v'10, Lv10 15: λd10, Pe10, Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning Me				Measurement angle:			
User calibration channel: 00 (No user calibration) to 10 When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, ∆uv, \lambda, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, \lambda u'10, \lambda e10 01: X,Y,Z 02: X, y, Lv 03: u', v', Lv 04: T, \lambda u, V, U 05: \lambda d, Pe, Lv 11: X10, Y10, Lv10 13: u'10, v'10, Lv10 13: u'10, v'10, Lv10 14: T10, \lambda uv10, Lv10 15: \lambda d10, Pe10, Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-theck codes Code Meanling Invalid command string or number of parameters received. ER17 Parameter error					1: 0.2°		
When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 100 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: Oi: All colorimetric data are output as follows: Oi: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 Oi: X, Y, Z Oi: X, y, Lv Oi: λd, Pe, L				2: 0.1°			
When Data mode=1 (Spectral data): Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u', v', Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Lv10 12: X10, Y10, Lv10 13: u'10, v'10, Lv10 10:: Lv Loy Lata are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received.				User calibration channel:			
Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces)				00 (No user calibration	on) to 10		
Data are output in blocks of 100 pieces (except for block 4, which is a block of 101 pieces)			· -	When Data mode=1 (Spec	tral data):		
block 4, which is a block of 101 pieces) Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII odde), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, X10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X, Y, Z 02: x, y, Lv 03: u', v', Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Lv10 13: u'10, v'10, Lv10 13: u'10, v'10, Lv10 10:: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER17 Parameter error							
floating data converted to ASCII code), separated by commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order:							
commas. When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u', v', Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Z10 12: x10, y10, Lv10 13: u'10, v'10, Lv10 13: u'10, v'10, Lv10 15: λd10, Pe10, Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received.							
When Data mode=2 (Colorimetric data): For each data block number, data are output as follows: 00: All colorimetric data are output in the following order:				floating data converted to A	ASCII code), separated by		
For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: X, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Lv10 12: X10, Y10, Lv10 13: u'10, V'10, Lv10 10: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received.				commas.			
For each data block number, data are output as follows: 00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, X, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: X, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe, Lv 11: X10, Y10, Lv10 12: X10, Y10, Lv10 13: u'10, V'10, Lv10 10: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received.			[-	When Data mode=2 (Color	imetric data):		
00: All colorimetric data are output in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10, Y10, Lv10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation							
order: Le, Lv, X, Y, Z, x, y, u', v', T, ∆uv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, V'10, T10, ∆uv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, ∆uv, Lv 05: λd, Pe,Lv 11: X10, Y10, Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, ∆uv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10, Y10, Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0Κ00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error					e output in the following		
Y10, Z10, x10, y10, u'10, V'10, T10, ∆uv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, ∆uv, Lv 05: λd, Pe,Lv 11: X10, Y10, Lv10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, ∆uv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning ©K00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: Τ, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: X10, Y10, Lv10 13: u'10,v'10,Lv10 14: Τ10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning 0K00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error					0, v'10, T10, Δuv10, λd10,		
02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10, Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning M							
03: u',v',Lv 04: T, ∆uv, Lv 05: λd, Pe,Lv 11: X10,Y10, Lv10 12: x10, Y10, Lv10 13: u'10,v'10, Lv10 14: T10, ∆uv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited.							
04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited.							
05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited.							
11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
14: T10, Δυν10, Lν10 15: λd10, Pe10,Lν10 100: Le 101: Lν Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning Meaning Command was processed normally							
Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. Explanation Reads data stored in memory from the instrument. Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error							
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Data are output as comma-delimited. Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error	Expl	ana	tion				
Error-check codes Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error				nent.			
Code Meaning OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error			•				
OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error	Erro	r-ch	eck codes				
OK00 Command was processed normally ER00 Invalid command string or number of parameters received. ER17 Parameter error	Cod	le	Meaning				
ER17 Parameter error	OK0	0					
ER17 Parameter error	ER0	0	Invalid command string or number of	parameters received.			
Input parameter is outside setting range.	ER1	7					
ER20 No data	ED 2	0		<u> </u>			
No data No data are stored in the specified memory channel.	ERZ	J		emory channel.			

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STD	D (<u>S</u>	<u>St</u> ore <u>D</u> ata <u>D</u> elete)		
Fun	Function			
D	eletes	s data stored in the specified memory	numb	per.
Inpu	ıt/Oı	ıtput Format		
		PC		CS-2000
"STD	D,[1]"	+ Delimiter code	⇒	
			(" Error-check code " + Delimiter
Con	nmai	nd Parameters		
	Mea	aning	Deta	ails/range
1	Men	mory number to delete data from 00 to 99		
Res	pons	se Parameters	•	
	Mea	aning	Deta	ails/range
Ехр	lana	tion		
D	eletes	s data from the specified memory num	nber.	
Erro	r-ch	eck codes		
Cod	de	Meaning		
OK(0.0	Command was processed normally		
ER	ER00 Invalid command string or number of parameters received.		meters received.	
ER1	17	Parameter error Memory number set to a value outsi	de the	e range of 00 to 99.
ER2	20	No data No measurement data in the selecte	ed me	mory number.

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STAD (S	STAD (<u>St</u> ore <u>A</u> II Data <u>D</u> elete)				
Function	n				
Delete	s data stored in all memory numbers.				
Input/O	utput Format				
	PC		CS-2000		
"STAD" +	- Delimiter code	⇒			
		\(\rightarrow	" Error-check code " + Delimiter code		
Comma	nd Parameters				
Mea	aning	Detai	ls/range		
Respon	se Parameters	•			
Mea	aning	Detai	ls/range		
Explana	tion	•			
Delete	s data from all memory numbers.				
Error-ch	neck codes				
Code	Meaning				
OK00	Command was processed normally				
ER00	Invalid command string or number of	of parar	neters received.		

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TGS	L (<u>T</u>	arget Number <u>S</u> e <u>l</u> ect)		
Fun	ctior	n		
S	elects	s the target number.		
Inpu	ıt/Oı	utput Format		
		PC		CS-2000
"TGS	L,1"	+ Delimiter code	\Rightarrow	
			\Leftrightarrow	" Error-check code " + Delimiter code
Con	nmai	nd Parameters		
	Mea	aning	Detai	ils/range
1	Taro	get number	01 tc	0 20
Res	pons	se Parameters		
	Mea	aning	Detai	ils/range
Ехр	lana	tion		
	Selects the target number to use for displaying color difference when taking measurements with the instrument alone (not connected to computer).			
Erro	Error-check codes			
Cod	de	Meaning		
OK(0.0	Command was processed normally		
ER(0.0	Invalid command string or number of	parar	meters received.
ER1	Parameter error Target number set to a value outside the range of 01 to 20.			

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TGSR	TGSR (<u>Targ</u> et Number <u>Selection Read)</u>				
Funct	tion				
Rea	ads the currently selected target number.	T-			
Input	/Output Format				
	PC	CS-2000			
"TGSR	" + Delimiter code	⇒			
		<pre>⟨□ " Error-check code ,1" + Delimiter code </pre>			
Comr	mand Parameters				
I	Meaning	Details/range			
Resp	onse Parameters				
ı	Meaning	Details/range			
1	Target number	00 to 20 00 indicates no target number is selected.			
Expla	nation				
mea	Reads the currently selected target number to use for displaying color difference when taking measurements with the instrument alone (not connected to computer). If 00 is returned, no target number is currently selected.				
Error	-check codes				
Code	e Meaning				
OK00	Command was processed normally				
ER00	Invalid command string or number of	of parameters received.			

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TGD	S (<u>T</u> arget <u>D</u> ata <u>S</u> et)	
	ction	
S	ets target data in instrument.	
Inpu	ıt/Output Format	
	PC	CS-2000
(For v	writing target data)	
"TGD	S,1,2,3,4,5" + Delimiter	⇒
code		·
		□ " Error-check code " + Delimiter code]
Data	writing target ID name: format=0, Data mode =3)	
"TGD	S,[],[2,[3,[5]" + Delimiter code	
Con	nmand Parameters	
	Meaning	Details/range
1	Data format	Alphanumeric Hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string)
2	Data mode	Spectral data Colorimetric data Target ID name
3	Target number	01 to 20
4	Data block number	Data block number to set.
		For spectral data: 000 to 400: 380nm to 780nm
		For colorimetric data: 00: All colorimetric data 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv
5	Target data	When Data mode=0 (Spectral data): 8-byte ASCII data (4-byte floating data converted to ASCII code).

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ER00

ER17

Parameter error

ī	ı		,		
			When Data mode=1 (Colorimetric data): For each data block number, data should be input as follows: 00: All colorimetric data should be input in the following order: Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10, Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10, Pe10 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Data are 8-byte ASCII data (4-byte floating data converted to ASCII code); comma-delimited. For parameters other than 00, data are output in the order of the variables stated above. When Data mode=3 (Target ID name):		
l			Alphanumeric string; Maximum length: 10 characters		
Res	pon	se Parameters			
	Mea	aning	Details/range		
Ехр	lana	tion			
Ei W If	Sets target data from PC to instrument. Either spectral or colorimetric data can be set. When spectral data is set, the colorimetric data are calculated and stored. If there are no spectral data, only the colorimetric data can be stored. If only part of spectral data are input, the data are not stored in the flash ROM.				
Erro	or-ch	neck codes			
Cod	de	Meaning			
OK	00	Command was processed normally			
		'			

Invalid command string or number of parameters received.

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TGE	DR (<u>T</u> ar <u>g</u> et <u>D</u> ata <u>R</u> ead)			
	ction			
R	leads target data in instrument.			
Inpu	ut/Output Format			
	PC	CS-2000		
(For	reading target data)			
"TGI	os,[1,2,3,4" + Delimiter code	⇒		
		⟨□ " Error-check code , 1"		
		+ Delimiter code		
-	reading target ID name: format=0, Data mode =3)			
"TGI	DS,[1],[2" + Delimiter code	⇔		
		<pre></pre>		
Con	nmand Parameters			
	Meaning	Details/range		
1	Target number	01 to 20		
2	Data mode	0: Measurement conditions1: Spectral data2: Colorimetric data3: Target ID name		
3	Data format	Alphanumeric Hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string)		
4	Data block number	Stored data block number to be read.		
		For spectral data: 01: 100 pieces of data from 380 to 479nm 02: 100 pieces of data from 480 to 579nm 03: 100 pieces of data from 580 to 679nm 04: 101 pieces of data from 680 to 780nm		
	For colorimetric data: 00: All colorimetric data 01: X,Y,Z 02: x, y, Lv 03: u',v',Lv 04: T, Δuv, Lv 05: λd, Pe,Lv 11: X10,Y10,Z10 12: x10, y10, Lv10 13: u'10,v'10,Lv10 14: T10, Δuv10, Lv10 15: λd10, Pe10,Lv10 100: Le 101: Lv Response Parameters			

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Meaning	Details/range
	When Data mode=0 (Measurement conditions):
	Speed mode:
	0: Normal
	1: Fast
	2: Multi
	3: Manual
	Sync mode:
	0: No sync
	1: Internal sync
	2: External sync
	Integration time:
	9-character text value in units of µsec
	Internal ND filter:
	0: Off 1: On
	Close-up lens:
	0: None 1: Attached
	External ND filter: 0: None 1: Attached
	When Data mode=1 (Spectral data):
	Data are output in blocks of 100 pieces (except for
	block 4, which is a block of 101 pieces)
	Each piece of data is 8-byte ASCII data (4-byte floating data converted to ASCII code), separated by
	commas.
	When Data mode=1 (Colorimetric data):
	For each data block number, data are output as follows:
	00: All colorimetric data are output in the following
	order:
	Le, Lv, X, Y, Z, x, y, u', v', T, Δuv, λd, Pe, X10,
	Y10, Z10, x10, y10, u'10, v'10, T10, Δuv10, λd10,
	Pe10
	01: X,Y,Z
	02: x, y, Lv
	03: u',v',Lv
	04: T, Δuv, Lv
	05: λ d , Pe,Lv
	11: X10,Y10,Z10
	12: x10, y10, Lv10
	13: u'10,v'10,Lv10
	14: T10, Δuv10, Lv10
	15: λd10, Pe10,Lv10
	100: Le
	101: Lv
	Data are 8-byte ASCII data (4-byte floating data
	converted to ASCII code); comma-delimited.
	For parameters other than 00, data are output in the
	order of the variables stated above.
	When Data mode=3 (Target ID name):
	Alphanumeric string; Maximum length: 10 characters
Explanation	

Reads target data from PC to instrument.

Either spectral or colorimetric data can be set.

When spectral data is set, the colorimetric data are calculated and stored.

If there are no spectral data, only the colorimetric data can be stored. If only part of spectral data are input, the data are not stored in the flash ROM.

Error-ch	Error-check codes		
Code	Meaning		
OKUU	Command was processed normally		

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ER00	Invalid command string or number of parameters received.
ER17	Parameter error A parameter was set outside the setting range.
ER20	No data No data in the selected target number.

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TGDD (<u>T</u> arget <u>D</u> ata <u>D</u> elete)				
Function				
Deletes data for the specified target number.				
Input/Output Format				
PC			CS-2000	
"TGDD,[]" + Delimiter code				>
			¢	□ "Error-check code " + Delimiter code
Command Parameters				
	Mea	eaning		tails/range
1	Targ	rget number to delete		to 20
Response Parameters				
	Meaning		Details/range	
Explanation				
Deletes data for the specified target number.				
Error-check codes				
Code		Meaning		
OK00		Command was processed normally		
ER00 Invalid command string or number of parameters received		ameters received.		
ER1	Parameter error Memory number set to a value outside the range of 01 to 20.		ne range of 01 to 20.	
ER2	ER20 No data No data in the selected target number.			

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TGAD (<u>Target All Data Delete</u>)				
Function	Function			
Deletes	s data stored in all target numbers.			
Input/Ou	ıtput Format			
	PC		CS-2000	
"TGAD" +	Delimiter code	\Rightarrow		
		\Leftrightarrow	" Error-check code " + Delimiter	
			code	
Comma	nd Parameters			
Mea	aning	Detail	s/range	
Respons	se Parameters			
Mea	aning	Detail	s/range	
Explana	tion			
Deletes	s data from all target numbers.			
Error-ch	Error-check codes			
Code	Meaning			
OK00	Command was processed normally			
ER00	Invalid command string or number of	paran	neters received.	

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IDDI	IDDR (<u>Id</u> entification <u>D</u> ata <u>R</u> ead)			
Fun	Function			
R	eads	the product identification information	n from the i	nstrument's flash ROM.
Inpu	ut/Ou	ıtput Format	_	
		PC		CS-2000
"IDD	DR" +	Delimiter code	\Rightarrow	
			⇔	Error-check code ,[1,2,3" Delimiter code
Con	nmaı	nd Parameters		
	Mea	aning	Details/	range
Res	pons	se Parameters	•	
	Mea	aning	Details/	range
1	Prod	duct name	differen	value t "CS-2000" for mass-production units. May be t for custom units. is less than 9 bytes, space (20h) will be
2	Vari	ation code		Used to differentiate models than 0 to 9, "*" will be output.
3	Serial number		7-digit i If serial	nteger number is not an integer or exceeds 99", "******" will be output.
Ехр	lana	tion		
	Reads the product identification information (product name, variation, serial number) from the instrument's flash ROM.			
Erro	or-ch	eck codes		-
Cod	de	Meaning		
OK(00	Command was processed norma	ly	
ER(ER00 Invalid command string or number of parameters received.			

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STS	STSR (Aperture <u>St</u> op <u>S</u> tatus <u>R</u> ead)			
Fun	Function			
R	eads	the status of the instrument's aperture	e stop.	
Inpu	ıt/Oı	ıtput Format		
		PC		CS-2000
"STS	SR" +	Delimiter code	⇒	
			\	" Error-check code ,1" + Delimiter code
Con	nmai	nd Parameters		
	Mea	aning	Detai	ls/range
Res	pons	se Parameters		
	Mea	aning	Detai	ls/range
1		asurement angle (aperture stop	0: 1.0	
	posi	ition)	1: 0.2 2: 0.1	
F.,,,,,	I	4:	∠. ∪.	
	lana			
		·	e stop,	which determines the measurement angle.
Erro	Error-check codes			
Cod	Code Meaning			
OK	00	Command was processed normally		
ER	00	Invalid command string or number of	of paran	neters received.
ER8	83	Measurement angle abnormality		

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RM	RMTS (Remote Mode Select)			
	Function			
S	elects	s the remote mode setting.		
Inpu	ut/Ou	utput Format		
		PC		CS-2000
"RMT	'S,[1]	" + Delimiter code		>
			<	□ "Error-check code" + Delimiter code
Con	nma	nd Parameters		
	Mea	aning	De	tails/range
1	Ren	mote mode setting		Off (Key mode: commands other than RMTS are not accepted.) On (Communication commands will be accepted.)
Res	pon	se Parameters	<u> </u>	
	Mea	aning	De	tails/range
Ехр	lana	ition		
Sets the remote mode setting. When remote mode is off (0), the unit is in key mode and will not accept any commands other than RMTS. When remote mode is on (1), the unit will accept communication commands, and key operations are disabled (with the exception of the measuring button, which can be enabled using the command MSWE).				
Error-check codes				
Co	de	Meaning		
OK	00	Command was processed normally		
ER(00	Invalid command string or number	r of par	rameters received.

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MS	MSWE (<u>M</u> easuring <u>Sw</u> itch <u>E</u> nable)				
Fun	ection				
Е	nables/disables the measuring button.				
Inpu	ut/Output Format				
	PC		CS-2000		
"MSV	NE,1" + Delimiter code		>		
		¢	" Error-check code" + Delimiter		
Con	nmand Parameters				
	Meaning	Det	ails/range		
1	Measuring button status	_	Disabled Enabled		
Res	Response Parameters				
	Meaning	Det	ails/range		
Evn	lanation	•			

Explanation

Enables/disables the measuring button.

When the measuring button is enabled, measurements can be started by pressing the measuring button, and the measurement results can be read using the command <u>MEDR</u>). When data has been read using MEDR, the data is cleared from the instrument's buffer.

Normal program flow when the measuring button is enabled would be to repeatedly attempt to read data using MEDR: While data is not present, "ER20" (No data) would be output by the instrument; When a measurement is taken by pressing the measuring button and data preparations have been completed, the measurement data will be output by the instrument and then cleared from the instrument's buffer.

Error-ch	Error-check codes		
Code Meaning			
OK 0 0	Command was processed normally		
ER00 Invalid command string or number of parameters received.			

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DTC	DTCR (<u>D</u> ate/ <u>T</u> ime of <u>C</u> alibration <u>R</u> ead)			
Fun	Function			
R	Reads	the date and time of factory calibrat	tion.	
Inpu	ut/Ou	utput Format		
		PC	CS-2000	
"DTC	CR" +	Delimiter code	☆	
			☆ "Error-check code , 1, 2"	
			+ Delimiter code	
Con	nma	nd Parameters		
	Mea	aning	Details/range	
Res	pon	se Parameters		
	Mea	aning	Details/range	
1	Date	e of factory calibration	8 characters indicating year (4 characters), month (2 characters), and day (2 characters) For example, "20070201" means February 1, 2007.	
<u> </u>	Tim	e of factory calibration	6 characters indicating hour (2 characters; 24-hour clock), minute (2 characters), and second (2 characters). For example, "235607" indicates 23:56:07 (11:56:07 PM)	
Exp	lana	tion		
R	Reads the date and time of factory calibration.			
Erro	or-ch	eck codes		
Co	de	Meaning		
OK	00	Command was processed normall	ly	
ER00 Invalid command string or number of parameters received.		r of parameters received.		

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UCC	UCCS (<u>U</u> ser <u>C</u> alibration <u>C</u> hannel <u>S</u> elect)			
Fun	Function			
S	elects	s the user calibration channel to use.		
Inpu	ıt/Oı	utput Format		
		PC	CS-2000	
"UCC	s,[1	' + Delimiter code	↔	
			⟨□ "Error-check code" + Delimiter code	
Con	nma	nd Parameters		
		aning	Details/range	
1	Use	er calibration channel	00 to 1000: No user calibration01 to 10: User calibration channel to use	
Res	pon	se Parameters		
	Mea	aning	Details/range	
Ехр	Explanation			
		e user calibration channel to use whe rement data are determined based on	n determining measurement data. When set to 00, factory calibration.	
Erro	r-ch	eck codes		
Cod	Code Meaning			
OK	OK00 Command was processed normally			
ER	ER00 Invalid command string or number of parameters received.		f parameters received.	
ER(ER05 No user calibration values			
ERI	Parameter error Input user calibration channel is outside the setting range of 00 to 10.		side the setting range of 00 to 10.	
ERS	ER99 Program abnormality Error writing to flash ROM			

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UCC	CR (<u>U</u> ser <u>C</u> alibration <u>C</u> hannel <u>R</u> o	ead)	
Fun	ction		
R	eads the number of the currently selected	d user c	alibration channel.
Inpu	ıt/Output Format		
	PC		CS-2000
"UCC	R" + Delimiter code	⇒	
			" Error-check code,]" + Delimiter code
Con	nmand Parameters		
	Meaning	Deta	ails/range
Res	ponse Parameters	•	
	Meaning	Deta	ails/range
1	User calibration channel	00:	0 10 No user calibration 0 10: Currently selected user calibration channel
Exp	lanation	-	
Reads the currently selected user calibration channel. 00 indicates no user calibration channel is selected			
Error-check codes			
Cod	de Meaning		
OKO	Command was processed normal	у	
ERO	No user calibration values		

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UCF	UCPS (<u>U</u> ser <u>C</u> alibration <u>P</u> arameter <u>S</u> et)			
Fun	Function			
S	Sets user calibration parameters.			
Inpu	ut/Output Format			
	PC	CS-2000		
Settir	ng user calibration parameters is a three-st	ep process:		
Step	1: Send user calibration coefficients (Repe	at for each wavelength.)		
"UCF	PS,[1,[2,[3],[4" + Delimiter code	\Rightarrow		
Step	2: Send user calibration ID name			
"UCF	PS,2,2,5" + Delimiter code	\Rightarrow		
Step	3: Finalize data and write to flash ROM			
"UCF	PS,3" + Delimiter code	⇨		
		⟨□ " Error-check code " + Delimiter code cod		
Con	nmand Parameters			
	Meaning	Details/range		
1	User calibration type	Wavelength correction Level compensation		
2	User calibration channel	01 to 10		
3	Wavelength number	000 to 400 (380nm to 780nm) Wavelength for which calibration data will be written.		
4	Calibration data	Calibration data for the specified wavelength.		
		For wavelength correction, the corrected wavelength should be input. Range: Nominal wavelength ±2nm; i. e., the correction wavelength should be such that *(Corrected wavelength) - (Wavelength number + 380)) ≤2		
		For level compensation, the compensation factor should be input as absolute value, not percentage. (For example, 10% should be written as 0.1f) Range: 0.001 to 1000		
		Data should be written in hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string) format.		
5	Calibration channel ID name	Alphanumeric string Length: 10 characters (if name is less than 10 characters, add spaces to achieve 10 characters)		
Res	ponse Parameters			
	Meaning	Details/range		
Exp	lanation			
	Sets user calibration data. For wavelength correction, Lagrange interp	olation is used to convert the data from 380nm to 780nm		

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based on the specified wavelength shift. For level compensation, the measured data are multiplied by the compensation factor to obtain the final measurement results.			
Error-ch	Error-check codes		
Code	Meaning		
OK00	Command was processed normally		
ER00	Invalid command string or number of parameters received.		
ER17 Parameter error Parameter set to value outside setting range			
ER30	Flash memory error		

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UCF	UCPR (<u>U</u> ser <u>C</u> alibration <u>P</u> arameter <u>R</u> ead)			
Fun	Function			
R	eads user calibration parameters for the sp	pecified user calibration channel.		
Inpu	ıt/Output Format			
	PC	CS-2000		
(To re	ead user calibration coefficients)	·		
"UCP	R,[1,[2,]3" + Delimiter code	⇨		
		<pre></pre>		
(To re	ead user calibration ID name)			
"UCP	PS,2,2" + Delimiter code	⇨		
		<pre> ⟨□ "Error-check code ,2" + Delimiter code </pre>		
Con	nmand Parameters	-		
	Meaning	Details/range		
1	User calibration type	Wavelength correction Level compensation		
2	User calibration channel	01 to 10		
3	Wavelength number	000 to 400 (380nm to 780nm) Wavelength for which calibration data will be written.		
Res	ponse Parameters			
	Meaning	Details/range		
1	Calibration data	Calibration data for the specified wavelength.		
		For wavelength correction, the corrected wavelength is output.		
		For level compensation, the compensation factor is output as absolute value, not percentage. (For example, 10% is output as 0.1f) Range: 0.001 to 1000		
		Data are output in hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string) format.		
2	Calibration channel ID name	Alphanumeric string Length: 10 characters (if name is less than 10 characters, additional spaces will be used to achieve 10 characters)		
Fxn	lanation			

Explanation

Reads user calibration data and ID name.

For wavelength correction, Lagrange interpolation is used to convert the data from 380nm to 780nm based on the specified wavelength shift.

For level compensation, the measured data are multiplied by the compensation factor to obtain the final measurement results.

Data should be written for each wavelength.

Once all data have been written and the ID name has been input, the data can be finalized and written to flash ROM according to step 3.

Error-check codes

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Code	Meaning
OK00	Command was processed normally
ER00	Invalid command string or number of parameters received.
ER17	Parameter error Parameter set to value outside setting range
ER20	No data
ER30	Flash memory error

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UCC	:D (<u>l</u>	Jser <u>C</u> alibration <u>C</u> hannel <u>D</u> ele	ete)		
Fund	ction	1			
De	eletes	s data stored in the specified user calil	oration	channel.	
Inpu	ıt/Οι	ıtput Format			
		PC		CS-2000	
"UCC	D,1"	+ Delimiter code	\Rightarrow		
	⟨□ " Error-check code " + Delimiter code cod				
Com	ımaı	nd Parameters			
	Mea	ning	Detai	ils/range	
1	Use	r calibration channel	01 to	0 10	
Res	pons	se Parameters			
	Mea	ning	Detai	ils/range	
Expl	lana	tion			
De	eletes	s data from the specified user calibration	on cha	annel.	
Erro	r-ch	eck codes			
Coc	Code Meaning				
OKO	OK00 Command was processed normally				
ERC	ER00 Invalid command string or number of parameters received.				
ER1	Parameter error Memory number set to a value outside the range of 00 to 99.				
ER3	ER30 Flash memory error				

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LNSS	(Close-up <u>Lens Status Select</u>)				
Functi	ion				
Sele	ects the status of the close-up lens.				
Input/	Output Format				
	PC		CS-2000		
"LNSS,	1" + Delimiter code	\Rightarrow			
		¢	"Error-check code" + Delimiter code		
Comm	nand Parameters				
N	Meaning (Detai	ls/range		
1 C	Close-up lens status	ose-up lens status 0: None 1: Attached			
Respo	onse Parameters				
N	Meaning	Detai	ls/range		
Explai	nation				
Sets	whether or not the close-up lens is attac	hed to	the instrument.		
Error-	Error-check codes				
Code	Code Meaning				
OK00	OK00 Command was processed normally				
ER00	ER00 Invalid command string or number of parameters received.				
ER17	Parameter error Memory number set to value other than 0 or 1.				
ER30	ER30 Flash memory error				

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LNS	LNSR (Close-up <u>Len</u> s <u>S</u> tatus <u>R</u> ead)				
Fun	ctio	1			
R	eads	the status of the close-up lens.			
Inpu	ıt/Oı	ıtput Format			
		PC		CS-2000	
"LNS	R" +	Delimiter code	⇒		
			\	"Error-check code, 1" + Delimiter code	
Con	nmai	nd Parameters			
	Mea	aning	Detai	ls/range	
Res	pon	se Parameters	•		
	Mea	aning	Detai	lls/range	
1	Clos	se-up lens status	0: No 1: At	one tached	
Ехр	lana	tion	Ë		
Sets whether or not the close-up lens is attached to the instrument.					
Error-check codes					
Code Meaning					
OK00 Command was processed normally					
ERO	0.0	Invalid command string or number of	f paran	meters received.	
ER3	ER30 Flash memory error				

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ALF	ALFS (Attachment Lens Compensation Factor Set)				
	ction	-	;		
Se	ets co	mpensation factors for attachment le	ns (closeup lens).		
Inpu	ıt/Ou	itput Format			
		PC	CS-2000		
Settin	ng con	npensation factors is a two-step proc	ess:		
Step	1: Ser	nd compensation factors (Repeat for	each wavelength)		
"ALF	s,[1],	2,3" + Delimiter code	⇔		
Step	2: Fin	alize data and write to flash ROM			
"ALF	S,3″	+ Delimiter code	\Rightarrow		
			□ "Error-check code " + Delimiter code □		
Com	nmar	nd Parameters			
	Mea	ning	Details/range		
1	Mea	surement angle	0: 1° 1: 0.2° 2: 0.1°		
2	Wav	Vavelength number 000 to 400 (380nm to 780nm) Wavelength for which compensation factor will be written.			
3	Com	npensation factor	The compensation factor (transmittance data) should be input as absolute value, not percentage. (For example, 10% should be written as 0.1f)		
			Data should be written in hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string) format.		
Res	pons	se Parameters			
	Mea	ning	Details/range		
Expl	lanat	tion			
	Sets compensation factor (transmittance data) when using close-up attachment lens. Data are not written to the flash ROM until "ALFS, 3" is sent.				
Erro	Error-check codes				
Code Meaning					
OK00 Command was processed normally					
ERC	0.0	Invalid command string or number of	of parameters received.		
ER1	L7	Parameter error Parameter set to value outside setting range			
ER3	ER30 Flash memory error				

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ALF	ALFR (Attachment Lens Compensation Factor Read)				
Fun	ctio	n			
R	eads	compensation factors for attachment	lens (c	oseup lens).	
Inpu	ut/Ou	utput Format			
		PC		CS-2000	
"ALF	'R , [1]	2" + Delimiter code	⇒		
			4	N	
			\Diamond	" Error-check code ,1"	
				+ Delimiter code	
Con	nma	nd Parameters	-		
		aning	Detai	ls/range	
1	Mea	asurement angle	0: 1°		
			1: 0.2°		
[2]	10/01	valanath number	2: 0.1		
	2 Wavelength number			000 to 400 (380nm to 780nm) Wavelength for which compensation factor will be	
	read.				
Res	pon	se Parameters			
	Mea	aning		ls/range	
1	Cor	npensation factor	hexad	compensation factor (transmittance data) will be in decimal (IEEE floating point format: 4-byte bigneral n hexadecimal string) format.	
Exp	lana	tion		3, 1	
F	Explanation Reads compensation factor (transmittance data) stored in instrument for when close-up attachment lens is used.				
Erro	Error-check codes				
Code Meaning					
OK00 Command was processed normally					
ER00 Invalid command string or number of		of paran	neters received.		
ER17 Parameter error Parameter set to value outside setting ran-		ing rang	e		
ER2	ER20 No data				

HERE

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NDF	NDFS (External ND Filter Select)				
Fun	ctio	1			
S	elects	which external ND filter (if any) is att	ached.		
Inpu	ıt/Oı	itput Format			
		PC		CS-2000	
"NDF	'S,1"	+ Delimiter code	⇒		
			\	" Error-check code" + Delimiter code	
Con	nmaı	nd Parameters			
	Mea	ning	Detail	ls/range	
1	Exte	o: None 1: ND1 attached 2: ND2 attached		D1 attached	
Res	pon	se Parameters	<u> </u>		
	Mea	ning	Detail	ls/range	
Exp	lana	tion	<u> </u>		
	Sets which (if any) external ND filter is attached to the instrument. Setting is stored in flash ROM, and is maintained even if instrument power is switched off.				
Erro	Error-check codes				
Code Meaning					
OK	00	Command was processed normally			
ER	00	Invalid command string or number of parameters received.			
ER:	17	Parameter error Memory number set to value other than 0, 1, or 2.			
ER.	ER30 Flash memory error				

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NDF	NDFR (External <u>ND Filter Read)</u>			
Fun	Function			
R	eads	which external ND filter (if any) is atta	ached.	
Inpu	ıt/Oı	itput Format		
		PC		CS-2000
"NDF	'R" +	Delimiter code	\Rightarrow	
			("Error-check code, 1" + Delimiter code
Con	nmai	nd Parameters		
	Mea	ning	Detai	ls/range
Res	pons	se Parameters		
	Mea	ning	Detai	ls/range
1	Exte	ernal ND filter	0: N c	
			1: ND1 attached 2: ND2 attached	
F		· · · · ·	∠. INL	JZ allacheu
	lana			
	Reads which (if any) external ND filter is attached to the instrument.			
Erro	Error-check codes			
Code Meaning				
OK00 Command was processed normally				
ER	ER00 Invalid command string or number of parameters received.		neters received.	
ER.	ER30 Flash memory error			

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NFC	NFCS (ND Filter Compensation Factor Set)				
Fun	ction				
S	ets compensation factors for external ND f	ilter attached to instrument.			
Inpu	ut/Output Format				
	PC	CS-2000			
Settir	ng compensation factors is a two-step prod	cess:			
Step	1: Send compensation factors (Repeat for	each wavelength)			
"NFC	s,[],[2],[3],[4" + Delimiter code	⇔			
Step	2: Finalize data and write to flash ROM				
"NFC	S,3" + Delimiter code	⇔			
		⟨□ " Error-check code " + Delimiter code cod			
Con	nmand Parameters	•			
	Meaning	Details/range			
1	Measurement angle	0: 1° 1: 0.2° 2: 0.1°			
2	External ND filter number	1: ND1			
1		2: ND2			
<u> </u>	Wavelength number	000 to 400 (380nm to 780nm) Wavelength for which compensation factor will be written.			
4	Compensation factor	The compensation factor (transmittance data) should be input as absolute value, not percentage. (For example, 10% should be written as 0.1f)			
		Data should be written in hexadecimal (IEEE floating point format: 4-byte big-endian hexadecimal string) format.			
Res	ponse Parameters	•			
	Meaning	Details/range			
Ехр	lanation				
[[Sets compensation factor (transmittance data) when using external ND filter. Data are stored in both SRAM and flash ROM. Data are not written to the flash ROM until "NFCS, 3" is sent. The same flash ROM sector is used for both ND1 and ND2 compensation data, so a single "NFSC, 3" command is sufficient.				
Erro	or-check codes				
Code Meaning					
OK	, , , , , , , , , , , , , , , , ,				
ER(of parameters received.			
ER		Parameter error Parameter set to value outside setting range			
ER.	Flash memory error				

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NFC	NFCR (ND Filter Compensation Factor Read)				
Fun	ctio	n			
R	Reads compensation factors for external ND filter attached to instrument.				
Inpu	ut/Ou	utput Format			
		PC	CS-2000		
"NFC	CR , [1] ,	,2,3" + Delimiter code	⇒		
			<pre> ⟨□ " Error-check code , 1" + Delimiter code </pre>		
Con	nma	nd Parameters			
	Mea	aning	Details/range		
1	Mea	asurement angle	0: 1° 1: 0.2° 2: 0.1°		
2	Exte	ernal ND filter number	1: ND1 2: ND2		
3	Wav	velength number	000 to 400 (380nm to 780nm) Wavelength for which compensation factor will be written.		
Res	pon	se Parameters			
	Mea	aning	Details/range		
3	Con	Compensation factor The compensation factor (transmittance hexadecimal (IEEE floating point format: endian hexadecimal string) format.			
Exp	lana	tion			
	Reads compensation factor (transmittance data) stored in instrument for when external ND filter is attached.				
Erro	Error-check codes				
Code Meaning		•			
OK00 Command was processed normally					
ER		Invalid command string or number of	of parameters received.		
ER17 Parameter error Parameter set to value outside setting range		ng range			
ER20 No data					
ER30 Flash memory error					

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