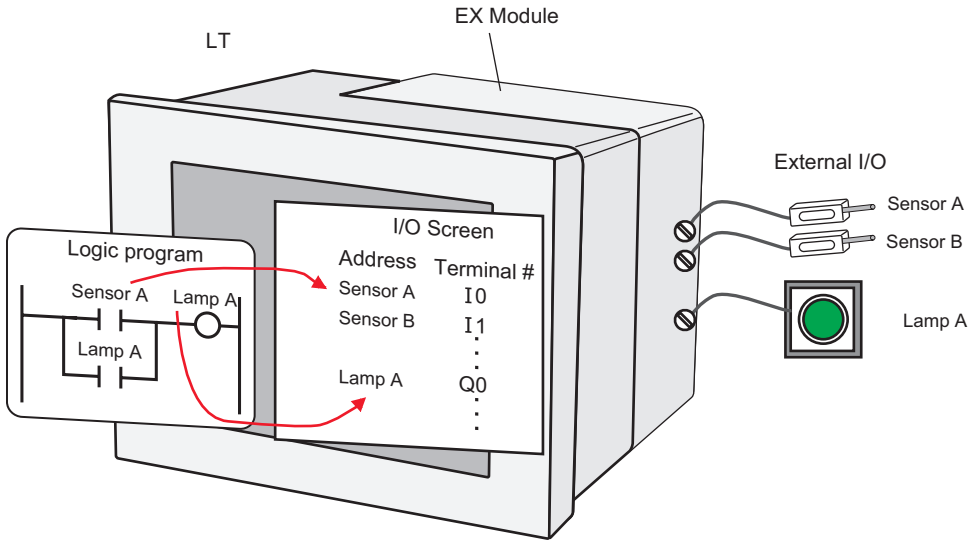# 30.6 Controlling I/O in LT and EX Modules

30.6.1 Detail

When you install an EX module in the LT, in addition to standard inputs and outputs you can run analog I/O and temperature inputs (thermocouple and Pt 100).

IMPORTANT	• Internal communication between the LT unit and EX module may experience a maximum delay of scan time + 10 milliseconds. In addition, because the EX module (hardware) also has a delay, to calculate the actual delay time for inputs and outputs, you need to also add the EX module delay time.

| NOTE	• Please refer to the following for details on LT processes.) "30.5.3 Interface Specification" (page 30-46)

■ EX Modules: Models and Features

| Feature	Model	Description	Browse to
Standard Input	EXM-DDI8DT	DIO Module: 8-input sink/source	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ DIO Input Module" (page 30-131)
	EXM-DDI16DT	DIO Module: 16-input sink/source	
Standard Output	EXM-DDO8UT	DIO module: 8-output sink	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ DIO Output Module" (page 30-131)
	EXM-DDO8TT	DIO module: 8-output source	
	EXM-DRA8RT	DIO module: 8-output relay	
	EXM-DDO16UK	DIO Module: 16-output sink	
	EXM-DDO16TK	DIO Module: 16-output source	
	EXM-DRA16RT	DIO Module: 16-output relay	
Standard IO	EXM-DMM8DRT	DIO Module: 4-input sink/source DIO Module: 4-output relay	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ DIO Input/Output Module" (page 30-132)
Analog Input	EXM-AMI2HT	Analog Module: 2-input voltage/current	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ Analog Input Module" (page 30-132)
Analog Output	EXM-AMO1HT	Analog Module: 1-output voltage/current	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ Analog Output Module" (page 30-133)
Analog IO	EXM-AMM3HT	Analog Module: 2-input voltage/current Analog Module: 1-output voltage/current	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ Analog Input/Output Module" (page 30-134)
	EXM-ALM3LT	Analog Module: Input 2 Points Thermocouple/Pt100 Analog Module: 1-output voltage/current	☞ "30.6.3 I/O Driver's [External Driver] Settings Guide ■ Temperature Input Module" (page 30-136)

30.6.2　Setup Procedure
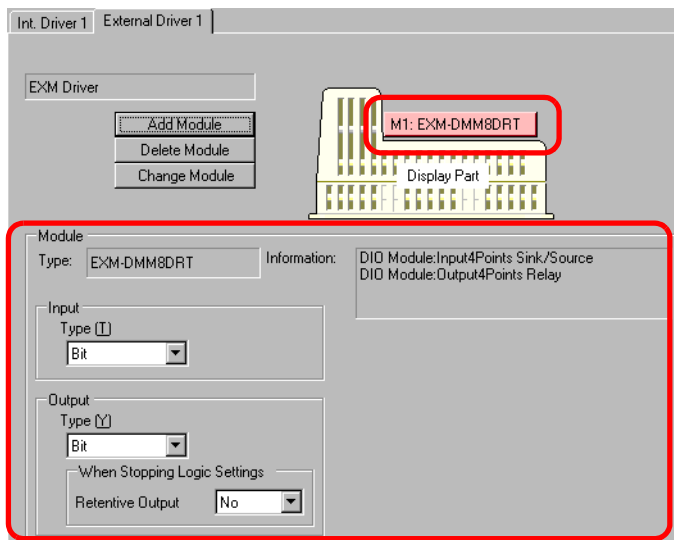
Settings for the EX modules can be specified as follows.

1 From the [System Settings] window, select [I/O Driver] to update the workspace and click the [External Driver] tab.
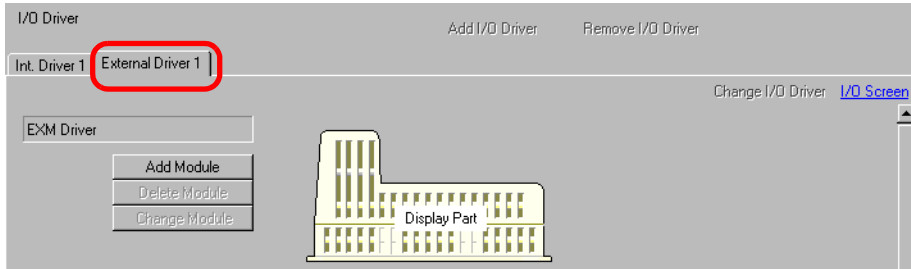
2 Click [Add Module] to display the [Module Details] dialog box. Specify the EX module type and click [OK].
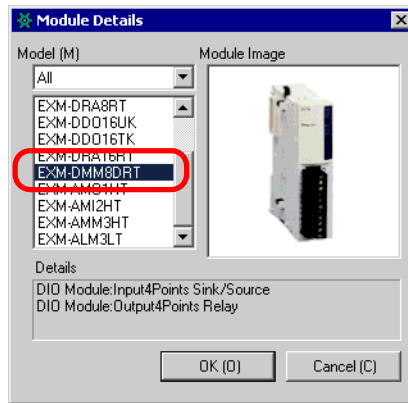
3 The module-specific settings appear. For details about each, see the Settings Guide.

4 To add, change, and delete modules, click the module and the button shown below.
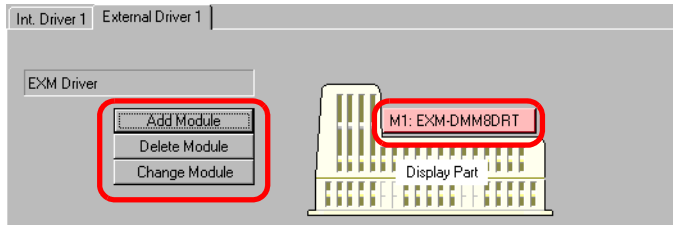
| NOTE | • For LT-3200 series, you can add up to two units, or three units for LT-3300 series. |

30.6.3 I/O Driver's [External Driver] Settings Guide

The following describes the detail settings for each module you can add in the [External Driver] tab, accessible from the System Settings window, [I/O Driver] link.
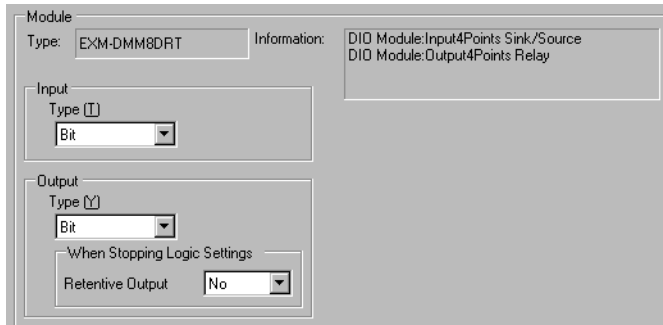
■ DIO Input Module

Setting		Description
Input		Configures settings for module input terminals.
	Type	Select the variable type for the input from either [Bit] or [Word].

■ DIO Output Module

Setting		Description
Output		Configures settings for module output terminals.
	Type	Select the variable type for the output from either [Bit] or [Word].
	Retentive Output	Specifies whether or not to keep the output when the logic is off. Select [Enable] to retain output values even if the logic stops.

■ DIO Input/Output Module

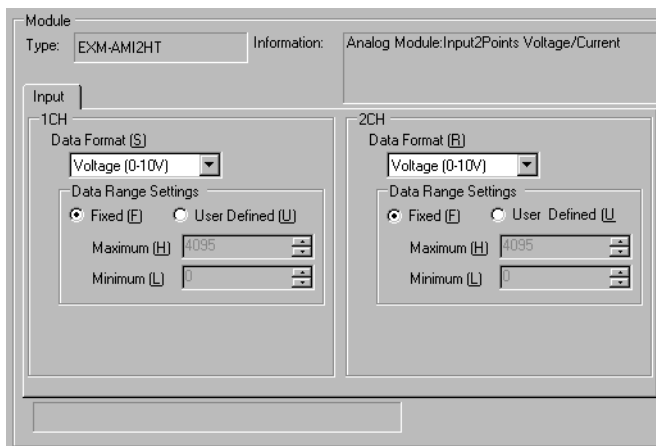| Setting		Description
Input		Configures settings for module input terminals.
	Type	Select the variable type for the input from either [Bit] or [Word].
Output		Configures settings for module output terminals.
	Type	Select the variable type for the output from either [Bit] or [Word].
	Retentive Output	Specifies whether or not to keep the output when the logic is off. Select [Enable] to retain output values even if the logic stops.

■ Analog Input Module
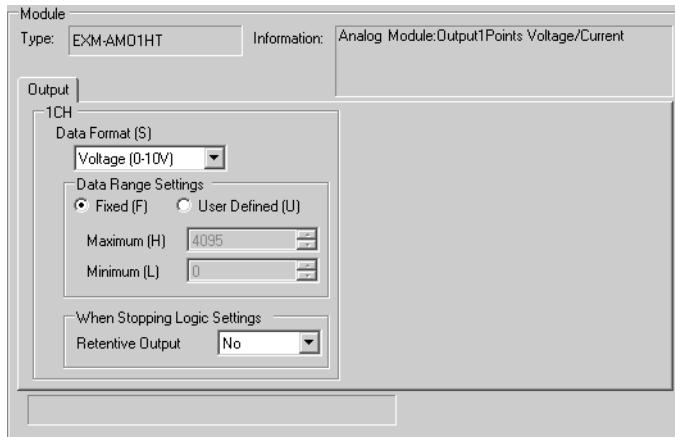

Setting		Description
Input (1CH, 2CH)		Configures settings for module analog input terminals.
	Data Type	Select a data type from either [Voltage (0-10V)] or [Current (4-20mA)] for analog input.

Continued

Setting		Description
Input (1CH, 2CH)	Fixed	The analog values in the voltage and current input settings appear in the range of 0 to 4095 as shown below. Displayed value
	User Defined (Maximum/ Minimum)	The analog values in the voltage and current input settings appear within the range of [Maximum] and [Minimum] settings. The available values are as follows. Maximum: minimum to 32767 Minimum: −32768 to maximum

■ Analog Output Module
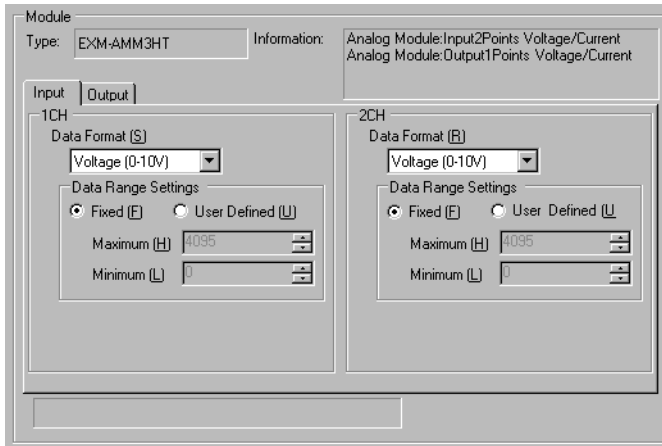

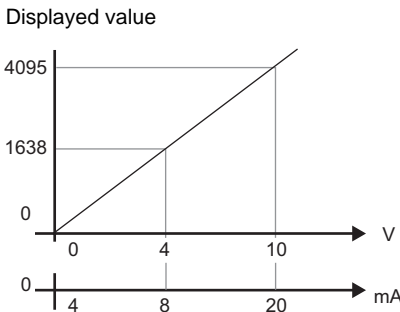| Setting		Description
Output (1 CH)		Configures settings for module analog output terminals.
	Data Type	Select a data type from either [Voltage (0-10V)] or [Current (4-20mA)] for analog output.

Continued

Setting		Description
Output (1 CH)	Fixed	The analog values in the voltage and current output settings appear in the range of 0 to 4095 as shown below.
		Displayed value
	User Defined (Maximum/ Minimum)	The analog values in the voltage and current output settings appear within the range of [Maximum] and [Minimum] settings. The available values are as follows. Maximum: minimum to 32767 Minimum: −32768 to maximum
	Retentive Output	Specifies whether or not to keep the output when the logic is off. Select [Enable] to retain output values even if the logic stops.

■ Analog Input/Output Module

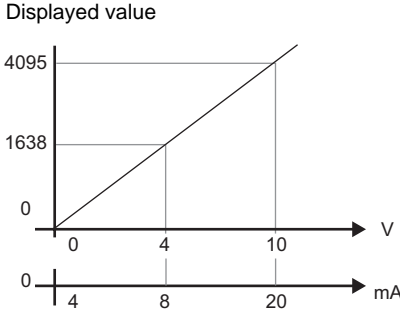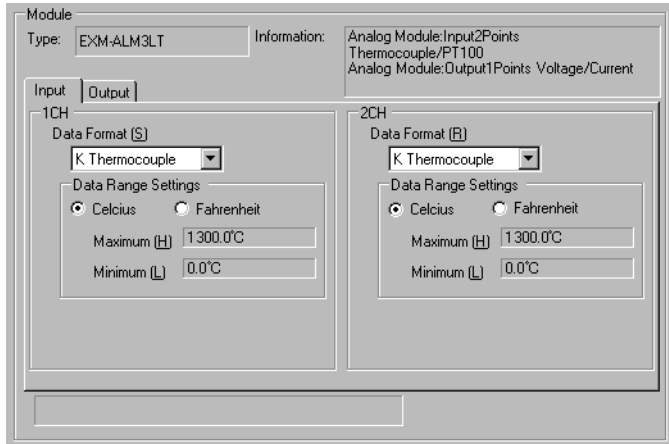| Setting		Description
Input (1CH, 2CH)		Configures settings for module analog input terminals.
	Data Type	Select a data type from either [Voltage (0-10V)] or [Current (4-20mA)] for analog input.

Continued

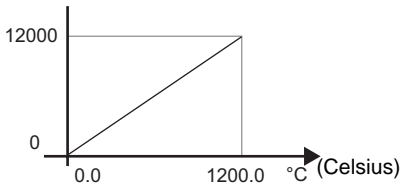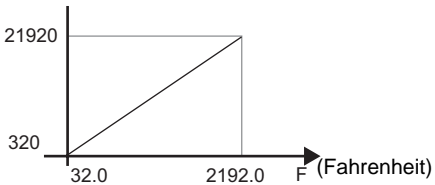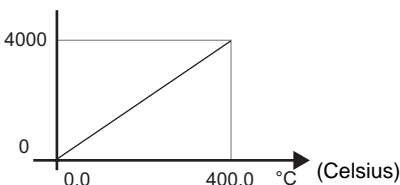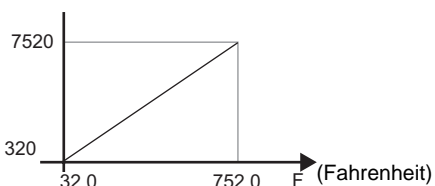| Setting		Description
Input (1CH, 2CH)	Fixed	The analog values in the voltage and current input settings appear in the range of 0 to 4095 as shown below. Displayed value 4095 1638 0 0 4 10 V 0 4 8 20 mA
	User Defined (Maximum/ Minimum)	The analog values in the voltage and current input settings appear within the range of [Maximum] and [Minimum] settings. The available values are as follows. Maximum: minimum to 32767 Minimum: −32768 to maximum
Output (3CH)		Configures settings for module analog output terminals.
	Data Type	Select a data type from either [Voltage (0-10V)] or [Current (4-20mA)] for analog output.
	Fixed	The analog values in the voltage and current output settings appear in the range of 0 to 4095 as shown below. Displayed value 4095 1638 0 0 4 10 V 0 4 8 20 mA
	User Defined (Maximum/ Minimum)	The analog values in the voltage and current output settings appear within the range of [Maximum] and [Minimum] settings. The available values are as follows. Maximum: minimum to 32767 Minimum: −32768 to maximum
	Retentive Output	Specifies whether or not to keep the output when the logic is off. Select [Enable] to retain output values even if the logic stops.

◼ Temperature Input Module

Setting		Description
Input (1CH, 2CH)		Configures settings for module temperature input terminals.
	Data Type	Select a data type for thermocouple input from below. • K Thermocouple • J Thermocouple • T Thermocouple • Pt100
	K Thermocouple Celsius/ Fahrenheit	The K thermocouple temperature range is as follows. • Celsius The displayed value is 10 times the input value ranging from 0.0°C to 1300.0°C (0 to 13000). • Fahrenheit The displayed value is 10 times the input value ranging from 32.0F to 2372.0F (320 to 23720).

Continued

Setting		Description
Input (1CH, 2CH)	J Thermocouple Celsius/ Fahrenheit	The J thermocouple temperature range is as follows. • Celsius The displayed value is 10 times the input value ranging from 0.0°C to 1200.0°C (0 to 12000). • Fahrenheit The displayed value is 10 times the input value ranging from 32.0F to 2192.0F (320 to 21920).
	T Thermocouple Celsius/ Fahrenheit	The T thermocouple temperature range is as follows. • Celsius The displayed value is 10 times the input value ranging from 0.0°C to 400.0°C (0 to 4000). • Fahrenheit The displayed value is 10 times the input value ranging from 32.0F to 752.0F (320 to 7520).

Continued

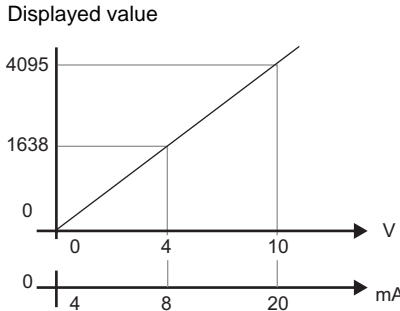| Setting		Description
Input (1CH, 2CH)	Pt100 Celsius/ Fahrenheit	The Pt100 temperature range is as follows. • Celsius The displayed value is 10 times the input value ranging from −100.0°C to 500.0°C (−1000 to 5000). • Fahrenheit The displayed value is 10 times the input value ranging from −148.0F to 932.0F (−1480 to 9320).
Output (3CH)		Configures settings for module analog output terminals.
	Data Type	Select a data type from either [Voltage (0-10V)] or [Current (4-20mA)] for analog output.
	Fixed	The analog values in the voltage and current output settings appear in the range of 0 to 4095 as shown below.
	User Defined (Maximum/ Minimum)	The analog values in the voltage and current output settings appear within the range of [Maximum] and [Minimum] settings. The available values are as follows. Maximum: minimum to 32767 Minimum: −32768 to maximum
	Retentive Output	Specifies whether or not to keep the output when the logic is off. Select [Enable] to retain output values even if the logic stops.

30.6.4   Error information

The system variable #L_IOStatus stores error information in the bottom 8 bits.

#L_IOStatus

H	Module Number								
L	Critical Failure	0	0	0	0	0	Settings	Verifications	Error Code

Verifications
When the I/O attribute of the specified unit is the same as that of the actually connected unit, but the points differ, "1" is set.

Settings
When the I/O attribute of the specified unit is different from that of the actually connected unit, "1" is set.

Critical Failure
When an error is detected which requires the logic to stop, sets a value of " 1".

■ Error code

	Error Code	Error Messages	Description		Solution
Project date related error	001	Module type error	Unsupported module type	Logic stop error	The project file might not have been sent properly. Transfer the project file again.
	002	Setting value error	The variable mapped to the terminal is incorrect. Invalid terminal settings		
	003	Device out-of-range error	The variable address allocated to the terminal is not correct.		
	004	Excess terminal settings	The number of terminals is not correct. (Too many terminals)		
	005	Terminal setting order error	The terminal no. is not in ascending order.		
	006	Terminal registry short	The number of terminals is not correct. (Too few terminals)		
	007	Module settings duplicated	The module is registered twice.		
	008	Excess module settings	Module number is invalid (too many modules)		
	009	Driver settings duplicated	The driver is registered twice.		
	010	I/O settings inconsistent	The terminal settings are not correct (Module I/O settings are not consistent).		
	011	Bit/Integer type inconsistent	The terminal settings are not correct (Module variable type settings are not consistent).		
	012	Setting level value error	The driver is not correct.		
	013	Data obtaining address error	The driver information is in correct. The controller information is not correct.		
	014	Driver ID error	The driver/Module registry results in an error and have not been registered.		
	015	Module setting order error	The module no. is not in ascending order.		

Continued

	Error Code	Error Messages	Description		Solution
HW related error	050	I/O board ID different	The connected I/O board is not correct.		The display type might not be correct. Check the display type and transfer the project file again.
	051	Unsupported model error	The driver does not support the model.		
	052	I/O board initialization error	The I/O board initialization fails.		The project file might not have been sent properly. Transfer the project file again. If the problem is still not solved, there may be a problem with the hardware. Contact your support center.

Continued

	Error Code	Error Messages	Description		Solution
Application related error	100	Module initialization error	Either the module is not connected correctly or it's broken	I/O update error	Module may not be connected correctly. Reconnect the module and turn the power on again. If this does not resolve the problem, the module itself may be broken. Please contact customer support
	101	Module initialization response error	Either the module is not connected correctly or it's broken		
	102	Module initialize send error	Either the module is not connected correctly or it's broken		
	103	Module initialize receive error	Either the module is not connected correctly or it's broken		
	104	Module initialization end error	Either the module is not connected correctly or it's broken		
	105	Module connection count error	Too many connected modules		There are too many modules connected. Reduce the number of modules to an acceptable number then turn the power on again.
	106	Unsupported module	An unsupported module is connected		An unsupported module is connected. Remove the unsupported module then turn the power on again.
	107	Mode setup value error	Mode setup value error		Project may not be transferred correctly to the display unit. Transfer the project again.
	108	Analog data range error	Analog module maximum/ minimum value setup error		
	109	Module setup error	When setup information and connected module do not match	Critical Failure	The setup information in the project and the connected module are different. Connect the defined module and turn the power back on.
	120	Module verification error	When the setup information and module do not match		

Continued

	Error Code	Error Messages	Description		Solution
Application related error	121	Module response error	Either the module is not connected correctly or it's broken	Critical Failure	Module may not be connected correctly. Reconnect the module and turn the power on again. If this does not resolve the problem, the module itself may be broken. Please contact customer support
	122	Module send error	Either the module is not connected correctly or it's broken		
	123	Module receive error	Either the module is not connected correctly or it's broken		
	124	Module communication setup error	Communication data error		
	125	Module ACK error	Either the module is not connected correctly or it's broken		
	126	Module communication error	Either the module is not connected correctly or it's broken		
	127	Analog output error	Writing analog output request flag is incomplete		Project may not be transferred correctly to the display unit. Transfer the project again. If the problem is still not solved, there may be a problem with the hardware. Contact your support center.
	128	Output data error	Analog output data range error		Output data is outside the setup range or output is stopped. Output data in the defined range.
	129	Analog external power error	Problem with the analog's external power supply		An external power supply is not powering the analog module. Connect power to the analog module.
	130	Input data error	Analog input data range error		Input data is outside the setup range or input is stopped. Input data in the defined range.

Continued

	Error Code	Error Messages	Description		Solution
Internal error	200	Integer type data read error	Reading the integer type terminal data value failed.	Critical Failure	The project file might not have been sent properly. Transfer the project file again.
	201	Bit type data read error	Reading the bit type terminal data value failed.		
	202	Integer type data write error	Writing the integer type terminal data value failed.		
	203	Bit type data write error	Writing the bit type terminal data value failed.		

30.6.5   Restrictions

- Power for the analog module should be separate from the LT unit's power supply. When turning the LT unit ON, first supply the module with power for 1 second or longer before you turn ON the LT unit. After turning the power OFF, wait long enough before powering on again to prevent malfunctions.
- When using the analog module (set up with 4 to 20 mA), and signals are less than 4 mA or greater than 20 mA, an abnormal data error message displays. In this scenario, inputs retain their previous values before the error.