

Instruction Manual

CTRS-100A

Control DLL Manual

Thank you for purchasing this KYOWA product.

Read this Instruction Manual carefully in order to make full use of the high performance capabilities of the product.

Use this product only as described in this Manual.

This Manual only describes how to operate the control DLL.

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Notations used in the instruction manual

Cautionary statements

The following notations are used in this document to draw attention to items that require special caution during use or information that could be of reference.

Examples

CAUTION

Indicates something that requires special caution during use.

MEMO

Indicates something that could be of reference during use.

1 Folder structure

Extracting the ZIP file for this software will result in the following folder structure.

CTRS100A_ControlDll

```
|   • IM-A-1315B_SoftwareLicenseAgreement.pdf
|   • ReadMe.txt
|—DLL
|   |—eng
|   |   • Ctrs100.dll
|   |   • Ctrs100.h
|   |   • Ctrs100.lib
|   |   • Ctrs100Usb.dll
|   |—jpn
|   |   • Ctrs100.dll
|   |   • Ctrs100.h
|   |   • Ctrs100.lib
|   |   • Ctrs100Usb.dll
|—DLL64
|   |—eng
|   |   • Ctrs100.dll
|   |   • Ctrs100.h
|   |   • Ctrs100.lib
|   |   • Ctrs100Usb.dll
|   |—jpn
|   |   • Ctrs100.dll
|   |   • Ctrs100.h
|   |   • Ctrs100.lib
|   |   • Ctrs100Usb.dll
|—ExcelVBA
|   |—eng
|   |   • CTRS100A_KS3ToCSV.xlsm
|   |   • CTRS100A_SampleVBA.xlsm
|   |—jpn
|   |   • CTRS100A_KS3ToCSV.xlsm
|   |   • CTRS100A_SampleVBA.xlsm
|—Manual
    • IM-A-1285_CTRS-100AInstruction_Manual_Control_DLL_Manual.pdf
    • IM-A-1286_CTRS-100A_ControlDLL.pdf
```

CAUTION

You must agree with the free software license agreement in order to use this software.
Be sure to read IM-A-1315B_SoftwareLicenseAgreement.pdf.

2 Outline

This Instruction Manual describes functions that use CTRS-100A ("CTRS" below) control DLL files to perform CTRS control.

The control DLL controls CTRS-100A. USB is used for communication between CTRS and a PC. Up to 32 channels can be measured for CTRS.

3 Operating environment

OS	Windows8.1(32/64bit) Windows10(32/64bit)
CPU	Core i5 2 GHz (or equivalent) or higher
Memory	32-bit OS: 2 GB or higher 64-bit OS: 4 GB or higher

4 Functions

- Can control CTRS.
- Can save recorded data to an SD card inserted into CTRS.
- Can collect a KS3 file from the CTRS SD card on a PC.
- Can convert a KS3 file to a CSV file on a PC.

5 Limitations

- The maximum number of channels is 32.
- There is no functionality to save monitor data on a PC.
- Only USB is supported as the control interface with CTRS. Control over TCP/IP is not supported.
- Synchronous operation is not supported.

6 Required files

- Ctrs100.dll: Control DLL
- CTRS100Usb.dll: DLL for sending/receiving USB commands

To obtain CTRS100Usb.dll, download the USB communication API library for CTRS from the Kyowa Electronic Instruments website (<https://www.kyowa-kyowa-ei.com>).

There are both 32-bit and 64-bit versions of each DLL. Select the proper DLL based on the application being used.

7 Excel VBA sample programs

7-1 Sample programs

7-1-1 Required files

Copy the required files for each sample program to the same folder.

There are 32-bit and 64-bit versions of the DLL files. Use the file that is compatible with the version of Excel being used.

(1) Program to control CTRS from a PC and obtain monitor data

- ① CTRS100A_SampleVBA.xlsm: Sample program
- ② Ctrs100.dll: CTRS control DLL
- ③ Ctrs100Usb.dll: CTRS USB communication DLL

(2) Program to convert a KS3 file on an SD card into CSV format

- ① CTRS100A_KS3ToCSV.xlsm: Sample program
- ② Ctrs100.dll: CTRS control DLL
- ③ Ctrs100Usb.dll: CTRS USB communication DLL

7-1-2 Operating environment

(1) PC

OS	Windows8.1(32/64bit) Windows10(32/64bit)
Software	Microsoft Excel 2019 (32/64-bit version)
CPU	Core i5 2 GHz (or equivalent) or higher
Memory	32-bit OS: 2 GB or higher 64-bit OS: 4 GB or higher

(2) Devices

Model	CTRS-100A
Interface	USB
Number of connected devices	1

7-1-3 Preparation

Before starting the sample program and CTRS, connect CTRS and the PC with a USB cable.

You may be asked for a USB driver when CTRS is connected to the PC. If so, download the KYOWA USB driver from the Kyowa Electronic Instruments website (<https://www.kyowa-kyowa-ei.com>) and then install it.

7-2 Program to control CTRS from a PC and obtain monitor data

7-2-1 Outline

This program (CTRS100A_SampleVBA) uses Excel VBA to obtain monitor data and display it on a worksheet.

7-2-2 Operations

- ① Set the amount of data to obtain.
- ② Perform balancing and an input resistance check.
- ③ Import the amount of data to obtain starting from the point when recording starts.
- ④ Write the data to a worksheet.
- ⑤ End recording.

7-2-3 Measurement conditions

The following table lists the specifications for this sample program.

Number of measuring channels	4CH(CH1~CH4) Up to 4 channels even if a CDV unit is connected
Mode	Strain only
Sampling frequency	Fixed at 1 kHz
Range	1k μ ϵ , 2k μ ϵ , 5k μ ϵ , 10k μ ϵ , 20k μ ϵ , 50k μ ϵ
High-pass filter	Fixed at OFF
Low-pass filter	Fixed at 1 kHz
Calibration factor	Fixed at 1.0
Offset	Fixed at 0.0
Amount of recorded data	1000,2000,5000,10000

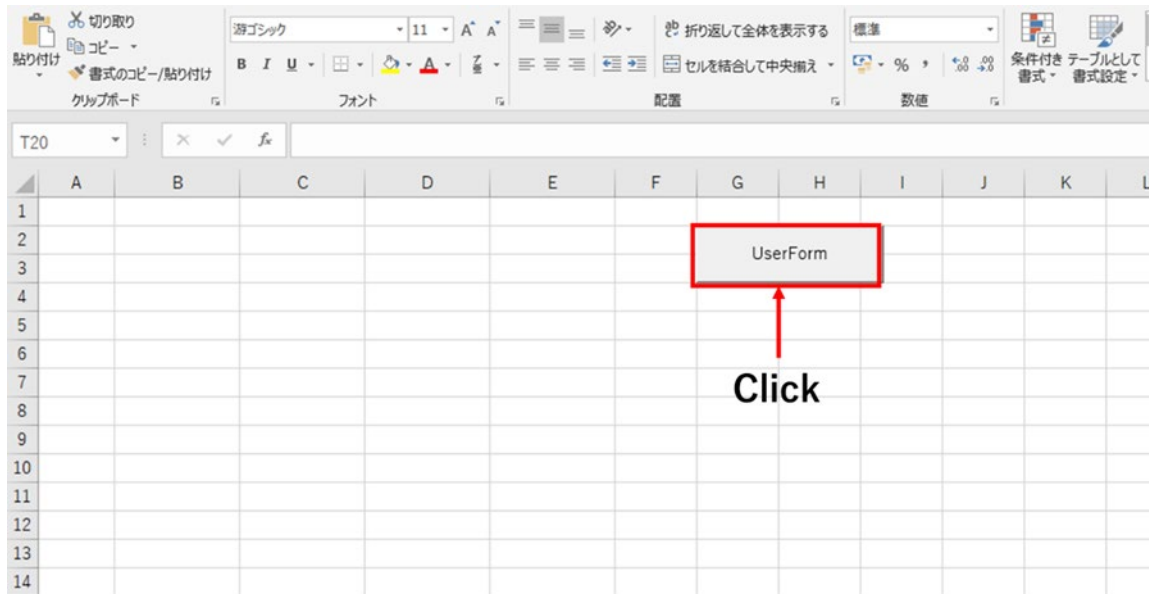
7-2-4 Program execution

(1) Create a folder for executing the sample program, then copy the following files into this folder.

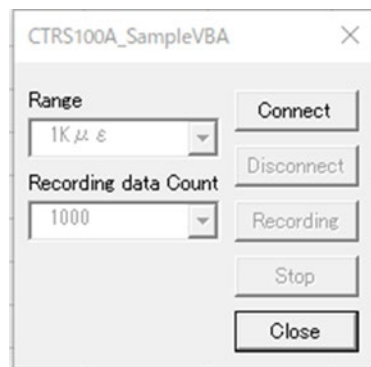
- ① CTRS100A_SampleVBA.xlsm
- ② Ctrs100.dll
- ③ Ctrs100Usb.dll

(2) Connect CTRS and the PC with a USB cable.

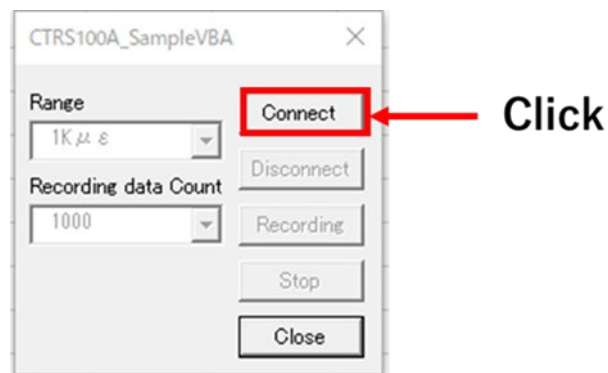
(3) Turn CTRS ON, execute CTRS100A_SampleVBA.xlsm, and then press "UserForm."



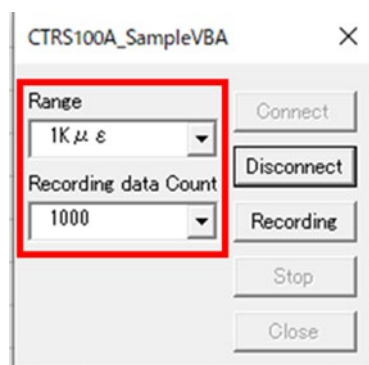
(4) The sample program user form is opened.



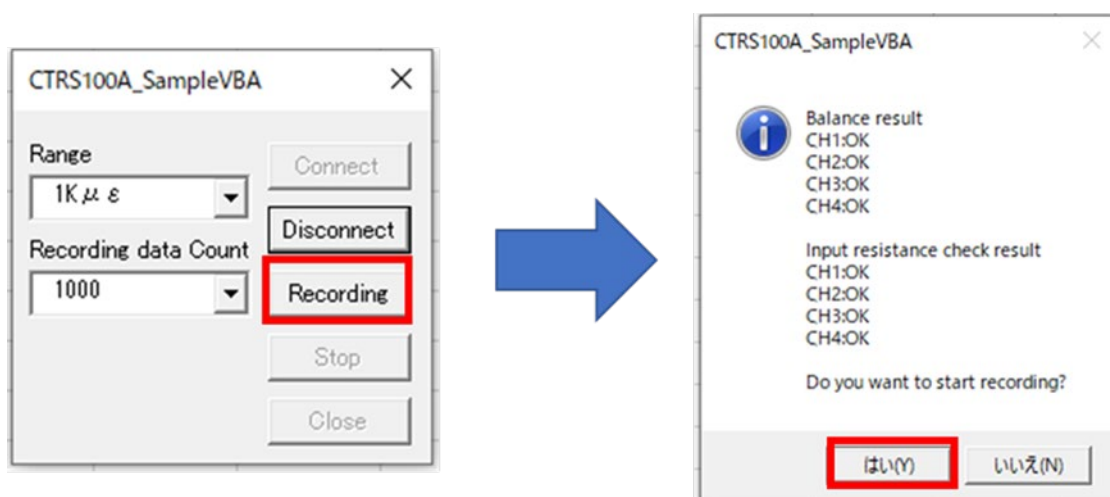
(5) Press "Connect."



(6) Select the measuring range and amount of recorded data.



(7) Press "Recording." Balancing is performed then the balancing result and input resistance check result are displayed. To begin recording now, press "Yes."



- (8) Recording starts, and measurement results are written to the sheet. To stop while recording, press "Stop."

	A	B	C	D	E	F	G	H	I
1	Number	CH1	CH2	CH3	CH4				
2	1	-1.225219727	0.604248047	0.617675781	-0.519775391				
3	2	-0.096191406	0.243652344	0.879882813	-0.825439453				
4	3	0.194458008	0.277954102	-0.575317383	-0.384033203				
5	4	-0.192016602	0.67980957	-0.647583008	-0.85546875				
6	5	0.058227539	0.382202148	-0.090576172	-0.928100586				
7	6	0.595458984	-0.037597656	-0.714111328	-0.360107422				
8	7	-1.090087891	1.027709961	0.223022461	0.386230469				
9	8	0.022338867	0.061767578	-0.293579102	0.041625977				
10	9	0.070800781	0.095947266	-0.408691406	0.225952148				
11	10	-0.533691406	-0.35144043	-0.424438477	0.487182617				
12	11	-0.274658203	0.619873047	-0.170410156	-0.342041016				
13	12	-0.475097656	0.660644531	-0.474853516	-0.65246582				
14	13	-0.8984375	-0.120239258	-0.642578125	-0.438598633				
15	14	0.375854492	0.022094727	-1.003295898	-0.154907227				
16	15	0.186401367	-0.690673828	-0.178710938	-0.448852539				
17	16	-0.837524414	0.161010742	0.168457031	-0.379638672				
18	17	0.146240234	0.058349609	0.406738281	0.336914063				
19	18	-0.0234375	-0.690673828	-0.075805664	0.191040039				
20	19	0.463623047	-0.620239258	0.467529297	-0.030761719				

CTRS100A_SampleVBA

Range: 1K μ ϵ

Recording data Count: 1000

During measurement and writing 210/1000

- (9) The following message will be displayed when recording is complete.

CTRS100A_SampleVBA

 The measurement is complete.

- (10) To end this program, press "Disconnect" and then press "Close."

CTRS100A_SampleVBA

Range: 1K μ ϵ

Recording data Count: 1000

7-3 Program to Convert a KS3 file on an SD card into CSV format

7-3-1 Outline

This program (CTRS100A_KS3ToCSV) uses Excel VBA to control CTRS from a PC and download a KS3 file from the CTRS SD card to the PC. It then converts the downloaded KS3 file into a CSV file to allow the user to confirm measurement results.

7-3-2 Operations

This program displays a list of KS3 files stored on the CTRS SD card. A single KS3 file can be selected for download to the PC. It can also convert the downloaded KS3 file into a CSV file to allow the user to confirm measurement results. The following information will be written to the CSV file:

- FileMemo
- SamplingFrequency(Hz)
- CHCount
- CHNumber
- CHName
- Range
- HighPassFilter
- LowPassFilter
- Calibration
- Offset
- OffsetZeroValue
- CableCorrectionValue
- Unit
- Data

The following image shows an example of an actual CSV file that has been output.

SamplingFrequency(Hz)	1000			
CHCount	4			
FileMemo	No1	No2	No3	No4
CHNumber	1	2	3	4
CHName	CH1	CH2	CH3	CH4
Range	10000 $\mu \varepsilon$	10000 $\mu \varepsilon$	10000 $\mu \varepsilon$	10000 $\mu \varepsilon$
HPF	OFF	OFF	OFF	OFF
LPF	5kHz	5kHz	5kHz	5kHz
Calibration	1	1	1	1
Offset	0	0	0	0
OffsetZeroValue	0	0	0	0
CableCorrectionValue	1	1	1	1
Unit	$\mu \varepsilon$	$\mu \varepsilon$	$\mu \varepsilon$	$\mu \varepsilon$
Time(sec)				
0	0.442871094	0.098022461	0.751708984	-0.181396484
0.001	-0.283203125	-0.008422852	0.551635742	0.471069336
0.002	-0.504272461	0.426757813	-0.337402344	-0.562011719
0.003	-0.114013672	0.655883789	0.004150391	0.404296875
0.004	-0.326049805	0.288085938	0.958740234	-0.145751953
0.005	0.875244141	0.385620117	0.483520508	-0.19519043
0.006	0.232666016	0.229614258	0.23034668	0.106079102

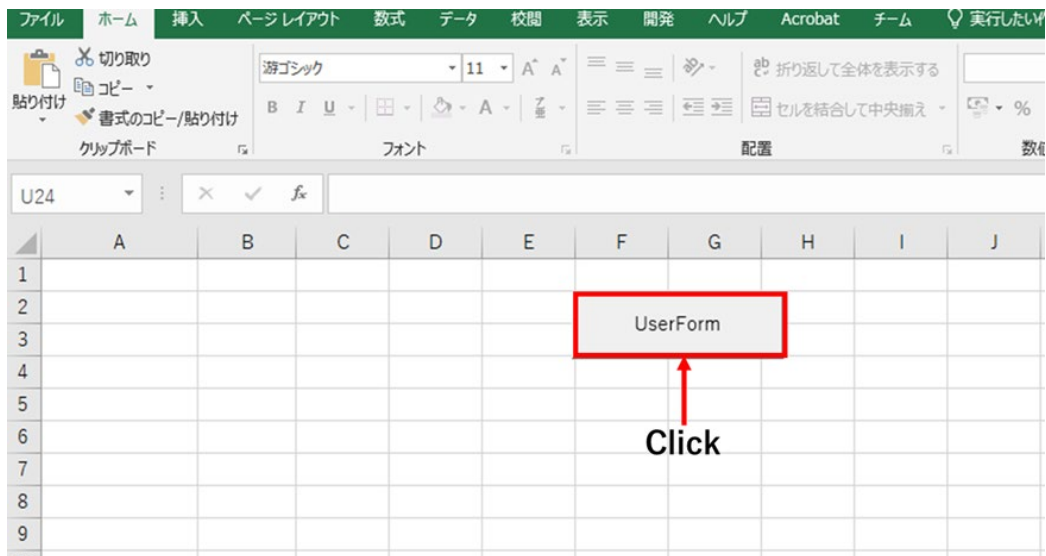
7-3-3 Program execution

(1) Create a folder for executing the sample program, then copy the following files into this folder.

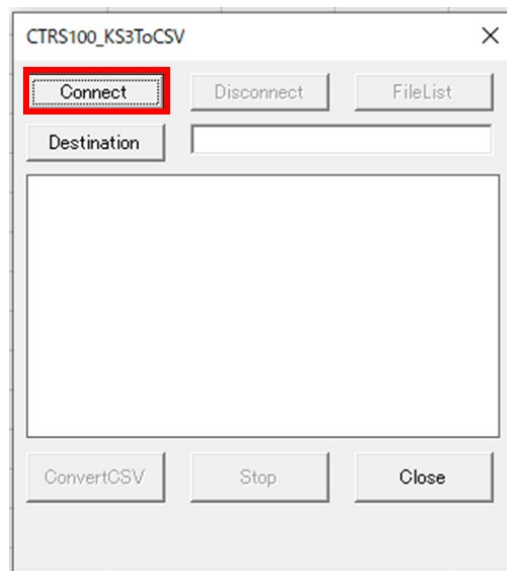
- ① CTRS100A_KS3ToCSV.xlsm
- ② Ctrs100.dll
- ③ Ctrs100Usb.dll

(2) Connect CTRS and the PC with a USB cable.

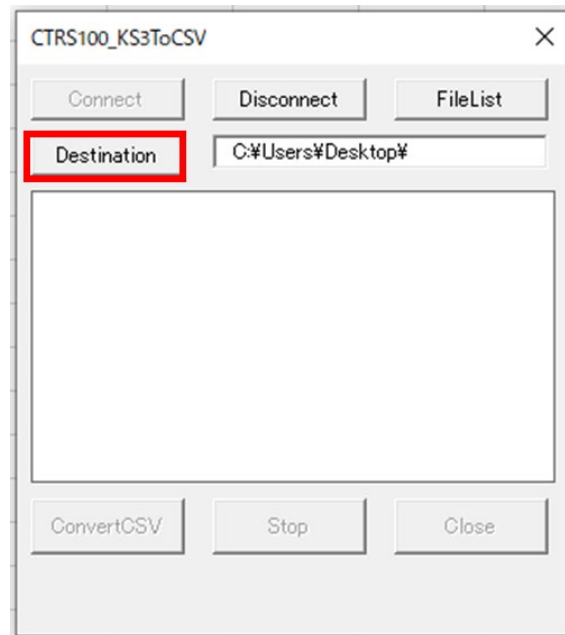
(3) Turn CTRS ON, execute CTRS100A_KS3ToCSV.xlsm, and then press "UserForm."



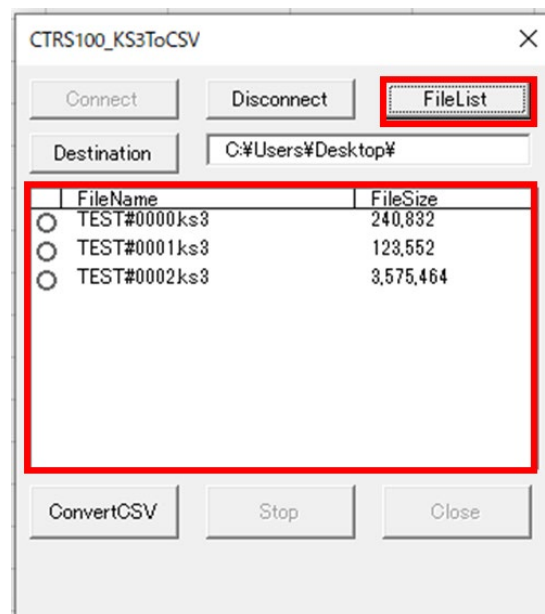
(4) The user form is displayed. Press "Connect" to connect to CTRS.



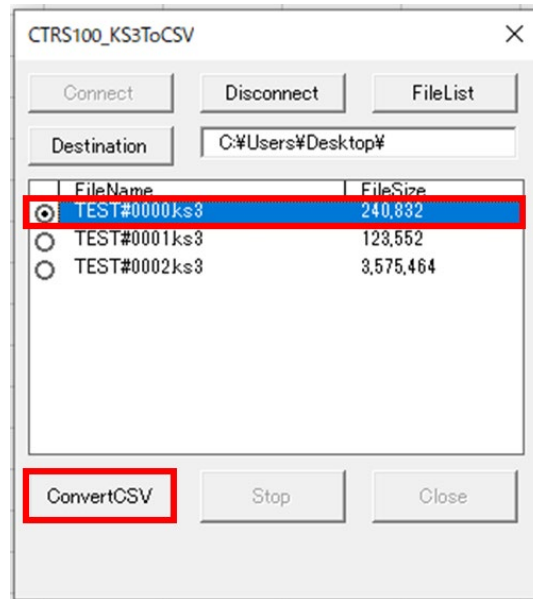
(5) Press "Destination" and select where to save the KS3 file and CSV file.



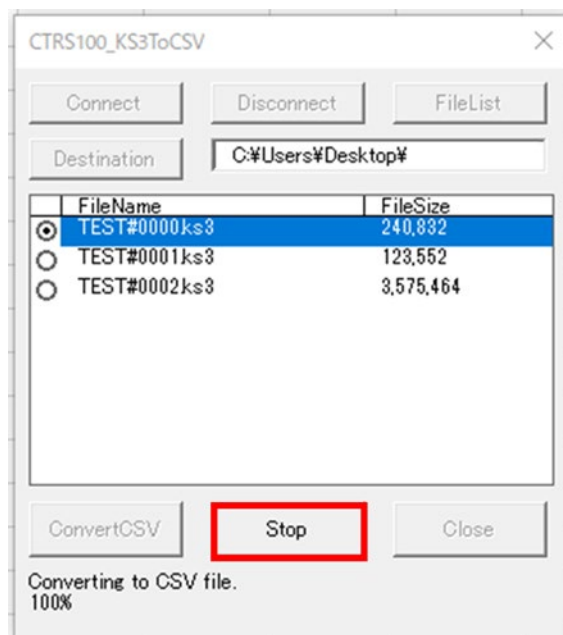
(6) Press "FileList" to display a list of KS3 files on the SD card in the list box.



- (7) Select the KS3 file to download and convert into CSV format, and then press "ConvertCSV" to begin downloading and converting the file to CSV format.



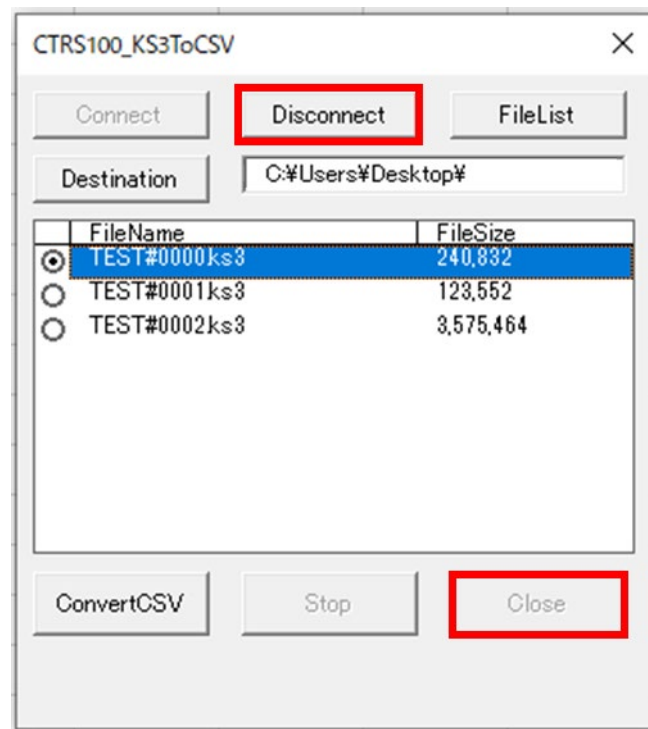
- (8) To stop while converting, press "Stop."



- (9) The following message is displayed when CSV conversion is complete. The KS3 file and CSV file will be output to the selected folder. The name of the CSV file will be the same as the name of the original KS3 file, except with a .csv extension.



(10) To end this program, press "Disconnect" and then press "Close."



8 Common function specifications

8-1 Functions return values

If a return value is not mentioned in the detailed explanation of a function, that function will use a common function return value.

Return value	Error content
0	Normal end
-1	Unknown command
-2	Parameter error
-3	SD card access error
-4	SD card not inserted
-5	Insufficient free space on SD card
-6	File does not exist
-10	Execution not possible - File being used via control command
-11	(Reserved)
-12	Execution not possible - Abnormal memory content
-13	Measurement start time ended
-14	AD not possible - Repeat number is maximum value
-15	AD not possible - File number is maximum value
-16	AD not possible - Folder number is maximum value
-17	Execution not possible - No remaining battery power
-18	Execution not possible - AD not possible
-23	Execution not possible - External clock error
-24	Execution not possible - Battery deteriorated
-25	Execution not possible - Battery overcurrent
-50	Received size error
-51	Not connected
-52	File output error
-53	Downloading KS3 or converting to CSV
-101	Abnormal function argument
-102	Abnormal device ID
-103	Data transmission error (timeout)
-104	Internal error (exception error)
-105	Controlled by other process
-106	Unable to open DLL file

8-2 CTRS status

Refer to the following table for the "plStatus[0]" of a function. This allows you to check the CTRS status. Each bit is independent, and multiple may be set at the same time.

Bit value	Details
0x00000001	AD possible
0x00000002	AD conversion (measurement) operation in progress
0x00000004	Manual measurement data recording
0x00000008	Manual measurement data recording paused
0x00000010	Waiting for trigger measurement
0x00000020	Trigger measurement data recording
0x00000040	Waiting for interval measurement
0x00000080	Interval measurement data recording
0x00000100	Waiting for time-based recording to start
0x00000200	System operating (busy)
0x00000400	File open or searching via control command
0x00000800	Updating
0x00001000	Recorded data file present
0x00002000	Measurement channel check result present
0x00004000	SD card inserted
0x00008000	SD card being accessed
0x00010000	(Reserved)
0x00020000	(Reserved)
0x00040000	Online (connected)
0x00080000	(Reserved)
0x00100000	Battery operating
0x00200000	Battery charging
0x00400000	Control interface (0: USB, 1: LAN)
0x00800000	Using wireless LAN
0x01000000	(Reserved)
0x02000000	(Reserved)
0x04000000	Monitor data no longer continuous
0x08000000	(Reserved)
0x10000000	Auto range executing
0x20000000	Auto range result present
0x40000000	GPV data present
0x80000000	Error (refer to "7-3 CTRS error statuses" for details)

Following are the conditions for setting and clearing each CTRS status.

● AD possible (0x00000001)

Set:

- When no error occurs as a result of checking measurement conditions, with measurement conditions set during startup.
- When no error occurs as a result of checking measurement conditions when the monitor is started using the OPTION button (start monitor function assigned).
- When no error occurs as a result of checking measurement conditions when measurement conditions are set using the MSD (load) command, MES (set) command, or the READ button.
- When no error occurs as a result of checking measurement conditions when an SD card is inserted or removed.
- When the INI command ends normally.
- When it becomes possible to record using the current measurement conditions via the FDF, FDK, or FMT command.

Clear:

- When an error occurs as a result of checking measurement conditions, with measurement conditions set during startup.
- When an error occurs as a result of checking measurement conditions when measurement conditions are set using the MSD (load) command, MES (set) command, or the READ button.
- When an error occurs as a result of checking measurement conditions when an SD card is inserted or removed.
- When an error occurs as a result of checking measurement conditions when the monitor is started using the OPTION button (start monitor function assigned).
- When the SD card is removed and AD is stopped during measurement.

● AD conversion (measurement) operation in progress (0x00000002)

Set:

- When the monitor is started via the STA command.
- With recording stopped, when recording is started using the REC button.
- When the monitor is started using the OPTION button (start monitor function assigned).
- When auto range is started.

Clear:

- When AD is stopped.

● Manual measurement data recording (0x00000004)

Set:

- When manual is included in the measurement mode and recording is started via the REC command or the REC button.

Clear:

- When recording of the specified amount of data ends.
- When recording is stopped.
- When recording is paused.

● Manual measurement data recording paused (0x00000008)

Set:

- During manual measurement data recording, when recording is paused via the PAU command or the OPTION button to which the PAUSE function is assigned (only when the repeat count is one recording).

Clear:

- When recording is resumed via the REC command or the REC button.
- When recording is stopped.

● Waiting for trigger measurement (0x00000010)

Set:

- When a trigger is included in the measurement mode and the status is switched to waiting for trigger measurement via the REC command or the REC button.

Clear:

- While waiting for trigger measurement, the waiting status is canceled via the STP command or the STOP button.
- When a trigger occurs and trigger recording starts.

● Trigger measurement data recording (0x00000020)

Set:

- While waiting for trigger measurement, when a trigger occurs and trigger recording starts.

Clear:

- When recording of the specified amount of data ends.
- When recording is stopped.

● Waiting for interval measurement (0x00000040)

Set:

- When an interval is included in the measurement mode and the status is switched to waiting for interval measurement via the REC command or the REC button.

Clear:

- While waiting for interval measurement, the waiting status is canceled via the STP command or the STOP button.
- When interval conditions are met and interval recording starts.

● Interval measurement data recording (0x00000080)

Set:

- While waiting for interval measurement, when interval conditions are met and interval recording starts.

Clear:

- When recording of the specified amount of data ends.
- When recording is stopped.

● **Waiting for time-based recording to start (0x00000100)**

Set:

- When time-specified manual recording starts.

Clear:

- When recording starts.

● **System operating (busy) (0x00000200)**

Set:

- When a command is received from the PC and a process that can operate with only a header response is started.

Clear:

- When command execution ends and response data can be sent.

● **File open or searching via control command (0x00000400)**

Set:

- When the FOF or FFF command ends normally.

Clear:

- When the FCF or FFC command ends normally.

● **Updating (0x00000800)**

Set:

- When updating is started.

Clear:

- When updating ends.

● **Recorded data file present (0x00001000)**

Set:

- During manual measurement or trigger measurement, when recording ends with the repeat count set to one time for either.

Clear:

- When no error occurs as a result of checking measurement conditions when measurement conditions are set using the MSD (load) command, MES (set) command, or the READ button.
- When recording starts.
- When the SD card is removed.
- When the INI, FMT, or FDK command ends normally.

● Measurement channel check result present (0x00002000)

Set:

- When the measurement channel check ends normally via the CCH command or the BAL button.

Clear:

- When no error occurs as a result of checking measurement conditions when measurement conditions are set using the MSD (load) command, MES (set) command, or the READ button.
- When recording starts.
- When the INI command ends normally.

● SD card inserted (0x00004000)

Set:

- When an SD card is inserted and successfully mounted.

Clear:

- When the SD card is removed.
- When an SD card is inserted but mounting fails.

● SD card being accessed (0x00008000)

Set:

- When the FDF, FMT, or FDK command ends normally.
- When recorded data deletion is executed using the OPTION button (delete recorded data function assigned) on the remote control.

Clear:

- When file deletion ends.

● Online (connected) (0x00040000)

Set:

- When a LAN or USB connection from the PC is established.

Clear:

- When the LAN or USB connection with the PC is disconnected.

● Battery operating (0x00100000)

Set:

- When no AC adapter is connected to the battery unit.

Clear:

- When an AC adapter is connected to the battery unit.

● Battery charging (0x00200000)

Set:

- When an AC adapter is connected to the battery unit.

Clear:

- When no AC adapter is connected to the battery unit.

● Control interface (0x00400000)

Set:

- When a synchronous unit is connected, the communication interface is set to LAN, and CTRS is started.

Clear:

- None.

● Using wireless LAN (0x00800000)

Set:

- When a wireless LAN unit is connected, the communication interface is set to wireless LAN, and CTRS is started.

Clear:

- None.

● Monitor data no longer continuous (0x04000000)

Set:

- When internal FIFO memory becomes full.

Clear:

- When measurement conditions are set, monitoring starts, recording starts, balancing is executed, and auto range is executed.
- When a monitor reset is received via the GMD command.

● Auto range executing (0x10000000)

Set:

- When auto range is started.

Clear:

- When auto range ends via the STP command, STOP button, or an error.

● Auto range result present (0x20000000)

Set:

- When auto range ends via the STP command, STOP button, or an error.

Clear:

- When measurement conditions are set via the MSD (load) command, MES (set) command, or the READ button, or when auto range is started.
- When recording starts.
- When the INI command ends normally.

● GPV result present (0x40000000)

Set:

- When auto range ends via the STP command, STOP button, or an error.
- During manual measurement or interval measurement, when recording ends with the pause function disabled.

Clear:

- When measurement conditions are set via the MSD (load) command, MES (set) command, or the READ button, or when auto range is started.
- When recording starts.
- When the INI command ends normally.

● Error (0x80000000)

Set:

- When the CTRS error status is not 0x00000000.
(Refer to "8-3 CTRS error statuses.")

Clear:

- When the CTRS error status is 0x00000000.

MEMO

- If the status of the return value after control command transmission is 0x00000200, processing of the sent command has not completed. Continue to check the status until the 0x00000200 bit is "0" and confirm that processing has ended.

MEMO

The relationships between CTRS AD operations and CTRS statuses are shown below.

- | | |
|---|---|
| • AD start possible: | 0x00000001 set |
| • Monitoring: | 0x00000003 set and
0x00000004 through 0x00000100 cleared |
| • Manual measurement data recording: | 0x00000007 set |
| • Manual measurement data recording paused: | 0x0000000B set |
| • Waiting for trigger measurement: | 0x00000013 set |
| • Trigger measurement data recording: | 0x00000023 set |
| • Waiting for interval measurement: | 0x00000043 set |

8-3 CTRS error statuses

Refer to the following table for the "plStatus[1]" of a function. If an error occurs in CTRS, the following bits will be set.

Bit value	Details
0x00000001	Insufficient measurement data storage capacity
0x00000002	(Reserved)
0x00000004	SD card access error
0x00000008	External clock error
0x00000010	Repeat number error
0x00000020	File number error
0x00000040	Folder number error
0x00000080	(Reserved)
0x00000100	Communication error with synchronous slave
0x00000200	(Reserved)
0x00000400	(Reserved)
0x00000800	(Reserved)
0x00001000	No remaining battery power ^(*1)
0x00002000	Battery deteriorated (replacement required, recording operation not possible) ^(*1)
0x00004000	Battery overcurrent
0x00008000	(Reserved)
0x00010000	(Reserved)
0x00020000	(Reserved)
0x00040000	(Reserved)
0x00080000	(Reserved)
0x00100000	Hardware error
0x00200000	Abnormal memory content
0x00400000	(Reserved)
0x00800000	(Reserved)
0x01000000	(Reserved)
0x02000000	(Reserved)
0x04000000	(Reserved)
0x08000000	(Reserved)
0x10000000	(Reserved)
0x20000000	(Reserved)
0x40000000	(Reserved)
0x80000000	(Reserved)

(*1) Subject of "do not perform battery error determination" measurement condition

Following are the conditions for setting and clearing each CTRS error status.

● Insufficient measurement data storage capacity (0x00000001)

Set:

- When there is insufficient free space to record even a single file using the current condition settings, when inserting an SD card, starting the monitor, or preparing for subsequent recording after recording ends during a repeated measurement.

Clear:

- At least one file can be recorded using the current condition settings after a file is deleted (FDF or FDK command) or a quick format is performed (FMT command), when inserting an SD card, starting the monitor, or preparing for subsequent recording after recording ends during a repeated measurement.
- When the mode is switched to PC recording mode.

● SD card access error (0x00000004)

Set:

- When a record file writing error occurs.
- When an error occurs while accessing the SD card, such as when reading/writing a file or obtaining SD card capacity.

Clear:

- When an SD card is inserted or removed, measurement conditions are set, monitoring starts, recording starts, balancing is executed, auto range is executed, or some other control command is received.

● External clock error (0x00000008)

Set:

- During external clock operation, when the external clock signal input during an AD conversion (measurement) operation is outside of specification. (Refer to the "CTRS-100A Compact Recorder [Hardware Manual]" Instruction Manual.)

Clear:

- When a normal external clock signal is input.

● Repeat number error (0x00000010)

Set:

- When the file naming convention is set to number specification, and the set number of file digits is exceeded while preparing for subsequent recording after recording ends during a repeated measurement.

Clear:

- When an SD card is inserted or removed, measurement conditions are set, monitoring starts, recording starts, balancing is executed, or auto range is executed.

● File number error (0x00000020)

Set:

- When the file naming convention is set to number specification, and measurement starts with a file number that exceeds the set number of file digits.
- When the file naming convention is set to number specification, and the set number of file digits is exceeded when recording ends.

Clear:

- When the file naming convention is set to number specification, and measurement starts with the number of file digits set to an allowable number.
- When the file naming convention is set to date specification.

● Folder number error (0x00000040)

Set:

- When the number of files in the CTRS100A.99 folder in the SD card reaches the recording limit that is currently set.

Clear:

- When the number of files in the CTRS100A.99 folder in the SD card reaches a level where recording is possible under the current settings.

● Communication error with synchronous slave (0x00000100)

Set:

- When synchronous operation is set and the master cannot communicate with the slave.
- When an error occurs during communication from the master to the slave in synchronous operation.

Clear:

- When synchronous operation is set and the master can communicate with the slave.
- When an error does not occur during communication from the master to the slave during synchronous operation.

● No remaining battery power (0x00001000)

Set:

- When the remaining battery power drops to the specified value or lower during battery operation. (*1)
- When the remaining battery power at the specified value or lower and then the AC adapter is unplugged and the battery is operating. (*1)
- When the battery is completely discharged.

Clear:

- When an AC adapter is connected to the battery unit and the battery is charging.
- When the battery is fully discharged and then the battery charges to a level that allows operation.
- When the "do not perform battery error determination" setting is changed to enabled.

● Battery deteriorated (0x00002000)

Set:

- When battery integrity drops to the specified value or lower.

Clear:

- When the "do not perform battery error determination" setting is disabled and battery integrity reaches the specified value or higher.
- When the "do not perform battery error determination" setting is enabled.

● Battery overcurrent (0x00004000)

Set:

- When overcurrent occurs in a group of compact recorders.

Clear:

- When there is no longer an overcurrent in a group of compact recorders.

● Hardware error (0x00100000)

Set:

- When an error occurs during communication between units or during EEPROM access.

Clear:

- None.

● Abnormal memory content (0x00200000)

Set:

- When the EEPROM in CTRS, the measuring unit, and the expansion unit cannot be successfully read during startup.

Clear:

- None.

CAUTION

- If "hardware error" or "abnormal memory content" is set, restart the CTRS power supply and confirm whether the error status is cleared. If it is not cleared even after repeatedly restarting CTRS, CTRS itself may have failed.

8-4 List of control functions

The control functions included in the DLL are shown in the table below.

8-4-1 Processes when connected to CTRS

Control function	Details
Ctrs100_ControlStart	Start CTRS control
Ctrs100_UsbCheckConnect	Check CTRS connection status
Ctrs100_ControlEnd	End CTRS control

8-4-2 Functions for sending/receiving control commands to CTRS

Control function	Details
Ctrs100_DFN1	Set data file name
Ctrs100_DFN0	Load data file name
Ctrs100_SMD1	Set monitor data output conditions
Ctrs100_SMD0	Load monitor data output conditions
Ctrs100_MSD1	Save measurement conditions set in CTRS to SD card
Ctrs100_MSD0	Load measurement conditions saved to SD card and set conditions in CTRS
Ctrs100_MES1	Set measurement conditions
Ctrs100_MES0	Load measurement conditions
Ctrs100_INI	Initialize measurement conditions (parameters) set in CTRS
Ctrs100_STA	Start AD conversion and switch to monitor status
Ctrs100_REC	Start data recording
Ctrs100_STP	Stop AD conversion or data recording
Ctrs100_PAU	Pause recording in manual measurement mode (pause status)
Ctrs100_ROS	Clear range-over status occurring during AD
Ctrs100_CCH1	Execute measurement channel check
Ctrs100_CCH0	Obtain measurement channel check result
Ctrs100_GMD_Long	Obtain monitor data (AD value)
Ctrs100_GMD_Double	Obtain monitor data (range value)
Ctrs100_IMK1	Insert marker into record file
Ctrs100_IMK0	Load marker from record file
Ctrs100_LOC1	Lock remote control unit buttons
Ctrs100_LOC0	Load remote control unit button lock status
Ctrs100_TIM1	Set date and time
Ctrs100_TIM0	Load date and time setting
Ctrs100_SYS	Load system information
Ctrs100_LED	Flash or light up LED
Ctrs100_FFR	Check free space on SD card
Ctrs100_FOF	Open loaded file
Ctrs100_FRF	Load data from file opened via FOF command

Ctrs100_FCF	Close file opened via FOF command
Ctrs100_FDF	Delete file
Ctrs100_FMT	Quick format SD card
Ctrs100_FFF	Start searching files in data folder on SD card
Ctrs100_FFN	Continue file search started via FFF command
Ctrs100_FFC	End file search started via FFF command
Ctrs100_FDK	Delete immediately preceding recorded data file
Ctrs100_AVG1	Measure measurement channel of measuring unit with 1 kHz sampling frequency
Ctrs100_AVG0	Obtain result of measuring via AVG1 command
Ctrs100_ATR1	Execute auto range
Ctrs100_ATR0	Load result of ATR1 command
Ctrs100_STS	Load CTRS status

8-4-3 Functions related to setting/loading DLL internal parameters

Control function	Details
Ctrs100_GetSYSInfo	Obtain system information
Ctrs100_SetKs3FileName	Configure KS3 file-related settings
Ctrs100_SetOption	Configure measurement condition settings
Ctrs100_GetOption	Load measurement condition settings
Ctrs100_SetMeasMode	Set measurement mode
Ctrs100_GetMeasMode	Load measurement mode
Ctrs100_SetManualCondition	Set manual measurement conditions
Ctrs100_GetManualCondition	Load manual measurement conditions
Ctrs100_SetIntvalCondition	Set interval measurement conditions
Ctrs100_GetIntvalCondition	Load interval measurement conditions
Ctrs100_SetTriggerCondition	Set trigger overall conditions
Ctrs100_GetTriggerCondition	Load trigger overall conditions
Ctrs100_SetAnalogTriggerCondition	Set analog trigger conditions
Ctrs100_GetAnalogTriggerCondition	Load analog trigger conditions
Ctrs100_SetExTriggerCondition	Set external trigger conditions
Ctrs100_GetExTriggerCondition	Load external trigger conditions
Ctrs100_SetExternalTriggerCondition	Set compound trigger conditions
Ctrs100_GetExternalTriggerCondition	Load compound trigger conditions
Ctrs100_SetMakerInfo	Set marker name
Ctrs100_GetMakerInfo	Load marker name settings
Ctrs100_SetTestInfo	Set test information
Ctrs100_GetTestInfo	Load test information
Ctrs100_SetChCondition	Set channel conditions
Ctrs100_GetChCondition	Load channel conditions

Ctrs100_SetChOffsetZero	Set offset zero conditions
Ctrs100_GetChOffsetZero	Load offset zero condition settings
Ctrs100_SetChNameEx	Set channel name
Ctrs100_GetChNameEx	Load channel name
Ctrs100_SetChTeds	Set TEDS information for channel conditions
Ctrs100_GetChTeds	Load TEDS information for channel conditions
Ctrs100_SetChRatedCapacity	Set rated capacity, etc.
Ctrs100_GetChRatedCapacity	Load rated capacity, etc. settings

8-4-4 General-purpose functions

Control function	Details
Ctrs100_ExeDownloadFile	Collect data file (KS3 file) from CTRS SD card
Ctrs100_ExeConvertKs3ToCsv	Convert KS3 file on PC into CSV file
Ctrs100_ReturnProgress	Obtain Ctrs100_ExeDownloadFile and Ctrs100_ExeConvertKs3ToCsv progress
Ctrs100_StandStopFlag	Stop Ctrs100_ExeDownloadFile and Ctrs100_ExeConvertKs3ToCsv operations

8-5 Function execution availability

Some functions may not be available based on the CTRS status.

The following tables lists whether each function can be executed in each status.

Refer to "8-2 CTRS status" for information on CTRS status.

Function	AD stopped				
	AD not possible	AD possible	File searching	File open	CCH,AVG executing ^(*1)
DFN	×	○	×	×	×
SMD	○	○	×	×	×
MSD	○	○	×	×	×
MES	○	○	×	×	×
INI	○	○	×	×	×
STA	×	○	×	×	×
REC	×	○	×	×	×
STP	×	×	×	×	×
PAU	×	×	×	×	×
ROS	○	○	×	×	×
CCH	×	○	×	×	×
GMD	×	×	×	×	×
IMK	×	×	×	×	×
LOC	○	○	×	×	×
TIM	○	○	×	×	×
SYS	○	○	×	×	×
LED	○	○	×	×	×
FFR	○	○	×	×	×
FOF	○	○	×	×	×
FRF	○ ^(*2)	○ ^(*2)	×	○	×
FCF	○ ^(*2)	○ ^(*2)	×	○	×
FDF	○	○	×	×	×
FMT	○	○	×	×	×
FFF	○	○	×	×	×
FFN	○ ^(*3)	○ ^(*3)	○	×	×
FFC	○ ^(*3)	○ ^(*3)	○	×	×
FDK	×	○ ^(*4)	×	×	×
AVG	×	○	×	×	×
ATR	×	○	×	×	×
STS	×	○	×	×	×

- (*1) When performing balancing, performing an input resistance check, or measuring the average value.
- (*2) Possible only when a file is open.
- (*3) Possible only when searching files.
- (*4) Enabled only during the period from when AD is stopped immediately after recording until subsequent recording starts.

9 Descriptions of functions

CAUTION

The numbers listed next to the arguments of each function indicate the number of required variables. Make sure to pass this number of variables when passing arguments.

9-1 Processes when connected to CTRS

9-1-1 Start CTRS control

Definition	long __stdcall Ctrs100_ControlStart(void)	
Argument	Data type	Description
None		
Notes	• This function must be called during application program startup.	

9-1-2 Check CTRS connection status

Definition	long __stdcall Ctrs100_UsbCheckConnect(long *plConnect1)	
Argument	Data type	Description
plConnect1	Long*	Returns the ID number of the connected CTRS as bit-compatible. The applicable bit will be set to 1 if CTRS is connected. A CTRS with ID number 0 will correspond to bit 0, while a CTRS with ID number 1 will correspond to bit 1. Ex.) 0x0000 will be returned if a single CTRS with ID number 0 is connected.
Notes	• This function can be used only after calling Ctrs100_ControlStart. • Control is possible with this DLL only when the value of plConnect1 is 0x0001.	

9-1-3 End CTRS control

Definition	long __stdcall Ctrs100_ControlEnd(void)	
Argument	Data type	Description
None		
Notes	• Make sure to call this function when disconnecting CTRS from the PC.	

MEMO

Refer to "8-2 CTRS status" and "8-3 CTRS error statuses" for information on plStatus2 for each function.

9-2-1 Set data file name

Definition	long __stdcall Ctrs100_DFN1(char *pszName128, char *pszTitle128, long *plStatus2)			
Argument	Data type	Description		
pszName128	Char*	Data file name (up to 63 characters, "." cannot be used)		
pszTitle128	Char*	File title (up to 127 characters, "." cannot be used)		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	If the file name is changed using this function and the measurement condition "file information" - "file name duplication check" setting is enabled, this will check whether a file with the same name is already on the SD card. If the same file already exists, an error will be returned. Refer to " CTRS-100A_ForControlCommand" for details.			

9-2-2 Load data file name

Definition	long __stdcall Ctrs100_DFN0(char *pszName128, char *pszTitle128, char *pszFirstName128, char *pszLastName128, long *plStatus2)			
Argument	Data type	Description		
pszName128	Char*	Current recorded data file name		
pszTitle128	Char*	File title		
pszFirstName128	Char*	First recorded data file name		
pszLastName128	Char*	Last recorded data file name		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	"First recorded data file name" is updated when recording starts. "Last recorded data file name" is updated when recording stops or the specified number of recordings have completed.			

9-2-3 Set monitor data output conditions

Definition	long __stdcall Ctrs100_SMD1(long *plMode8, long *plStatus2)				
Argument	Data type	Description			
plMode8	Long*	plMode[]	Description		
		0	Monitor data output mode(*1) -1: No monitor data output 0: Continuous monitor data output mode 1: Intermittent monitor data output mode		
		1	Analog data monitor data output 0:OFF 1:ON		
		2	Auto range data monitor data output 0:OFF 1:ON		
		3~7	Reserved		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes	• When using Ctrs100_GMD_Long() and Ctrs100_GMD_Double(), make sure to use this function and set output conditions.				

(*) Monitor output modes

- No monitor data output (monitor data output mode is -1)

Monitor data output is not performed.

The amount of monitor data will always be 0 even if the function for obtaining monitor data (Ctrs100_GMD) is used.

If CTRS is offline, this mode will automatically be set.

- Continuous monitor data output mode (monitor data output mode is 0)

Monitor data is continuously obtained from the connected CTRS.

It may not be possible to obtain all monitor data depending on PC performance.

- Intermittent monitor data output mode (monitor data output mode is 1)

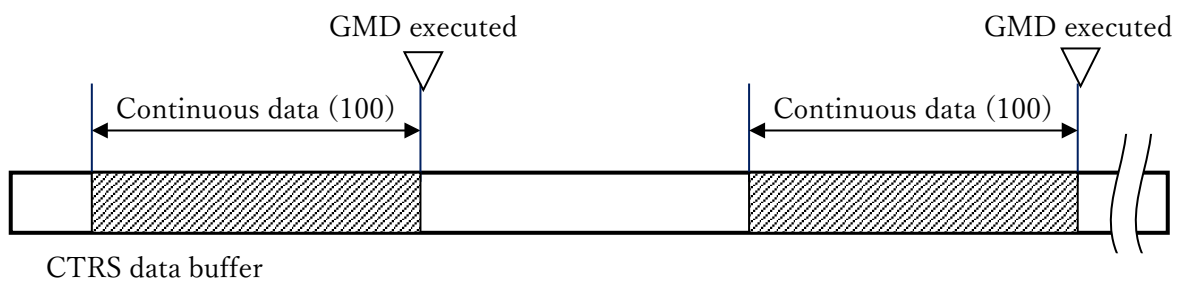
Monitor data is obtained intermittently. Obtained data will be continuous internally, but will not be continuous with subsequently obtained monitor data.

Ex.) Monitor data obtained during intermittent monitor data output mode

- Amount of data obtained per channel for GMD function set to 100

( indicates the CTRS data buffer, with data accumulating to the right.

 indicates the range of data obtained.)



9-2-4 Load monitor data output conditions

Definition	long __stdcall Ctrs100_SMD0(long *plMode8, long *plStatus2)				
Argument	Data type	Description			
plMode8	Long*		plMode[]	Description	
			0	Monitor data output mode	
			1	Analog data monitor data output	
			2	Auto range data monitor data output	
			3~7	Reserved	
		Refer to Ctrs100_SMD1			
plStatus2	Long*		plStatus[0]	Status	
			plStatus[1]	Error status	
Notes					

9-2-5 Save measurement conditions set in CTRS to SD card

Definition	long __stdcall Ctrs100_MSD1(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes			

9-2-6 Load measurement conditions saved to SD card and set conditions in CTRS

Definition	long __stdcall Ctrs100_MSD0(long *plResult1, long *plStatus2)		
Argument	Data type	Description	
plResult1	Long*	Measurement condition check result (bit-compatible)	
		0x00000000	Check OK, AD conversion start possible
		0x00000001	Sampling frequency setting error
		0x00000002	Overall information setting error
		0x00000004	File information setting error
		0x00000008	Measurement condition (common) setting error
		0x00000010	Nothing to measure
		0x00000020	Measurement condition (manual) setting error
		0x00000040	Measurement condition (interval) setting error
		0x00000080	Measurement condition (trigger common) setting error
		0x00000100	Measurement condition (analog trigger) setting error
		0x00000200	Reserve
		0x00000400	Measurement condition (external trigger) setting error
		0x00000800	Reserve
		0x00001000	Measurement condition (compound) setting error
		0x00002000	Marker condition error
		0x00004000	Channel condition setting error
		0x00008000	Channel range setting error
		0x00010000	Insufficient capacity
		0x00020000	SD card not inserted

		0x00040000	File number error		
		0x00080000	Folder number error		
		0x00100000	Reserve		
		0x00200000	Reserve		
		0x00400000	Reserve		
		0x00800000	Reserve		
		0x01000000	Reserve		
		0x02000000	Reserve		
		0x04000000	Reserve		
		0x08000000	Reserve		
		0x10000000	Reserve		
		0x20000000	Reserve		
		0x40000000	Reserve		
		0x80000000	Reserve		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes					

9-2-7 Set measurement conditions

Definition	long __stdcall Ctrs100_MES1(long *plResult1, long *plStatus2)			
Argument	Data type	Description		
plResult1	Long*	Refer to plResult1 for Ctrs100_MSD0		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	Make sure to call this function prior to starting AD conversion with Ctrs100_STA0.			

9-2-8 Load measurement conditions

Definition	long __stdcall Ctrs100_MES0(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• Loads the current measurement conditions from CTRS to an internal variable of CTRS100.dll. • When controlling CTRS, call this function after calling Ctrs100_ControlStart(). • To check each parameter, use the functions described in "9-3 Setting/loading DLL internal parameters." • Refer to "CTRS-100A_ForControlCommand" for information on the measurement condition format.		

9-2-9 Initialize measurement conditions (parameters) set in CTRS

Definition	long __stdcall Ctrs100_INI(long lMode, long *plStatus2)		
Argument	Data type	Description	
lMode	Long	Initialization mode 0: Initialize measurement conditions. (TCP/IP-related conditions will not be initialized.) 1: Initialize all conditions and revert to factory settings. TCP/IP-related conditions will also be initialized, so communication may not be possible after receiving response data. 2: Initialize the wireless LAN unit SSID and security key.	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	CTRS will switch to the following status after INI command transmission. • If lMode is 0 • Date and time: No change • Number of recording channels: Measure using all channels capable of recording • Channel conditions: Initial values for each unit (refer to " CTRS-100A_ForControlCommand") • Balancing value: 0 • If lMode is 1 • Date and time: No change		

	• CTRS-100A IP address: 192.168.70.100 • Subnet mask: 255.255.255.0 • Default gateway: 0.0.0.0 • Number of recording channels: Measure using all channels capable of recording • Channel conditions: Initial values for each unit (refer to " CTRS-100A_ForControlCommand ") • Balancing value: 0
--	--

9-2-10 Start AD conversion and switch to monitor status

Definition	long __stdcall Ctrs100_STA(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	That status must be AD possible in order to execute this function.		

9-2-11 Start data recording

Definition	long __stdcall Ctrs100_REC(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	This function is enabled only in the AD possible status, when monitoring, or when recording is paused.			

9-2-12 Stop AD conversion or data recording

Definition	long __stdcall Ctrs100_STP(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	If measurement condition (common) "restart AD once recording is complete" is set to "0: Disabled," AD will be stopped without switching to the monitor status. Refer to " CTRS-100A_ForControlCommand" for details.			

9-2-13 Pause recording in manual measurement mode (pause status)

Definition	long __stdcall Ctrs100_PAU(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	• This function is enabled when all of the following conditions are met. • Manual measurement mode (however, only when the repeat count is one recording only) • No amount of data specified • Data is recording • If the measurement condition (common) "PAUSE function" is set to "0: Disabled" this will always be disabled.			

9-2-14 Clear range-over status occurring during AD

Definition	long __stdcall Ctrs100_ROS(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes				

9-2-15 Execute measurement channel check

Definition	long __stdcall Ctrs100_CCH1(long lMode, long *plStatus2)			
Argument	Data type	Description		
lMode	Long	Execution mode (bit-compatible) 0x0001: Balancing 0x0002: Input resistance check		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes				

Definition	long __stdcall Ctrs100_CCH0 (long *plItem1, long *plResult512, long *plStatus2)			
Argument	Data type	Description		
plItem1	Long*	Check execution item (bit-compatible) 0x01: Balancing 0x02: Input resistance check		
plResult512	Long*	plResult512[]	Description	
		0	Balancing result -1: No unit, no function, measurement OFF 0: OK 1: NG 2: Function OFF 3: No balancing 4: Balancing result writing error	
		1	Balancing remaining AD value	
		2	Input resistance check result -1: No unit, no function, measurement OFF 0: OK 1: NG 2: RESISTANCE NG (exceeded upper limit of resistance value that can be measured) 3: Function OFF	
		3	Input resistance value (Ω) * Enabled only when the input resistance check result is 0 or 1	
		4~15	reserve	
		2 items per check result × 8 checks × 32 channels		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	After executing Ctrs100_CCH10, use Ctrs100_STS0 and confirm the status is not "system operating (BUSY)" prior to using this function.			

Definition	long __stdcall Ctrs100_GMD_Long(long *plDataNum1, long *plData150000, long *plStatus2)		
Argument	Data type	Description	
plDataNum1	Long*	Amount of data per channel However, the value set by the monitor data output mode from the SMD command will vary. • Continuous monitor data output mode: 0 • Intermittent monitor data output mode: Amount of data per channel * Special usage If this parameter is set to "0xFFFFFFFF" or "0xFFFFFFFFFE," the following operations will be performed. 0xFFFFFFFF: Process following occurrence of non-continuous monitor data 0xFFFFFFFFFE: Response request without monitor data	
plData150000	Long*	Obtained AD data	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• Use Ctrs100_SMD10 to set monitor data output conditions prior to executing this function. • When in intermittent monitor data output mode, the maximum value of the range that can be set for "amount of data per channel" will be condition (1) or (2) below, whichever is smaller. (1) $600,000 / (4 * \text{Number of analog channels with measurement ON})$ (2) Amount of data when monitoring is performed at a 30 second interval at the set sampling frequency Ex.) One measurement analog channel and a sampling frequency of 1 kHz (1) $600,000 / (4 * 1) = 150,000$ (2) $1000 * 30 = 30,000$ The maximum value of the range that can be set in this case would therefore be 30,000.		

MEMO

Use the following equation to convert an AD value into a physical amount.

$$\text{Physical amount} = \text{AD value} \times \text{Calibration factor} \times \text{Cable factor} \times (\text{Range value} / \text{AD full scale}) + \text{Offset value} + \text{Offset zero value (when offset zero is ON)}$$

Ex.) AD value = 8.192, Calibration factor = 1.0, Cable factor = 1.0, Range value = 1000,

AD full scale = 8192000 (for range value 1000), Offset value = 0.0, Offset zero OFF

$$\begin{aligned} \text{Physical amount} &= 8.192 \times 1.0 \times 1.0 \times (1000 / 8192000) + 0.0 \\ &= 1000 \times 10^{-6} \end{aligned}$$

9-2-18 Obtain monitor data (range value)

Definition	long __stdcall Ctrs100_GMD_Double(long *plDataNum1, long *pdData150000, long * plStatus2)			
Argument	Data type	Description		
plDataNum1	Long*	Amount of data per channel		
pdData150000	Double*	Value of obtained AD data converted into a physical amount		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	Refer to Ctrs100_GMD_Long() above.			

● Monitor data arrangement

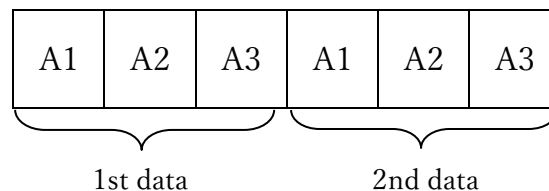
Monitor data will be four bytes for a single channel for an analog channel.

Monitor data is arranged in order of analog channel 1, 2, then 3 each time sampling is performed.

Ex.) Measurement data over two samplings when measurement is ON for three channels of analog data (A1, A2, A3)

• Monitor data total size

$(3 \text{ analog channels} \times 4 \text{ bytes}) \times 2 \text{ times} = 24 \text{ bytes}$



● When SMD command monitor data output mode is -1

Only the header is returned (no monitor data).

● When status is not AD possible

Only the header is returned (no monitor data).

● When non-continuous monitor data occurs

If the CTRS status after executing the GMD command was "non-continuous monitor data," the GMD command response will be the header only (no monitor data).

To clear "non-continuous monitor data," set "0xFFFFFFFF" in plDataNum1 and execute the function.

MEMO

- CTRS monitor data is transferred to the PC through internal FIFO memory.

When set to continuous monitor output mode, the "obtain monitor data" command must be used to continue to obtain monitor data before this FIFO memory becomes full, in order to obtain continuous data on the PC. If this FIFO memory becomes full, the CTRS status will be set to "non-continuous monitor data" and monitor data will lose continuity.

- If "non-continuous monitor data" is set in CTRS, new monitor data will not be stored in FIFO memory. When "non-continuous monitor data" is cleared, the data in FIFO memory will also be cleared and new monitor data will begin being stored.
- The following equation can be used to determine the approximate maximum time that can be stored in FIFO memory.

$$\begin{aligned} &\text{Amount of time that can be stored in FIFO [seconds]} \\ &= 4194304 / ((4 * \text{Number of analog channels with measurement ON}) \times \text{Sampling}) \end{aligned}$$

Ex.) 32 analog measurement channels and a sampling frequency of 1 kHz

$$4194304 / (4 * 32 * 1000) = \text{Approx. } 32.8 \text{ [seconds]}$$

9-2-19 Insert marker into record file

Definition	long __stdcall Ctrs100_IMK1(long lMakerBit, long *plStatus2)			
Argument	Data type	Description		
lMakerBit	Long	Marker specification (bit-compatible 0x0001 to 0x0200)		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	This function is enabled only during recording.			

9-2-20 Load marker from record file

Definition	long __stdcall Ctrs100_IMK0(long *plMakerNum2, long *plStatus2)				
Argument	Data type	Description			
plMakerNum2	Long*	plMakerNum2[0]	Marker 1 insertion total		
		plMakerNum2[1]	Marker 2 insertion total		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes	This function is enabled only during recording.				

9-2-21 Lock remote control unit buttons

Definition	long __stdcall Ctrs100_LOC1(long lLockKey long *plStatus2)		
Argument	Data type	Description	
lLockKey	Long	Key lock status (1: Enabled, 0: Disabled) (0x01:REC, 0x02:STOP, 0x04:BAL 0x08:READ, 0x10:OPTION1, 0x20:OPTION2)	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	If the connection with the PC is disconnected, the currently set key lock status will be cleared.		

9-2-22 Load remote control unit button lock status

Definition	long __stdcall Ctrs100_LOC0(long *plLockKey long *plStatus2)		
Argument	Data type	Description	
plLockKey1	Long*	Key lock status (1: Enabled, 0: Disabled) (0x01:REC, 0x02:STOP, 0x04:BAL 0x08:READ, 0x10:OPTION1, 0x20:OPTION2)	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes			

9-2-23 Set date and time

Definition	long __stdcall Ctrs100_TIM1(long *plTime8, long *plStatus2)				
Argument	Data type	Description			
plTime8	Long*	plTime8[]	Description		
		0	year		
		1	month		
		2	day		
		3	hour		
		4	minute		
		5	second		
		6	reserve		
		7	reserve		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes					

9-2-24 Load date and time setting

Definition	long __stdcall Ctrs100_TIM0(long *plTime8, long *plStatus2)				
Argument	Data type	Description			
plTime8	Long*	plTime8[]	Description		
		0	year		
		1	month		
		2	day		
		3	hour		
		4	minute		
		5	second		
		6	reserve		
		7	reserve		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes					

9-2-25 Load CTRS system information

Definition	long __stdcall Ctrs100_SYS(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	Use Ctrs100_GetSYSInfo() to obtain the value from the DLL.		

9-2-26 Flash or light up LED

Definition	long __stdcall Ctrs100_LED(long lUnit, long lAction, long *plStatus2)		
Argument	Data type	Description	
lUnit	Long	Applicable unit (bit-compatible) 0: All units Bit 1: Main unit Bits 2 through 8: Measuring units 2 through 8 9 through 13: Expansion units 1 through 5 Bit 16: remote control unit	
lAction	Long	Flash operation specification 0: Reserved 1: Light up in blue (3 seconds) 2: Light up in red (3 seconds) 3: Light up in purple (3 seconds) 4: Flash blue (3 seconds) 5: Flash red (3 seconds) 6: Flash purple (3 seconds)	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• Cannot be used during AD operation. • CTRS will return response data after the LED flash operation completes.		

9-2-27 Check free space on SD card

Definition	long __stdcall Ctrs100_FFR(char *pszFree16, char *pszTotal16, long* plStatus2)		
Argument	Data type	Description	
pszFree16	Char*	Free space on SD card	
pszTotal16	Char*	Total capacity of SD card	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	The value of the free space on the SD card will be returned as a value with the system reserved area (approx. 16 MB) subtracted. It will therefore be less than the value indicated on the PC.		

9-2-28 Open loaded file

Definition	long __stdcall Ctrs100_FOF(char *pszFileName128,, long* plStatus2)		
Argument	Data type	Description	
pszFileName128	Char*	File name Make sure to set this with the extension included.	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• If the return value of this function is 0 (normal end), the status will be set to "file open or searching via control command." Only the Ctrs100_FRF(), Ctrs100_FCF(), and Ctrs100_STS() functions can be executed at this time. • Use Ctrs100_FCF() to close the file.		

9-2-29 Load data from file opened via FOF command

Definition	long __stdcall Ctrs100_FRF(long lSetReadByte, long *plResult1, long *plReadByte1 char *pszReadData2000000, long *plStatus2)			
Argument	Data type	Description		
lSetReadByte	long	Number of bytes to load (up to 2,000,000 bytes)		
plResult1	Long*	Load result (same as function return value)		
plReadByte1	Long*	Number of bytes actually loaded (number of pszReadData2000000 bytes)		
pszReadData2000000	Char*	Loaded data (data for 0 to 2,000,000 bytes)		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	The maximum size of data that can be loaded at once by the function is 2,000,000 bytes. To load a file of a size exceeding 2,000,000 bytes, execute this function as many times are required.			

9-2-30 Close file opened via FOF command

Definition	long __stdcall Ctrs100_FCF(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	If the result of closing the response data file is a normal end, the CTRS status "file open or searching via control command" will be cleared.			

9-2-31 Delete file

Definition	long __stdcall Ctrs100_FDF(char *pszFileName128, long *plStatus2)		
Argument	Data type	Description	
pszFileName128	Char*	Name of file to delete (including extension)	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• This is used to delete files in the data folder of the SD card. • A folder cannot be specified for this function, so if multiple files with the same name exist on the SD card one of the files will be deleted. • When deleting a file, wildcard characters such as a question mark ("?",) or asterisk ("*") cannot be used for the file name specified by the parameter. • To delete multiple files, specify the file name for each file and execute this function.		

9-2-32 Quick format SD card

Definition	long __stdcall Ctrs100_FMT(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• Executing a quick format will delete all files and folders on the SD card. • Quick format will clear only the management area.		

Definition	long __stdcall Ctrs100_FFF(char *pszFindFileName128, long *plResult1, long *plInputFileNum1, long *plAllFileNum1, char *pszFileSize16, long *plTime8, long *plStatus2)																						
Argument	Data type	Description																					
pszFindFileName128	Char*	Name of file to search (including extension)																					
plResult1	Long*	File search result																					
pszFileName128	Char*	Name of file on SD card (including extension)																					
plInputFileNum1	Long*	Number of loaded files																					
plAllFileNum1	Long*	Total number of files																					
pszFileSize16	Char*	File size																					
plTime8	Long*	File creation date and time <table><tr><td>plTime8[]</td><td>Description</td></tr><tr><td>0</td><td>year</td></tr><tr><td>1</td><td>month</td></tr><tr><td>2</td><td>day</td></tr><tr><td>3</td><td>hour</td></tr><tr><td>4</td><td>minute</td></tr><tr><td>5</td><td>second</td></tr><tr><td>6</td><td>reserve</td></tr><tr><td>7</td><td>reserve</td></tr></table>				plTime8[]	Description	0	year	1	month	2	day	3	hour	4	minute	5	second	6	reserve	7	reserve
plTime8[]	Description																						
0	year																						
1	month																						
2	day																						
3	hour																						
4	minute																						
5	second																						
6	reserve																						
7	reserve																						
plStatus2	Long*	plStatus[0]	Status																				
		plStatus[1]	Error status																				
Notes	When searching using pszFindFileName128, the question mark ("?",) and asterisk ("*") characters can be specified for the file name. "?" represents any single-byte character, while "*" represents a character string. Ex. 1) To search for all files Specify "*" for pszFindFileName128. Ex. 2) To search all files for a character string beginning with "TEST" Specify "TEST*.KS3" for pszFindFileName128. Ex. 3) To start searching file numbers 20 to 29 for file name "TEST" Specify "TEST002?.KS3" for pszFindFileName128.																						

MEMO

- If the return value of this function is 0 (normal end), the status will be set to **"file open or searching via control command."** Only the Ctrs100_FFN() and Ctrs100_FFC() functions can be executed at this time.
- Execute Ctrs100_FFC() to stop searching files.

9-2-34 Continue file search started by Ctrs100_FFF

Definition	long __stdcall Ctrs100_FFN(long *plResult1, char *pszFileName128, char *pszFileSize16, long *plFileInfo8, long *plStatus2)				
Argument	Data type	Description			
plResult1	Long*	File search result (same as standard type)			
pszFileName128	Char*	File name (with extension)			
pszFileSize16	Char*	File size			
plFileInfo8	Long*	plFileInfo8[]	Description		
		0	Year		
		1	Month		
		2	Day		
		3	Hour		
		4	Minute		
		5	Second		
		6	reserve		
		7	reserve		
plStatus2	Long*	plStatus[0]	Status		
		plStatus[1]	Error status		
Notes	• If the return value of this function is -6 (file does not exist), the "file open or searching via control command" status will be cleared.				

9-2-35 End file search started by Ctrs100_FFF function

Definition	long __stdcall Ctrs100_FFC(long *plStatus2)			
Argument	Data type	Description		
plStatus2	Long*	plStatus[0]	Status	
		plStatus[1]	Error status	
Notes	• If the return value of this function is -6 (file does not exist), the "file open or searching via control command" status will be cleared.			

9-2-36 Delete immediately preceding recorded data file

Definition	long __stdcall Ctrs100_FDK(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• This function returns the return value prior to the file being deleted. The status while deleting a file will be set to "SD card being accessed." File deletion can be confirmed by checking that the "SD card being accessed" status has been cleared. When "SD card being accessed" is set, no functions can be executed other than loading the status. • This can be executed only when the "recorded data file present" status is set. Once recording is complete, execute the function with AD stopped. • This function will become unavailable when waiting to record (waiting for interval, waiting for trigger) or when recording.		

9-2-37 Measure measurement channel of measuring unit with 1 kHz sampling frequency

Definition	long __stdcall Ctrs100_AVG1(long lAvgTime, long *plStatus2)		
Argument	Data type	Description	
lAvgTime	Long	Time to obtain average value (sec.) 0~10 There will be approximately 1 second of average data if this is set to 0.	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	This function can only be executed when in the AD possible status or when AD is stopped.		

9-2-38 Obtain the result of measuring with Ctrs100_AVG1

Definition	long __stdcall Ctrs100_AVG0(long *plAvgData32, long *plStatus2)		
Argument	Data type	Description	
plAvgData32	Long*	Average AD value of each measured channel Data will be 0 for channels not measured.	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	• When executing this function, check the status and confirm it is not "system operating (BUSY)."		

9-2-39 Execute auto range

Definition	long __stdcall Ctrs100_ATR1(long *plStatus2)		
Argument	Data type	Description	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes	- When using this function to set the range, follow the procedure below. - Execute this function. - Execute Ctrs100_STP0 and complete auto range. - Use Ctrs100_ATR00 to load the auto range result. - Use Ctrs100_MES0 to configure settings based on the result.		

9-2-40 Load result of Ctrs100_ATR1

Definition	long __stdcall Ctrs100_ATR0(long *plResult256, long *plStatus2)		
Argument	Data type	Description	
plResult256	Long*	plResult256[]	Description
		0	The value with the largest absolute value of the maximum value and minimum value
		1	Arbitrary range value enabled 0: Disabled 1: Enabled
		2	Old range number -1: Use arbitrary range value From 0: Use range number
		3	New range number From 0: Recommended range number
		4	Auto range enabled 0: Disabled 1: Enabled
		5	Old arbitrary range value
		6	New arbitrary range value (When arbitrary range value item is enabled)
		7	reserve
		8 items × 32 channels = 256	
plStatus2	Long*	plStatus[0]	Status
		plStatus[1]	Error status
Notes			

Definition	long __stdcall Ctrs100_STS(long lMode, long *plStatus24, char *pszFileName128)			
Argument	Data type	Description		
lMode	Long	0: Obtain status that was most recently obtained. 1: Send/receive header and obtain status.		
plStatus24	Long*	plStatus24[]	Description	
		0	Status	
		1	Error status	
		2	File number	
		3	Repeat count	
		4	Set repeat count	
		5	Year	
		6	Month	
		7	Day	
		8	Hour	
		9	Minute	
		10	Second	
		11	reserve	
		12	Input exceeded	
		13	Marker 1 quantity	
		14	Marker 2 quantity	
		15	Remaining battery power	
		16	Battery integrity	
		17	Remaining SD card space	
		18	External clock frequency	
		19	Number of bytes that can be recorded (high)	
		20	Number of bytes that can be recorded (low)	
		21	Number of analog data recording bytes	
		22~23	reserve	
pszFileName128	Char*	File name		
Notes	• Use this in cases where CTRS status was confirmed or when a subsequent operation cannot be performed until after confirming whether a process that takes some time to complete has completed on CTRS.			

9-3 Setting/loading DLL internal parameters

9-3-1 Load system information

Definition	long __stdcall Ctrs100_GetSYSInfo(long lUnitType, long lUnitPos, char *pszType32, char *pszCpuVer32, char *pszFpgaVer32, char *pszReserve32, long *plInfo4)		
Argument	Data type	Description	
lUnitType	Long	0: Main unit 1: Measuring unit 2: Expansion unit 3: Remote control	
lUnitPos	Long	Main unit: Fixed at 0 Measuring unit: 0 through 7 Expansion unit: 0 through 4 Remote control unit: Fixed at 0	
pszType32	Char*	Model	
pszCpuVer32	Char*	CPU version	
pszFpgaVer32	Char*	FPGA version	
pszReserve32	Char*	reserve	
plInfo4	Long*	plInfo4[]	Description
		0	Unit type number
		1	Device ID number
		2	Unit classification number
		3	Unit group number
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.		

9-3-2 Configure KS3 file-related settings

Definition	long __stdcall Ctrs100_SetKs3FileName(char *pszFileName64, char *pszFileTitle128, long lFileNo)	
Argument	Data type	Description
pszFileName64	Char*	KS3 file name (up to 63 characters, "." cannot be used)
pszFileTitle128	Char*	File notes (up to 127 characters, "." cannot be used)
lFileNo	Long	File number 0~99,999
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-3 Configure measurement condition settings

Definition	long __stdcall Ctrs100_SetOption(long lSetItem, long *plOption32)		
Argument	Data type	Description	
lSetItem	Long	Bit-compatible	
		0x00000001	KS3 language 0: Japanese 1: English
		0x00000002	BEEP 0: OFF 1: ON (loud) 2: ON (quiet)
		0x00000004	Input exceeded BEEP 0: OFF 1: Only when input exceeded 2: Until REC/STOP
		0x00000008	Do not perform battery error determination 0: OFF 1: ON
		0x00000010	Operation when DC power supply is shutoff 0: OFF 1: Power supply OFF after backup
		0x00000020	Automatic recording recovery 0: Disabled 1: Enabled
		0x00000040	STOP button operation 0: Double press 1: Single press
		0x00000080	BAL button operation 0: Double press 1: Single press

		0x00000100	Option button 1 operation 0: None 1: Start monitor 2: Delete recorded data 3: Reset input exceeded 4: Pause 5: Marker 6: Auto range 7: CAN output
		0x00000200	Option button 2 operation 0: None 1: Start monitor 2: Delete recorded data 3: Reset input exceeded 4: Pause 5: Marker 6: Auto range 7: CAN output
		0x00000400	Timezone Japan: -540
		0x00000800	Power supply shutoff monitoring time Enabled only when power supply is OFF after backup 0: 15 seconds 1 to 60 seconds
		0x00001000	Operation when PC disconnected 0: Stop 1: Continue
		0x00002000	Clock output division ratio 0~65534
		0x00004000	Balancing standard value Enter a value from 0.1 to 50% multiplied by 10 (from 1 to 500: 50 if 0)
		0x00008000	AD restart after recording 0: Disabled 1: Enabled

		0x00010000	Clock output mode 0: Output from startup 1: Output inverted from startup 2: Output only during recording 3: Output inverted only during recording 4: Do not output
		0x00020000	Check during balancing 0x00: Disabled 0x01: Input resistance check 0x02: Burnout check
		0x00040000	Auto range settable range Set from 50 to 100% in increments of 1% (0:70%)
		0x00080000	Pause function 0: Disabled 1: Enabled
		0x00100000	File name assignment rule 0: Number 1: Recording start time
		0x00200000	Number of file digits 0: 4 digits 3 to 5 digits (3 digits: up to 999, 5 digits: up to 99,999)
		0x00400000	Overwrite check 0: Disabled 1: Enabled
		0x00800000	Standard contact compensation 0: Disabled 1: Enabled
		0x01000000	Reserve
		0x02000000	Reserve
		0x04000000	Reserve
		0x08000000	Reserve
		0x10000000	Reserve
		0x20000000	Reserve
		0x40000000	Reserve
0x80000000	Reserve		
plOption32	Long*	Insert the value to set in the array of the corresponding number	
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.		

Definition	long __stdcall Ctrs100_GetOption(long *plOption32)		
Argument	Data type	Description	
lSetItem	Long	plOption32[]	Function
		0	KS3 language 0: Japanese 1: English
		1	BEEP 0:OFF 1: ON (loud) 2: ON (quiet)
		2	Input exceeded BEEP 0:OFF 1: Only when input exceeded 2: Until REC/STOP
		3	Do not perform battery error determination 0:OFF 1:ON
		4	Operation when DC power supply is shutoff 0:OFF 1: Power supply OFF after backup
		5	Automatic recording recovery 0: Disabled 1: Enabled
		6	STOP button operation 0: Double press 1: Single press
		7	BAL button operation 0: Double press 1: Single press
		8	Option button 1 operation 0: None 1: Start monitor 2: Delete recorded data 3: Reset input exceeded 4: Pause 5: Marker 6: Auto range

		9	Option button 2 operation 0: None 1: Start monitor 2: Delete recorded data 3: Reset input exceeded 4: Pause 5: Marker 6: Auto range
		10	Timezone Japan: -540
		11	Power supply shutoff monitoring time Enabled only when power supply is OFF after backup 0: 15 seconds 1 to 60 seconds
		12	Operation when PC disconnected 0: Stop 1: Continue
		13	Clock output division ratio 0~65534
		14	Balancing standard value Enter a value from 0.1 to 50% multiplied by 10 (from 1 to 500: 50 if 0)
		15	AD restart after recording 0: Disabled 1: Enabled
		16	Clock output mode 0: Output from startup 1: Output inverted from startup 2: Output only during recording 3: Output inverted only during recording 4: Do not output
		17	Check during balancing 0x00: Disabled 0x01: Input resistance check 0x02: Burnout check
		18	Auto range settable range Set from 50 to 100% in increments of 1% (0:70%)

		19	Pause function 0: Disabled 1: Enabled
		20	File name assignment rule 0: Number 1: Recording start time
		21	Number of file digits 0: 4 digits 3 to 5 digits (3 digits: up to 999, 5 digits: up to 99,999)
		22	Overwrite check 0: Disabled 1: Enabled
		23	Reserve
		24	Reserve
		25	Reserve
		26	Reserve
		27	Reserve
		28	Reserve
		29	Reserve
		30	Reserve
		31	Reserve
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.		

Definition	long __stdcall Ctrs100_SetMeasMode(long lMeasMode, long lSamplingFrequency, long lSamplingType)	
Argument	Data type	Description
lMeasMode	Long	Measurement mode -1: PC recording mode (without file name and free space check) 0: Manual 1: Interval 2: Analog trigger 3: External trigger 4: Manual trigger 5: Compound trigger
lSamplingFrequency	Long	Sampling frequency 1~100,000(Hz)
lSamplingType	Long	Sampling frequency type 0: Internal clock 1: External clock (conventional operation)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

Definition	long __stdcall Ctrs100_GetMeasMode(long *plMeasMode1, long *plSamplingFrequency1, long *plSamplingType1)	
Argument	Data type	Description
plMeasMode1	Long	Measurement mode -1: PC recording mode (without file name and free space check) 0: Manual 1: Interval 2: Analog trigger 3: External trigger 4: Manual trigger 5: Compound trigger
plSamplingFrequency1	Long	Sampling frequency 1~100,000(Hz)
plSamplingType1	Long	Sampling frequency type 0: Internal clock 1: External clock
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

Definition	long __stdcall Ctrs100_SetManualCondition(long lDataNum, long lRepeatCount, long *plStartTime8)																		
Argument	Data type	Description																	
lDataNum	Long	Amount of manual recorded data 0 or less than 5 seconds: Repeat count must be one recording Other: Pause must be disabled																	
lRepeatCount	Long	Manual repeat count 0: Unlimited From 1 to the limit of digits specified by number of file digits																	
plStartTime	Long*	Manual start time <table><tr><td>plStartTime []</td><td>Description</td></tr><tr><td>0</td><td>Year</td></tr><tr><td>1</td><td>Month</td></tr><tr><td>2</td><td>Day</td></tr><tr><td>3</td><td>Hour</td></tr><tr><td>4</td><td>Minute</td></tr><tr><td>5</td><td>Second</td></tr><tr><td>6~7</td><td>reserve</td></tr></table>		plStartTime []	Description	0	Year	1	Month	2	Day	3	Hour	4	Minute	5	Second	6~7	reserve
plStartTime []	Description																		
0	Year																		
1	Month																		
2	Day																		
3	Hour																		
4	Minute																		
5	Second																		
6~7	reserve																		
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.																		

Definition	long __stdcall Ctrs100_GetManualCondition(long *plDataNum1, long *plRepeatCount1, long *plStartTime8)		
Argument	Data type	Description	
plDataNum1	Long*	Amount of manual recorded data	
plRepeatCount1	Long*	Manual repeat count 0: Unlimited From 1 to the limit of digits specified by number of file digits	
plStartTime8	Long*	Manual start time	
		plStartTime []	Description
		0	Year
		1	Month
		2	Day
		3	Hour
		4	Minute
		5	Second
		6~7	reserve
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.		

9-3-9 Set interval measurement conditions

Definition	long __stdcall Ctrs100_SetIntvalCondition(long lDataNum, long lRepeatCount, long lIntvalTime, long *plStartTime8)			
Argument	Data type	Description		
lDataNum	Long	Amount of interval recorded data From 1 to amount of time recording is possible		
lRepeatCount	Long	Number of intervals 0: Unlimited From 1 to the limit of digits specified by number of file digits		
lIntvalTime	Long	Interval period Specify as the time of a single recording +10 [seconds].		
plStartTime	Long*	plStartTime []	Description	
		0	Year	
		1	Month	
		2	Day	
		3	Hour	
		4	Minute	
		5	Second	
		6~7	reserve	
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.			

Definition	long __stdcall Ctrs100_GetIntvalCondition(long *plDataNum1, long *plRepeatCount1, long *plIntvalTime1, long *plStartTime8)			
Argument	Data type	Description		
plDataNum1	Long*	Amount of interval recorded data From 1 to amount of time recording is possible		
plRepeatCount1	Long*	Number of intervals 0: Unlimited From 1 to the limit of digits specified by number of file digits		
plIntvalTime1	Long*	Interval period Set a value equal to or greater than 10 seconds + the amount of data (converted into seconds and rounded up).		
plStartTime8	Long*	plStartTime []	Description	
		0	Year	
		1	Month	
		2	Day	
		3	Hour	
		4	Minute	
		5	Second	
		6~7	reserve	
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.			

9-3-11 Set trigger overall conditions

Definition	long __stdcall Ctrs100_SetTriggerCondition(long lDataNum, long lRepeatCount, long lEndTrigger, long lPriDataNum, long lPostDataNum)	
Argument	Data type	Description
lDataNum	Long	Amount of trigger recorded data 0: Specify if end trigger exists From 1 to amount of time recording is possible
lRepeatCount	Long	Trigger repeat count 0: Unlimited From 1 to the limit of digits specified by number of file digits
lEndTrigger	Long	End trigger mode 0: None 1: Yes
lPriDataNum	Long	Amount of pre-data 0 to 524,288 (up to 2*1024*1024 [bytes])
lPostDataNum	Long	Amount of post-data 0 to 524,288 (up to 2*1024*1024 [bytes])
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

Definition	long __stdcall Ctrs100_GetTriggerCondition(long *plDataNum1, long *plRepeatCount1, long *plEndTrigger1, long *plPriDataNum1, long *plPostDataNum1)	
Argument	Data type	Description
plDataNum1	Long*	Amount of trigger recorded data 0: Specify if end trigger exists From 1 to amount of time recording is possible
plRepeatCount1	Long*	Trigger repeat count 0: Unlimited From 1 to the limit of digits specified by number of file digits
plEndTrigger1	Long*	End trigger mode 0: None 1: Yes
plPriDataNum1	Long*	Amount of pre-data 0 to 524,288 (up to 2*1024*1024 [bytes])
plPostDataNum1	Long*	Amount of post-data 0 to 524,288 (up to 2*1024*1024 [bytes])
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

Definition	long __stdcall Ctrs100_SetAnalogTriggerCondition (long *plStartCondition4,, Char *pszStartLevel28,, long *plEndCondition4, char *pszEndLevel28)			
Argument	Data type	Description		
plStartCondition4	Long*	plStartCondition4[]	Description	
		0	Start trigger channel (1 to 32)	
		1	Start trigger slope 0: UP 1: DOWN	
		2	Start trigger level (AD) ± 8192000	
		3	Reserve	
pszStartLevel28	Char*	Start trigger level (physical amount, up to 127 characters)		
plEndCondition4	Long*	plEndCondition4[]	Description	
		0	End trigger channel (1 to 32)	
		1	End trigger slope	
		2	End trigger level (AD)	
		3	Reserve	
pszEndLevel28	Char*	End trigger level (physical amount, up to 127 characters)		
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.			

Definition	long __stdcall Ctrs100_GetAnalogTriggerCondition (long *plStartCondition4,, Char *pszStartLevel28,, long *plEndCondition4, char *pszEndLevel28)			
Argument	Data type	Description		
plStartCondition4	Long*	plStartCondition4[]	Description	
		0	Start trigger channel	
		1	Start trigger slope	
		2	Start trigger level (AD)	
		3	reserve	
pszStartLevel28	Char*	Start trigger level (physical amount)		
plEndCondition4	Long*	plEndCondition4[]	Description	
		0	End trigger channel	
		1	End trigger slope	
		2	End trigger level (AD)	
		3	reserve	
pszEndLevel28	Char*	End trigger level (physical amount)		
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.			

9-3-15 Set external trigger conditions

Definition	long __stdcall Ctrs100_SetExTriggerCondition(long lStartSlope, long lEndSlope)	
Argument	Data type	Description
lStartSlope	Long	Start trigger slope 0: UP 1: DOWN
lEndSlope	Long	End trigger slope 0: UP 1: DOWN
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-16 Load external trigger conditions

Definition	long __stdcall Ctrs100_GetExTriggerCondition(long *plStartSlope1, long *plEndSlope1)	
Argument	Data type	Description
plStartSlope	Long*	Start trigger slope 0: UP 1: DOWN
plEndSlope	Long*	End trigger slope 0: UP 1: DOWN
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

Definition	long __stdcall Ctrs100_SetExternalTriggerCondition (long *plAndOr4, long *plStartCondition20, long *plEndCondition20)		
Argument	Data type	Description	
plAndOr4	Long*	Start/end AND/OR setting (0: OR, 1: AND)	
		plAndOr4[]	Description
		0	Analog trigger CH1 and CH2 AND/OR setting
		1	Analog trigger CH3 and CH4 AND/OR setting
		2	AND/OR setting for two settings listed above
		3	reserve
plStartCondition20	Long*	Start compound trigger conditions	
		plStartCondition20[]	Description
		0	Trigger condition 1 0: Unused 1: Analog
		1	Trigger channel 1 1~32
		2	Trigger slope 1 0:UP 1:DOWN
		3	Trigger level (analog) 1 ±8192000
		4~7	Condition 2
		8~11	Condition 3
		12~15	Condition 4
		16	External trigger 0: Disabled 1: Enabled
		17	External trigger slope 0: UP 1: DOWN
		18	Manual trigger 0: Disabled 1: Enabled

		19	Reserve
plEndCondition20	Long*	End compound trigger conditions Refer to start compound trigger conditions	
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.		

9-3-18 Load compound trigger conditions

Definition	long __stdcall Ctrs100_GetExternalTriggerCondition (long *plAndOr4, long *plStartCondition20, long *plEndCondition20)		
Argument	Data type	Description	
plAndOr4	Long*	Start/end AND/OR	
		plAndOr4[]	Description
		0	CH1/CH2
		1	CH3/CH4
		2	0/1
		3	reserve
plStartCondition20	Long*	Start compound trigger conditions	
		plStartCondition20[]	Description
		0	Trigger condition 1 0: Unused 1: Analog
		1	Trigger channel 1 1~32
		2	Trigger slope 1 0: UP 1: DOWN
		3	Trigger level (analog) 1 ± 8192000
		4~7	Condition 2
		8~11	Condition 3
		12~15	Condition 4
		16	External trigger 0: Disabled 1: Enabled
		17	External trigger slope 0:UP 1:DOWN

		18	Manual trigger 0: Disabled 1: Enabled
		19	reserve
plEndCondition20	Long*	End compound trigger conditions Refer to start compound trigger conditions	
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.		

9-3-19 Set marker name

Definition	long __stdcall Ctrs100_SetMakerInfo(long lMakerNo, char *pszMakerInfo128)	
Argument	Data type	Description
lMakerNo	Long	1~2
pszMakerInfo128	Char*	Marker name (up to 127 characters, "." cannot be used)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-20 Load marker name settings

Definition	long __stdcall Ctrs100_GetMakerInfo(long lMakerNo, char *pszMakerInfo128)	
Argument	Data type	Description
lMakerNo	Long	1~2
pszMakerInfo128	Char*	Marker name
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

9-3-21 Set test information

Definition	long __stdcall Ctrs100_SetTestInfo(long lTestNo, char *pszTestInfo128)	
Argument	Data type	Description
lTestNo	Long	1~10
pszTestInfo128	Char*	Arbitrary test information (up to 127 characters, "." cannot be used)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

Definition	long __stdcall Ctrs100_GetTestInfo(long lTestNo, char *pszTestInfo128)	
Argument	Data type	Description
lTestNo	Long	Number of arbitrary test information to load (1 to 10)
pszTestInfo128	Char*	Arbitrary test information
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

Definition	long __stdcall Ctrs100_SetChCondition(long lChNo, long lSetItem, long *plChCond16, char *pszCoeff28, char *pszOffset28, char *pszCable28, char *pszUnit32, char *pszName128)		
Argument	Data type	Description	
lChNo	Long	Channel number (0 to 31)	
lSetItem	Long	Bit-compatible	
		0x00000001	Measurement ON/OFF
		0x00000002	Mode number
		0x00000004	Range number
		0x00000008	HPF number
		0x00000010	LPF number
		0x00000020	Balancing ON/OFF
		0x00000040	Input check
		0x00000080	Number of digits after decimal point
		0x00000100	Upper limit check value
		0x00000200	Lower limit check value
		0x00000400	Calibration factor
		0x00000800	Offset
		0x00001000	Cable factor
		0x00002000	Unit character string
		0x00004000	Channel name
		0x00008000	Reserve
plChCond16	Long*	plChCond16[]	Description
		0	Measurement ON/OFF -1: No channel 0: Do not measure 1: Measure
		1	Mode number 0 to ?
		2	Range number
		3	HPF number
		4	LPF number

		5	Balancing ON/OFF 0: OFF 1: ON 2: NONE
		6	Input check (bit-compatible) 0x00: OFF 0x02: Input resistance 0x04: Burnout
		7	Number of digits after decimal point -1: Automatic 0~8
		8	Upper limit check value (*) Full scale $\pm 100\%$
		9	Lower limit check value (*) Full scale $\pm 100\%$
		10	Reserve
		11	Reserve
		12	Reserve
		13	Reserve
		14	Reserve
		15	Reserve
		pszCoeff28	Char*
pszOffset28	Char*	Offset (up to 27 characters)	
pszCable28	Char*	Cable factor (up to 27 characters)	
pszUnit32	Char*	Unit character string (up to 31 characters, "." cannot be used)	
pszName128	Char*	Channel name (up to 127 characters, "." cannot be used)	
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10. * The upper limit check value must be larger than the lower limit check value.		

Definition	long __stdcall Ctrs100_GetChCondition(long lChNo, long *plChCond16, char *pszCoeff28, char *pszOffset28, char *pszCable28, char *pszUnit32, char *pszName128)		
Argument	Data type	Description	
lChNo	Long	Channel number (0 to 31)	
plChCond16	Long*	plChCond16[]	Description
		0	Measurement ON/OFF -1: No channel 0: Do not measure 1: Measure
		1	Mode number 0 to ?
		2	Range number -1: Use range value (do not use range number)
		3	HPF number
		4	LPF number
		5	Balancing ON/OFF 0: OFF 1: ON 2: NONE
		6	Input check (bit-compatible) 0x00: OFF 0x02: Input resistance 0x04: Burnout
		7	Range value
		8	Number of digits after decimal point -1: Automatic 0~8
		9	Upper limit check value Full scale $\pm 100\%$
		10	Lower limit check value Full scale $\pm 100\%$
		11	Reserve
		12	Reserve

		13	Reserve
		14	Reserve
		15	Reserve
pszCoeff28	Char*	Calibration factor	
pszOffset28	Char*	Offset	
pszCable28	Char*	Cable factor	
pszUnit32	Char*	Unit character string	
pszName128	Char*	Channel name	
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.		

9-3-25 Set offset zero conditions

Definition	long __stdcall Ctrs100_SetChOffsetZero(long lChNo, long lOnOff, char *pszZeroValue28)	
Argument	Data type	Description
lChNo	Long	Channel number (0 to 31)
lOnOff	Long	Offset zero ON/OFF 0: OFF 1: ON
pszZeroValue28	Char*	Offset zero value (up to 27 characters)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-26 Load offset zero condition settings

Definition	long __stdcall Ctrs100_GetChOffsetZero(long lChNo, long *plOnOff, char *pszZeroValue28)	
Argument	Data type	Description
lChNo	Long	Channel number
plOnOff	Long*	Offset zero ON/OFF 0: OFF 1: ON
pszZeroValue28	Char*	Offset zero value
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

9-3-27 Set channel name

Definition	long __stdcall Ctrs100_SetChNameEx(long lChNo, char *pszChName32)	
Argument	Data type	Description
lChNo	Long	Channel number (0 to 31)
pszChName32	Char*	Channel name (up to 31 characters, "." cannot be used)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-28 Load channel name

Definition	long __stdcall Ctrs100_GetChNameEx(long lChNo, char *pszChName32)	
Argument	Data type	Description
lChNo	Long	Channel number
pszChName32	Long	Channel name
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

9-3-29 Set TEDS information for channel conditions

Definition	long __stdcall Ctrs100_SetChTeds(long lChNo, char *pszUserData32, char *pszSerialNo16, char *pszType32, char *pszRomId32)	
Argument	Data type	Description
lChNo	Long	Channel number (0 to 31)
pszUserData32	Char*	TEDS user data (up to 31 characters, "." cannot be used)
pszSerialNo16	Char*	Sensor manufacturing number (up to 15 characters, "." cannot be used)
pszType32	Char*	Sensor model (up to 31 characters, "." cannot be used)
pszRomId32	Char*	TEDS ROMID (up to 31 characters, "." cannot be used)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-30 Load TEDS information for channel conditions

Definition	long __stdcall Ctrs100_GetChTeds(long lChNo, char *pszUserData32, char *pszSerialNo16, char *pszType32, char *pszRomId32)	
Argument	Data type	Description
lChNo	Long	Channel number (0 to 31)
pszUserData32	Char*	TEDS user data
pszSerialNo16	Char*	Sensor manufacturing number
pszType32	Char*	Sensor model
pszRomId32	Char*	TEDS ROMID
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

9-3-31 Set rated capacity, etc.

Definition	long __stdcall Ctrs100_SetChRatedCapacity (long lChNo, long lEnable, char *pszRatedCapacity28 char *pszRatedOutput28, char *pszRatedOutputStrain28)	
Argument	Data type	Description
lChNo	Long	Channel number
lEnable	Long	Rated capacity and rated output information status 0: Rated capacity and rated output information disabled 1: Set rated capacity and rated output (sensor output) 2: Set rated capacity, rated output (sensor output), and rated output (mV/V)
pszRatedCapacity28	Char*	Rated capacity (up to 27 characters)
pszRatedOutput28	Char*	Rated output (sensor output, up to 27 characters)
pszRatedOutputStrain28	Char*	Rated output (mV/V, up to 27 characters)
Notes	If a parameter was changed using this function, in order to configure CTRS, make sure to execute Ctrs100_MES10.	

9-3-32 Load rated capacity, etc. settings

Definition	long __stdcall Ctrs100_GetChRatedCapacity (long lChNo, long *plEnable1, char *pszRatedCapacity28 char *pszRatedOutput28, char *pszRatedOutputStrain28)	
Argument	Data type	Description
lChNo	Long	Channel number
plEnable1	Long	Rated capacity and rated output information status 0: Rated capacity and rated output information disabled 1: Set rated capacity and rated output (sensor output) 2: Set rated capacity, rated output (sensor output), and rated output (mV/V)
pszRatedCapacity28	Char*	Rated capacity
pszRatedOutput28	Char*	Rated output (sensor output)
pszRatedOutputStrain28	Char*	Rated output (mV/V)
Notes	To obtain the latest information in CTRS, before executing this function, execute Ctrs100_MES00.	

9-4 General-purpose functions

9-4-1 Collect data file (KS3 file) from CTRS SD card

Definition	long __stdcall Ctrs100_ExeDownloadFile(char *pszFileName128, char *pszDestination260)	
Argument	Data type	Description
pszFileName128	Char*	File name to collect (up to 127 characters including extension, "." cannot be used)
pszDestination260	Char*	Absolute path for KS3 file collection (up to 259 characters, "." cannot be used)
Notes	If suspending this function, make sure to call Ctrs100_StandStopFlag0. To obtain the progress (%), use Ctrs100_ReturnProgress0.	

9-4-2 Convert KS3 file on a PC into CSV file

Definition	long __stdcall Ctrs100_ExeConvertKs3ToCsv (char *pszFileName260)	
Argument	Data type	Description
pszFileName260	Char*	Absolute path of KS3 file to convert (including extension)
Notes	When this function is executed, the CSV file will be output in the same folder as the selected KS3 file. The following information will be output to the CSV file: • File notes • Sampling frequency (Hz) • Number of channels • Channel number • Channel name • Range • High-pass filter • Low-pass filter • Calibration factor • Offset • Offset zero value (output if set) • Cable factor • Unit • Recorded data (physical amount)	

9-4-3 Obtain ExeDownloadFile and ExeConvertKs3ToCsv progress

Definition	long __stdcall Ctrs100_ReturnProgress(long* plProgress)	
Argument	Data type	Description
plProgress	Long*	Progress (0 to 100)
Notes		

9-4-4 Stop ExeDownloadFile and ExeConvertKs3ToCsv operations

Definition	long __stdcall Ctrs100_StandStopFlag()	
Argument	Data type	Description
None		
Notes	If suspending Ctrs100_ExeDownloadFile() and Ctrs100_ExeConvertKs3ToCsv() operations, make sure to execute this function.	