User's Manual

DTSX1 Fiber Optic Heat Detector Installation, Configuration and Operation Guide

IM 39J06B35-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 39J06B35-01EN
12th Edition

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Introduction

■ About This Document

This user's manual (IM 39J06B35-01EN) explains how to install, configure, and operate the DTSX1 Fiber Optic Heat Detector. This manual is written for all those who will be using the DTSX1 Fiber Optic Heat Detector.
Before using the DTSX1, read this document and "Read Me First" (IM 39J06A35-01EN).

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Safety Precautions

■ Safety, Protection, and Modification of the Product

- In order to protect the product and ensure safe operation, observe the safety precautions described in this instruction manual. We assume no liability for safety if users fail to observe these instructions when operating the product.
- If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- If any protection or safety circuit is required for the product, prepare it separately.
- Be sure to use the spare parts approved by Yokogawa Electric Corporation (hereafter simply referred to as YOKOGAWA) when replacing parts or consumables.
- Modification of the product is strictly prohibited.
- The following symbols are used in the product and instruction manual to indicate that there are precautions for safety:



Indicates that warning is required for operation. This symbol is placed on the product to refer the user to the instruction manual in order to protect the operator and the equipment. In the instruction manuals you will find precautions to avoid physical injury or death of the operator, including electrical shocks.



Indicates a caution of high temperature surface.



Indicates a caution of Laser radiation.



Identifies a functional grounding terminal. Before using the product, ground the terminal.

Indicates a DC supply.

■ Notes on Manuals

- Please hand over the user's manuals to your end users so that they can keep the manuals on hand for convenient reference.
- Please read the information thoroughly before using the product.
- The purpose of these manuals is not to warrant that the product is well suited to any particular purpose but rather to describe the functional details of the product.
- No part of the manuals may be transferred or reproduced without prior written consent from YOKOGAWA.
- YOKOGAWA reserves the right to make improvements in the manuals and product at any time, without notice or obligation.
- If you have any questions, or you find mistakes or omissions in the manuals, please contact our sales representative or your local distributor.

■ Disclaimer

- The product is provided on an "as is" basis.
- YOKOGAWA shall have neither liability nor responsibility to any person or entity with respect to any direct or indirect loss or damage arising from using the product or any defect of the product that YOKOGAWA cannot predict in advance.

■ Notes on Hardware

● Appearance and Accessories

Check the following when you receive the product:

- Appearance

Contact our sales representative or your local distributor if the product's coating has come off, it has been damaged, or there is shortage of required accessories.

● Model and Suffix Codes

The name plate on the product contains the model and suffix codes. Compare them with those in the general specification to make sure the product is the correct one. If you have any questions, contact our sales representative or your local distributor.

■ Symbol Marks

Throughout this manual, you will find several different types of symbols being used to identify different sections of text. This section describes these icons.



WARNING

Identifies instructions that must be observed in order to avoid physical injury and electric shock or death of the operator.

CAUTION

Identifies instructions that must be observed in order to prevent the software or hardware from being damaged or the system from becoming faulty.

IMPORTANT

Identifies important information required to understand operations or functions.

TIP

Identifies additional information.

SEE ALSO

Identifies a source to be referred to.

■ Safety Precautions for Using the Device

● Installation method

Follow the guidance below on how to use this device to guarantee satisfactory safety and performance.

- Confirm that all cables are firmly secured with the screws.
- Keep the cabinet door closed and lock the cabinet doors for safety.
- Prepare a dedicated circuit breaker in the same room of the device so that it can be used to cut off the power supply when abnormality occurs. Use this breaker to shutdown power supply to equipment devices when a device abnormality occurs. For ensuring the the product hardware to satisfy the safety standards, the dedicated breakers in the power supply side must be installed and conform to the following specifications:
  - CSA Safety or UL Safety: CSA C22.2 No.5 or UL 489
  - CE mark Safety: EN 60947-1 and EN 60947-3

● Requirements for Installation

When installing the device, the installation requirements of the device must be satisfied.

Install the device under the following conditions:

Item	Specifications
Rated Voltage	12 VDC or 24 VDC（30 W）
Ambient Temperature (Operation)	-20～60℃
Ambient humidity (Operation)	5 to 95%RH (no condensation)
Installation height	Altitude up to 2000 m
Installation category based on IEC 61010 *1	I
Pollution degree based on IEC 61010 *2	2
Installation	Indoor use only

*1: Installation category is the specification of the impulse withstanding voltage which is termed overvoltage category. Category I applies to specially protected electrical devices on the secondary side

*2: Pollution degree represents the level of foreign matter adhesion, solid, liquid, and gaseous, which may decrease the withstanding voltage.
Pollution degree 2 is applicable to general indoor atmosphere.

● Standard

SEE ALSO

For the standards that the product complies with, refer to “DTSX1 Fiber Optic Heat Detector General Specifications” (GS 39J06B35-01EN).

- **Installation**



WARNING

Be careful not to drop and damage the equipment during installation to avoid equipment damage or injury.

- **Power Cable Wiring**



WARNING

- Connect the power cables according to the procedure given in this document. Power cables must conform to the safety standards of the country where the device is installed.
- Connect cables according to the National Electrical Code (NEC) or local electrical codes.
- Use copper conductors only to make this system compliance with the CSA safety standards or the UL safety standards.

SEE ALSO

For more information about power cables, refer to section 3.2.1, “Power/Ground Cable.”.

- **Earth Wiring**



WARNING

- Ground the device following the procedure in this document to prevent electric shock and to minimize noise.
- Connect cables according to NEC or local electrical codes.
- Use copper conductors only to make this system compliance with the CSA safety standards or the UL safety standards.

SEE ALSO

For more information about earth wiring, refer to section 3.2.1, “Power/Ground Cable.”.

- **Battery**



WARNING

- Yokogawa designated batteries must be used.
- Mount and change batteries following the procedure given in this document.

- **I/O Devices**



WARNING

To ensure this system compliance with the CSA safety standards or the UL safety standards, all devices connected to this system shall be CSA certified devices or UL certified devices.

- **Cables and Connectors**



WARNING

- When the power is on, do not connect or disconnect cables or connectors.
- Do not use cables or connectors not listed in this manual.
- Connect cables according to NEC or local electrical codes.
- Remove the unused cable bracket and paste the sealing sheet of accessory parts.

- **Maintenance**



WARNING

- If the device becomes dusty, use a vacuum cleaner or a soft cloth to clean it.
- During maintenance, wear a wrist strap, and adopt other ESD (Electrostatic Discharge) measures.

● Laser Beam

Safety Precautions for Laser Products

- This instrument uses a laser light source.
- This instrument is a Class 1M laser product as defined by IEC 60825-1:2007 Safety of Laser Products - Part1: Equipment classification and requirements, and a Class1 laser product as defined by IEC 60825-1:2014 Safety of Laser Products - Part1: Equipment classification and requirements.
- In addition, this instrument complies with 21 CFR 1040.10 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

The table below shows the parameters of the laser light used in this instrument.

Table Parameters of Laser Light

Laser Class	Class 1M(2007)/ Class1 1(2014)
Structure	DFB-LD and EDFA
Wavelength	1552 nm
Output power (average)	3.8 mW
Pulse train	Periodic pulse train
Pulse width	Max 10 ns
Pulse repetition cycle	Min 80 µs

The Laser Class label is affixed to the exterior of the DTSX1.



WARNING

Invisible laser light is output from the OPTICAL OUTPUT connector of the DTSX1. Do not look directly or indirectly into the laser beam or at a specular reflection of the beam without protective equipment. Do not aim the laser beam at the eye. The laser beam may cause blindness or damage to your eyes. Attach the cover to the optical connector when it is not in use.
Using an optical instrument, such as a loupe, magnifying glass, or microscope, to observe the laser beam from a distance of less than 100 mm may cause eye injury.
This instrument uses invisible laser light, which may cause eye injury or vision damage if it enters the human eye. To prevent accidents, always observe the following precautions:

- Do not turn on laser output when no optical fiber is connected to the optical connector.
- Always stop laser output before disconnecting the optical fiber from the optical connector.
- Never look into the end of an optical fiber connected to the optical connector during laser output.
- Never direct the laser beam into an area where a telescope optical instruments (for example, telescopes and binoculars) are likely to be used.

High-power laser light may be emitted during disassembly and modification of this instrument. For this reason, customers must not disassemble or modify this instrument under any circumstance. Operating this instrument not in accordance with procedures described in this manual may result in exposure to hazardous laser emissions.

IEC60825-1:2007

LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT

RAYONNEMENT LASER
NE PAS OBSERVER DIRECTEMENT À L'AIDE D'INSTRUMENTS D'OPTIQUE
APPAREIL À LASER DE CLASSE 1M

不可见激光辐射
勿通过光学仪器直接观看光束
1M 类激光产品

IEC60825-1:2014

CLASS 1 LASER PRODUCT

APPAREIL À LASER DE CLASSE 1

1 类激光产品

- **High Temperature Safety Caution**



Figure High Temperature Caution Mark

WARNING

Avoid skin contact. Burn hazard.
When installed in high ambient temperature environments, the instrument surface may become hot. Wear thermal protective gloves when touching metallic parts. Avoid direct skin contact. Beware especially in high temperature installation environments.

■ Measurement

Before performing heat detection operation:
• Ensure that the environment complies with the DTSX1 specifications, and
• Perform temperature calibration of the sensor optical fiber with DTSX1.

Conformity standards and precautions

■ Drawing Conventions

Some drawings may be partially emphasized, simplified, or omitted, for the convenience of description.
Some screen images depicted in the manual may have different display positions or character types (e.g., upper or lower cases). Also note that some of the images contained in this manual are display examples.

■ About EN 54-22 standard

・Style S2

This product (2km, 4km, 6km, 8km, or 10km model) comply to EN 54-22 A1N standard and approved by VdS (No. G 220001). In order to comply with EN 54-22 as a whole system, all peripherals used for laying sensor fibers must also conform to standards. Build the system referring to the table below.

Product Name	Model
Fiber Optic Heat Detector	DTSX1 Style S2
Optical Fiber Sensor Cable	S9550TK
Junction Box	D1JB-01, D1JB-03
Patch Cable	D1PT-01

・Style S3

This product complies to EN 54-22 A1N, A2N, BN, CN standard (Hereinafter, it is described as EN54-22) and approved by VdS (No. G 220001). In order to comply with EN 54-22 as a whole system, all peripherals used for laying sensor fibers must also conform to standards. Build the system referring to the table below.

Product Name	Model
Fiber Optic Heat Detector	DTSX1 Style S3
Optical Fiber Sensor Cable	S9550TK, S9580TK
Junction Box	D1JB-01, D1JB-03
Patch Cable	D1PT-01

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DTSX1 Fiber Optic Heat Detector
Installation, Configuration and Operation

IM 39J06B35-01EN 12th Edition

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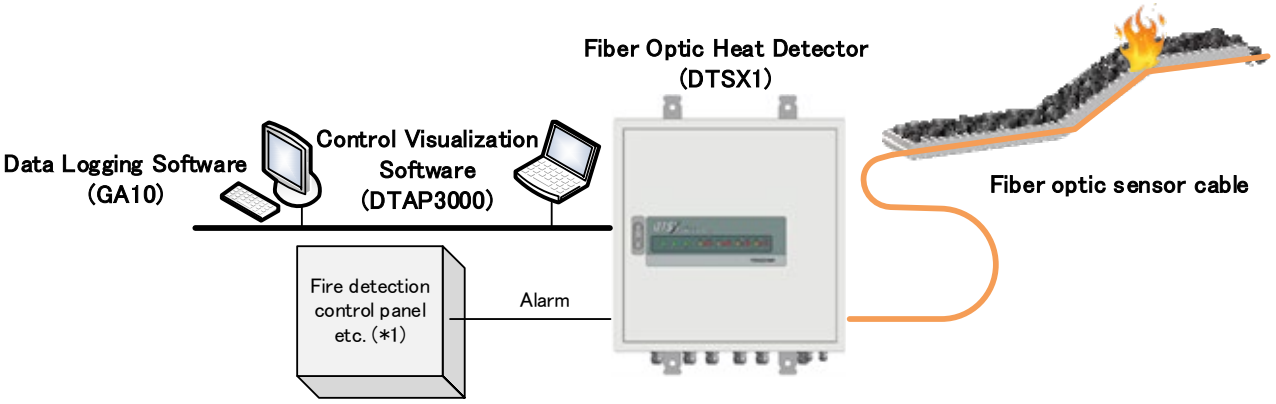
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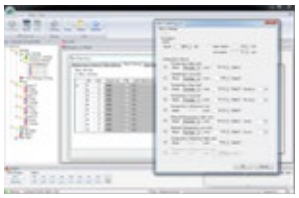
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◆Revision Information Rev-1

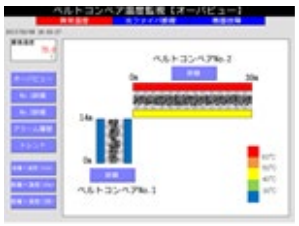
1. Overview

Fiber Optic Heat Detector (DTSX1) detects heat by measuring the temperature along the connected optical fiber and transmits a heat alarms to a fire detection control panel or the like. The pre-alarm function allows early detection of heat.
By using the Data Logging Software (GA10), you can acquire temperature measurement data from the DTSX1 and display it graphically. In the event of a fire, you can grasp the scope of fire (location, size, direction) by checking this temperature display.
The DTSX3000 Control Visualization Software (DTAP3000) allows you to configure the heat alarm conditions, temperature settings, and other initial settings of the DTSX heat detector and control the heat detection operation such as starting and stopping.
The Heat Detection System configuration using DTSX1 is shown below.





Control Visualization Software (DTAP3000)
screen example



Data Logging Software (GA10)
screen example

*1: The fire detection control panel, etc. is not included in this specification.

Figure 1.1 The Heat Detection System configuration using DTSX1

The following table shows the configuration of the Heat Detection System using DTSX1.

Table 1.1 Configuration of DTSX1 Heat Detection System

Component	Model	Remarks
Optical fiber temperature sensor	DTSX1	Detects heat along the sensor fiber cable and generates an alarm. The distance range and the number of required channel is selectable by defining the model code.
DTSX3000 Control Visualization Software	DTAP3000	Configure the initial settings of the DTSX1 such as temperature calibration, alarm conditions, zone settings as well as control the DTSX1. For details, refer to “DTAP3000 DTSX3000 Control Visualization Software Guide” (IM 39J02B40-01EN).
Data Logging Software	GA10	Acquires temperature measurement data from the DTSX1 and displays it graphically. For details, refer to “GA10 Data Logging Software” (GS 04L65B01-01EN). Purchase this if necessary.

SEE ALSO

For the specifications of the DTSX1 Fiber Optic Heat Detector, refer to “DTSX1 Fiber Optic Heat Detector General Specifications” (GS 39J06B35-01EN).

2. Component Names and Functions

The component names and functions of the DTSX1 are shown below.

2.1. Component Names

The names of the DTSX1 components are shown below.

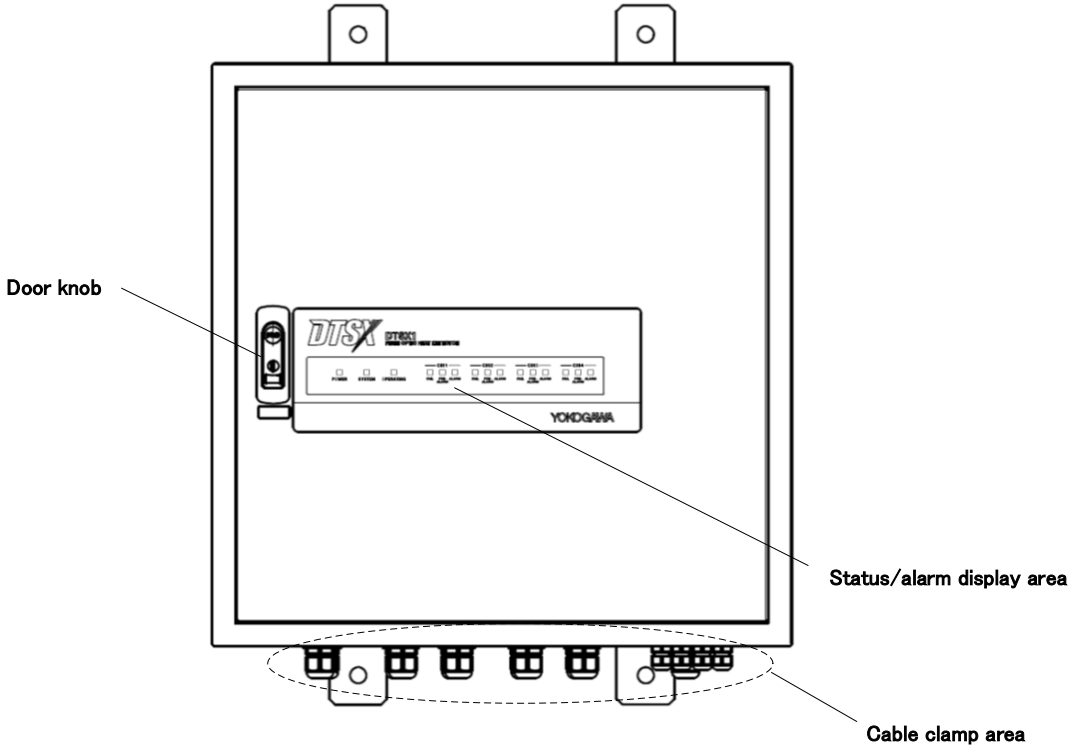


Figure 2.1 DTSX1 front view

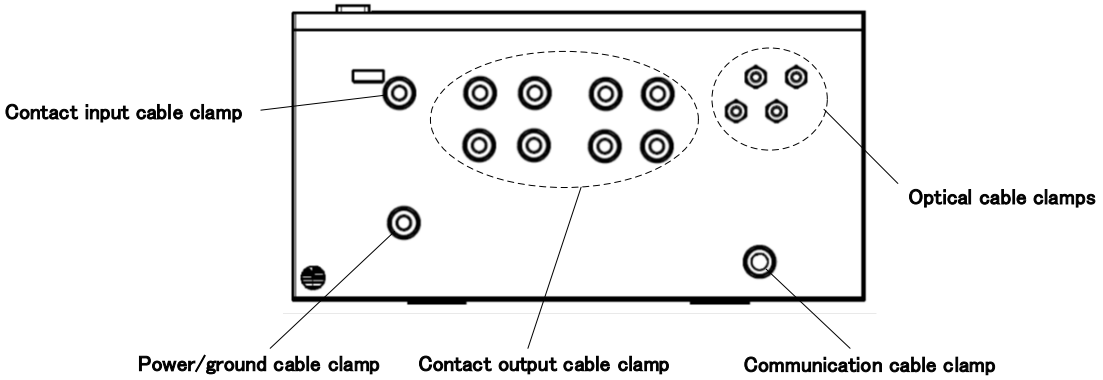
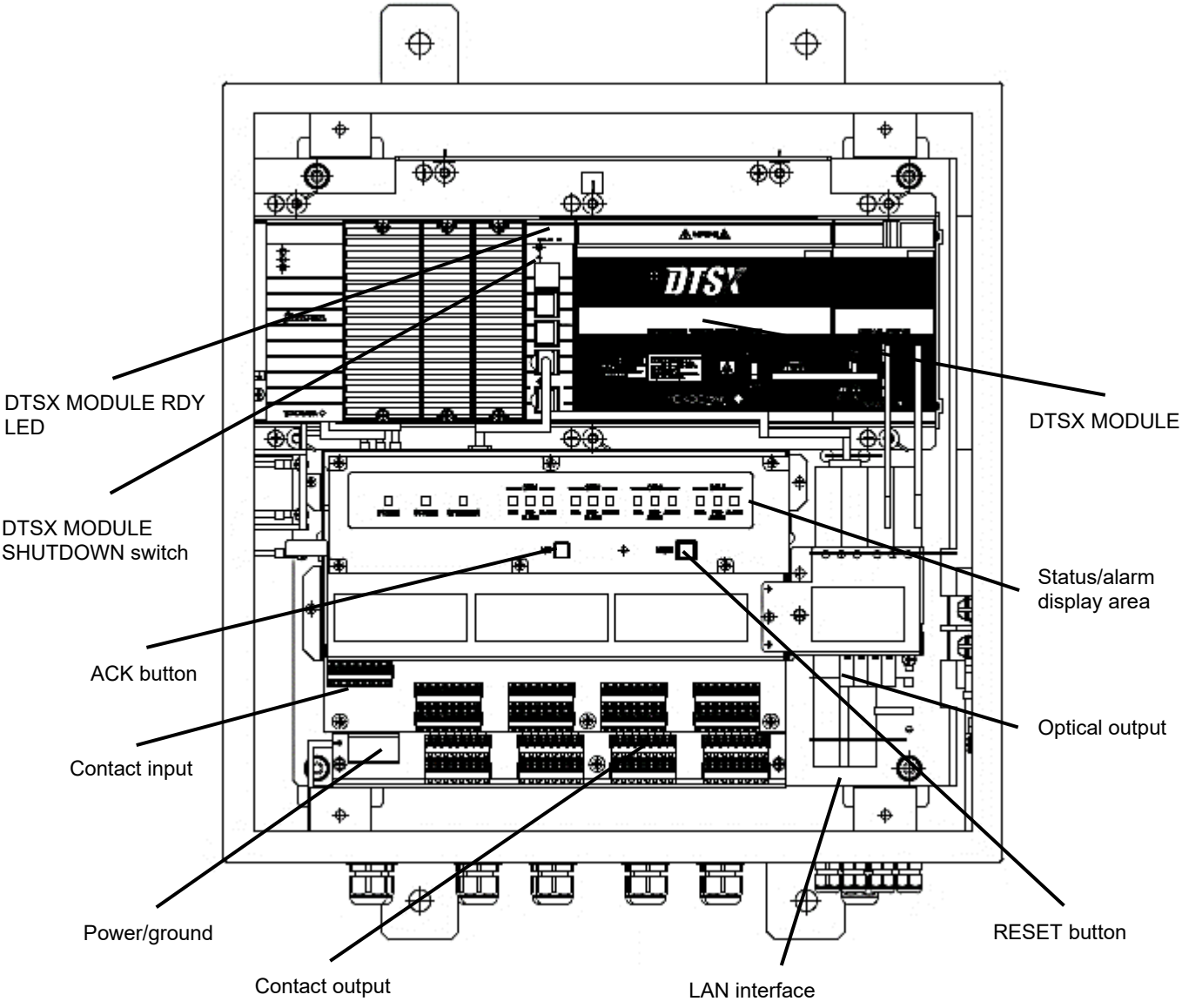


Figure 2.2 DTSX1 bottom view



Finure 2.3 DTSX1 internal front view

2.2. Component Functions

The functions of the DTSX1 components are described below.

Table 2.1 DTSX1 component names and functions

Name		Function
Status/alarm display area		Displays the DTSX1 status and measurement status
Cable clamp area	Power cable clamp	Holds the ground/power cable
	Communication cable clamp	Holds the Ethernet cable
	Optical cable clamp	Holds the optical sensor cable
	DI cable clamp	Holds the contact input cable
	DO cable clamp	Holds the contact output cable
Door knob		Can be opened only during setup or maintenance. Can be locked.

IMPORTANT

Only allow administrators to open and close the front door of the housing.

The DTSX1 status and alarm status are described below.

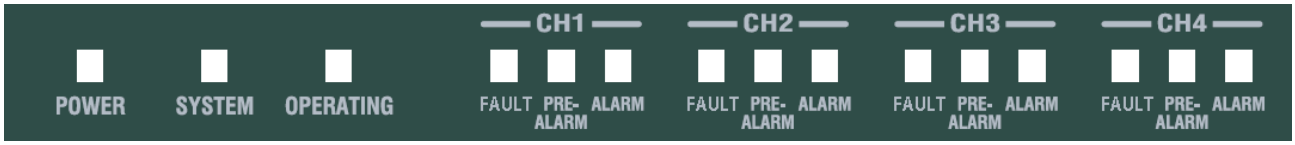


Figure 2.4 Status/alarm display

Table 2.2 Indicators in the status/alarm display area

Display	Color	Description
POWER	Green ON	Power ON, the power voltage is normal
	Yellow (Red) ON	Power ON, the power voltage is abnormal
	Green flashing	DTSX1 is booting
	OFF	Power OFF
SYSTEM	Green ON	DTSX1 is normal
	Yellow (Red) ON	DTSX1 is abnormal
	Yellow (Red) flashing	Internal communication error. DTSX module is shut down or in maintenance mode.
	OFF	Power OFF
OPERATING	Green ON	Heat detection is operating
	Red ON	Test mode
	OFF	Heat detection is stopped.
ALARM	Red ON	Alarm occurred
	OFF	No alarm occurred
PRE-ALARM	Red flashing (Red ON)	Pre-alarm occurred
	OFF	No pre-alarm occurred
FAULT	Orange ON	There is a fault in the fiber optic sensor cable
	OFF	There is no fault in the fiber optic sensor cable

(In parentheses are for Style S1)

2.3. Specifications

The DTSX1 specifications are described below.

Table 2.3 DTSX1 Specifications

Item		Specifications
Distance range		2 km, 4 km, 6 km, 8 km, 10 km, 16 km*1
Number of channels		1-channel, 2-channels, 4-channels
Spatial resolution		1m or less
Sampling resolution		0.5 m, 1 m
Minimum measurement time		5 s
Measurement mode		Single-ended, Double-ended
Number of defined zones		1000
Interfaces	Optical output	E2000/APC
	LAN	10BASE-T or 100BASE-TX
	Relay output channels	8 ports, 64 ports, rated voltage: 35 VDC / rated current: 1 A PhotMOS isolation Switching leakage current: 10 uA max. ON resistance: 0.09 Ω max. Dielectric strength: 850 Vrms, 1 minute Response time: ON→OFF: 3 ms or less OFF→ON: 10 ms or less
	Relay input channels	4 ports, rated voltage: 30 V Photocoupler isolation (rated current 50 mA) Input impedance: 2.16 kΩ Dielectric strength: 850 Vrms, 1 minute ON condition: 5.5 mA or more OFF condition: 2.2 mA or less Response time: ON→OFF: 0.1 ms or less OFF→ON: 0.1 ms or less
	Display	・POWER ・SYSTEM ・OPERATING ・FAULT (per channel) ・PRE-ALARM (per channel) ・ALARM (per channel)
	Switches	・RESET ・ACK
Power supply	Voltage	10 to 30V DC (Rated voltage: 12 / 24 V DC)
	Power consumption	30W (15W typically at 23℃ ambient temperature)
Dimensions	W x H x D	500 mm x 500 mm x 250 mm (Except fo r cable clamps and brackets for mounting)
Weight		28 kg
Mounting		Wall mounted

*1 : Style S2 is compliant with the fire detection standard (EN 54-22 Class A1N) certification with distance range of 10km or less.

Table 2.4 DTSX1 installation environment specifications

Item		Specifications
Temperature	Normal operating conditions	-20 to 60°C*1
	Transport and storage conditions	-40 to 70°C
Humidity	Normal operating conditions	5 to 95% RH (no condensation)
	Transport and storage conditions	5 to 95% RH (no condensation)
Installation		Indoor equipment
Vibration, shock, impact		Compliant with EN 54-22 standard (EN 60068-2-6, 27, 75)
Corrosive gas		Compliant with EN 54-22 standard (EN 60068-2-42)
EMI noise		Compliant with EN 54-22 standard (EN 50130-4)

*1: Compliant with the EN 54-22 Class A1N,A2N, BN, CN Environmental group II from -10 to 55°C.

Table 2.5 DTSX1 compliant standards

Category		Standard	Remark
Fire detection		EN 54-22	[Style S2] Heat response class: A1N Environmental group: Ⅱ Maximum sensing element length: 10km VdS-approval No. G 220001
			[Style S3] Heat response class: A1N, A2N, BN, CN Environmental group: Ⅱ VdS-approval No. G 220001
Laser safety		IEC 60825-1	Class1M（2007）/ Class1（2014）
		EN 60825-1	Class1
		FDA(CDRH)	21CFR 1040.10
CE mark *1	EMC	EN 55011 EN 61000-6-2	Class A Group 1 *2
	Safety *3	EN 61010-1	-
		EN IEC 61010-2-201	-
	RoHS Directive *4	EN IEC 63000	-
	Laser safety	EN 60825-1	Class1
CSA-US mark	CSA Safety *3	CSA C22.2 No.61010-1-12	-
		CSA C22.2 No.61010-2-201:18	-
	UL Safety *3	UL 61010-1	-
		UL 61010-2-201	-
KC mark	EMC	Korean EMC standards	-
RCM mark	EMC	EN 55011	Class A Group 1

*1: The manufacturer and the authorized sales representative in Europe are shown below according to the EU's laws and regulations.
Manufacturer: Yokogawa Electric Corporation (9-32, Nakacho 2-chome, Musashino-shi, Tokyo, Japan 180-8750)
Authorized sales representative in Europe: Yokogawa Europe B.V. (Euroweg 2, 3825 HD Amersfoort, the Netherlands)
*2: Class A compliant devices are designed for an industrial environment and cannot be used for any other purposes.
*3: In order to make the DTSX1 compliant with the standard, a dedicated breaker compliant with the following standards must be installed on the power supply side.
CSA Safety or UL Safety: CSA C22.2 No.5 or UL489
CE mark Safety: EN 60947-1 and EN 60947-3
*4: Including the confirmation of 10 restricted substances defined in the Commission Delegated Directive(EU) 2015/863 amending Annex II to Directive 2011/65/EU.

Note: Waste Electrical and Electronic Equipment (WEEE) Directive
This is a directive governed by the EU's environmental regulations. The DTSX1 is designed to comply with the requirements for large industrial equipment among the equipment categories controlled by the WEEE Directive.

- **Distance range**

  The distance range is the maximum length of the optical fiber that can be connected to each channel.

- **Number of Channels**

  Channels are the number of channels that can detect heat through switching. The channel switches each time the set measurement time.

- **Spatial resolution**

  The spatial resoluition is an ability of resolving a step temperature change along the optical fiber. It is defined as the distance between the 10% and 90% points on the DTSX1 response to a step temperature change at the near of DTSX1 optical output with 0.5m sampling.

- **Sampling resolution**

  It is the interval to sample the measured temperature along the length of the optical fiber. Setting 0.5 m takes measurement time, so Normally 1 m is set for heat detection.

- **Measurement time**

  It is the time of a single measurement on the DTSX1. Normaly 5 seconds is set for heat detection.

- **Measurement mode**

  The DTSX1 can perform single-ended measurement, in which one end of the optical fiber is connected and double-ended measurement, in which both ends are connected. The following figure shows examples of the methods when the system is installed in a tunnel. Double-ended measurement uses the average of the temperatures measured from each end at the measurement time. Because measurement is performed from both ends in double-ended measurement, it provides redundancy by allowing measurements to be performed from one end in case the cable breaks. However, as compared to single-ended measurement that makes cable installation simple, double-ended measurement requires both ends of the cable to be connected to the DTSX1 and uses two channels.

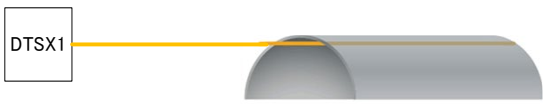


Figure 2.5 Single-ended measurement

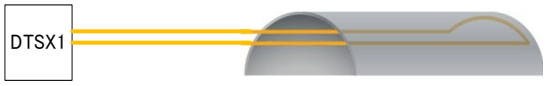


Figure 2.6 Double-ended measurement

CAUTION

The redundancy is not subject to EN 54-22 certification test.

- **Number of defined zones**

  The zone is the range for alarm judgement. The fine setting of zones makes to find out the location of the alarm.

  The DTSX1 functions are described below.

Table 2.6 DTSX1 Functions

Item		Function
Heat detection	Alarm function	Measures the temperatures along a sensor fiber according to distance and channel settings, and detects a heat according to heat alarm temperature setting.
	Pre-alarm function	Generate a pre-alarm set at a temperature lower than heat alarm setting. Temperature limit, temperature difference limit and rate of temperature rise alarms can be defined.
	Reset function (*1)	An alarm can be reset using the Reset button on the front panel, Modbus/TCP or configuration software.
	ACK function (*2)	An alarm can be acknowledged using the ACK button on the front panel, Modbus/TCP or configuration software.
	Zone data (*3) generation function	Generates heat detection zone data (maximum, minimum and average values) from temperature measurement data.
Configuration	Alarm setup function (*4)	Temperature limit, temperature difference limit and rate of temperature rise alarms can be defined for each zone. Preset function is available for different purposes.
	Zone setup function	Up to 1000 sections can be defined as alarm output ranges (zones).
Interface	Alarm output function (*5)	Alarm output is programmable for each contact output.
	Alarm input function	Alarms from other equipment can be input from contacts and combined with the alarms generated by the DTSX1 for output. Reset and ACK inputs are also possible.
	Alarm display function	Displays a generated alarm on the front panel for each channel.
	Communications function	Modbus/TCP enables zone data and alarm status to be acquired.
Maintenance	Sensor fiber break detection function	Detects as sensor fiber break when the signal level of the sensor fiber decreases. It can be monitored and status information obtained via Modbus/TCP. Any fiber break is displayed on the front panel for each channel.
	Supply voltage monitoring function	Supply voltage drop can be monitored and status information obtained via Modbus/TCP. Any abnormality is displayed on the front panel.
	System failure detection function	System failure can be monitored and status information obtained via Modbus/TCP. Any abnormality is displayed on the front panel.
	Self-diagnosis function	Self-diagnosis of Individual system parts by Modbus/TCP or configuration software.

*1 Alarm status is reset regardless of the alarm condition.
*2 Alarm status is retained.
*3 Data in the heat detection section
*4 Select or combine three judgment methods to judge alarms.
*5 Up to 3 outputs can be set for each zone.

● Alarm output function

The internal circuit block diagram of the contact output is shown below. Switching is possible between normally open, normally closed, and off.

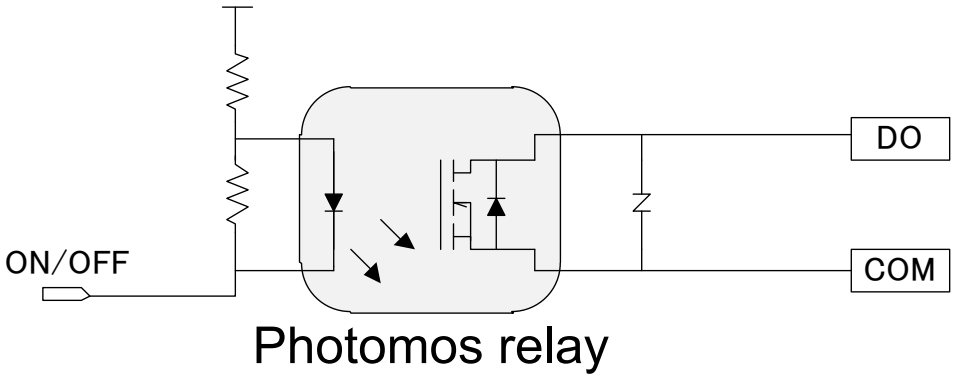


Figure 2.7 Internal circuit block diagram of the contact output

● Alarm input function

The internal circuit block diagram of the contact input is shown below.

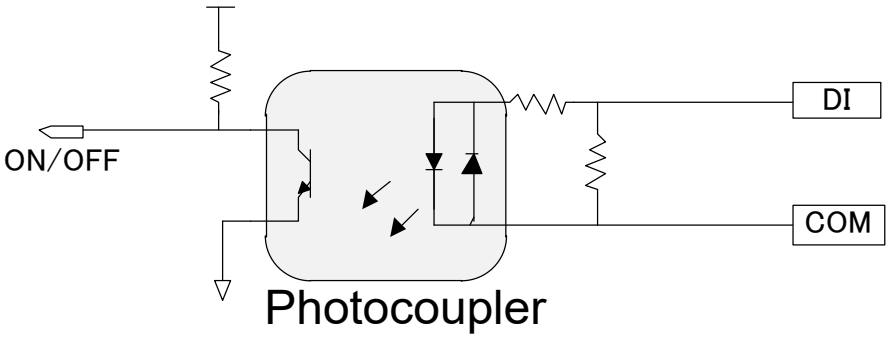


Figure 2.8 Internal circuit block diagram of the contact input

3. Installation and Connection

This chapter explains how to install and wire the DTSX1 and how to install the optical fiber.

3.1. DTSX1 Installation

■ Installation Location

Attach the DTSX1 to a wall that can bear the weight of the DTSX1 by securing the four brackets of the housing using attached screws (M12, 25 mm length, stainless steel) or the equivalent screws.
Install it at a height so that the status/alarm display area is easy to view.

■ Installation Orientation

Install the DTSX1 in the correct orientation (front panel, horizontal, vertical directions).

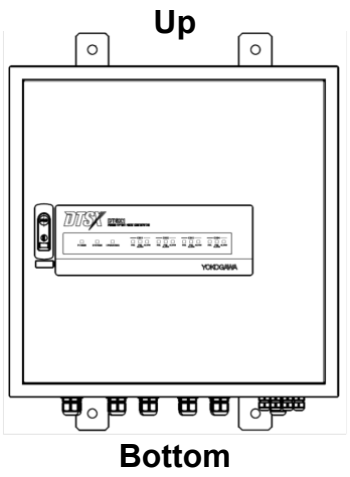


Figure 3.1 DTSX1 installation

CAUTION

- Before installing or removing the DTSX1, be sure to turn off the power.
- Keep the DTSX1 from direct sunlight.
- All access to the DTSX1 is from the front panel. Provide at least 550 to 600 mm of space in front of the housing door for opening and closing the door.
- Provide space below the housing by considering the wiring and bending radius of the cables.
- Have at least three persons do the installation work (at least two persons lifting the DTSX1 and at least one person fastening the screws).

3.2. Wiring and Connecting the DTSX1

IMPORTANT

- Do not bend or press the power cable or the signal cable if the ambient temperature is minus 20 degrees Celsius or below.
- Cables with the temperature rating of an ambient temperature plus 10 °C or more must be used.

3.2.1. Power/Ground Cable

Run the power/ground cable through its cable bracket from the outside to the inside. Screw the cables to the terminals (Connect the power cable to terminals '+' and '- ', and connect the ground cable to 'FG' terminal).
Check that the cables are securely fastened, and then turn the cable bracket to fix the cables in place.

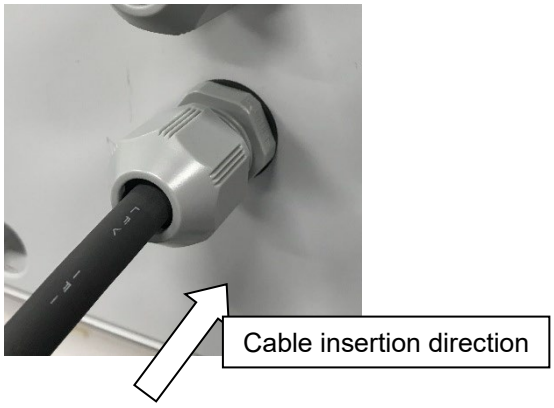


Figure 3.2 Securing the power/ground cable

The cables must meet the following specifications.

Table 3.1 Power/ground cable specifications

Item	Specifications
Number of cables	3
Length	Less than 3 m
Cables	Industrial equipment insulation cables
Cable thickness	AWG14 (2 mm^2)
Termination	M4 ring tongue crimp terminal, external dimensions: 8.5 mm or less, with insulation sleeve
Outer diameter	6.5 to 10.5 mm

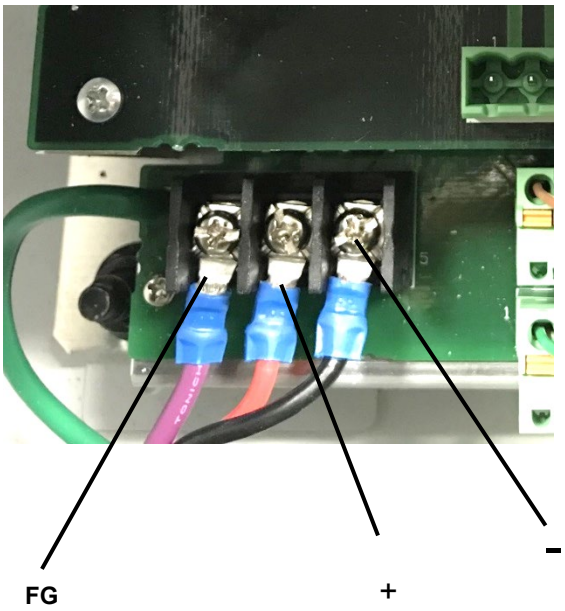


Figure 3.3 Power/ground cable terminal

IMPORTANT

- It is recommended to install a switch or circuit breaker on the power wiring so that the power can be turned on and off individually during maintenance. And, to prevent overcurrent, install an overcurrent protection device (cutoff current 6 A). (To make the power supply system for DTSX1 conform to the safety standards, use a breaker or a switch that conforms to the safety standards.)
- It is also recommended to install a noise filter to improve power supply quality.
- Grounding resistance must be 100 Ω or less.

CAUTION

- Power failure during writing of files to the system memory of the DTSX1, say during program update, may damage the file system. (Power failure during DTSX1 operation will not damage the system memory.)
  Power failure during measurement may also damage measurement data.
- To prevent such risks, install an uninterrupted power supply (UPS) device.

3.2.2. Contact Output Cables

Run the contact output cables through their cable brackets from the outside to the inside.
Connect the cables to the clamp terminal socket.
The clamp terminal socket does not have screws, so there is no need to fasten screws.
Attach the clamp terminal socket to its base.
Check that the socket has been attached to its base, and then turn the cable brackets to fix the cables in place.
If the cable is not connected, remove the unused cable bracket and paste the sealing sheet of accessory parts.

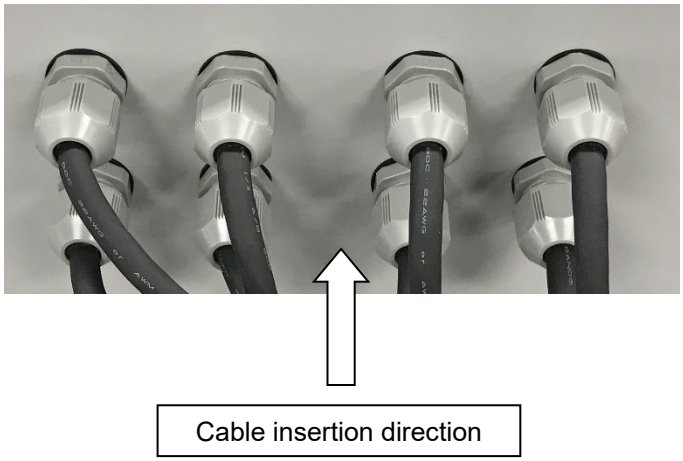


Figure 3.4 Securing contact output cables

The cables must meet the following specifications.

Table 3.2 Contact output cable specifications

Item	Specifications	
Number of cables	8 max. (internal wires 8 pairs max.)	
Length	Less than 30 m	
Cables	Industrial equipment insulation cables	
Outer diameter	6.5 to 10.5 mm	
Termination*	Stripped cable: 10 mm in length, with insulation sleeve AWG24 (0.2 mm^2) to AWG12 (3.3mm^2)	Bar terminal: tip φ0.2 mm^2 to 2.5 mm^2

* Bar terminal is recommended for terminal.

The port channel numbers of the clamp terminals increase from the upper left toward the lower right (1 to 64 channels).
For each port, there are two terminals: left and right. The left side is common, and the right side is positive.

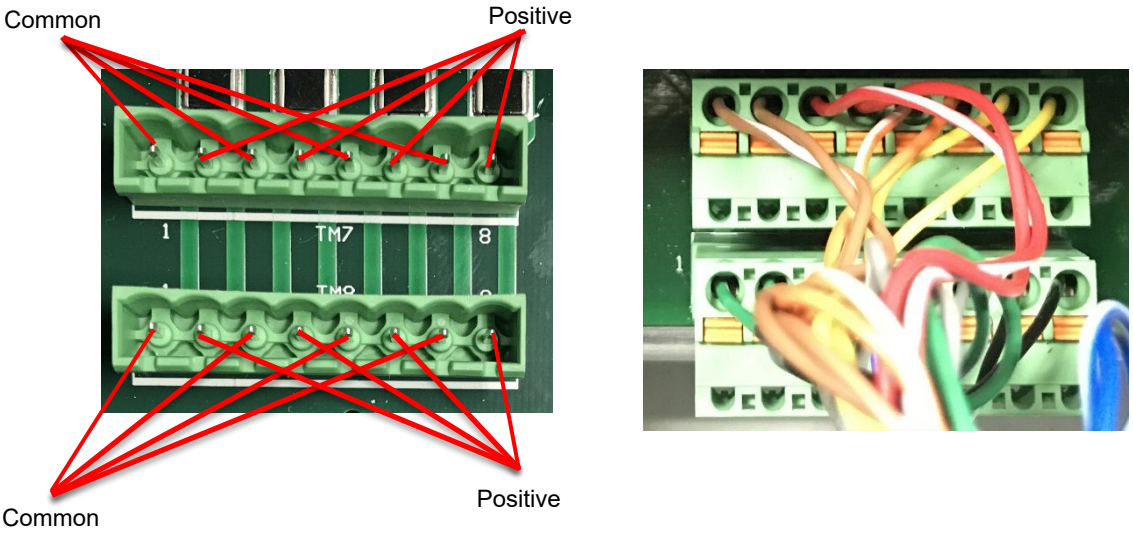


Figure 3.5 Contact output base and socket

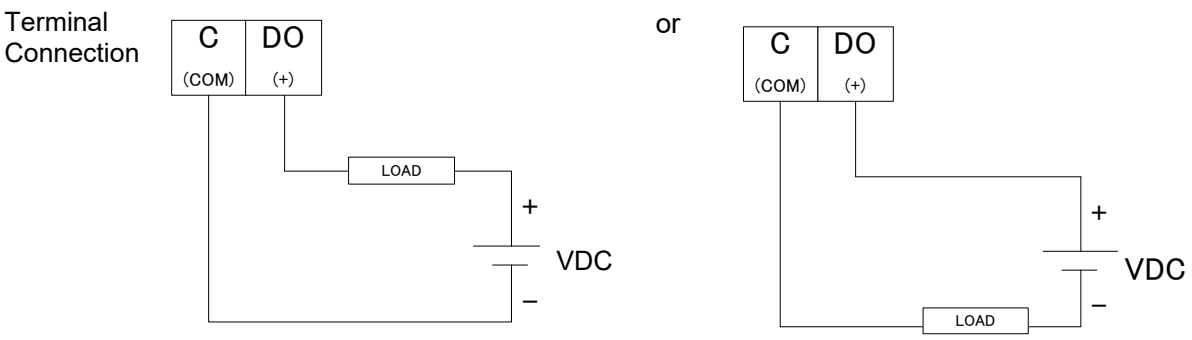


Figure 3.6 Contact output terminal connection diagram

Depress the orange button on the clamp terminal, insert the cable, and then release the button.

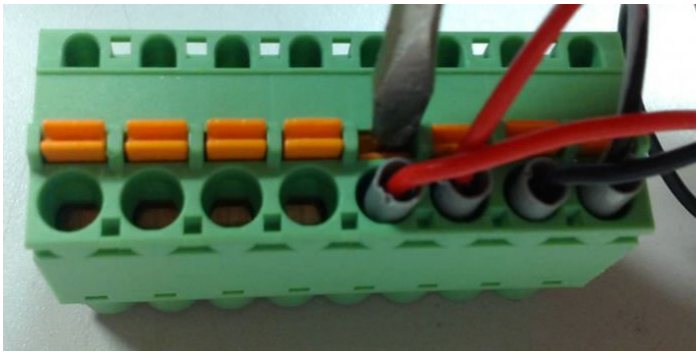


Figure 3.7 Inserting a cable into a clamp terminal

The contact output terminal arrangement is shown below. The 8ch model has CH1 to CH8.

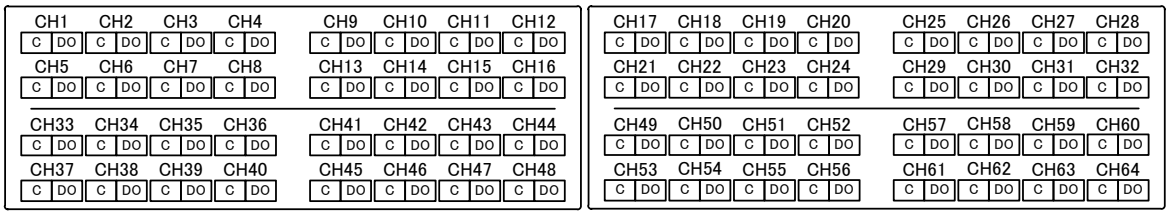


Figure 3.8 Contact output terminal arrangement

3.2.3. Contact Input Cable

Run the contact input cable through its cable bracket from the outside to the inside.
Connect the cable to the clamp terminal socket.
The clamp terminal socket does not have screws, so there is no need to fasten screws.
Attach the clamp terminal socket to its base.
Check that the socket has been attached to its base, and then turn the cable bracket to fix the cable in place.
If the cable is not connected, remove the unused cable bracket and paste the sealing sheet of accessory parts.



Figure 3.9 Securing contact input cables

The cables must meet the following specifications.

Table 3.3 Contact input cable specifications

Item	Specifications	
Number of cables	1 max. (internal wires 4 pairs max.)	
Length	Less than 30 m	
Cables	Industrial equipment insulation cables	
Outer diameter	6.5 to 10.5 mm	
Termination*	Stripped cable: 10 mm in length, with insulation sleeve AWG24 (0.2 mm^2) to AWG12 (3.3mm^2)	Bar terminal: Bar length 10 mm Tip φ0.2 mm^2 to 2.5 mm^2

* Bar terminal is recommended for terminal.

The port channel numbers of the clamp terminals increase from the left toward the right (1 to 4 channels).
For each port, there are two terminals: left and right. The left side is common, and the right side is positive.

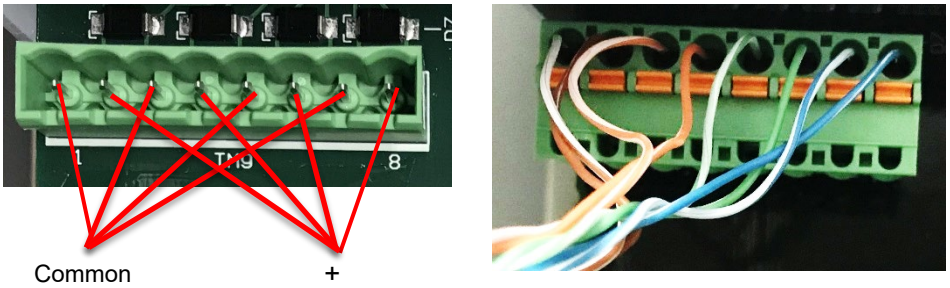


Figure 3.10 Contact input base and socket

Terminal Connection

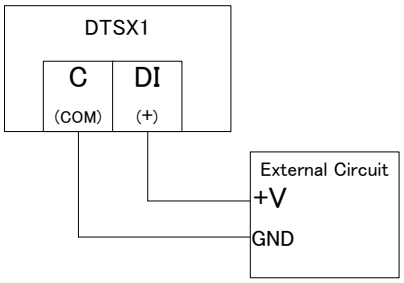


Figure 3.11 Contact input terminal connection diagram

SEE ALSO

For the method to insert cables into the clamp terminal, refer to section 3.2.2, “Contact Output Cables.”

The contact output terminal arrangement is shown below.

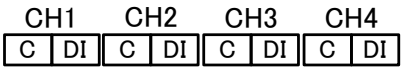


Figure 3.12 Contact output terminal arrangement

3.2.4. Communication Cable

For the communication cable (LAN cable), use an RJ45 connector cable complying with the 100Base-TX and 10Base-T standards.
If the cable is not connected, remove the unused cable bracket and paste the sealing sheet of accessory parts.

IMPORTANT

If you connect or disconnect the communication cable (LAN cable) while the DTSX1 is turned on, communication may not work afterwards. If this happens, reboot the DTSX1, or turn off the power and then turn it back on.

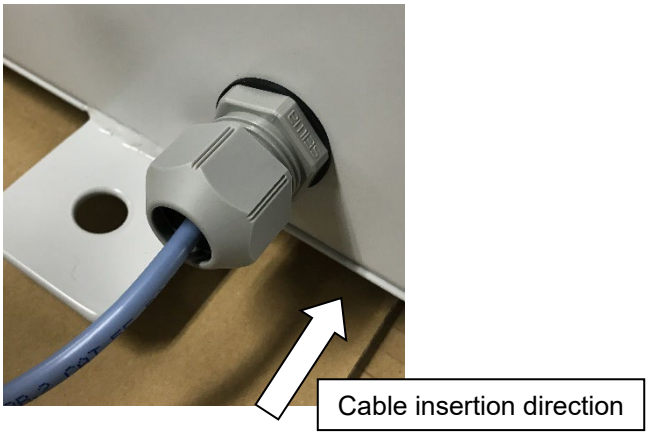


Figure 3.13 Securing the communication cable

Run the communication cable through their cable bracket from the outside to the inside.
Connect the cable to the RJ45 connector.



Fifure 3.14 Commnuication calbe connector

Check that the cable is connected to the connector, and then turn the cable bracket to fix the cables in place.

3.2.5. Optical Fiber

Before splicing the E2000 connectors of one end of the cables, run the optical fiber through their cable brackets from the inside to the outside.
Then, splice the E2000 connectors.
Connect the optical fiber inside the housing to the E2000 connector.
If the cable is not connected, remove the unused cable bracket and paste the sealing sheet of accessory parts.

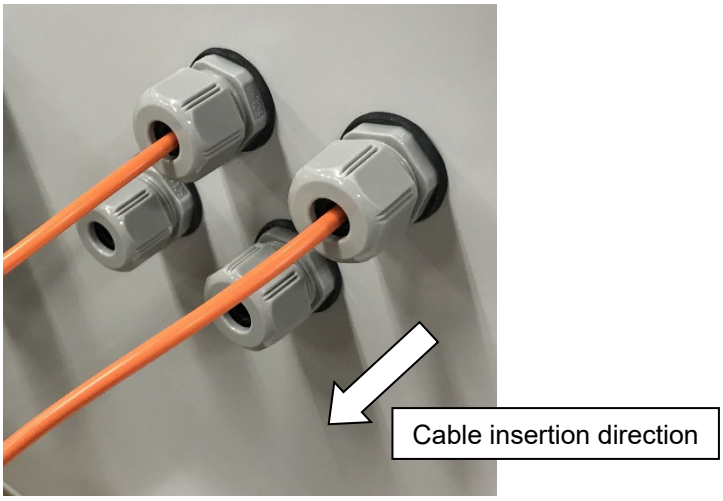


Figure 3.15 Securing the optical fibe

On the E2000 connector, channels are numbered from the left: Ch1, Ch2, Ch3, and Ch4.

The cables must meet the specifications described in section 3.3, “Installing Optical Fiber.”

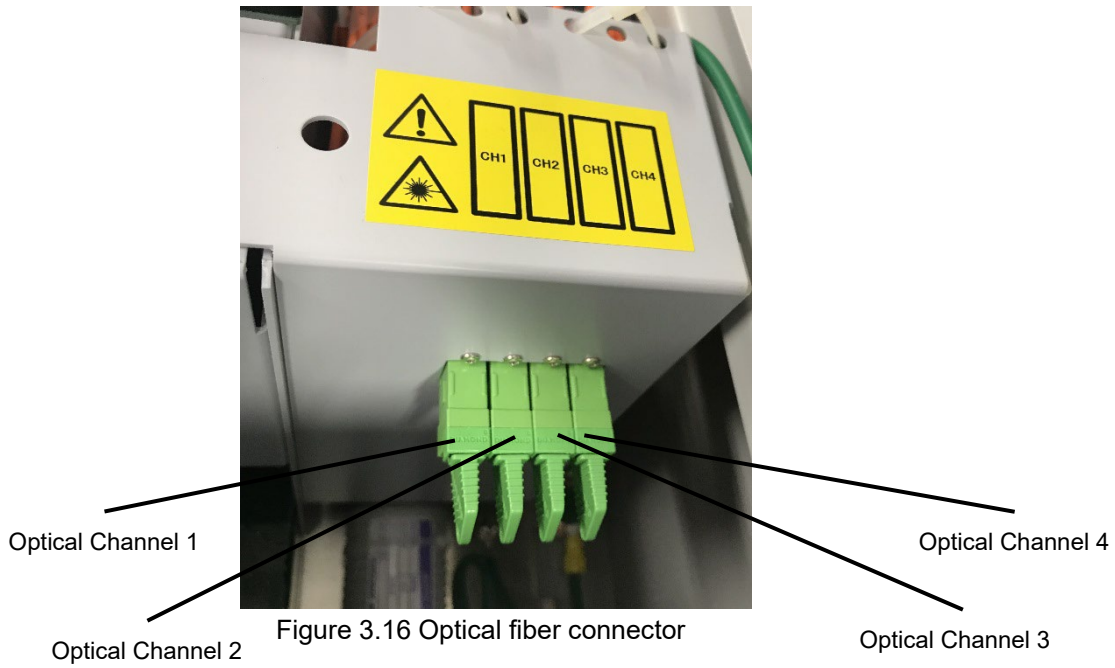


Figure 3.16 Optical fiber connector

CAUTION

Handling precautions for optical fibers:

- Use optical connectors and optical fibers that meet product specification requirements.
  Connecting the wrong type of optical connector to the DTSX1 may damage not only the optical connector but also the optical connector of the DTSX1.
- Do not apply excessive force on the lever of an optical connector.
  Pressing down too hard or too much on the lever may damage it.
- Before connecting an optical connector, clean its end face to remove dirt, dust, oil or other contaminants.
  Contaminants on optical connectors may lead to fiber loss and optical reflection and in turn failure to meet the DTSX1 performance specifications. Moreover, the laser pulse peak power of this instrument is about 30 W, which may cause contaminants to be fused to and thus damage the end face of the optical connector.
- Ensure that the end face of an optical connector is free of scratches.
  Using an optical connector with a scratched end face may damage the optical connector of the DTSX1.
  Never connect an optical connector with a scratched end face.
- When connecting an optical connector, insert it gently and vertically into the optical connector of the DTSX1.
  Improper connection, lateral movements and insertion by force may damage not only the optical connector but also the optical connector of the DTSX1.
- Ensure that a connected optical connector is locked in place.
- Optical fibers must be routed according to routing instructions and not be subjected to excessive tension, lateral pressure, tight bending, or twisting.
- Disconnecting an optical connector improperly or forcibly may damage not only the optical connector but also the optical connector of the DTSX1.
- Do not open the shutter, which protects the ferrule of an optical connector, in normal use.
  The shutter will open (not visible externally) automatically when the optical connector is connected.
  If you need to check or clean the end face of the optical connector, open the shutter of the optical connector in a clean, dust-free place.
- The optical connector of the DTSX1 comes with its protective cap.
  Leave the cap in place except when connecting an optical fiber.
- Using an optical connector or optical fiber that does not meet product specification requirements, using an optical connector with a scratched end face or improper handling of optical connectors may result in hardware failure. Hardware repair or parts replacement necessitated by improper use is chargeable even during the warranty period.
- To comply with EN 54-22, use the Patch Cable (D1PT-01).

3.2.6. Junction Box

The Junction Box is a cabinet for storing the connection part where the optical fiber is fused and the extra length part on both sides of the connection part. There are two types, D1JB-01 and D1JB-03.
Refer to 3.3.4 to 3.3.6 for how to use the connection box.

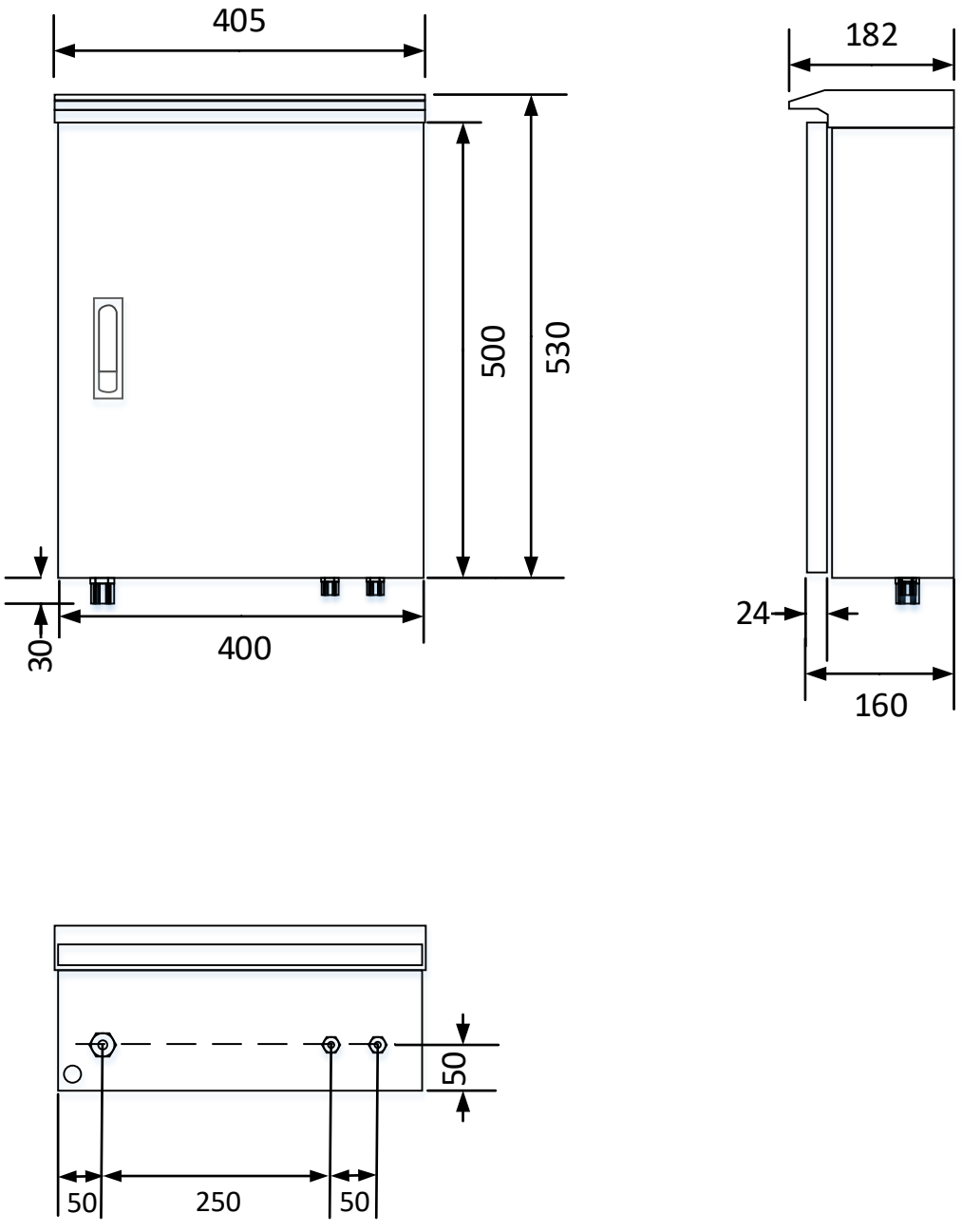


Figure 3.17 D1JB-01 size

Table 3.4 D1JB-01 Specification

Item		Description
External dimensions	WxHxD	405 mm x 530 mm x 182 mm （Excluding cable clamp and mounting bracket）
Weight		14.5 kg
Mounting		Wall mounted
Material		Steel
Surface treatment		Coating
Cable hole (Inside hole)		3 ports (Maximum 10.5 mm x 1 port and Maximum 4.5 mm x 2 ports)

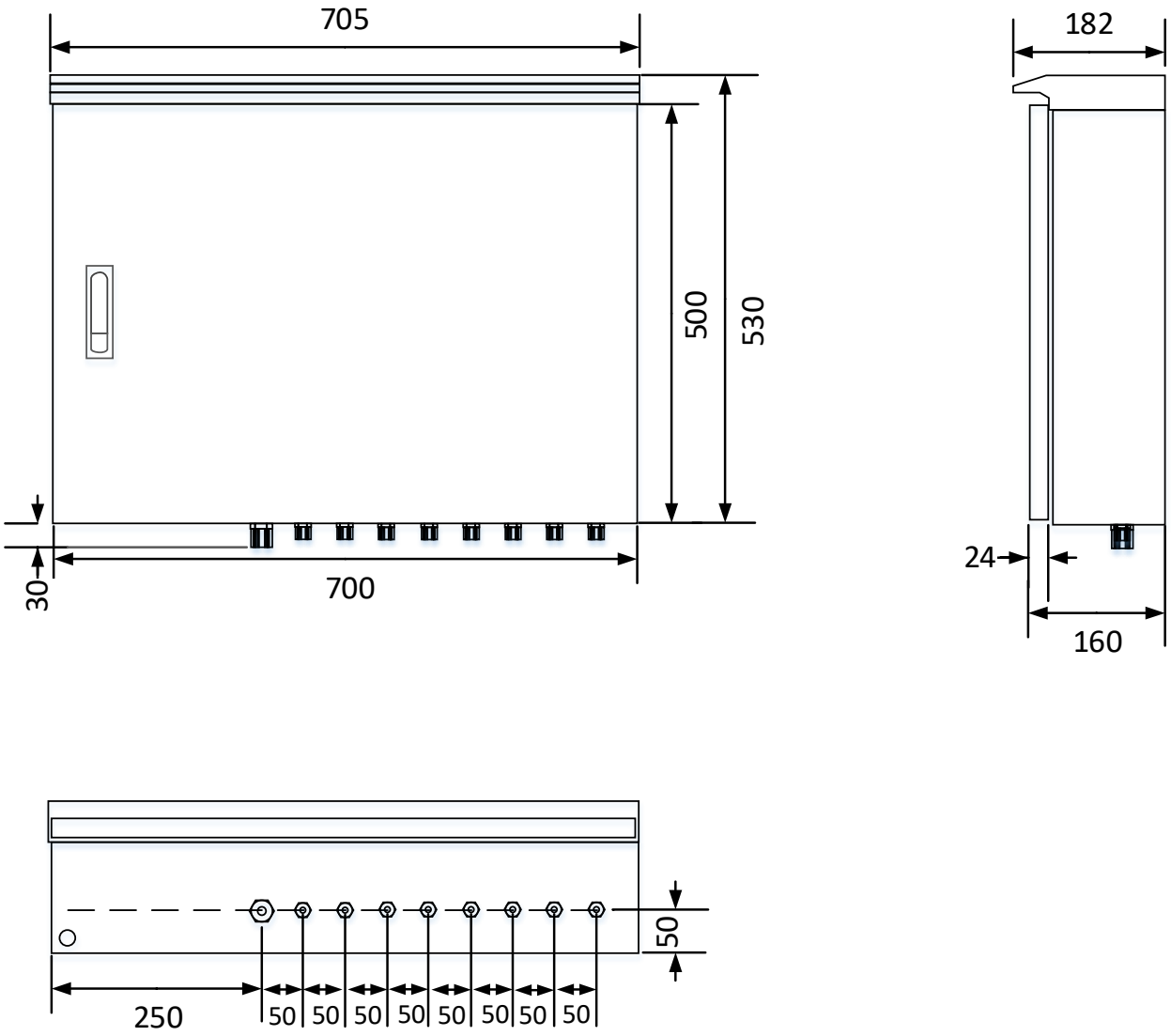


Figure 3.18 D1JB-03 Size

Table 3.5 D1JB-03 Specification

Item		Description
External dimensions	WxHxD	705 mm x 530 mm x 182 mm （Excluding cable clamp and mounting bracket）
Wright		23 kg
Mounting		Wall mounted
Material		Steel
Surface treatment		Coating
Cable hole (Inside hole)		9 ports (Maximum 10.5 mm x 1 port and Maximum 4.5 mm x 8 ports)

CAUTION

To comply with EN 54-22, use the Junction Box (D1JB-01 and / or D1JB-03).

3.2.7. Cable Clamp

A cable clamp is a bracket that secures an optical fiber to a wall or ceiling when laying it.
Refer to 3.3.7 for how to use the cable clamp.

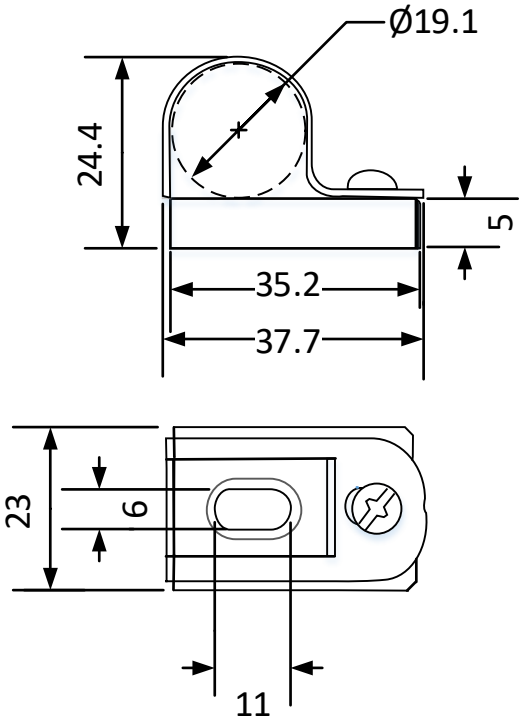


Figure 3.19 D1CL-01 Size

Table 3.6 D1JB-03 Specification

Item	Description
Application	Ceiling install clamp
Dimensions (W×H×D)	37.7 mm x 24.4 mm x 23 mm
Weight	30 g
Material	Stainless

3.3. Installing Optical Fiber

- Up to 20 fiber optic cable connections per channel, including the DTSX1 optical output, is allowed.
- The fiber optic cable must be connected by fusion splicing within 0.1 dB loss per splice. If the connection using connector cannot be avoided, use connector with APC and keep connector loss within 0.5 dB per connector.
- To comply with EN 54-22, the total loss including sensor cable loss and connection loss must be within 6.5 dB.

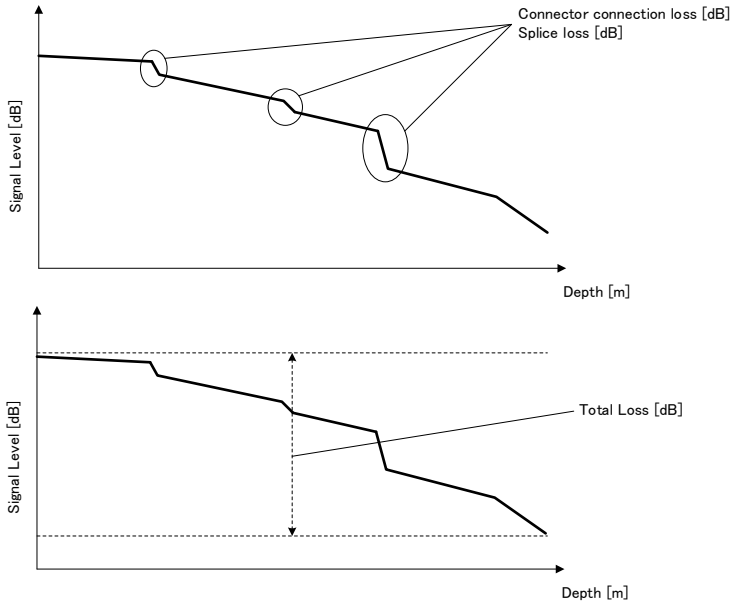


Figure 3.20 Connection Loss and Total Loss

3.3.1. Types of optical fiber

There are pach cable, approach cable and sensor cable as the types.

- **Patch cable (D1PT-01)**

  This is an optical fiber with an E2000 connector.
  It is used to connect the DTSX1 and the approach cable.

Table 3.7 Patch cable specifications

Item	Specification
Optical fiber	50/125 µm GI, 1 core
Typical Diameter	2.8 mm
Length	10 m
Termination	E2000 MM APC connector on one side
Insertion loss	0.15dB or less

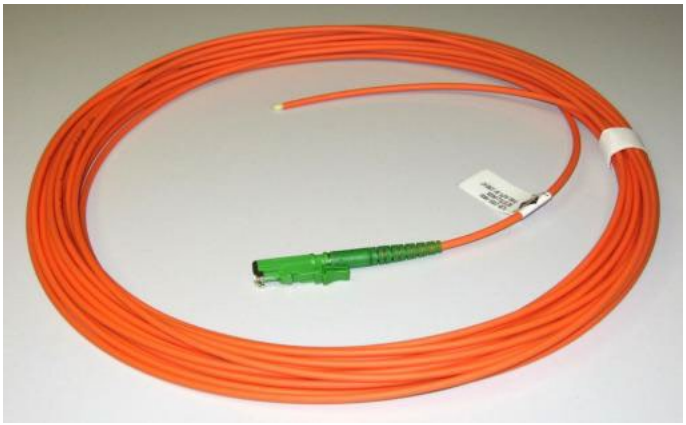


Figure 3.21 Patch cable

- **Approach cable**

  This is an optical fiber for the approach zone.
  The approach zone contains the installation of cable up to the vicinity of the heat detection target.

Table 3.8 Approach cable specifications example

Item	Specifications
Optical fiber	50/125 μm GI 4 cores
Outer diameter	10 mm
Weight	80 kg/km
Bending radius	100 mm
Stress	800 N/dm
Tensile strength	800 N
Operating temperature range	-20 to 80°C
Installation temperature range:	-5 to 50°C

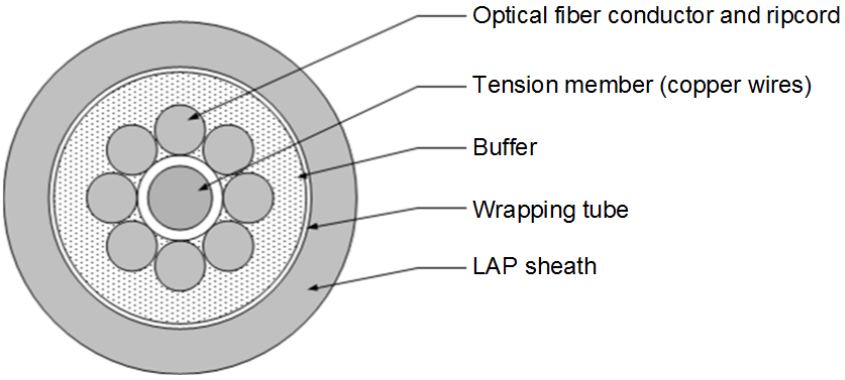
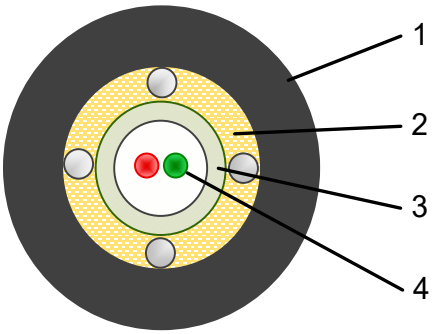
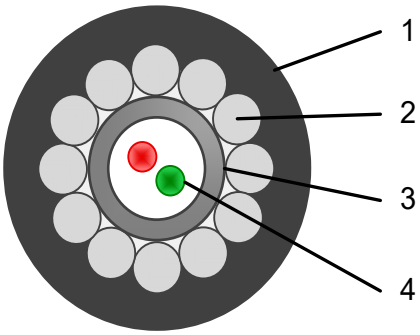


Figure 3.22 Approach cable cross section

- **Sensor cable**

  This is the optical fiber that is installed by the detection target.
  Use the following optical fiber sensor cable with the DTSX1 if necessary.
  To comply with EN 54-22, use the DTSX1 together with the fiber optic sensor cable standard type(S9550TK) or robust type(S9580TK).

Table 3.9 Sensor cable specifications(Note)

Item	Standard type	Robust type	
Cross section structure	 1 Outer sheath 2 Tensile strength fiber 3 Loose tube 4 Optical fiber	 1 Outer sheath 2 Tensile strength stainless cable 3 Stainless pipe 4 Optical fiber	
Optical fiber	50/125 µm GI, 2 cores	50/125 µm GI, 2 cores	
Outer layer	Flame retardant non-corrosive (FRNC)	Flame retardant non-corrosive (FRNC)	
Standard outer diameter	4.5 mm	4.0mm	
Operating temperature range	-40 to 85°C*1	-40 to 85°C	-25 to 70°C
Allowable tension (short term / long term)	700N/200N	1500N/1100N	1000N/500N
Minimum bend radius (static/ dynamic)	60 mm/80 mm	60 mm/80 mm	
Weight	21 kg/km	32 kg/km	46 kg/km
Operating environment/ conditions	Indoors/outdoors	Indoors/outdoors	
EN 54-22 standard compliant	Class A1N, A2N, BN, CN Environmental group Ⅱ*1	Class A1N, A2N, BN, CN Environmental group Ⅲ*2	-
Type No.	S9550TK	S9580TK	S9560TK

（Note） The cables are recommended for use for a fire detection system. Cables provided by other suppliers can also be used to suit your applications provided they are compatible with the optical output specifications of the DTSX1.
There are three types of Environmental groups depending on the environment in which the device is used, and the authentication conditions differ for each. DTSX1 and fiber optic sensor cable, for each, is Environmental group certified.

*1: Environmental group II is intended for equipment installed inside (indoors) buildings on the premises of general commercial / industrial areas.

*2: Environmental group III is intended for equipment installed outdoors.

3.3.2. Optical fiber layout

The following figure shows a typcal fiber layout to EN 54-22 for fiber cable.
The optical output from the DTSX1 is spliced to a sensor cable. An approach cable (multi-core cable) can be used when EN 54-22 is not required and DTSX1 unit is far away from the measurement target.
The sensor cable is installed beside the heat detection target using cable clamps or the like.
At each splice location, provide at least 20 m of extra cable for temperature calibration and disconnection repair and store it in a junction box.

When making Single-ended measurements, connect an optical patch cable for termination.

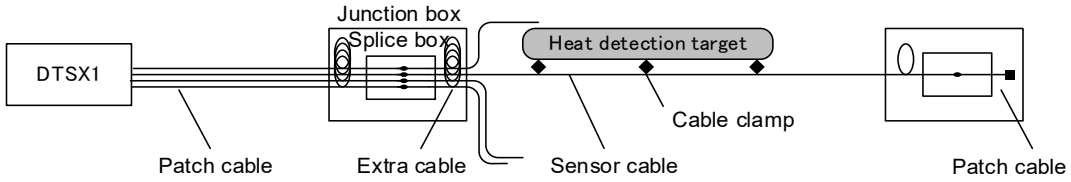


Figure 3.23 Optical fiber connection example (Single-ended)

To perform Double-ended measurement, connect both ends of the cable to the DTSX1.
As a result, two channels are required. In the event of a fiber break, the temperature can be measured continuously, as the measurement is made from each channel to the break point.

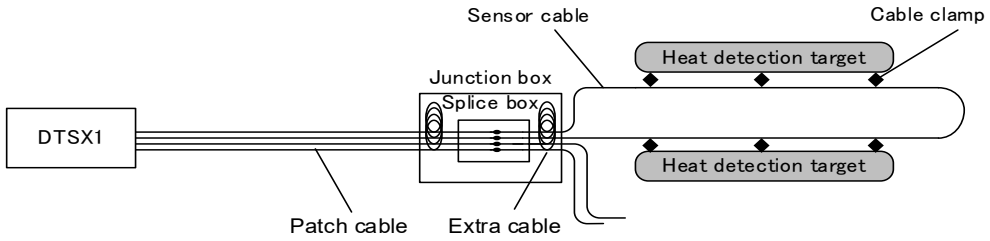


Figure 3.24 Optical fiber connection example (Double-ended)

CAUTION

- To comply with EN 54-22, please wire to satisfy the following conditions.
- Use DTSX1 of 2km, 4km, 6km, 8km or 10km model of Style S2 to comply with class A1N.
- DTSX1 Style S3 uses a standard type (S9550TK) or a robust type (S9580TK) sensor cable to comply with EN 54-22 Class A1N, A2N, BN, CN.
- Use D1JB-01 and/or D1JB-03 for the connection box.

- Use D1PT-01 for the patch cable.
- Do not use an approach cable.
- The redundancy is not subject to EN 54-22 certification test.

3.3.3. Connecting Optical Fiber

The DTSX1 is connected to an optical patch cable using an E2000 connector.
The optical fiber are spliced together.
Make sure there are no scratches, dirt, dust, powder, oil film, or the like on the E2000 connector end face.
We recommend that you check the optical connector end face with an appropriate microscope or clean it with a dedicated cleaner.
A fusion splicing box is in a junction box (D1JB-01, D1JB-03).
The method of fusion splicing is as follows.

・Strip the cable jacket and take the bare fiber and cut it with the following length.
L1: 520~540 mm, L2: 720~750 mm

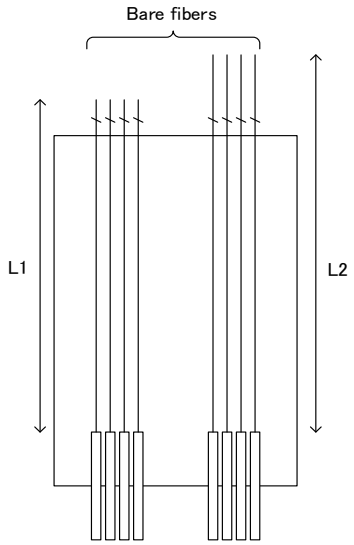


Figure 3.25 Method of strip the cable jacket

・Attach the cable holder as below.

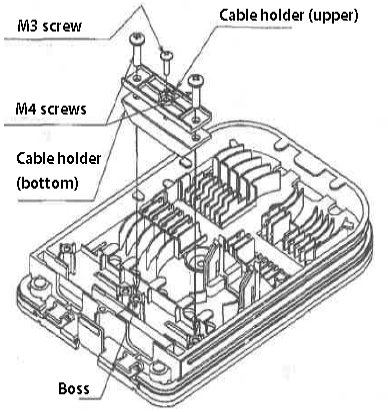


Figure 3.26 Method of Attach the cable holder

・ Attach the sleeve on the fiber, splice fibers by fusion and wire in splice box.

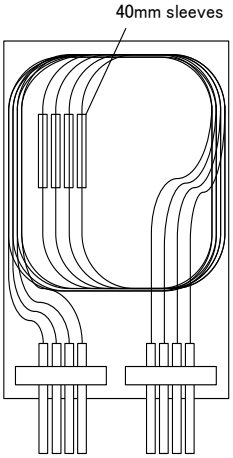


Figure 3.27 Method of attach the sleeve on the fiber

3.3.4. Connecting to a Patch Cable

Splice the approach cable to the optical patch cable. Provide at least 20 m of extra cable, and store it in a connection box.
On the outside of the connection box, protect and secure the cable with a protecting tube if necessary.
Use D1JB-03 for the junction box.

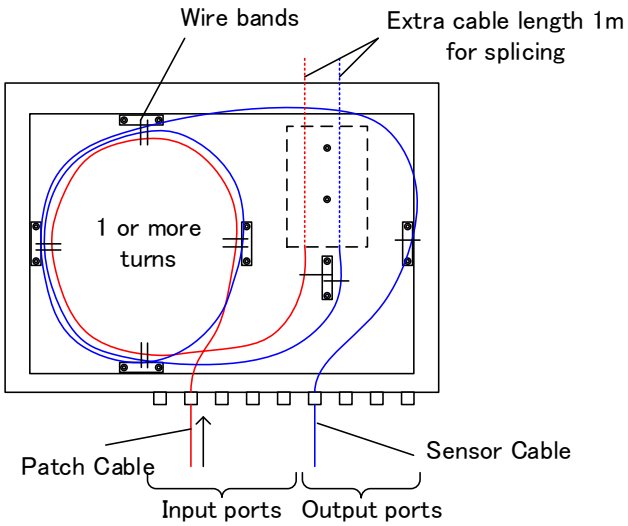


Figure 3.28 Large junction box

3.3.5. Connecting Sensor Cables

The sensor cable has an extra length of 20m or more, and is fused and connected to other sensor cables and stored in the junction box.
On the outside of the connection box, protect and secure the cable with a protecting tube if necessary.

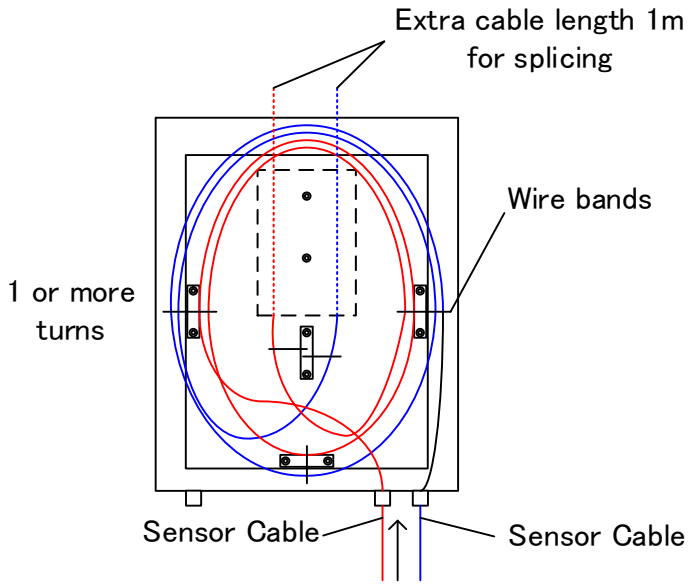


Figure 3.29 Small junction box

3.3.6. Cannecting to a patch cable (Termination)

The sensor cable has an extra length of 20m or more, and is fused and connected to other patch cable and stored in the junction box.
On the outside of the connection box, protect and secure the cable with a protecting tube if necessary.

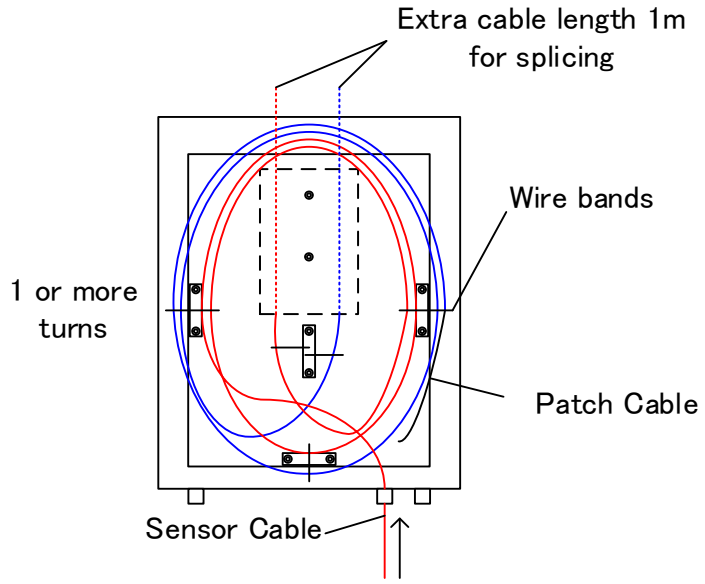


Figure 3.30 Small juction box

3.3.7. Installing the Cable Clamps

Use cable clamps D1CL-01 if you are installing the sensor cable along the ceiling. Install them by following the procedure below.

1. Fasten the cable clamps to the ceiling using anchor bolts.

- The installation interval of cable clamps varies depending on the sensor cable material as follows.
  - Non-metallic sensor cable: 1 to 2 m interval
  - Metallic sensor cable: 2 to 3 m interval

- If there are steps in the ceiling, install the cable as shown below.

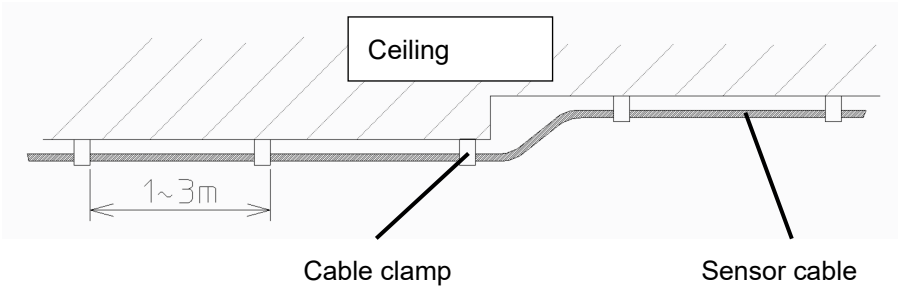


Figure 3.31 Installation when there are steps in the ceiling

- If you are using a metal wire to fasten the cable, install it as shown below.

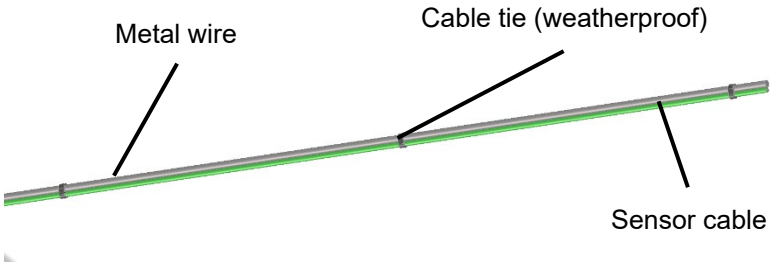


Figure 3.32 Fastening the sensor cable to a metal wire using cable tie

SEE ALSO

For details on how to fasten the cable clamp D1CL-01, refer to “DTSX Peripheral Devices” (IM 39 J00S01-01EN).

2. Pass the cable through the cable clamp. If required, fasten the cable with a cable tie (weatherproof).

TIP

This section shows how to fasten the sensor cable to the cable clamp.

1) Pass the sensor cable through D1CL-01 and tighten the screws.

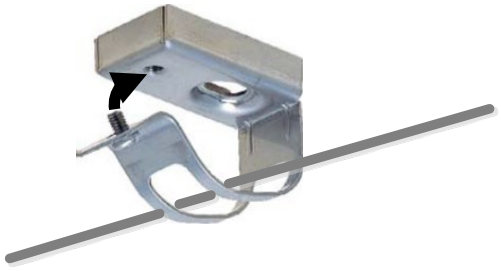


Figure 3.33 Securing the Sensor Cable with Cable Clamp D1CL-01 1

2) Set two cable ties under the sensor cable and cut off the excess part of the tightened cable tie.

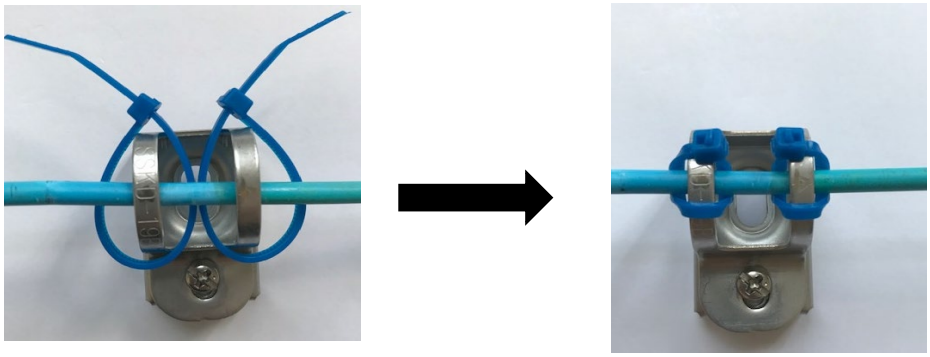


Figure 3.34 Securing the Sensor Cable with Cable Clamp D1CL-01 2

CAUTION

- Protect the cable from lamps and other heat sources.
- Secure safe distance from high voltage cables.

When laying sensor cables on a belt conveyor, use cable clamps.
Install them by following the procedure below.
As an example, sensor cables can be installed as shown in the figure below.

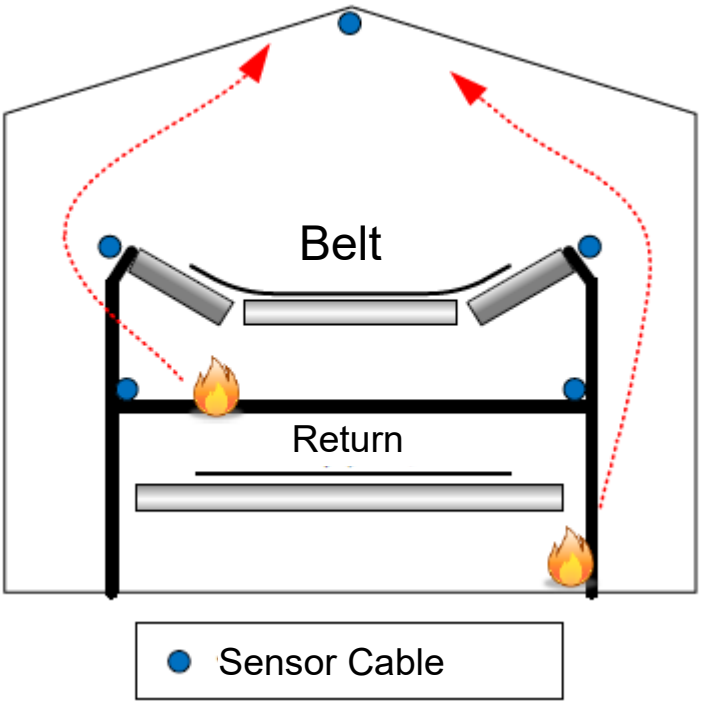


Figure 3.35 Example of installation of sensor cables on a belt conveyor

As shown as an example in the figure below, a cable can be fixed by passing it through PF pipe fixed to a clip with a cable tie (weatherproof).



Figure 3.36 Securing a sensor cable with a clamp and PF pipe

As the clamp, SGK or SGKL manufactured by Mirai Kogyo, for example, can be used.

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4. Preparation

This chapter describes the preparations for operating the DTSX1.

4.1. Turning the Power On

Turn the DTSX1 on by following the procedure below.

4.1.1. Procedure to Turn the Power On

When the power is turned on, the DTSX1 starts automatically.
The DTSX1 starts in the state that it was in before the power was turned off.

For example, if the power is turned off while a measurement is in progress and the power is turned back on (such as when the power returns after a power failure), there is no need for the DTSX1 to receive a measurement start communication command.
The DTSX1 will automatically resume the measurement using the settings before the power was turned off.
In a normal operation, the DTSX1 is shut down after the measurement is stopped, and then the power is turned off. If the power turns back on, the DTSX1 retains the measurement stopped state.

- **Checking the power-on completion**

  You can determine whether the power-on procedure has been completed by whether the SYSTEM LED is lit green in the status/alarm display area on the front of the housing.

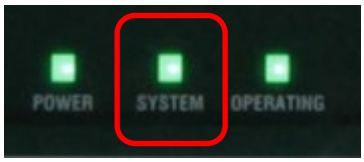


Figure 4.1 Power-on complete state
(LED in the status/alarm display area on the front of the housing)

It takes about 5 minutes for the power-on procedure to complete.

4.1.2. Procedure to Turn the Power Off

To turn off the DTSX1, first turn off (shut down) the DTSX MODULE inside the housing, and then turn off the power.
The following shutdown methods are available.

- **Shutdown switch**

  Press the DTSX MODULE shutdown switch inside the DTSX1 housing with a pointed object (e.g., the tip of a pen) to start the shutdown procedure.

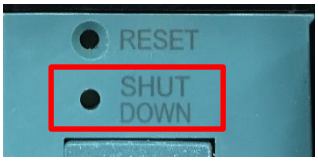


Figure 4.2 DTSX MODULE shutdown switch

- **Web browser**

  Show the system setting screen in a Web browser and select Shutdown under Reboot in the left menu to start the shutdown procedure.
  For details on showing the system setting screen, refer to section 4.2.3, “Checking the System Setting Screen.”

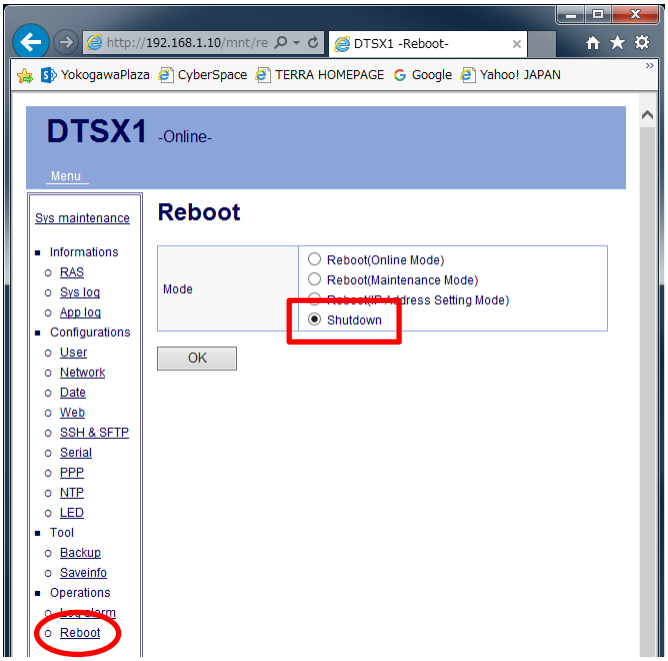


Figure 4.3 Shutdown by web browser

When the shutdown procedure starts, the DTSX MODULE RDY LED starts to blink. When the LED turns off, the DTSX1 power can be turned off.

It takes about 5 minutes for the shutdown procedure to complete.

TIP

During the shutdown process of DTSX MODULE, SYSTEM in the Status/alarm display area may blink red.

4.2. Initial Settings

Initial settings must be configured first. Using a Web browser, set the DTSX1 time, add users that will log into the DTAP3000, and set the DTSX1 IP address.

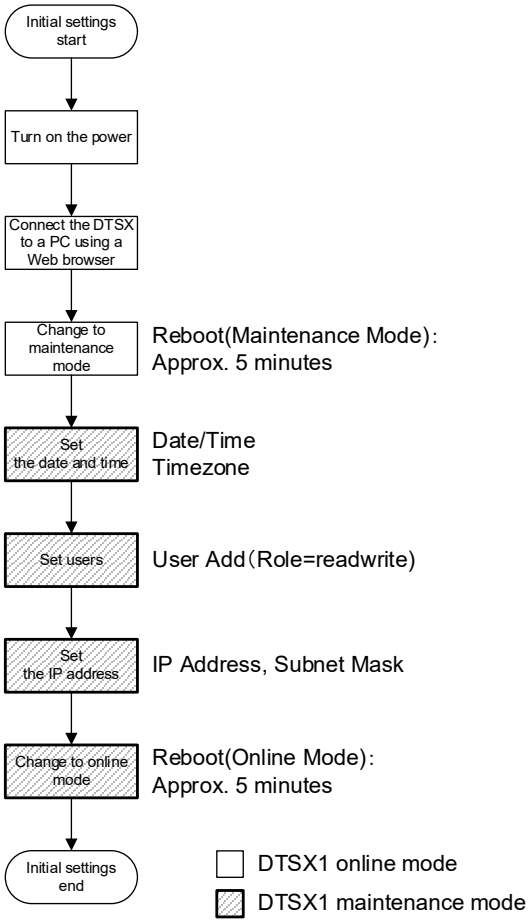


Figure 4.1 Flowchart of initial setting

IMPORTANT

You cannot log into the DTAP3000 unless you add a user. Be sure to add a user.

4.2.1. Connecting to a PC

Connect the DTSX1 to a configuration PC with an Ethernet cable.
On the Configuration PC, under Network connections of Windows, choose Local Area Connection - Properties - Internet Protocol Version 4 (TCP/IPv4) - Use the following IP address, and specify the IP address.

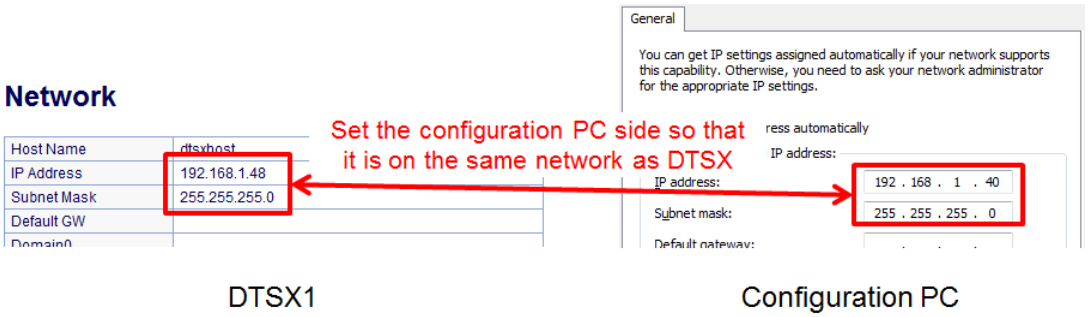


Figure 4.5 Network settings on the configuration PC

IMPORTANT

- Do not use the same IP address for the configuration PC and the DTSX1.
- Make sure that the configuration PC and the DTSX1 are on the same network.

4.2.2. Turning on the Power

Turn on the DTSX1 according to section 4.1.1, “Procedure to Turn the Power On.”

4.2.3. Checking the System Setting Screen

Show the DTSX1 system setting screen.
The factory default IP address of the DTSX1 is 192.168.1.10.

In the address bar of the Web browser, type “http://192.168.1.10/mnt”.
From the authentication screen, display the DTSX1 system setting screen.

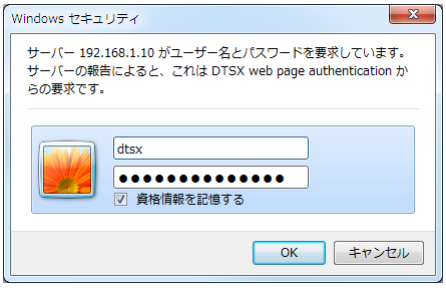


Figure 4.6 Authentication sreen

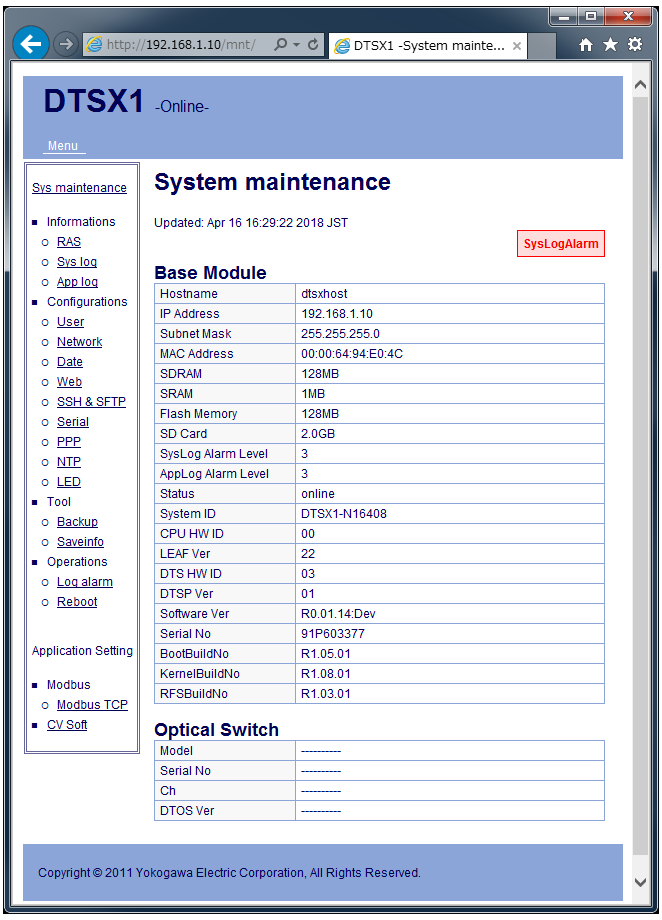


Figure 4.7 System setting screen

4.2.4. Changing to the Maintenance Mode

To configure the DTSX1, switch to maintenance mode by following the procedure below.

1. On the left menu of the system setting screen, click Reboot.
   Select Reboot (Maintenance Mode) and click OK.

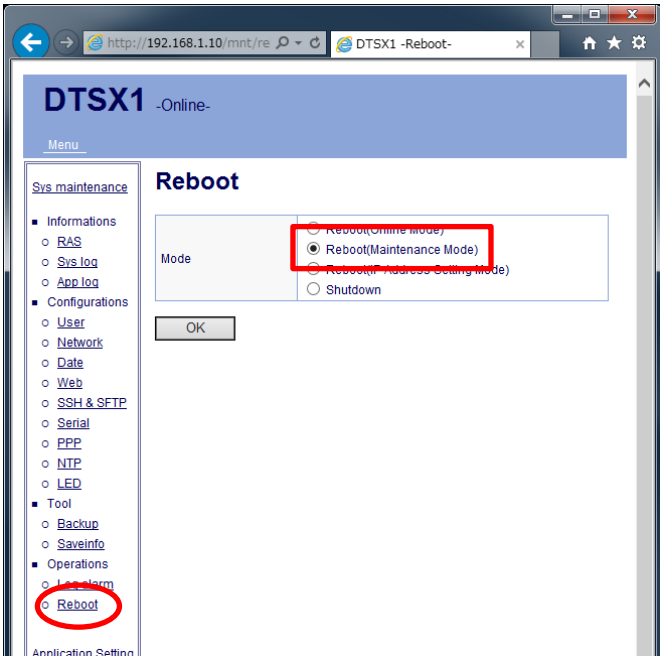


Figure 4.8 Reboot mode selection screen

2. A confirmation screen is displayed.
   Click OK to restart the DTSX1 in maintenance mode.
   You can check whether the DTSX1 has completed the startup procedure in maintenance mode with the LEDs.
   - The SYSTEM LED in the status/alarm display area on the front of the housing lights.
   - On the front of the DTSX MODULE inside the housing light, the HRDY LED blinks and the RDY LED lights.

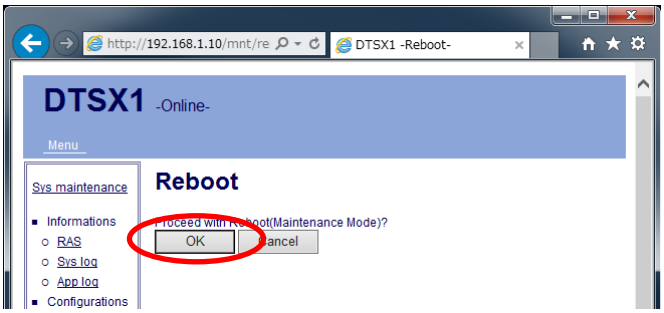


Figure 4.9 Reboot confirmation screen

3. After the DTSX1 restarts in maintenance mode, display the system setting screen.

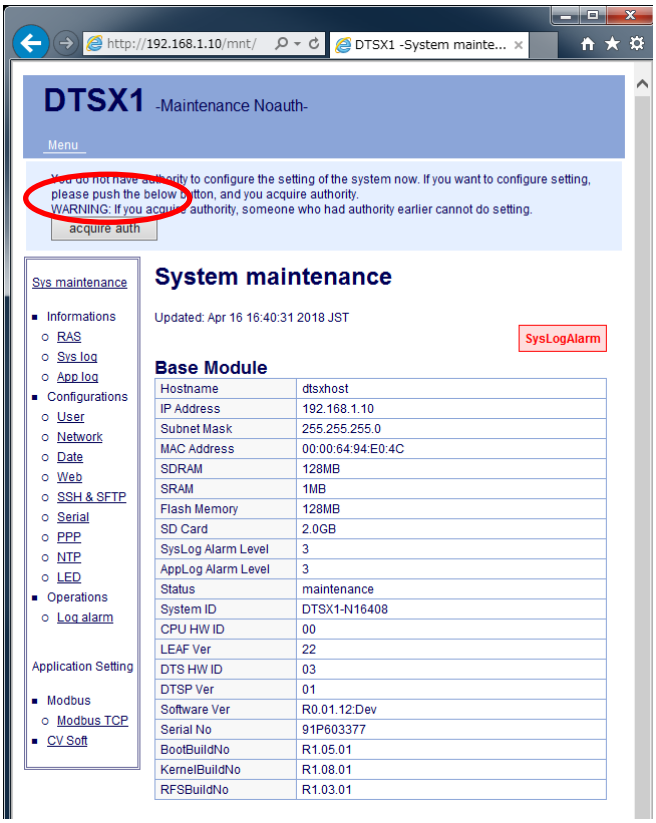


Figure 4.10 System setting screen in maintenance mode

4. To enable setting changes, click acquire auth.
   The button disappears, and “-Maintenance Auth-” appears. You can now change the settings.

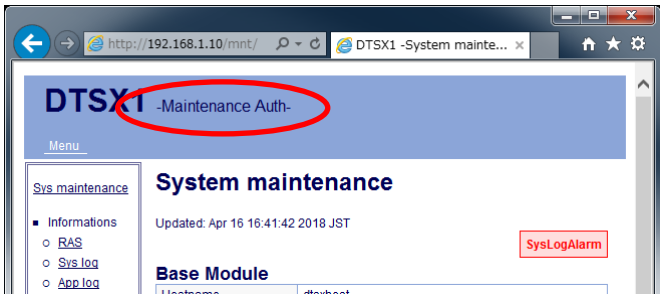


Figure 4.11 Changing to allow changes to settings

4.2.5. Setting the Date

Change the date and time.

1. On the left menu of the system setting screen, click Date.
   Select the Date/Time and Timezone check boxes.
   Set the date, time, and time zone, and click OK.

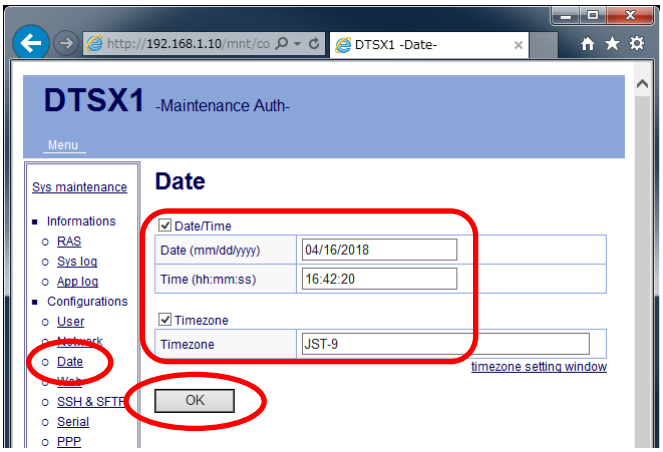


Figure 4.12 Date setting screen

2. A confirmation screen is displayed.
   Click OK to apply the settings.

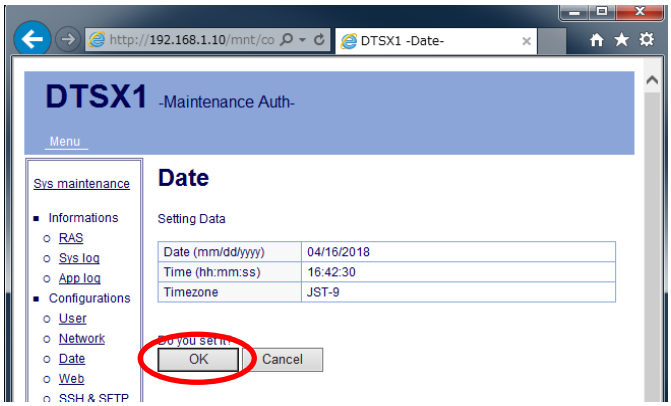


Figure 4.13 Date setting confirmation screen

4.2.6. Setting Users

Add users that will log into the DTAP3000.

1. On the left menu of the system setting screen, click User.
   Select User Add.
   Fill in the Name, Password, and Password (again) boxes.
   For Role, select User:readwrite.
   Click Set at the bottom of the screen.
   A confirmation screen appears. Click OK to apply the settings.

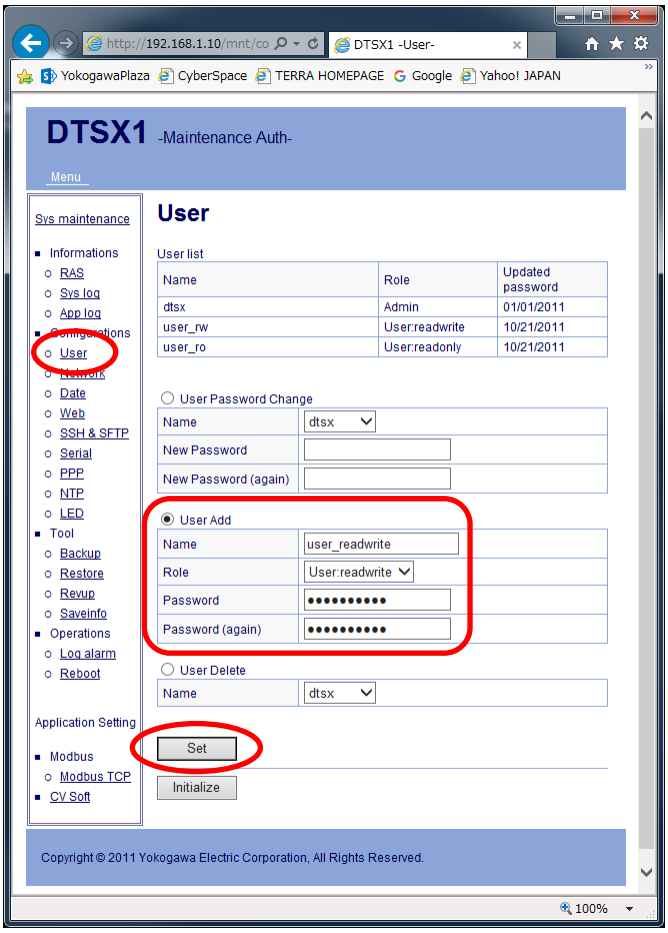


Figure 4.14 User setting screen

2. A confirmation screen is displayed.
   Click OK to apply the settings.

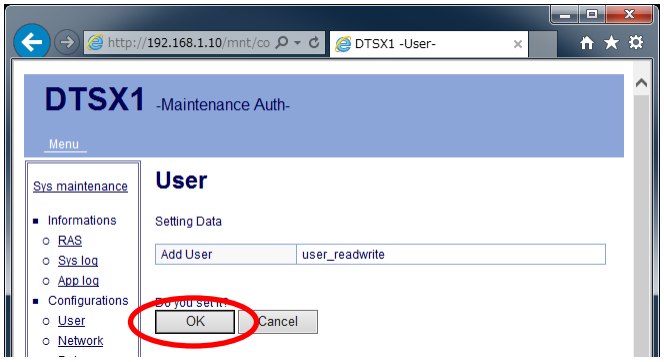


Figure 4.15 User setting confirmation screen

4.2.7. Setting the IP Address

If you want to change the DTSX1 IP address from the factory default address (192.168.1.10), you need to perform the procedure here.

1. On the left menu of the system setting screen, click Network.
   Fill in the Host Name and IP Address boxes.
   Click Set at the bottom of the screen.
   A confirmation screen appears. Click OK to apply the settings.

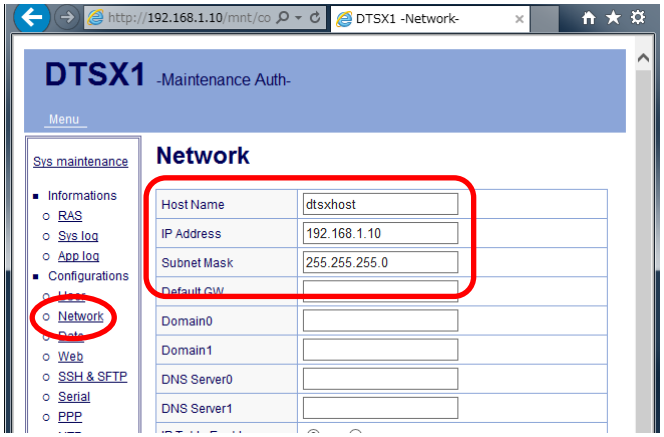


Figure 4.16 Network setting screen

2. A confirmation screen is displayed.
   Click OK to apply the settings.

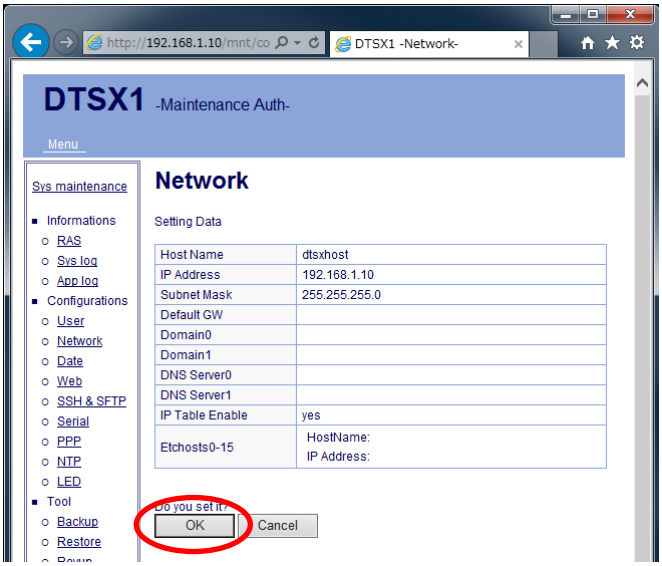


Figure 4.17 Network setting confirmation screen

4.2.8. Changing to Online Mode

After all the settings are complete, change the DTSX1 to online mode by following the procedure below.

1. On the left menu of the system setting screen, click Reboot.
   Select Reboot (Online Mode) and click OK.

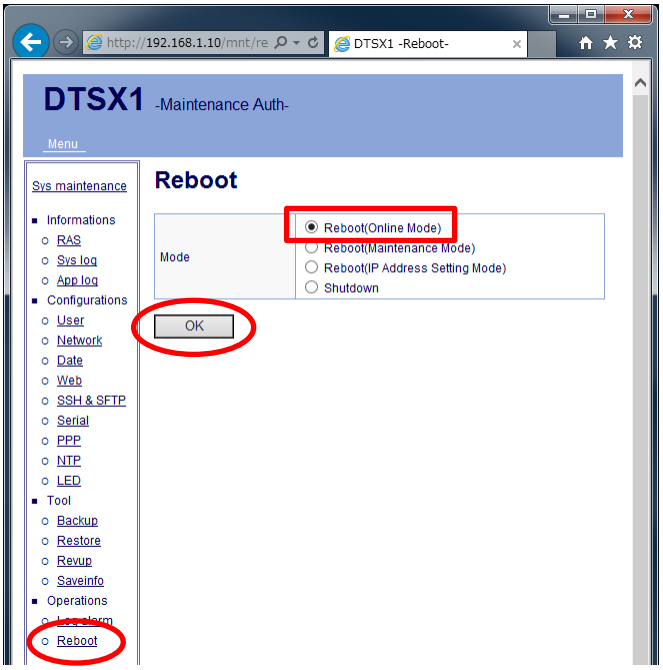


Figure 4.18 Reboot mode selection screen

2. A confirmation screen is displayed.
   Click OK to restart the DTSX1 in online mode.
   You can check whether the DTSX1 has completed the startup procedure in online mode with the LEDs.
   - The SYSTEM LED in the status/alarm display area on the front of the housing lights.
   - The HRDY and RDY LEDs on the front of the DTSX MODULE inside the housing light.

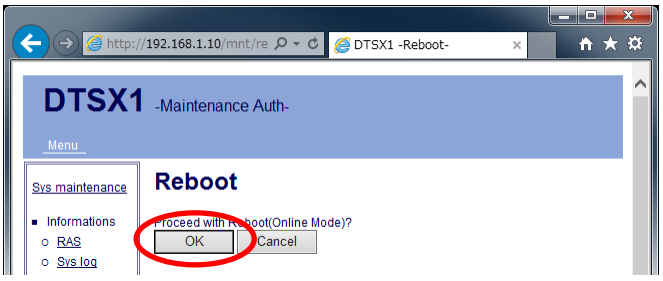


Figure 4.19 Reboot confirmation screen

IMPORTANT

The DTSX1 will not perform heat detection if it is not in online mode. After completing the initial settings, be sure to change to online mode.

4.3. Temperature Calibration

The DTSX1 detects heat by measuring the temperature along the connected optical fiber sensor cable. Because the temperature measured based on the optical signal intensity depends on the optical fiber sensor cable in use and splice loss, temperature calibration must be performed on-site.
Temperature calibration is performed by (1) setting the measurement mode, (2) setting the temperature calibration sections, and (3) executing temperature calibration using the DTAP3000's temperature calibration function. These steps are explained below. For further details, refer to "DTAP3000 DTSX3000 Control Visualization Software Calibration Guide" (IM 39J02B40-04EN).

4.3.1. Setting the Measurement Mode

First, set the measurement mode (single-ended measurement or double-ended measurement) according to the optical fiber installation.
Basically, single-ended measurement requires temperature calibration on both ends, and double-ended measurement requires calibration on one end.

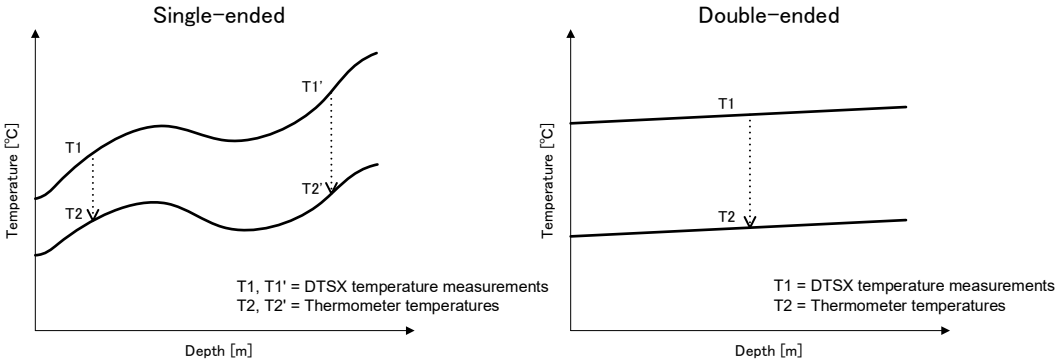


Figure 4.2 Temperature calibration method

4.3.2. Setting the Temperature Calibration Sections

Because temperature calibration is performed on each connected optical fiber, sections are assigned between each splice points.

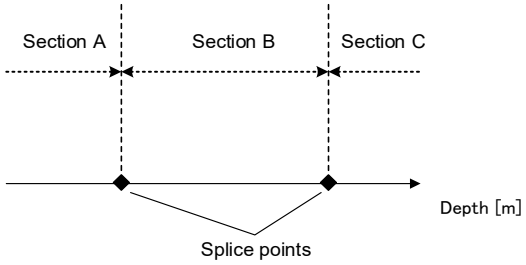


Figure 4.3 Section Settings

4.3.3. Executing the Temperature Calibration

For each temperature calibration section, the DTSX1 is configured so that the temperature measured by the DTSX1 matches the actual temperature (reference temperature) around the optical fiber. Temperature calibration is performed using the temperature inside the connection box.

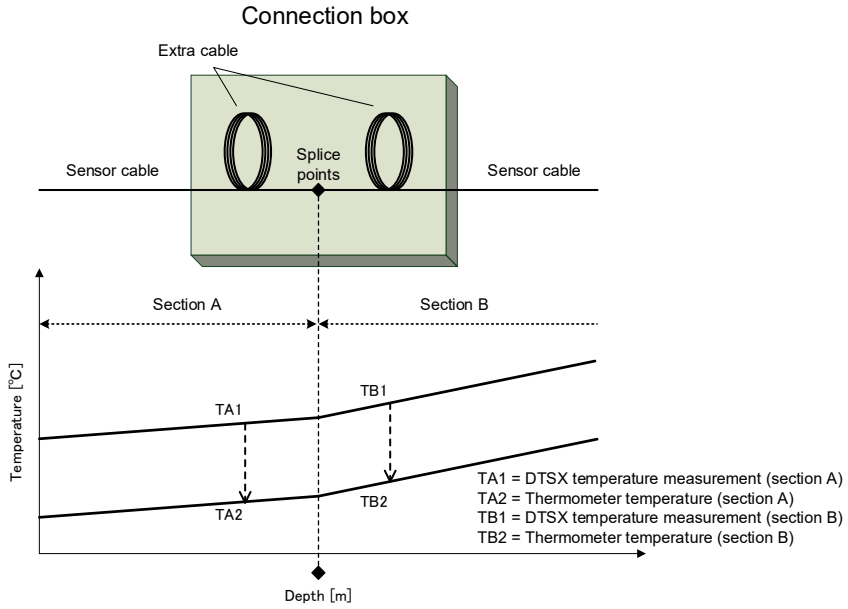


Figure 4.4 Temperature Calibration

IMPORTANT

Obtain the reference temperature using a calibrated thermometer or the like.

4.4. Setting Heat Alarms

You can set pre-alarms and alarms based on heat detection conditions.

4.4.1. Setting Temperature Conditions

On the DTAP3000 Preset Alarm Setting screen, you can set pre-alarms and alarms based on the maximum temperature, temperature difference limit, and rate of rise. When a typical heat detection setting is used, Setting Mode is set to EN 54-22 A1N (PATTERN1)[*1], EN 54-22 A2N (PATTERN2)[*2], EN 54-22 BN (PATTERN3)[*3], or EN 54-22 CN (PATTERN4)[*4]. The values will be set automatically.
To set each value manually, set Setting Mode to User Setting.

Table 4.1 Setting Value of Preset Alarm

Setting Mode	Max		Average Max		Rate of Rise1	
	Alarm	Pre-Alarm	Alarm	Pre-Alarm	Alarm	Pre-Alarm
EN 54-22 A1N (PATTERN1)[*1]	60	Off	Off	Off	Δt : 100 ΔT : 25	Off
EN 54-22 A2N (PATTERN2)[*2]	60	Off	Off	Off	Δt : 100 ΔT : 25	Off
EN 54-22 BN (PATTERN3)[*3]	77	Off	Off	Off	Off	Off
EN 54-22 CN (PATTERN4)[*4]	92	Off	Off	Off	Off	Off
User Setting	-273.15 ~ 999.99	-273.15 ~ 999.99	-273.15 ~ 999.99	-273.15 ~ 999.99	Δt : 1 ~ 180 ΔT : 1 ~ 999	Δt : 1 ~ 180 ΔT : 1 ~ 999

Setting Mode	Rate of Rise2[*5]		Rate of Rise3[*5]		Delay
	Alarm	Pre-Alarm	Alarm	Pre-Alarm	
EN 54-22 A1N (PATTERN1)[*1]	Off	Off	Off	Off	1
EN 54-22 A2N (PATTERN2)[*2]	Off	Off	Off	Off	1
EN 54-22 BN (PATTERN3)[*3]	Off	Off	Off	Off	1
EN 54-22 CN (PATTERN4)[*4]	Off	Off	Off	Off	1
User Setting	Δt : 1 ~ 180 ΔT : 1 ~ 999	Δt : 1 ~ 180 ΔT : 1 ~ 999	Δt : 1 ~ 180 ΔT : 1 ~ 999	Δt : 1 ~ 180 ΔT : 1 ~ 999	0 ~ 2

*1: In Style S1 and/or measurement distance range 16km model (non-EN 54-22 certified model) of Style S2, Setting Mode is displayed as 'PATTERN1'.
*2: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN2'.
*3: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN3'.
*4: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN4'.
*5: Effective with a combination of firmware R1.03.01 or later and DTAP3000 R1.06.01 or later.

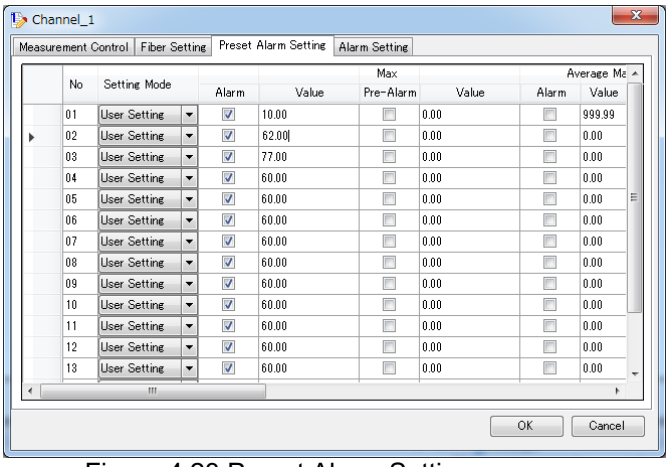


Figure 4.23 Preset Alarm Setting screen

CAUTION

To comply with EN 54-22, select “EN 54-22 A1N”, “EN 54-22 A2N”, “EN 54-22 BN” or “EN 54-22 CN” for Setting Mode.

To set a pre-alarm or alarm, select from the following three judgment methods or a combination of them.

- **Maximum temperature (Max)**

  An alarm is output when the maximum value in the zone is greater than or equal to the threshold.

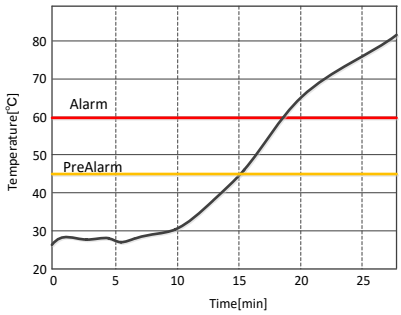


Figure 4.5 Maximum temperature alarm

- **Temperature difference limit (Average Max)**

  An alarm is output when the difference between the maximum value and the average value in the zone is greater than or equal to the threshold.

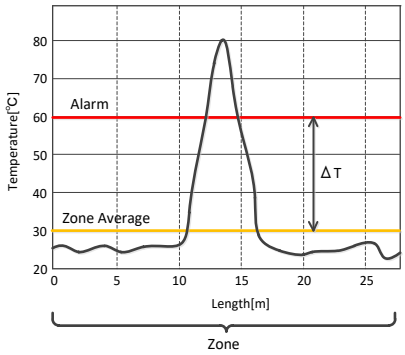


Figure 4.6 Temperature difference limit alarm

- **Rate of rise**

  An alarm is output when the maximum rate of rise in temperature in the zone is greater than or equal to the threshold.

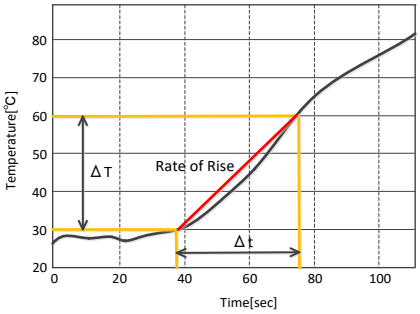


Figure 4.7 Rate of rise alarm

- **Alarm Output Delay (Delay)**

  The pre-alarm or alarm is output when the condition set in the pre-alarm or alarm is satisfied and the measured cycle number exceeds the value set in "Delay".
  For example, when you set Delay = 0, if the condition set in Alarm (or pre-alarm) is satisfied, Alarm (or pre-alarm) is output.
  When you set Delay = 1, if the condition set in Alarm (or pre-alarm) is satisfied for 2 consecutive cycles, Alarm (or pre-alarm) is output.

4.4.2. Setting Zones

Set zones for outputting the pre-alarms and alarms set in “Preset Alarm Setting” in section 4.4.1, “Setting Temperature Conditions.”
You can set up to 1000 zones.
You can set zones on the DTAP3000 Alarm Setting screen.
Zones can be set as a range from Start Depth [m] to End Depth [m].
However, the total of the distances of all zones should not exceed 48 km.
If you want to control contact outputs when an alarm or pre-alarm occurs in the zone, use "Output". You can select it 1 to 8 or 1 to 64.
The number of contacts that can be selected differs depending on the model name of DTSX1.

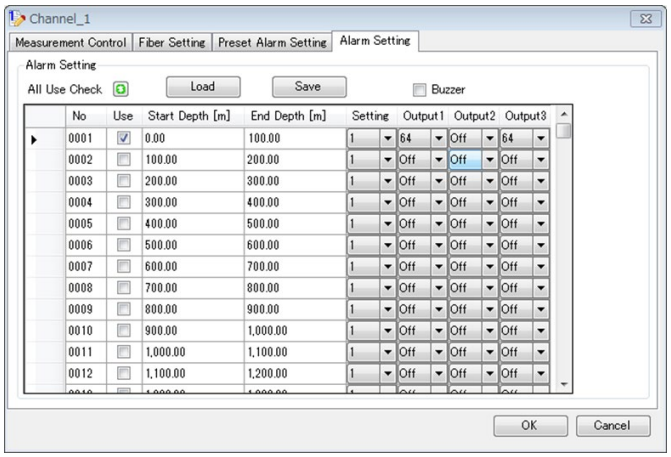


Figure 4.27 Alarm Setting screen

The number of contact outputs that can be controlled in each zone depends on the combination of firmware version and DTAP3000 version as shown in the table below.
Load / Save button allows you to save the Alarm Setting settings from file to load / file.
The file is in CSV format.

Table 4.2 Number of contact outputs that can be controlled in each zone.

Firmware version	DTAP3000 version	Number of controllable contact outputs.
R1.03.01 or later	R1.06.01 or later	3
	R1.05.01 R1.04.01 R1.03.01 R1.02.01 R1.01.01	1
R1.02.01 R1.01.01	R1.06.01 R1.05.01 R1.04.01 R1.03.01 R1.02.01	

Start Depth [m] and End Depth [m] of each zone correspond to the zone boundary positions where the temperature is reduced as a result of applying cooling spray to the corresponding positions on the sensor cable.

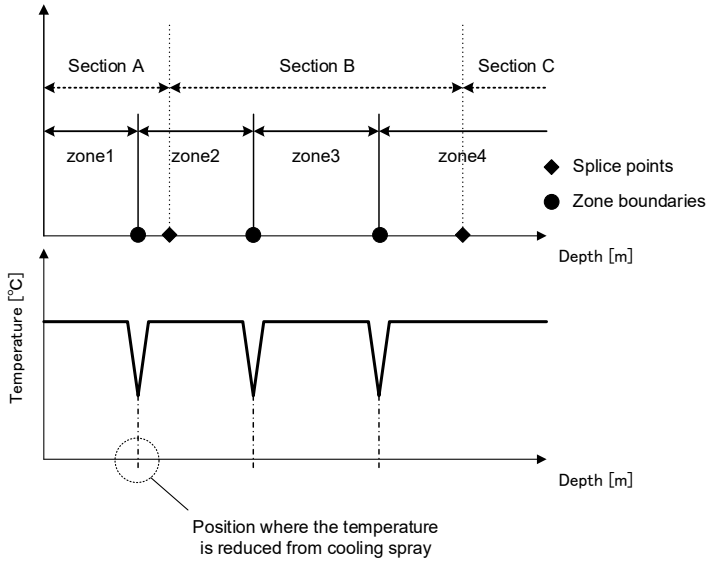


Figure 4.8 Relationship between zones,
temperature reduction from cooling spray, and boundary positions

IMPORTANT

If the temperature condition is set to EN 54-22 A1N (PATTERN1)*1, EN 54-22 A2N (PATTERN2)*2, EN 54-22 BN (PATTERN3)*3, or EN 54-22 CN (PATTERN4)*4 for all valid zones, Measurement Control Repetition Rate, Sampling Resolution, Averaging, and Fiber Failure Detection are set automatically.

*1: In Style S1 and/or measurement distance range 16km model (non-EN 54-22 certified model) of Style S2, Setting Mode is displayed as 'PATTERN1'.

*2: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN2'.

*3: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN3'.

*4: In Style S1 and Style S2, Setting Mode is displayed as 'PATTERN4'.

4.4.3. Heat Alarm Contact Input/Output

Contact outputs and contact inputs can be used for alarms that occur.

- **Contact outputs**

  Alarms that occur on the DTSX1 can be output to external devices.
  Up to 8 or 64 contact outputs can be configured.
  You can set them on the DTAP3000 External Contact Output screen.
  To use contact output, set Function to Normally Open or Normally Close. The default value is normally open.

  When set to Normally Open (N.O.), the contact is normally in the open (off) state and changes to the closed (on) state when the output conditions are met.
  When set to Normally Close (N.C.), the contact is normally in the closed (on) state and changes to the open (off) state when the output conditions are met. When set to OFF, the contact is always open (off).

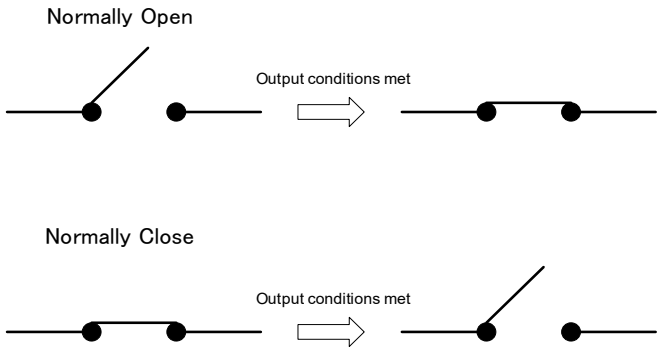


Figure 4.9 Normally Open and Normally Close

Select the output conditions from Alarm, Pre-Alarm, Fault, System, Power, and Input. Multiple conditions can be selected.

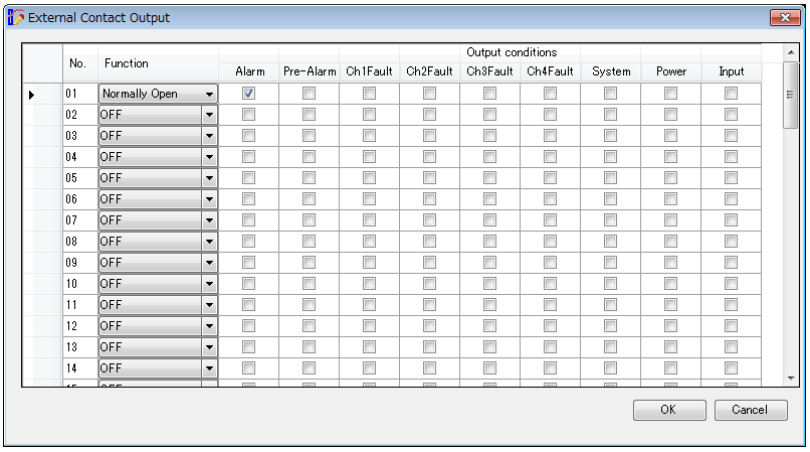


Figure 4.10 External Contact Output screen

- **Contact inputs**

  Alarms occurring on external devices can be input.
  The input alarms can be consolidated on the DTSX1 and generated as an alarm.
  Up to four contact inputs can be configured.
  You can set them on the DTAP3000 External Contact Input screen.
  To use contact input, set Function to Alarm, ACK, or RESET.
  Set Mode to Active High or Active Low.

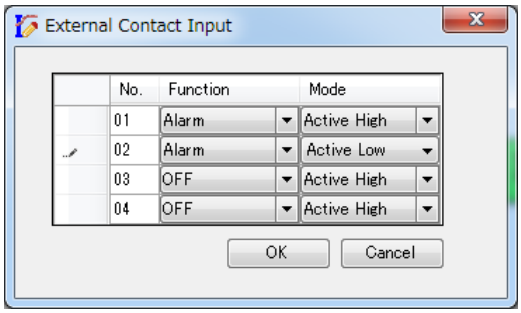


Figure 4.11 External Contact Input screen

4.4.4. Operation Settings

Set the measurement conditions for DTSX1 operation.

- **Distance range**

  Select the optical fiber length that the DTSX1 can measure.
  You must select a distance range that is longer than the length of the optical fiber connected to the DTSX1.
  The distance range can be set to 2 km, 4 km, 6 km, 8 km, 10 km, or 16 km*1.
  *1: On Style S2, compliant with the fire detection standard (EN 54-22 Class A1N) certification with distance range of 10km or less.

- **Measurement time**

  This indicates the time of a single measurement on the DTSX1.
  If conforming to EN 54-22, this is automatically set to 5 seconds.

- **Sampling resolution**

  Select 0.5 m or 1 m.
  If conforming to EN 54-22, this is automatically set to 1 m.

- **Optical fiber breakage detection**

  When the optical fiber sensor cable breaks, it is detected as a fault signal.
  This function is enabled when Fiber Failure Detection is set On.
  If conforming to EN 54-22, this is automatically set to On.

IMPORTANT

Optical fiber breakage detection is not performed in 30m zone from the end of optical fiber.

- **Temperature data mask at the time of fiber breakage**

  When optical fiber is broken, temperature in range where temperature measurement becomes impossible due to break is masked to -273 °C or + 999 °C.
  However, it is not masked when "Masking" is OFF.
  If conforming to EN 54-22, this is automatically set to -273 °C.

TIP

- Masking is effective when DTSX1 firmware R1.03.01 or later and DTAP3000 R1.06.01 or later versions are combined.
- Masking is enabled when Fiber Failure Detection is selected as On.

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5. Operation

This chapter explains how to operate the DTSX1.

5.1. Regular Operation

This section explains how to start and stop a measurement on the DTSX1.

5.1.1. Starting a Measurement

1. When the DTAP3000 stopped, click Start to start a measurement.

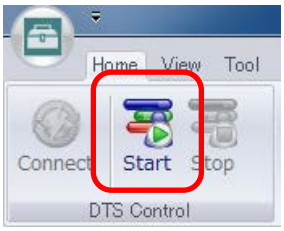


Figure 5.1 Starting a measurement with the Start button

You can determine whether a measurement is in progress by whether the OPERATING LED is lit green in the status/alarm display area on the front of the housing.

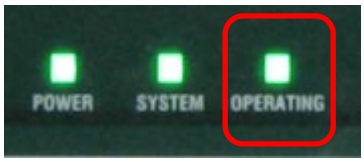


Figure 5.2 Measurement state
(LED in the status/alarm display area on the front of the housing)

2. In order to prevent erroneous operation, set it with the web browser so that the DTAP3000 can not be used during measurement.
   Changing the DTSX1 to maintenance mode.
   Refer to “4.2.4 Changing to the Maintenance Mode”.

3. On the left menu of the system setting screen, click CV Soft.
   Select the invalid of CVSoft.
   Click Set.

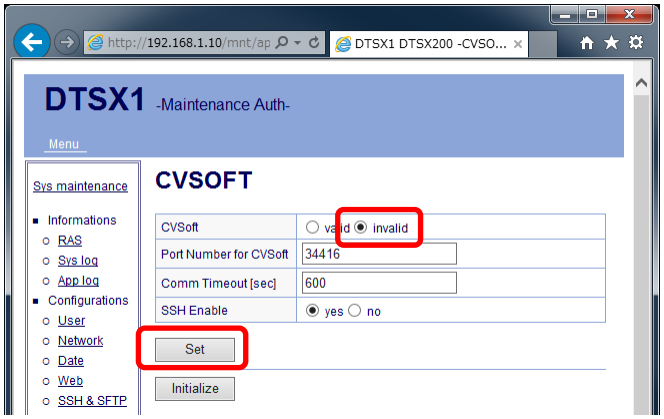


Figure 5.3 CV Soft settings (invalid)

4. A confirmation screen appears. Click OK to apply the settings.

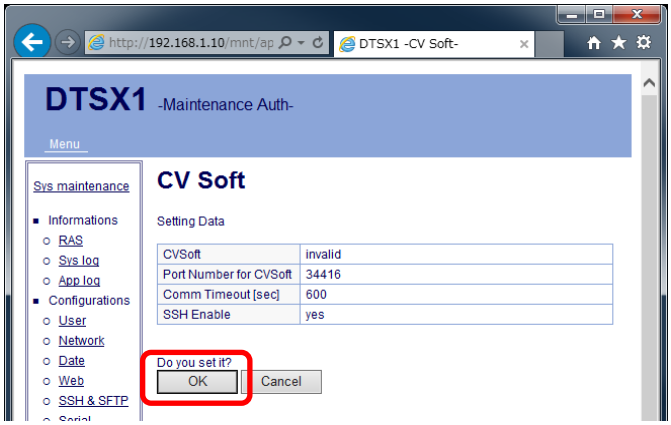


Figure 5.4 CV Soft setting confirmation screen

5. Changing the DTSX1 to online mode.
   Refer to “4.2.8 Changing to Online Mode”.

IMPORTANT

Measurement stops automatically when changing from online mode to maintenance mode during measurement. When changing from maintenance mode to online mode, the measurement is started automatically.

5.1.2. Stopping a Measurement

1. In order to prevent erroneous operation, set it with the web browser so that the DTAP3000 can be used during measurement.
   Changing the DTSX1 to maintenance mode.
   Refer to “4.2.4 Changing to the Maintenance Mode”.

2. On the left nemu of the system setting screen, click CV Soft.
   Select the valid of CVSoft.
   Click Set.

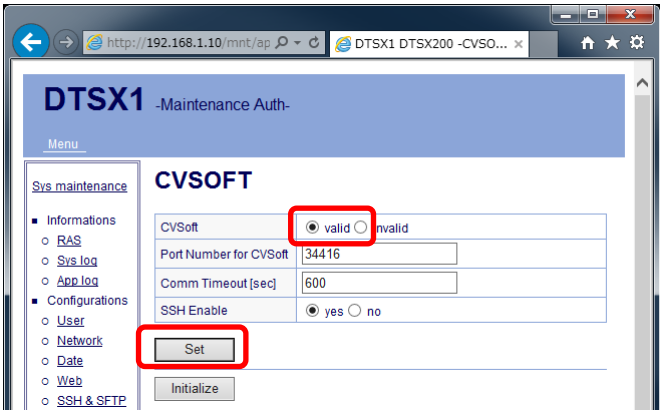


Figure 5.5 CV Soft settings (valid)

3. A confirmation screen appears. Click OK to apply the settings.

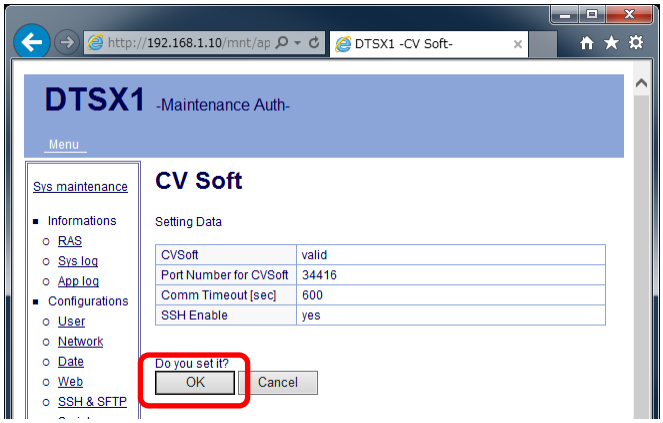


Figure 5.6 CV Soft setting confirmation screen

4. Changing the DTSX1 to online mode.
   Refer to “4.2.8 Changing to Online Mode”.

5. When the DTAP3000 running, click Stop to stop the measurement.



Figure 5.7 Stopping a measurement with the Stop button

You can determine whether a measurement is stopped by whether the OPERATING LED is off in the status/alarm display area on the front of the housing.

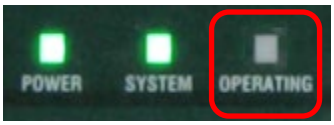


Figure 5.8 Measurement state
(LED in the status/alarm display area on the front of the housing)

5.2. How to Handle a Heat Alarm

If a pre-alarm or alarm occurs, the PRE-ALARM of the relevant channel in the status/alarm display area blinking red (lights red) and/or ALARM LED of the relevant channel in the status/alarm display area lights red.
(In parentheses are for Style S1)



Figure 5.9 Alarm activated state
(LED in the status/alarm display area on the front of the housing)

The administrator opens the door of the DTSX1 housing, and uses the RESET or ACK button inside the housing.



Figure 5.10 ACK and RESET buttons

5.2.1. RESET

When you press RESET, the DTSX1 resets the pre-alarm and alarm statuses, regardless of the alarm conditions.

5.2.2. ACK

When you press ACK, the DTSX1 acknowledges the pre-alarm or alarm.
However, the pre-alarm or alarm status is retained until the alarm conditions are no longer true.

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6. Maintenance

This chapter describes maintenance (inspection, hardware replacement, etc.) for ensuring uninterrupted system operation.

6.1. Regular Operation Periodic Inspection

The execution of periodic inspections as necessary is recommended.

Table 6.1 Daily Inspection Items

Inspection Items	Inspection Content	Evaluation criterion
Power supply	Is the power supply voltage within the reference?	12V to 24VDC
Ambient environment	Is the ambient temperature adequate?	-20 to 60°C*1
	Is the ambient humidity adequate?	5 to 95%RH (with no condensation)
Installation state	Is the housing firmly fixed?	No looseness
	Are the connectors of the wiring cable fully inserted and firmly fixed?	No looseness
	Are any of the external wiring screws loose?	No looseness
	Do any of the external wiring cables have cuts in them?	No abnormality in appearance
Optical fiber	Is the optical fiber connection loose?	No looseness
	Is excessive bending or stress applied to the optical fiber?	There should be no excessive bending or stress.
Self-test	Are there any errors in the self-test?	No errors
Relay function check	Terminal ON/OFF switching working properly?	Terminal ON/OFF switching working properly.
LED function check	Do the LEDs of the status/alarm display area work properly?	They light on/off properly.
Temperature setting	Difference between measured temperature of DTSX 1 and reference temperature	The requirements during initial settings must be met
Optical fiber loss	Loss value measured with DTSX1	The requirements during initial settings must be met

*1 : Compliant with the EN 54-22 Class A1N, Environmental group II from -10 to 55°C.

6.1.1. Self-test

DTSX1 can diagnose whether there is no problem with hardware by self-test. However, not all problems can be detected with the self-test function. Further, depending on the installation environment (temperature, disturbance noise, etc.), there is the possibility of misdetection. If the same fault is detected frequently, please contact us.

The self-test execution method is described below.

1. Click [Tool]-[Self Test] button on DTAP3000.

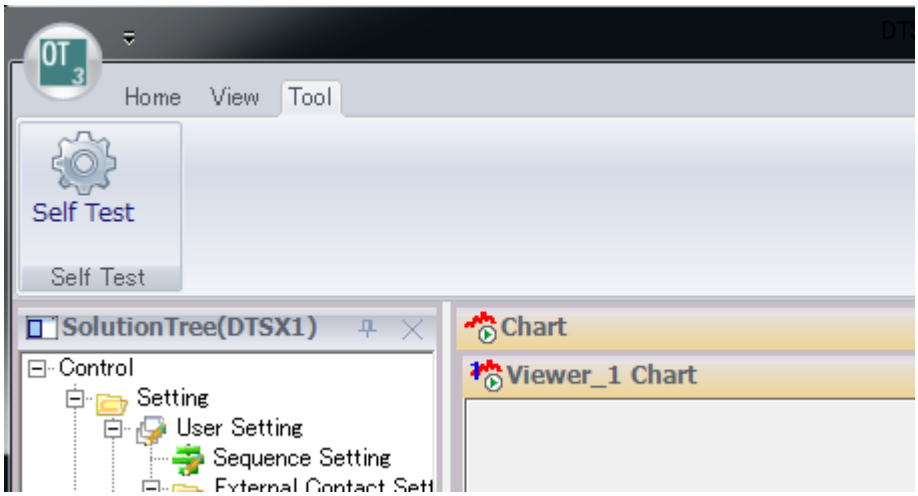


Figure 6.1 Self-Test execution button

2. The Self-Test dialog box is displayed, so click the [Start] button to execute the self-test and display the result.

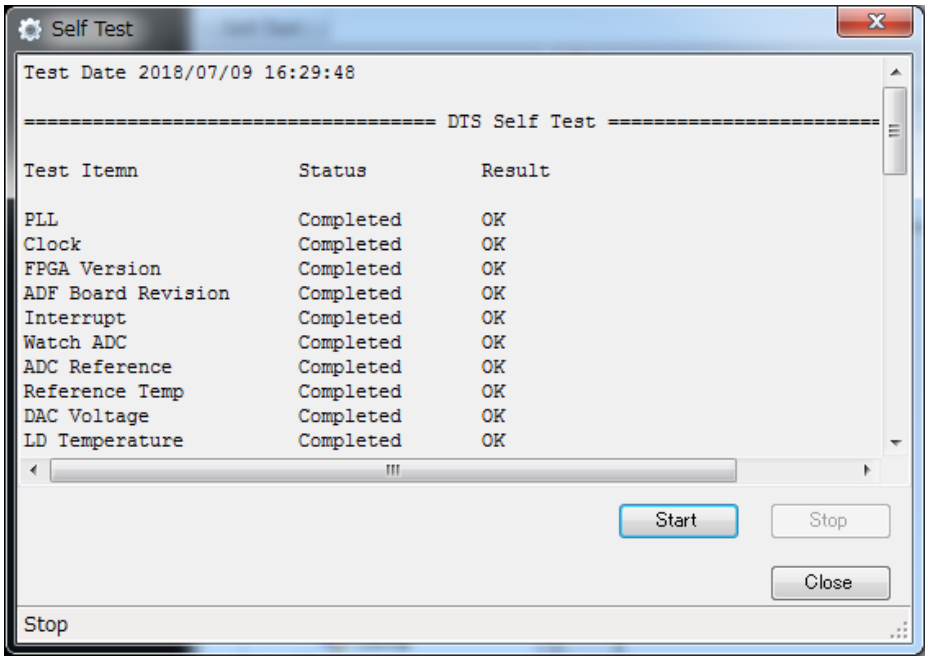


Figure 6.2 Self-test result display screen

TIP

The self-test cannot be executed during measurement. An execution error occurs when the self-test execution command is received during measurement.

The self-test can also be executed by remote command from external devices.

SEE ALSO

Refer to “DTSX1 Communication (Modbus) Guide” (IM39J06B35-02EN) for the remote command to execute the self-test.

■ Display of self-test results

The results of the self-test are displayed in the application log.
If the self-test results include Fails, this may indicate faults.
If the same test result comes up frequently, contact us with the application log information.

SEE ALSO

For the application log, refer to "Appendix. DTSX 1 Setup Items List".

Table 6.2 Self test message table

Failure Diagnosis Test Item	Application Log Display	
	Pass Result	Fail Result
PLL status	Pll Lock: OK	Pll Lock: NG+(data)
DTS clock status	DTS Clock Status: OK+(data)	DTS Clock Status: NG+(data)
FPGA version	FPGA(DTSP) Version: OK+Ver	(No judgment)
PCB revision	ADF Board Version: OK+Ver	(No judgment)
DTS interrupt line	DTS Interrupt Line: OK	DTS Interrupt Line: NG
Status monitoring ADC status	ADC Status: OK	ADC Status: NG+(data)
ADC reference voltage	ADC Reference Volt: OK+(data)	ADC Reference Volt: NG+(data)
Reference temperature measurement status	Reference Temp Status : OK	Reference Temp Status: NG+(data)
DAC voltage for setting	DAC (B/C)Set: OK	DAC(B/C) Set (set)[V] : NG diff = (data)
Analog power supply voltage	Analog Board OFF::LDD Board Power (n) : OK+(data) Analog Board OFF::APD Board Power (n) : OK+(data) Analog Board ON::LDD Board Power (n) : OK+(data) Analog Board ON::APD Board Power (n) : OK+(data)	Analog Board OFF::LDD Board Power (n) : NG+(data) Analog Board OFF::APD Board Power (n) : NG+(data) Analog Board ON::LDD Board Power (n) : NG+(data) Analog Board ON::APD Board Power (n) : NG+(data)
LD temperature	LD Temperature: OK+(data)	LD Temperature: NG+(data)
LD temperature control current	LD Temp Control Current: OK+(data)	LD Temp Control Current: NG+(data)
LD drive current	LD Drive Current: OK+(data)	LD Drive Current: NG+ (data)
Photodetector APD temperature	APD Temperature ST: OK+(data) APD Temperature AS: OK+(data)	APD Temperature ST: NG+(data) APD Temperature AS: NG+(data)
Photodetector APD bias voltage	APD Bias Voltage ST: OK+(data) APD Bias Voltage ST: OK+(data)	APD Bias Voltage ST: NG+(data) APD Bias Voltage ST: NG+(data)
Photodetector amp offset voltage	Amp Offset Voltage ST: OK+(data) Amp Offset Voltage AS: OK+(data)	Amp Offset Voltage ST: NG+(data) Amp Offset Voltage AS: NG+(data)
Photodetector ADC data	ADC Data: OK+(data)	ADC Data ST [H]: NG diff =(data) ADC Data ST [M]: NG diff =(data) ADC Data ST [L]: NG diff =(data) ADC Data AS [H]: NG diff =(data) ADC Data AS [M]: NG diff =(data) ADC Data AS [L]: NG diff =(data)
Photodetector ADC overflow	ADC Overflow: OK	ADC Overflow: NG
Light emitting circuit fault	(no display)	Light Emission Error
ST photodetector circuit fault	(no display)	Light Receive Error [ST]
AS photodetector fault	(no display)	Light Receive Error [AS]
DTSX MODULE measurement start, abortion	Measure Start: OK Measure Abort: OK	Measure Start: NG Status=(data) Measure Abort: NG Status=(data)
Excitation LD drive current	EXLD Drive Current: OK+ (data)	EXLD Drive Current: NG+ (data)
Optical amplifier ASE level current	Amp ASE Level Current: OK+ (data)	Amp ASE Level Current : NG+ (data)
Optical switch interrupt line	OSW Interrupt: OK	OSW Interrupt: NG
Optical switch communication status	OSW Communication: OK	OSW Communication: NG
Optical switch standby	OSW Standby: OK	OSW Standby: NG
Optical switch FPGA version	OSW FPGA(DTOS) Version: +(Ver)	(No judgment)
Optical switch internal temperature	OSW Temp.: OK	OSW Temp.: NG + (data)
Optical switch drive current status	OSW Drive Current: OK	OSW Drive Current: NG
Optical switch channel setting	OSW CH(n) test: OK	OSW CH(n) test: NG
Optical switch return to origin	OSW Origin: OK	OSW Origin: NG

Optical switch information display	OSW Information:OK (OSW info)	OSW Information: NG (OSW info)
Optical switch communication error	(no display)	OSW Communication Error Interrupt
Optical switch setting timeout	(no display)	OSW Timeout Error
Optical switch response error	(no display)	OSW Response Error
Optical switch switching count exceeded	(no display)	The counter of OSW channel switching has been exceeded.
Serial communication	(no display)	Execution Error/

TIP

When the optical switch switching count exceeded warning is displayed, this means that the time to replace the optical switch module is approaching, so replacement of the optical switch module is recommended.
Refer to “6 Manintenace” about replacing the optical switch module.

6.2. System Update

The system can be updated from a browser on a Windows PC.
Obtain an appropriate archive container file (*1) in advance, and save it in a folder on a Windows PC or a storage device (e.g., USB memory device) from which the file can be loaded into the PC.

*1 Archive container file
The DTSX1 system consists mainly of a kernel, root file system, and app file system. A single file containing the update images of these components is called an archive container file.
The latest archive container file can be downloaded from Yokogawa’s member website, Yokogawa Customer Portal.

1. Connect the DTSX1 to a Windows PC with a LAN cable.
2. Start the DTSX1 in maintenance mode.
3. Access the DTSX1 from a browser and display the top page.

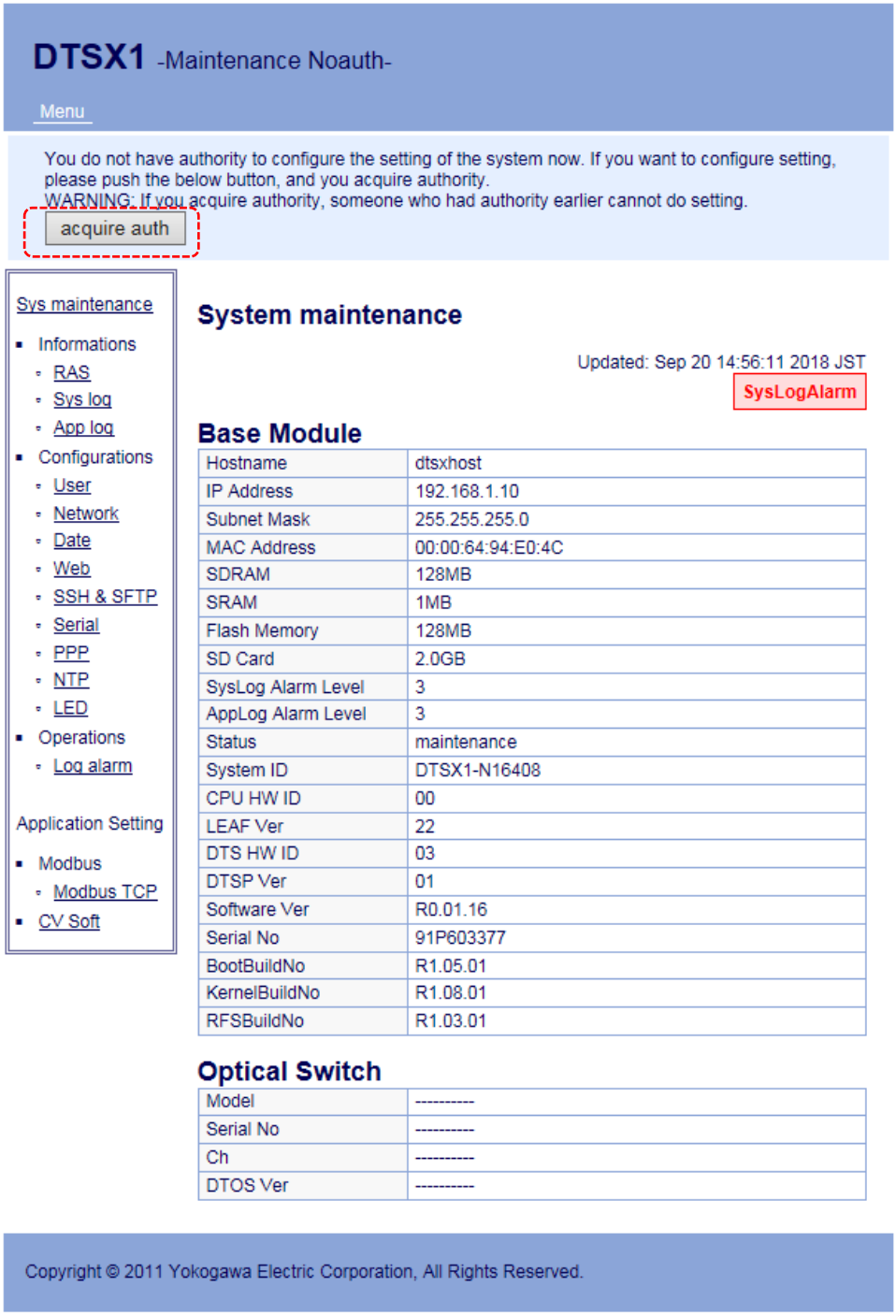


Figure 6.3 acquire auth button

4. Obtain operating privileges.
   Click acquire auth at the top area of the top page. Tool appears in the side menu.

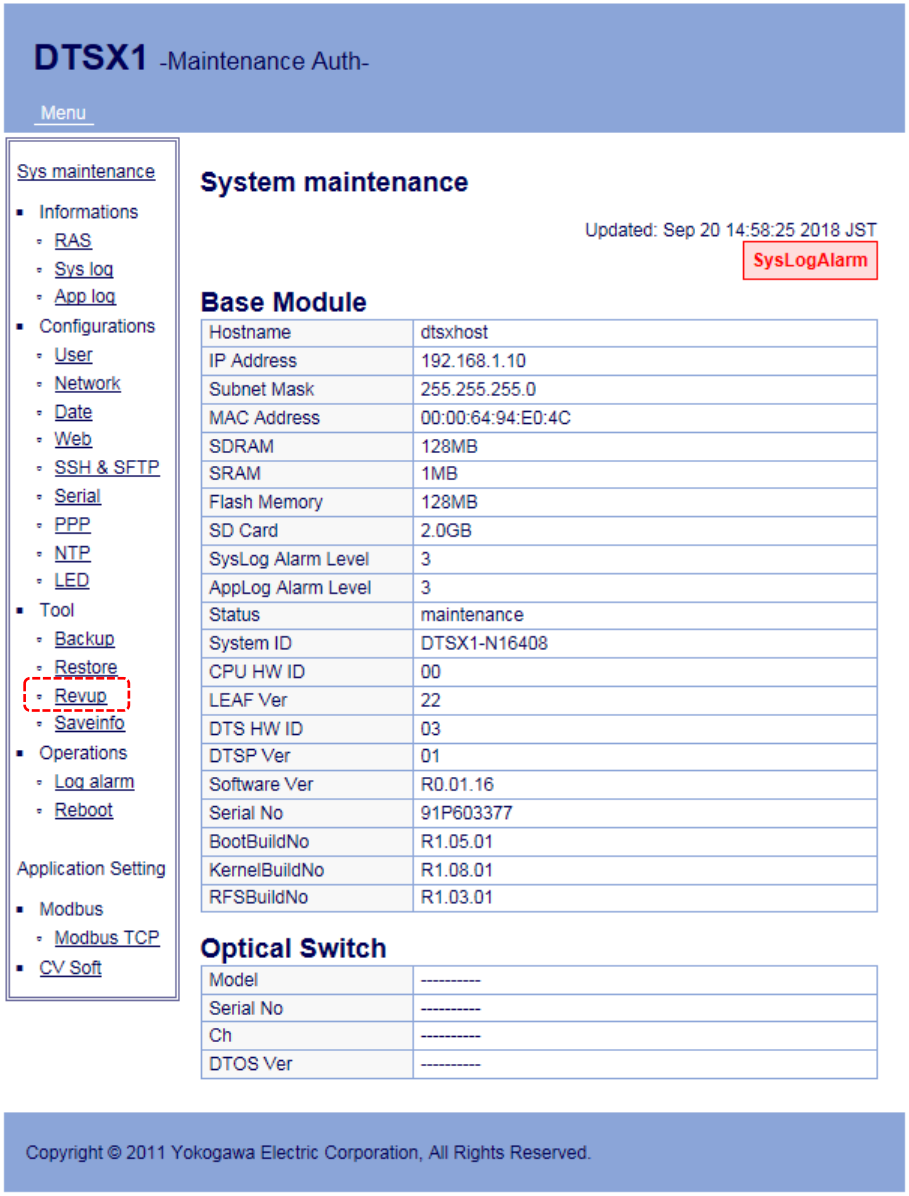


Figure 6.4 Revup menu

5. Switch to Revup mode, and obtain restore/update privileges.
   Click Revup under Tool on the side menu to display a Revup page. Click Lock at the top of the page.



Figure 6.5 LOCK button

TIP

- To abort updating, click Unlock to allow other operations.
- Unlock can be used only from a browser after executing Lock.
- If you close the browser without executing Unlock, the locked state continues for 10 minutes, during which settings cannot be changed by you or by others.

6. Configure the upload settings for the archive container file and configuration information archive file.
   Click Browse in the Container row, and select the archive container file.
   In addition, select whether to maintain the system configuration file or overwrite with a configuration file archive.
   To maintain the system configuration file, select Keep in the System Configuration line.
   If you want to change the system configuration file after updating, select Overwrite. If you select Overwrite, click Browse in the Archive row, and select the configuration information archive file that you created in advance.

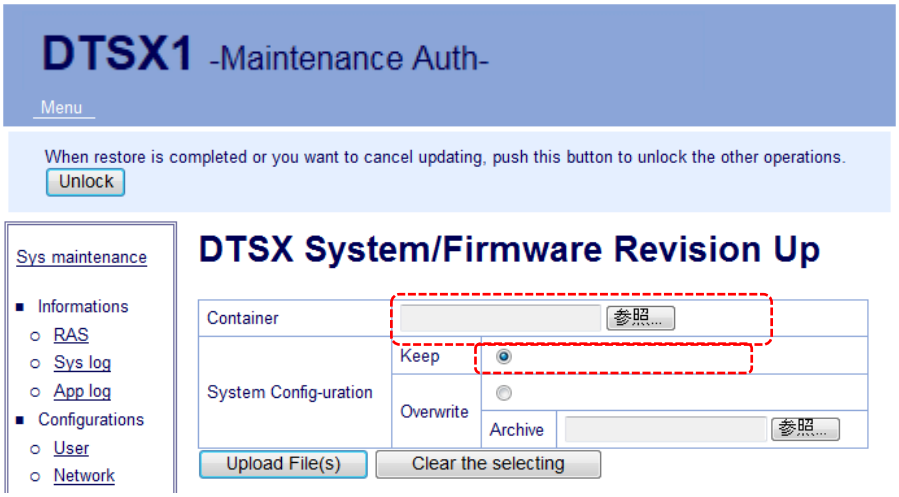


Figure 6.6 File selection menu

7. Upload the archive file.
   Click Upload File(s) in the center of the page. The progress bar in the browser shows the upload progress.

TIP

The time it takes to upload varies depending on the content of the update.

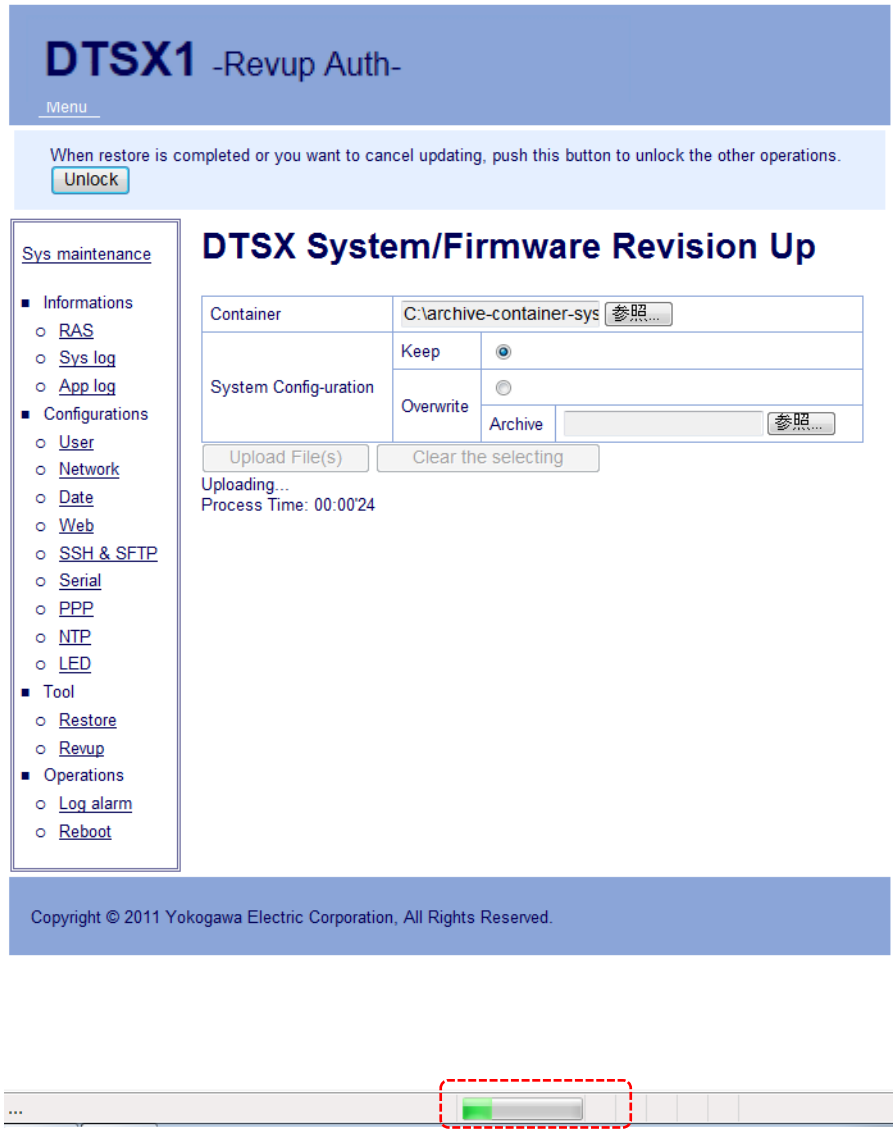


Figure 6.7 File upload page

When uploading is complete, the following page appears.

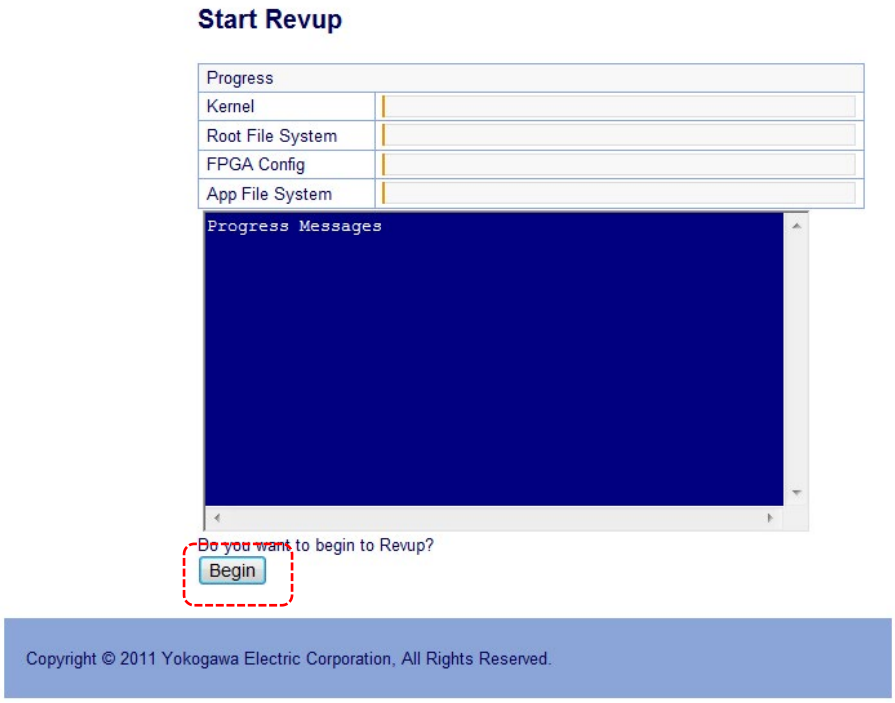


Figure 6.8 Begin button

8. Start the update.
   Click Begin at the bottom of the page.

TIP

The time it takes to update varies depending on the content of the update.

The progress bar at the center of the page shows the update progress.

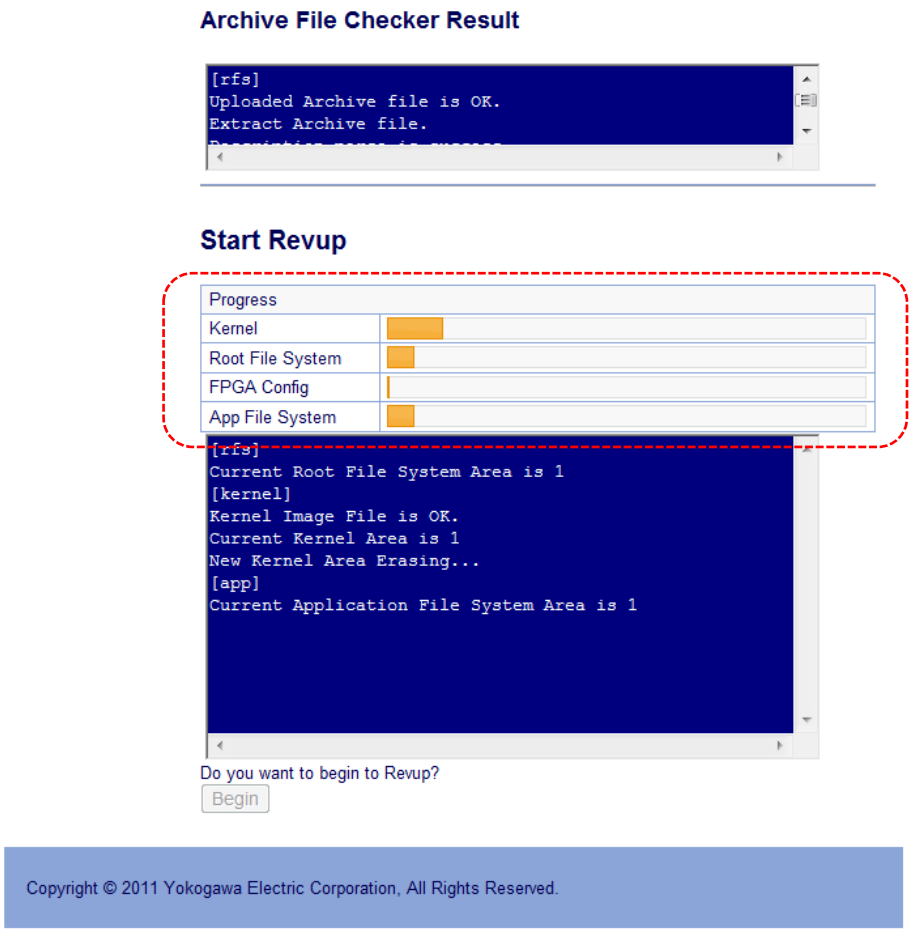


Figure 6.9 Updating page

TIP

The archive container file does not contain FPGA Config. Updating of the FPGA Config is performed through maintenance at Yokogawa.

When updating is complete, the following page appears.

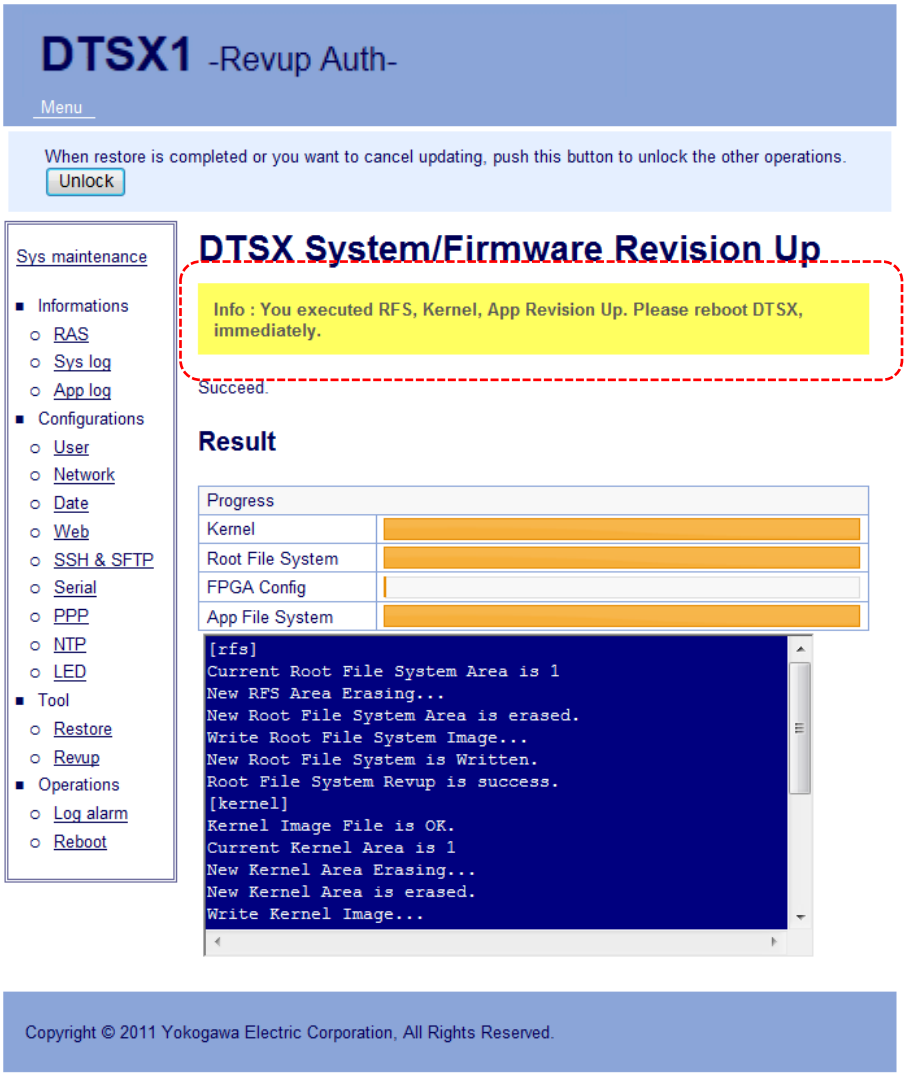


Figure 6.10 Update complete page

9. Restart the system.

TIP

When you perform a system update, a new host key is generated on the DTSX1. As such, when trying to establish an SSH/SFTP connection the first time after system updating, an error message such as “host key does not match” may appear.
If this happens, check with the DTSX1 administrator to find out if an update has been made, and update to the new host key sent from the DTSX1.

6.3. Replacement of limited-life parts

This chapter explains cautions regarding the replacement of limited-life parts and how to replace limited life parts.
Limited-life parts are parts whose performance and reliability decline over time, leading to functional loss and ultimately failure. For DTSX1, such parts are defined as "parts whose functional loss/wear failure is expected to occur within 10 years when the internal module lower intake air temperature is 30°C on average".
In the case of DTSX1, the following parts are as limited-lift parts.

- Battery
- SD Card
- Power supply module
- Optical switch module

Battery and SD Card can be replaced by the customer; however, it is recommended that replacement be performed by Yokogawa specialists.
Power supply module and Opticale switch module must be repleced by a Yokogawa specialist only.

Please contact Yokogawa Service personnel if require the maintenance work by Yokogawa specialist.

6.3.1. Cautions on operation

This section presents cautions regarding the replacement of DTSX1 parts.

■ Cautions regarding static electricity

- When storing or carrying maintenance parts, place them in an electrostatic bag.
- When replacing parts, use a grounding strap with 1 MΩ grounding resistance. Ground the wrist strap.
- Never touch maintenance parts without using a wrist strap and conductive sheet.

■ Cautions regarding electric shock

- Prior to replacing parts, be sure to switch off the DTSX1. To switch off the DTSX1, follow the procedure described in section 4.1.2, “Procedure to Turn the Power Off”.

6.3.2. Other cautions

■ How to dispose the batteries included in this product

Dispose of the lithium battery in accordance with domestic law and regulation.

●How to dispose the batteries in the EU

This is an explanation about the EU Battery Directive.

This directive is only valid in the EU.

Batteries are included in this product.

When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal.

Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.

Battery type: Thionyl Chloride Lithium battery



Notice:

The symbol (see above), which is marked on the batteries, means they shall be sorted out and collected as ordained in the EU Battery Directive.

6.3.3. Removing, replacing, and installing Battery and SD-card

Battery and SD-card are attached to the back of DTSX module. Therefore, replacement of Battery and SD-card require the removal and reinstallation of the DTSX1's various modules.
The procedure is explained below.
The following figure shows the screws (red circle ○ and red triangle Δ) for the status/alarm display and the bracket. This figure will be referred to during each of the steps.

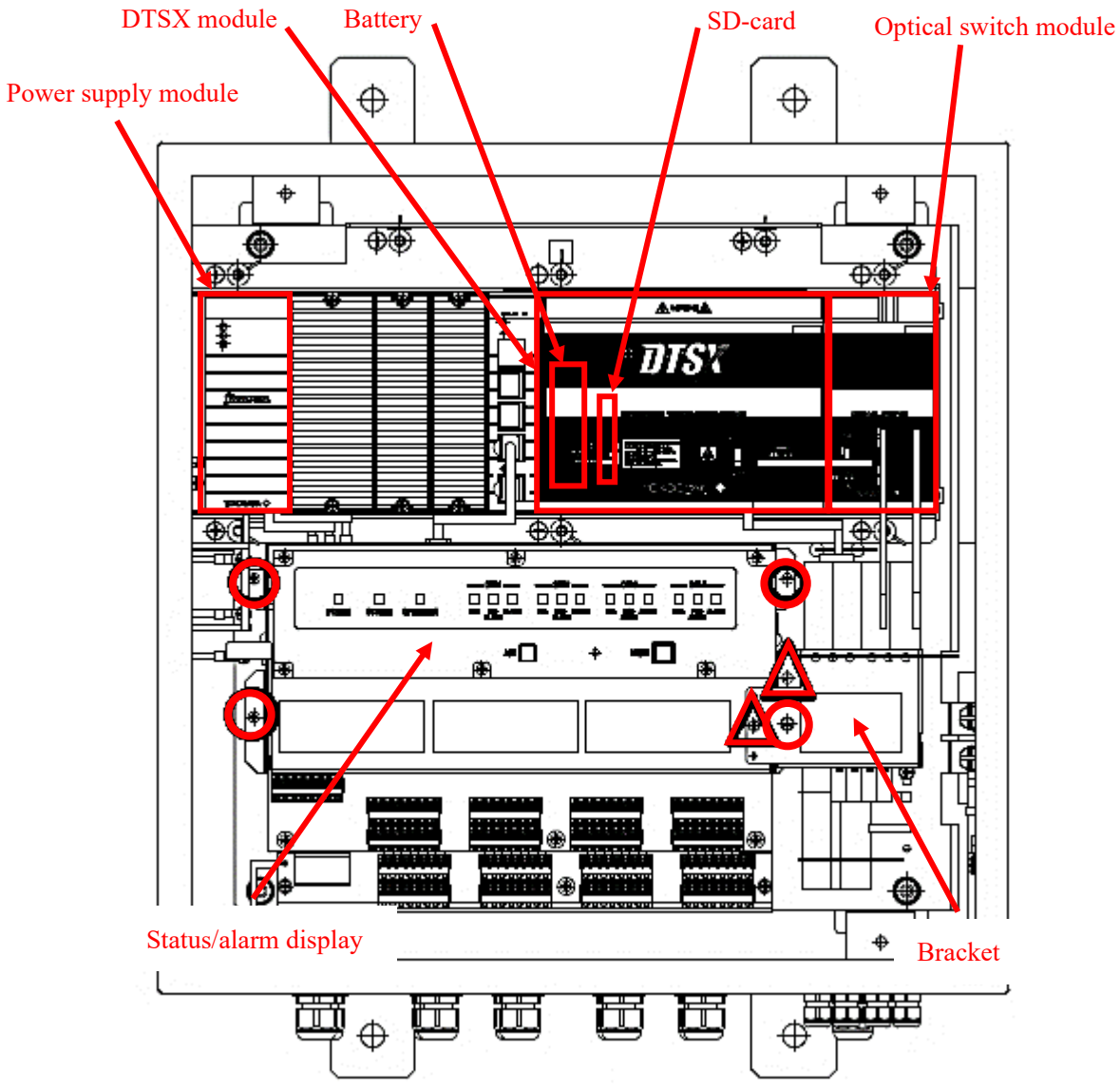


Figure 6.11 DTSX1 module and screw positions

■ Removing and re-installing the DTSX module

● Remove the DTSX module

1. Disconnect the sensor optical fiber connected to the DTSX module. Attach the dustproof cap to the optical output connector after disconnecting the sensor optical fiber.
   The optical fiber to be disconnected is the one connected to the bracket in the case that the DTSX1 is 1-channel model, or the one connected to the optical switch module in the case that the DTSX1 is 2-channel or 4-channel model.
2. Disconnect the LAN cable and the serial cable connected to the DTSX module.
3. In the case that the DTSX1 is 2-channel or 4-channel model, disconnect the optical fiber connected to the optical switch module. Attach the dustproof cap to the optical output connector after disconnecting the sensor optical fiber.
4. Disconnect the optical fiber connected to the optical output connector at the bottom of the bracket.
5. Remove the two screws indicated by red triangle Δ in Figure 6.11 and remove the bracket.
6. Remove the four screws indicated by red circle ○ in Figure 6.11 and remove the status/alarm display (The lower right screw is under the bracket). There is a flat cable under the status/alarm display area. Take care not to damage it when removing the status/alarm display.
7. In the case that the DTSX1 is 2-channel or 4-channel model, loosen the two top and bottom screws, and the center screw, and then remove the optical switch module from the base module.
8. Loosen the six top and bottom screws, and then remove the DTSX module from the base module.

● Replace Battery and SD-card

Replace Battery and SD-card in DTSX module.
Refer to “6.3.4 Battery” and “6.3.5 SD-card”.

● Re-install the DTSX module

1. Attach the DTSX module to the base module.
   Tighten the fixing screw at the center of the module. Next, attach the six top and bottom screws. (The tightening torque: 0.5 - 0.6 newton-meters)
2. In the case that the DTSX1 is 2-channel or 4-channel model, attach the optical switch module to the base module.
   Tighten the two top and bottom screws. (The tightening torque: 0.5 - 0.6 newton-meters)
3. Attach the status/alarm display panel.
   Tighten the two right and left screws. (The tightening torque: 0.5 - 0.6 newton-meters)
4. Attach the bracket.
   Tighten the two screws. (The tightening torque: 0.5 - 0.6 newton-meters)
5. Connect the optical fiber to the optical output connector at the bottom of the bracket.

6. In the case that the DTSX1 is 2-channel or 4-channel model, connect the sensor optical fiber to the optical switch module.
7. Connect the sensor optical fiber to the DTSX module.
   The optical fiber to be connected is the one connected to the bracket in the case that the DTSX1 is 1-channel model, or the one connected to the optical switch module in the case that the DTSX1 is 2-channel or 4-channel model.
8. Connect the LAN cable and the serial cable to the DTSX module.
9. Turn on the power.

IMPORTANT

- When attaching the DTSX module to the base module, be careful not to remove the gasket on the back of the DTSX module.
- When attaching the DTSX module to the base module, make sure that the SD card on the back of the DTSX module does not pop out.

6.3.4. Battery

The DTSX1 has a Lithium primary battery installed to maintain data and the RTC (Real-time clock) when power is off.

The recommended replacement period varies depending on the operating environment and conditions (operation time and ambient temperature).

Table 6.3 Limited Lifespan Component (Battery)

Product name	Part number
Battery	S9883FA

■ Recommended Replacement Period

The lifespan of the battery depends greatly on ambient temperature. The following table shows the recommended replacement periods for the battery at different ambient temperatures.

A label for writing battery replacement dates is supplied with the unit. As a guide, write the year and month when the unit should be next replaced on the label and affix it to an easily visible location.

Table 6.4 The recommended battery replacement period for different ambient temperatures

Ambient temperature (*1)	Replacement period
25 °C	8 years
35 °C	4 years
45 °C	3 years

*1: The ambient temperature is the average temperature in which the unit is used.



Figure 6.12 Battery Replacement Period Label

CAUTION

- Even when the average ambient temperature is below 20 °C, the battery should be replaced after 10 years.
- If the unit is used beyond its recommended replacement period, the battery may leak.
- If the battery leaks, a strong odor may be produced and the metal parts may be corroded.
- Replace battery that has leaked as soon as possible.
- Replacing the battery clears the data storage memory and clock setting. Before requesting for a battery replacement, back up the data (retained data, etc.) using a software tool. Set the clock in the Maintenance window after replacing the battery.
- Turn off the DTSX1 before making replacements.

■ DTSX1 battery replacement method

It is recommended that replacement be performed by Yokogawa specialists.

● Preparations

In addition to a new battery, prepare materials used for the connection to the PC.

● Replacement procedure

Replace the DTSX1 battery with the following procedure.

1. Remove the DTSX MODULE according to procedure described in section 6.3.3, “Removing, replacing, and installing Battery and SD-card”.
   Make sure that the battery is connected to the back of the DTSX module with a cable.

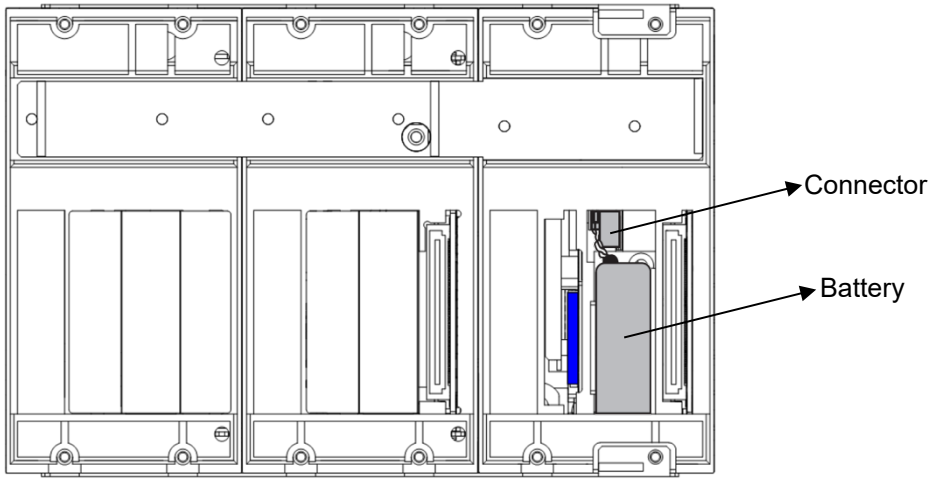
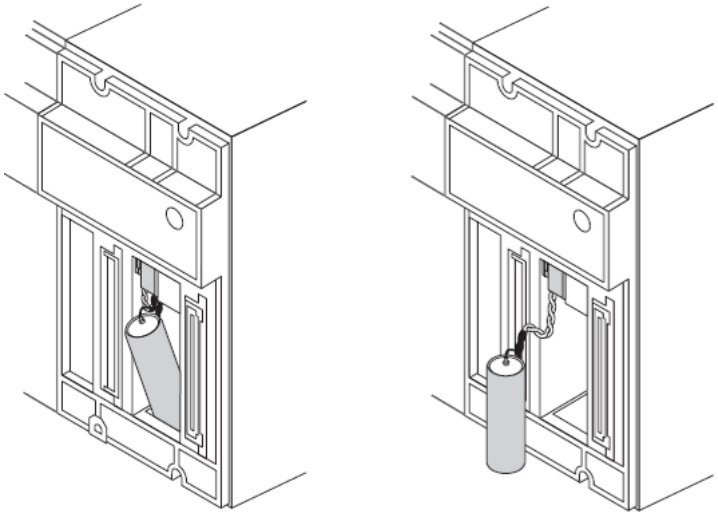


Figure 6.13 Back of DTSX MODULE

2. First pull out the top of the battery, then pull out the bottom of the battery.



(1) Pull from the top of the battery (2) Take out the whole battery

Figure 6.14 Removing the battery

3. Pull the connector downward and remove it.

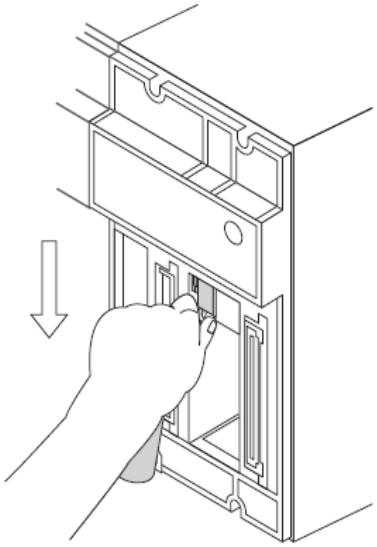


Figure 6.15 Removing the connector

4. Install the replacement battery in the reverse order to the above.
   The connector of the battery is as shown in the figure below.
   When attaching the connector, orient it so that the part that sticks out is positioned as shown in the figure below.

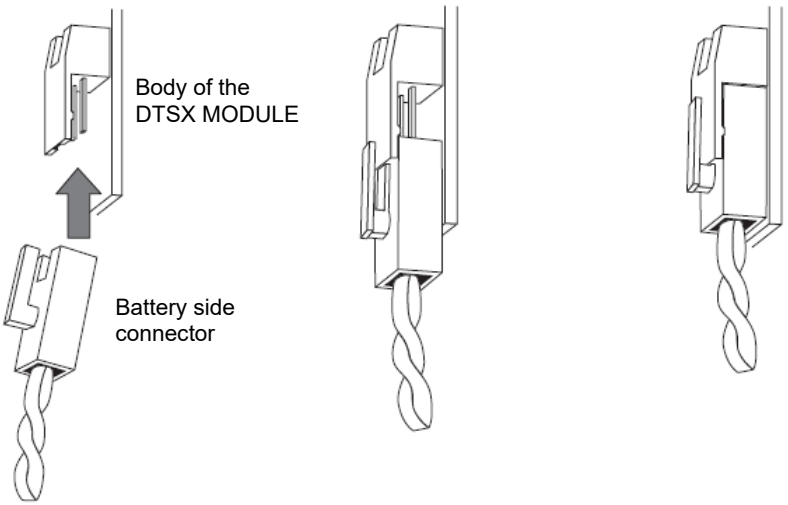


Figure 6.16 Attaching the connector

5. Install the DTSX MODULE according procedure described in section 6.3.3, “Removing, Replacing, and Installing Battery and SD-card”.
6. After switching on the power, wait for the HRDY operating status LED to start blinking, and then push the [Reset] button.
   Pressing the [Reset] button starts the unit in maintenance mode, with the HRDY and RDY LEDs blinking.
7. Display the maintenance menu on the web browser and set the date and time.

8. Reboot the unit in online mode from the browser's reboot menu.

SEE ALSO

For details on setting the date and time, refer to section 4.2.5, "Setting the Date."

TIP

If a power outage occurs while the battery is depleted, information such as the IP address and total power on time of the DTSX1 will be deleted, and it will start up in the state in which it was when last shut down.
Therefore, periodic replacement of the battery is required to prevent such trouble.

CAUTION

- Do not replace the DTSX 1 battery in an explosive atmosphere.
- Be careful not to short-circuit the battery during battery replacement.
  A short-circuited will emit a lot of heat, leak liquid, and become unusable.
- Retain data saving, date setting, online mode setting, etc., need to be done on the Web browser.
- When attaching the DTSX MODULE, be careful not to remove the gasket on the back of the DTSX MODULE.
- When attaching the DTSX MODULE, make sure that the SD card on the back of the DTSX MODULE does not pop out.

■ Handling Precautions Regarding the Battery

This device uses a lithium battery. The lithium battery is structurally sealed by glass seal and laser welding, and lithium and thionyl chloride are charged inside. Therefore, improper handling may cause the battery to leak electrolyte, generate heat, burst or ignite, resulting in injury or damage to the equipment. To prevent these problems, be sure to observe the following precautions.

CAUTION

- Never charge the battery.
  If the battery is charged, the electrolyte inside the battery may bubble or the internal pressure may rise due to generated gas. When this happens, the battery may leak electrolyte, generate heat, burst or ignite.
- Do not use this battery except for the specified purpose.
  The terminal structure or other aspect of the battery may be incompatible with the equipment, resulting in poor contact or nonconforming voltage. When this happens, the battery may leak electrolyte, generate heat, burst or ignite.
- Do not put the battery into fire, or heat, disassemble or modify the battery.
  The glass seal, vent (safety valve) or other parts of the battery may be damaged, causing the battery to leak electrolyte, generate heat, burst or ignite.

- Do not connect the positive and negative electrodes of the battery in reverse. Abnormal reaction may occur due to accidental charging or short-circuiting, causing the battery to leak electrolyte, generate heat, burst or ignite.
- Electrolyte is harmful to the human eyes. If electrolyte has gotten into the eye, do not rub but rinse the eye thoroughly under clean running water and then immediately seek medical attention.
- If electrolyte has been licked, immediately rinse the mouth and consult a doctor.
- Do not connect the positive and negative electrodes of the battery using a wire, etc., or transport or store the battery with a metal necklace, hairpin, etc.
  The battery will be shorted and excessive current may flow, causing the battery to leak electrolyte, generate heat, burst or ignite.
- If the battery is leaking electrolyte or releasing odor, immediately dispose of the battery. Failure to do so may result in corroded metal due to the leaked electrolyte.
- Do not solder the battery directly.
  The glass seal, vent (safety valve) or other parts of the battery may be damaged by heat, causing the battery to leak electrolyte, generate heat, burst or ignite.
- Do not remove or damage the exterior label of the battery (heat shrinkable tube).
  The battery may be shorted and leak electrolyte, generate heat, burst or ignite.
- Do not drop or throw the battery or otherwise apply strong impact.
  The battery may leak electrolyte, generate heat, burst or ignite.
- Do not deform the battery.
  The glass seal or vent (safety valve) of the battery may be damaged, causing the battery to leak electrolyte, generate heat, burst or ignite.
- Do not use or leave the battery in a high-temperature environment, such as a place exposed to direct sunlight or inside a car parked under the hot summer sun. Doing so may cause the battery to leak electrolyte, generate heat or burst.
- Do not wet the battery with liquid such as water. Doing so may cause the battery to generate heat.

IMPORTANT

Use a lithium battery designed exclusively for use with DTSX module.

6.3.5. SD-card

SD-card is recommended to be replaced every eight years.
It is recommended that replacement be performed by Yokogawa specialists.

Table 6.5 Part number of SD card

Product name	Part number
SD card	A1016NL

- **Replacement preparation**

  In addition to a new SD card, prepare materials used for the connection to the PC.

- **Replacement procedure**

  Replace the SD card with the following procedure.

  1. Remove the DTSX MODULE according to procedure described in section 6.3.3, “Removing, replacing, and installing Battery and SD-card”.
     Replace the SD card on the rear panel of the DTSX module.
     - When you press the SD card, the lock is disengaged, and the SD card pops out slightly.
       Pinch it with your fingers, and remove it.
     - Insert the new SD card.
       Check that the SD card write protection is off (writable).
       Insert the SD card, making sure its orientation is correct, and press in to lock it in place.

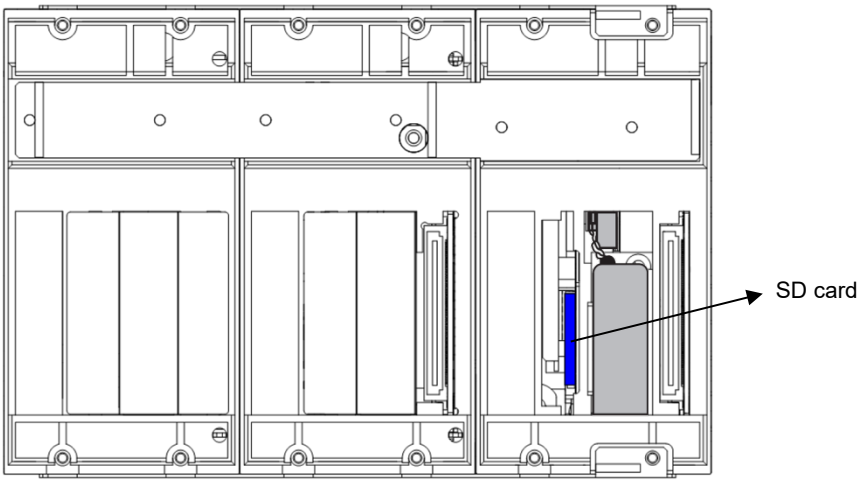


Figure 6.17 Rear panel of the DTSX module

  2. Install the DTSX MODULE according to procedure described in section 6.3.3, “Removing, Replacing, and Installing Battery and SD-card”.

6.3.6. Replacements of other parts

■ Power supply Module

Power supply modules use electrolytic capacitors, and their life is mainly determined by ambient temperature. The Table 6.6 shows the ambient temperature and the recommended exchange period.
Replacement must be carried out by a Yokogawa specialist only. For further details, please contact Yokogawa.

Table 6.6 The recommended exchange period of the power supply module for different ambient temperatures

Ambient temperature (*1)	Replacement period
25 °C	8 years
35 °C	8 years
45 °C	4 years

*1: The ambient temperature is the average temperature in which the unit is used.

■ Optical switch module

The optical switch module is recommended to be replaced every four years.
Replacement must be carried out by a Yokogawa specialist only. For further details, please contact Yokogawa.

6.4. Maintenance functions

This section explains useful functions when installing the DTSX1, for periodic inspections, etc.

TIP

The functions in this chapter are enabled with a combination of firmware R1.05.01 or later and DTAP3000 R1.12.01 or later.

All functions described here are performed from Test Mode dialog that is displayed by clicking the DTAP3000 Tool – Test Mode button.

When you close Test Mode dialog, tests other than Alarm Test Mode will end (Contact Output Test and Alarm Simulate Mode).

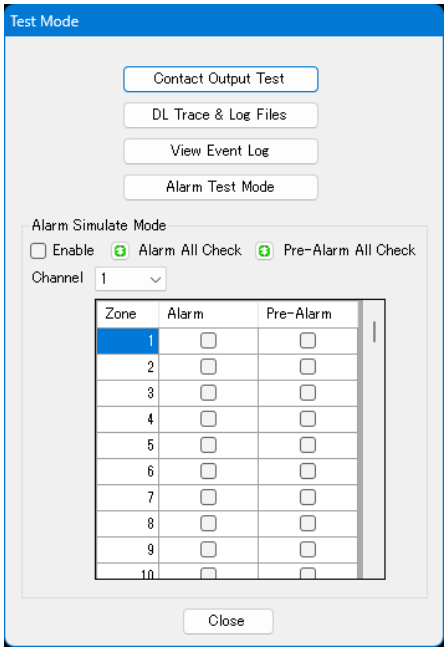


Figure 6.18 Test Mode dialog

SEE ALSO

For details of DTAP3000, refer to “DTAP3000 DTSX3000 Control Visualization Software Guide” (IM 39J02B40-01EN).

6.4.1. Contact Output Test

Executes a contact output test.
Clicking the Contact Output Test button on Test Mode dialog to display screen for turning ON (CLOSE) / OFF (OPEN) contact output of DTSX1.
Set contacts on this screen and click the "SEND" button.
Checked contacts are ON (CLOSE) and unchecked contacts are OFF (OPEN).

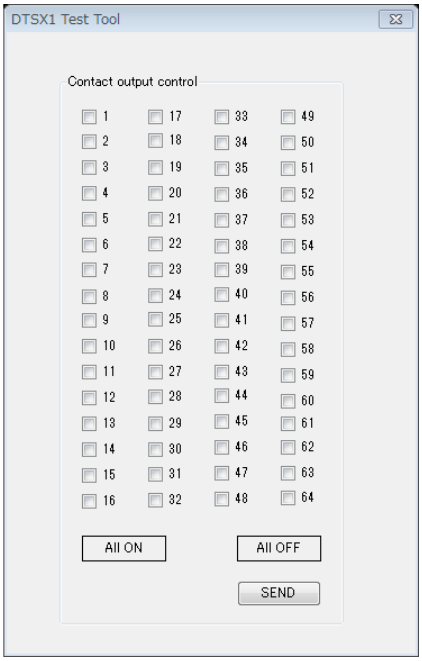


Figure 6.19 Contact output test dialog

6.4.2. Get Trace & Log Files

Click the DL Trace & Log Files button on Test Mode dialog will download trace files and log files stored in DTSX1 to PC.

Up to 500 trace files (for 500 measurements) and up to 100 MB of log files (1 MB x 100 files) are saved in DTSX1.
These files will be useful to make an analysis in case of a fire, etc..
When the number of files exceeds the maximum amount, the oldest files are deleted, and new files are saved.

TIP

- The DTAP3000 file download function downloads all trace files and log files saved in DTSX1.
- You may also use SFTP client software to download files from DTSX1 to PC. Trace files can be downloaded from “/mnt/data/trace” and log files from “/mnt/data/log”.
- Trace files downloaded from DTSX1 to PC can be imported using the DTAP3000 trace mode.

6.4.3. View log files

Click the View Event Log button on Test Mode dialog to view log files saved in DTSX1.

6.4.4. Alarm test mode

You can turn the alarm test mode on and off by clicking the View Event Log button on Test Mode dialog.
This mode is used when it is not necessary to control the contact output with the alarm, such as during an alarm test.
The table below shows the contact output status when the alarm test mode is ON.

Table 6.7 Contact Output Status when the Alarm Test Mode is ON

Contact output setting	Contact output status
OFF	Always open
Normally Open	Always open
Normally Close	Always close

“TST” on DTAP3000 Alarm window turns yellow when the alarm test mode is ON.

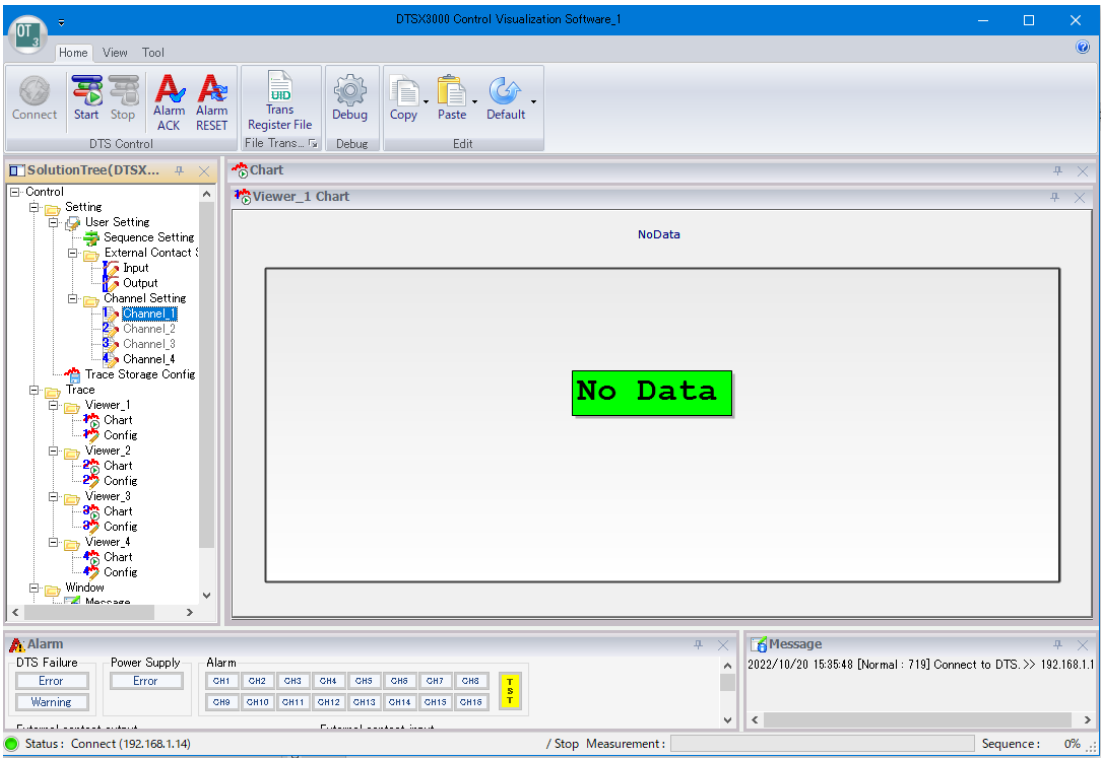


Figure 6.20 Alarm window

6.4.5. Alarm simulate mode

The alarm simulate mode simulates alarm/pre-alarm for each zone. You can verify that the contact outputs operate properly with the alarm occurrence.

On Test Mode dialog, select the target channel, check "Alarm" for the section you want to set to alarm status and "Pre-Alarm" for the section you want to set to pre-alarm status, and check "Enable" to turn alarm simulation mode ON. Checking "Enable" OFF turns alarm simulation mode OFF.
When alarm simulation mode is ON, "Enable" turns green.
Clicking the "Close" button when "Enable" turns green, alarm simulation mode is turned OFF and close Test Mode dialog.

Blank Page

7. Troubleshooting

If something goes wrong, check the table below. If the DTSX1 can start and the self-test is possible, first run the self-test to check that the problem does not lie in the hardware, and then check the table below. If, as a result of checking the table below, there is the possibility of a hardware problem, or if the problem cannot be identified, or the same problem occurs repeatedly, please contact us.

Table 7.1 Troubleshooting chart

Description of problem	Verification actions
The unit cannot be powered on (the LEDs of the DTSX1 do not light up The DTSX1 keeps on rebooting.	Check that the power supply is properly connected. Check that the power supply voltage is between 12 V DC and 24 V DC. Check that the SD card did not pop out. If the SD card popped out, reinsert it. If the DTSX1 LEDs do not light up, check the DTSX MODULE and power module LEDs. If the LED of the power supply module is not lit, there may be a problem with the power supply module. If the LED of the power supply module is lit, but the LED of the DTSX MODUL is not, there may be a problem with either the DTSX MODULE or the base module.
The SYSTEM LED is lit re	If the RDY LED of the DTSX MODULE blinks red, use the LOG function of the DTSX1 setting screen to check the content of the fault, then turn the power off and back on again, and check if the same fault reoccurs. If the same fault is detected frequently even after turning on the power again, there may be a problem with the DTSX MODULE. If the RDY LED of the DTSX MODULE is lit green, there may be a problem wi the cable connected to the RS232C terminal of the DTSX MODULE or the board connected to that cable.
The POWER LED is lit re	Check that the power supply voltage is between 12 V DC and 24 V DC.
The temperature cannot b measured at all	Check the connection of the optical fiber and connect it again correctly. Check if there is a problem with the end face of the optical connector. Replace the optical fiber with other identical optical fiber or optical fiber for DTFB10 DTS and measure again to see if correct measurement is possible. If there is no problem with the connected optical fiber and temperature measurement is not possible at all even after replacing the optical fiber, there may be a problem with the DTSX MODULE.
The temperature cannot b measured correctly	Check that temperature calibration was performed correctly. If the difference between the calibration temperature and the measured temperature is large, a difference between the actual temperature and the measured value will tend to occur, so calibrate the temperature as close to the measured temperature as possible.
While constant temperatu is being measured, the temperature waveform drifts	Check whether loss correction of the optical fiber was done. Over a sufficient measurement interval, perform loss correction with a low nois waveform.
The temperature cannot b measured at all	Check whether measurement with the DTSX MODULE alone can be done without problem. If there is no problem with measurement with the DTSX MODULE alone, chec that both the HRDY and RDY LEDs of the optical switch are lit green. If they a not lit or they blink green, there may be a problem with the optical switch. Use the LOG function to check the content of the fault, then turn the power off and back on again, and check if the same fault reoccurs.

LAN communication is no possible	Check whether the LINK LED on the DTSX MODULE is lit. Make sure that the communication cable is properly connected and power off and back on the DTSX1 and communication device. Disconnect and reconnect the communication cable. Replace the communication cable with a new one. Check that the various settings such as the firewall settings of the communication device are correct. Check that the IP address and subnet mask settings of the DTSX1 and communication device are correct. Try changing the communication device. If communication is still not possible even after replacing the communication device, there may be a problem with the DTSX MODULE.
Heat detection alarm does not work	Check that the conditions are set correctly. Perform the relay function check described in section 6.1, “Periodic Inspection Perform the LED function check described in section 6.1, “Periodic Inspection. If no problem is detected with the above checks and the alarm does not work even when the measurement data meets the alarm conditions, there may be a problem with the device.

7.1. Handling in case of optical fiber breaks

If a breakage occurs in an optical fiber, the FAULT indicator of the corresponding channel in the status/alarm display area lights orange.
You can check the position of the breakage with the following procedure.

• DTSX1 configuration page

Select App log on the DTSX1 configuration page to display the application log. If a breakage occurs in an optical fiber, the distance to the breakage position is displayed here.

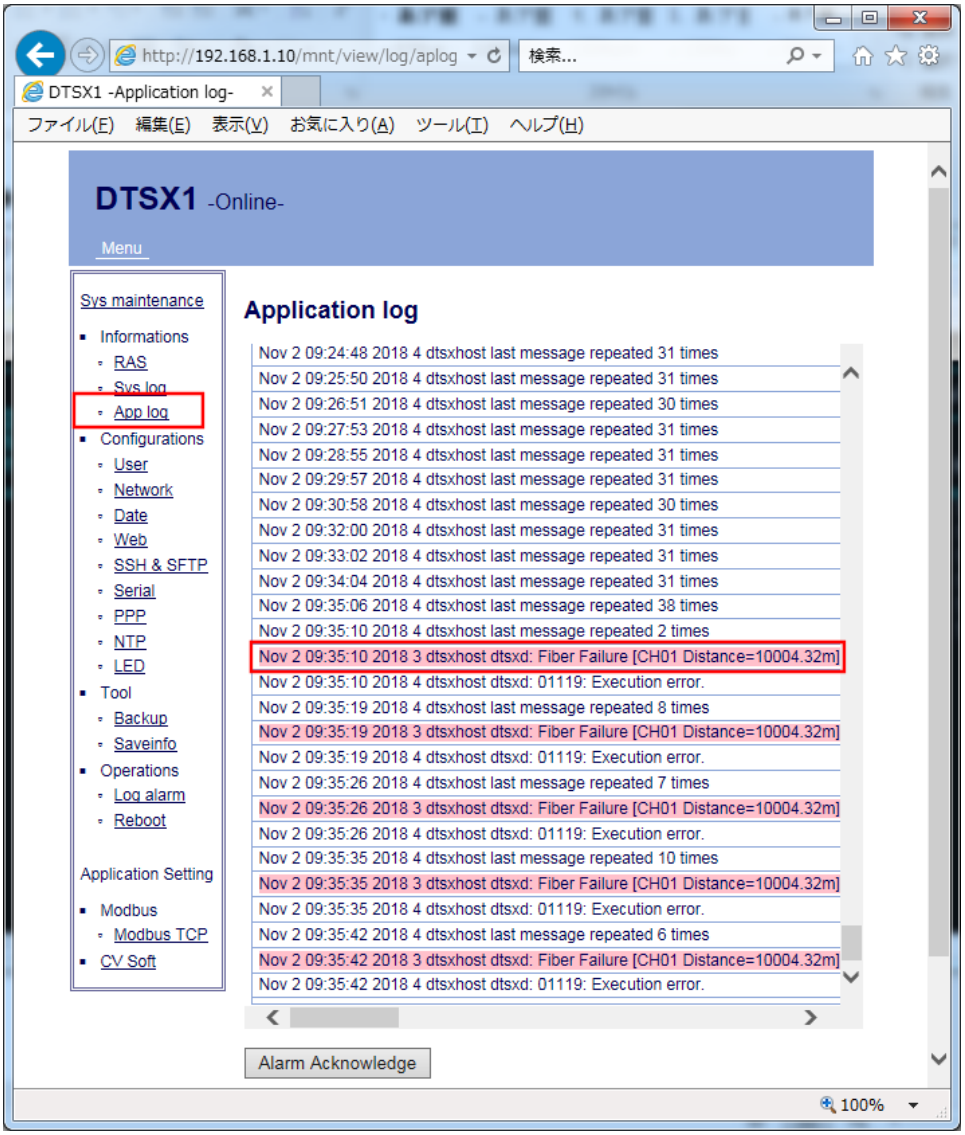


Figure 7.1 DTSX1 configuration page

SEE ALSO

For instructions on how to display the DTSX1 configuration page, refer to section 4.2.3, “Displaying the DTSX1 Configuration Page.”

• Modbus

Read the Modbus breakage position information (register address 320001 and later) to find out the distance to the breakage position.

SEE ALSO

For details on Modbus, refer to “DTSX1 Communication (Modbus) Guide” (IM39J06B35-02EN).

This section describes an example of the recovery procedure when the installed optical fiber breaks.
The procedure varies depending on the conditions of the installation location.

Method 1

1. Replace the broken optical fiber between connection boxes.
2. Perform temperature calibration.
3. If monitoring software is connected to the DTSX1, it may be necessary to change this setting.

Method 2

1. Install a new connection box at the optical fiber break section.
2. Draw out some extra length of optical fiber from the connection box on both sides of the wire break section and splice the broken wire using a splicing box. Store the splicing box in the connection box installed at the break section.
3. Perform temperature calibration.
4. If monitoring software is connected to the DTSX1, it may be necessary to change this setting.

TIP

The FAULT indicator remains lit until the optical fiber breakage is recovered.

Appendix. DTSX1 Setup Item List

The DTSX1 setup items are listed below.

Table DTSX1 setup items

Menu	Description	Function
Sys Maintenance	Maintenance information	Display maintenance information.
Informations		
RAS	RAS information display	Display RAS information.
Sys log	System log display	Display the system level log.
App log	Application log display	Display the application level log.
Configurations		
User	User management	Add/delete users and change passwords.
Network	Network settings	Set IP address, DNS, and domain name.
Date	Date and time settings	Set the date, time, and time zone.
Web	Web server settings	Set authentication settings of web server, enable/disable HTTPS.
SSH & SFTP	SSH, SFTP settings	Enable/disable SSH, SFTP, TELNET, FTP.
Serial	Serial port settings	Set the serial port use and communication settings.
PPP	PPP server setting	Set the PPP server function.
NTP	NTP server setting	Register an external NTP server.
LED	LED power saving setting	Set power saving function for the LEDs of the DTSX MODULE.
Tool		
Backup	Setting content backup	Upload the setting content to the PC and create a backup file.
Restore	Setting content restore	Restore the backup file of the setting content to the DTSX1.
Revup	System update	Update the kernel, root file system, DTSX1 application.
Saveinfo	Log saving	Upload the system level log, application log, and RAS information to the PC and create log files.
Operations		
Log Alarm	Log alarm level setting	For the system level log and application level log, set the level at which alarm notification occurs.
Reboot	Reboot/Shutdown	Reboot/shutdown the DTSX MODULE.
App Setting		
Modbus		
Modbus Tcp	ModbusTCP related settings	Set the port number used by the ModbusTCP function and other settings.
CV Soft	CV software related settings	Select whether or not to use the Control Visualization Software for DTSX MODULE, and set the port number for connection with this software.

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◆Revision Information

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Nov. 2018/ 1st Edition

May 2019 /2nd Edition
- Update of Laser Safety Standard and changing of related description.
- Symbol mark and content correction.

Feb. 2020/ 3rd Edition/ R1.02.01 or later
- Update of EN 54-22 A1N Standard and changing of related description.

Oct. 2020/ 4th Edition/ R1.02.01 or later
-Add Information
  Reference and supplement of ‘Installing the Cable Clamps’, delay explanation of ‘Setting temperature Condition’, and part replacement period.

May 2021/ 5th Edition/ R1.02.01 or later
- Update of compliant standards.

July 2021/ 6th Edition/ R1.02.01 or later
- Update of compliant standards.

Jan. 2022/ 7th Edition/ Firmware R1.03.01 or later, Style S3 or later, DTAP3000 R1.07.01 or later
- Update of EN 54-22 A2N, BN, CN Standard and changing of related description.
- Changed specification
  Changed number of contact output control, added temperature data mask function at fiber breakage, and added contact output test function.
- Added SD card part number.

Feb. 2023/ 8th Edition/ Firmware R1.05.01 or later, DTAP3000 R1.10.01 or later
- Added “6.4. Maintenance functions”.

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- Changed in warning content related to compliant standards updates.

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- Changed “6.4. Maintenance functions”.

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- Update to the "Laser Beam" section in "Safety Precautions"

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