General
Specifications

GS 39J06B40-01E

DTSXL
Distributed Temperature Sensor
Long Range System

■ GENERAL

This General Specification (GS) describes the DTSXL Distributed Temperature Sensor Long Range System.

For information on its associated software, read GS 39J02B40-01E "DTSXL Distributed Temperature Sensor Long Range System (Software)".



■ FEATURES

The DTSXL Distributed Temperature Sensor Long Range System (DTSXL System) measures the temperature distribution over the length of an optical fiber using the optical fiber itself as the sensing element. The module can be combined with appropriate power supply and optical switch modules to configure a required system. It can be accessed using the optional DTSX3000 Control Visualization Software (DTAP3000) or via the communications interface of a host computer.

- Easy to integrate in process control system
- Wide Temperature range operation
- Compact and low power consumption

■ CONFIGURATION

The following table lists the hardware and software for configuring a DTSXL System.

Component	Quantity	Description
Distributed temperature sensor (DTSX3000)	1	Required
Optical switch module (DTOS2L, DTOS4L, DTOS16L)	1	Optional. Select one optical switch module unit for switching between 2, 4 or 16 channels.
Base module (DTSBM10)	1	Required
Power supply module (NFPW426, NFPW441, NFPW442, NFPW444)	1	One power supply module is required (*1). For details, see GS 34P02Q12-01E "FCN Autonomous Controller Hardware" or GS 34P02Q13-01E "FCN-RTU Low Power Autonomous Controller Hardware".
CPU module (NFCP050)	1	Optional. For details, see GS 34P02Q13-01E "FCN-RTU Low Power Autonomous Controller Hardware".
Rack mount kit (DTRK10)	1	Optional tray for mounting optical fiber cables.
DTSX3000 Control Visualization Software (DTAP3000)	1	Optional software for configuring measurement and displaying measurement results. For details, see GS 39J02B40-01E "DTSXL Distributed Temperature Sensor Long Range System (Software)".
DTSX3000 data conversion software (DTAP3000D)	1	Optional software for converting measurement data into WITSML format. For details, see GS 39J02B40-01E "DTSXL Distributed Temperature Sensor Long Range System (Software)".

*1: Dual-redundant configuration is not allowed for the power supply module.

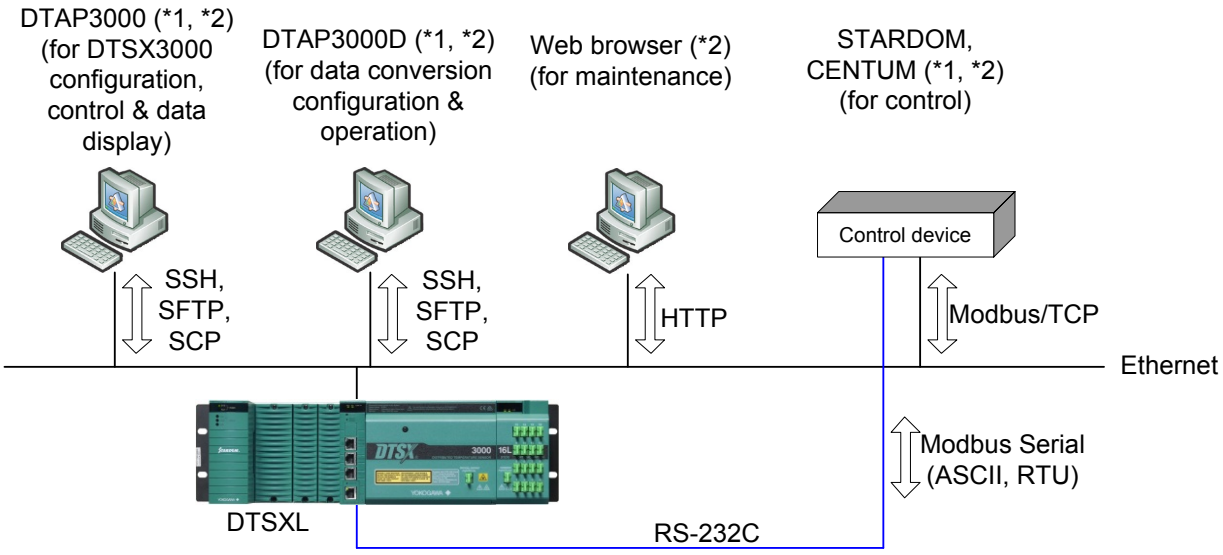
YOKOGAWA

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System Application Example

The DTSXL System performs temperature profile measurement according to instructions from control and monitoring stations.
A control and monitoring station polls the DTSX3000 of the DTSXL System constantly and when measurement data is available, it retrieves and displays the data. The DTSX3000 can also convert data to WITSML format (when used with the optional DTAP3000D data conversion software) for transmission to a host data server.



System Configuration Example

(*1) Requires separate purchase.
(*2) Neither hardware nor software is included in this specification.

With built-in support for the Modbus protocol, the DTSX3000 can communicate with STARDOM and CENTUM.
If a CPU module (NFCP050) is connected to the base module (DTSBM10), the CPU module can communicate with the DTSX3000 Distributed Temperature Sensor using the Modbus (Modbus serial or Modbus/TCP) protocol via an RS-232C or Ethernet connection.

System Requirements for DTSXL System Maintenance

The DTSX3000 can be accessed using a Web browser for backup, restore, network configuration and other maintenance operations.

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■ INSTALLATION REQUIREMENTS (*1)

Item		Specifications
Ambient temperature	Operation	-40 to +65°C (*2)
	Transportation/storage	-40 to +70°C
Ambient humidity	Operation	20 to 80%RH (no condensation)
	Transportation/storage	5 to 85%RH (no condensation)
Rate of change in temperature	Operation	Within ±10°C/h
	Transportation/storage	Within ±20°C/h
Dust		0.3 mg/m^3 or less
Protection class		IP20
Resistance to corrosive gases		ANSI/ISA S71.04 Class G2 (Standard) (ANSI/ISA S71.04 Class G3, option)
Resistance to vibration		0.15mm P-P (5 to 58 Hz), 1 G (58 to 150 Hz)
Resistance to shock		15 G, 11 ms (during power-off, for sine half-waves in XYZ-directions)
Altitude		3000 m or less (*3)
Noise	Electric field	10 V/m or less (26 MHz to 1 GHz)
	Magnetic field	30 A/m (AC) or less, 400 A/m (DC) or less
	Electrostatic discharge	4 kV or less contact discharge, 8 kV or less aerial discharge
Grounding		100 Ω or less (*4)
Cooling		Natural air cooling

*1: Not applicable to DTFB10. Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.
*2: 0 to +55°C when power supply module NFPW441, NFPW442 or NFPW444 is used.
*3: 2000 m or less when power supply module NFPW441, NFPW442 or NFPW444 is used.
*4: Applicable to DTSBM10.

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■ REGULATORY COMPLIANCE AND CONFORMITY TO STANDARDS

Item		Specifications (✔:Compliant)	Suffix Code (*14)	
			5: Non explosion-proof, EAC mark	E: Explosion proof
Safety Standards (*1) (*2)		CSA C22.2 No.61010-1-04	✔	✔
		EN 61010-1:2010	✔	✔
		EN 61010-2-030:2010 (*3)	✔	✔
		EN 61010-2-201:2013 (*3)	✔	✔
		CU TR 004 (*13)	✔	
EMC Standards (*1)	CE Marking	EN 55011:2009 +A1 :2010 Class A Group 1 EN 61000-6-2:2005 (*4) (*5) EN 61000-3-2:2014 (*6) EN 61000-3-3:2013 (*6) (*7)	✔	✔
	RCM	EN 55011:2009 +A1 :2010 Class A Group 1	✔	✔
	KC Marking	Korea Electromagnetic Conformity Standard	✔	✔
	EAC Marking	CU TR 020 (*13)	✔	
Laser safety (*1) (*8)	Class	IEC 60825-1:2007 Class1M EN 60825-1:2007	✔	✔
	FDA(CDRH)	21CFR Part 1040.10	✔	✔
Standards for Hazardous Location Equipment (*1) (*9) (*10)	FM Nonincendive (*2)	Class I, Division 2, Groups A, B, C, D T4 FM 3600-2011 FM 3611-2004 FM 3810-2005		✔
	ATEX Type ”n” (*11)	II 3 G Ex nA ic [op is] II C T4 Gc X (*12) EN 60079-0:2012+A11:2013 EN 60079-11:2012 EN 60079-15:2010 EN 60079-28:2015		✔
	CSA Non-Incendive (*2)	Class I, Division 2, Groups A, B, C, D T4 C22.2 No. 0-10 CAN/CSA-C22.2 No. 0.4-04 C22.2 No. 213-M1987 TN-078		✔
Restriction of Hazardous Substances	RoHS Directive	EN 50581	✔	✔

Note: Under EU legislation, the manufacturer and the authorised representative in EEA (European Economic Area) are indicated below:
Manufacturer: YOKOGAWA Electric Corporation (2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750, Japan).
Authorised representative in EEA: Yokogawa Europe B.V. (Euroweg 2, 3825 HD Amersfoort, The Netherlands).

*1: Not applicable to DTRK10 and DTFB10. Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.
*2: To be compliant with these standards, the DTSXL System hardware needs to be installed in a lockable metal cabinet.
*3: Applicable when CPU module NFCP050 is used.
*4: For lightning surge immunity, a device such as a lightning arrester needs to be installed externally to Power cable and Network cable.
*5: To be compliant with EMC Standards, Mount three ferrite cores “A1190MN” or “A1193MN” to FG cable, Power cable, Network cable and RS-232-C Communication cables.
*6: Applicable when power supply module NFPW442 is used.
*7: The specified magnitude of the voltage drop determined by the cable wiring length needs be met.
*8: Applicable to DTSX3000.
*9: Refer to IM 39J06B40-01E “DTSXL Distributed Temperature Long Range System Guide” for the products meeting NI.
*10: For modules conforming to explosion-proof standards, refer to the section Explosion Protection of “COMBINING SYSTEM COMPONENTS” of this document.
*11: When DTSXL System is used under the ATEX Type ”n” environment, the Instruction Manual, IM 39J06B40-10E “Explosion Protection of DTSXL Distributed Temperature Sensor Long Range System under the ATEX Directive” is required for safer installation and wiring.
*12: “X” indicates specific condition of use, in a hazardous area of Zone 2, install DTSXL System in a lockable metal cabinet which meets the IP54 or higher protection rating provided in IEC 60529.
*13: The EAC mark is as follows.

EAC

*14: Refer to each suffix code for DTSX3000, DTOS2L, DTOS4L and DTOS16L.

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■ DISTRIBUTED TEMPERATURE SENSOR (DTSX3000)

● General

The DTSX3000 measures temperature distribution using optical fiber cable (not included in this specification) as the sensing element.

● Model and Suffix Codes

		Description
Model	DTSX3000	Distributed Temperature Sensor
Suffix Codes	-S	10km Range
	-N	16km Range
	-M	30km Range
	-L	50km Range *2
	0	Standard type
	S	Single Mode Fiber *1, *3
	5	Non explosion proof, EAC mark
	E	Explosion-proof *2
	E	E2000/APC
	N	Basic type
	G	With ISA Standard G3 option *2
Option Codes	/Z	Tokuchu *4

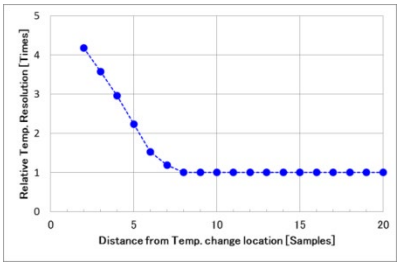
*1: Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.
*2: The combination with the suffix code of “Single Mode Fiber” is not allowed.
*3: When it with Optical Switch Module is used, combined with Optical Switch Module for single mode fiber.
*4: For products whose suffix code contains “/Z” an exclusive document is included. Please read it along with the standard document.

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● DTSX3000 Specifications (*12)

Item				Specifications			
Distance range suffix code				-S	-N	-M	-L
Distributed temperature measurement (*1)	Distance (*2)	Measurement distance range		6km, 10km	6km, 10km, 16km	6km, 10km, 16km, 20km, 30km	6km, 10km, 16km, 20km, 30km, 50km
		Sampling resolution (*3)		0.5m, 1m, 2m			
		Spatial resolution (*4)		1m or less			
	Temperature	Measurement temperature range		-200 to 300 °C (*5)			
		Temperature resolution (*6) (10-minute measurement, 1 σ, without optical switch)		Distance range			
				10 km	16 km	30 km	50 km
			Max. Value	0.03°C	0.06°C	0.2°C	2.6°C
			Typical Value(*7)	0.02°C	0.03°C	0.1°C	1.6°C
Sensor optical fiber	Optical fiber (*8)			50/125μm GI closed end, non-reflection required			
	Optical connector			E2000/APC			
Interface				3 ports, non-isolated, RJ45 modular jacks Full duplex, asynchronous			
	Serial (RS-232C)	SERIAL 1		Function: Communication (Modbus) Baud Rate: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4 57.6, 115.2 kbps			
		SERIAL 2		Function: Communication (Modbus) Baud rate: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4 kbps			
		SERIAL 3 (*9)		Function: Maintenance (Private)			
	Network interface	LAN		1 port, 10BASE-T (*10) or 100BASE-TX, RJ45 modular jacks, automatic negotiation, automatic MDI, with power switch (ON/OFF)			
	Display			LEDs: HRDY, RDY, LASER ON			
Power supply	Consumption	Operating mode		16 W			
		Power save mode		2.1 W			
Dimensions (W x H x D)				197.8 x 132.0 x 162.2 mm (6 slots width) (*11)			
Weight				2.5 kg			

*1: Temperature calibration of the Sensor Optical Fiber for DTSX3000 is required before temperature distribution measurement.
*2: Indicated nominal values vary with the refractive index of the optical fiber.
*3: Sampling range is 2 m for 50 km range; selectable from 1 m and 2 m for 20 km and 30 km range; and selectable from 0.5 m, 1 m and 2 m for other distance ranges.
*4: The spatial resolution (sometimes known as the response distance) is the distance between the 10% and 90% points on the DTS response to a step temperature change in the near end part of the optical fiber under 16 km distance range or less and 0.5 m sampling.
*5: If using outside of the described range, please contact our sales representative.
*6 : The given values indicate one standard deviation over distance for measurements of uniform temperature 20°C with no coupling loss and fiber attenuation of 0.25 dB/km for stokes light and 0.25dB/km for anti-stokes light.(The values of temperature resolution are not detectable temperature changes.)
Time values indicate hardware measurement time in fast measurement mode at sampling resolution of 1 m (2 m for 50 km range)
A 100 meter section each at the near end and the far end of the optical fiber is excluded.
The temperature resolution changes near a temperature change location or a fiber connection point. (The diagram on the right shows the graph for 1 m sampling as a reference case); how the temperature resolution changes depends on the fiber length, measurement time and excess loss.



*7: These values indicate typical performance at 23°C ambient temperature but are not performance specification values.
*8: Sensor optical fiber splicing must be by fusing splicing.
Sensor optical fiber connection loss must be 0.3 dB max. and no more than 0.15 dB on average
*9: SERIAL 3 of RS-232C is dedicated for maintenance use.
*10: A repeater hub cannot connect.
*11: Dimensions exclude protective cap of optical connector.
*12: Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature System Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.

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● Software Functions

Item		Function
Measurement functions	Optical switch control (*1)	Controls channel switching by optical switch DTOS2L, DTOS4L or DTOS16L.
	Measurement control	Starts measurement and stops measurement
	(Global) measurement settings	Settings for channel combination, measurement sequence, measurement mode (single-ended or double-ended), measurement interval and measurement start time
	Channel settings	Measurement condition settings (repetition rate, measurement time (*2) or averaging times, distance range and sampling resolution)
		Sensor optical fiber settings (optical fiber length, wave number, group index, loss correction, temperature offset correction and winding coefficient (distance-depth conversion factor))
	WITSML data conversion configuration (*3)	WITSML data conversion configuration, destination server configuration for data transfer by HTTP client
	LAS data conversion configuration	LAS data conversion settings and destination server configuration for data transfer by HTTP client
	CSV data conversion configuration	CSV data conversion settings and destination server configuration for data transfer by HTTP client
Data processing functions	Temperature data calculation	Calculates temperature by applying various defined corrections.
	Generated data	Temperature distribution data, temperature alarm data and sectional temperature data
	Sectional temperature data generation	Data generation sections can be defined with the temperature output data type (average, maximum, minimum, difference or slope) selected for each section
Detection functions	Temperature alarm settings	Alarm detection sections can be defined with temperature high limit, low limit, rise limit, fall limit and difference limit values specified for each section. An alarm is generated if the optical fiber line loss exceeds the specified threshold value.
	Optical fiber failure detection	An error and alarm is generated if optical fiber loss exceeds a specified threshold value.
	Optical loss up detection	An optical loss up alarm is generated if the CFL value near the fiber far end exceeds a threshold value.
Data management functions	Configuration data	Various settings
	LAS data	Data files in LAS (Log ASCII Standard) format. More than 100 files can be saved. With 2 m sampling over 6 km range, more than 1000 files can be saved.
	CSV data	Data files in CSV (comma-separated values) format. More than 100 files can be saved. With 2 m sampling over 6 km range, more than 1000 files can be saved.
	WITSML data (*3)	Data files in WITSML (Wellsite Information Transfer Standard Markup Language) format. More than 100 files can be saved. With 2 m sampling over 6 km range, more than 1000 files can be saved.
WITSML data conversion function (*3)		Conversion of configuration and temperature distribution data into WITSML format (WITSML version 1.3.1.1 compatible).
LAS data conversion function		Conversion of configuration and temperature distribution data into LAS format (LAS version 2.0 compatible).
CSV data conversion function		Conversion of configuration and temperature distribution data into CSV format.
Data transfer functions		Transfers LAS data files or WITSML data files (*3) to HTTP server using PUT or POST.
RAS functions		Fault diagnosis, self-diagnosis, log data generation, error handling and watchdog timer
Maintenance functions		Firmware upgrade, power management, reset processing, time setting and maintenance functions
Authentication functions		SSH, SFTP, SCP and HTTPS; authentication using username and password
User registration functions		Up to 10 users can be registered for use with HTTPS server and SSH server.

*1: Available when DTSX3000 is used with optical switch DTOS2L, DTOS4L or DTOS16L.
*2: Actual measurement time might differ from the measurement time setting, and might fluctuate.
The difference between actual measurement time and the measurement time setting increases when DTAP3000 connection, alarm detection, sectional data generation, data conversion, data transfer and other functions are used.
*3: Available when DTSX3000 is used with the DTSX3000 Data Conversion Software (DTAP3000D).

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● Network Function (Ethernet)

Purpose

Ethernet is used for connecting the DTSX3000 to the DTSX3000 Control Visualization Software (DTAP3000), the DTSX3000 Data Conversion Software (DTAP3000D), autonomous controllers FCN/FCJ and various types of PLCs. It is also used for maintenance of the DTSX3000.

Communication Functions

	Destination	Maximum Number of Connections (*1)	Description
1	DTSX3000 Control Visualization Software (DTAP3000)	4	Enables measurement configuration, control and data display for the DTSX3000.
2	DTSX3000 Data Conversion Software (DTAP3000D)	4	Enables configuration of data conversion by DTSX3000.
3	Modbus/TCP client	4	The DTSX3000 runs as a Modbus/TCP server.
4	SSH client	4	The DTSX3000 runs as an SSH server.
5	SFTP client	4	The DTSX3000 runs as an SSH server.
6	SCP client	5	The DTSX3000 runs as an SSH server.
7	Web browser	No restriction	Enables display of DTSX3000 system settings and status. Moreover, modification of system settings, as well as backup/restore and other maintenance operations are allowed when connected with administrator privileges.
8	HTTP server	1	The DTSX3000 runs as an HTTP client and transfers measurement data files in LAS format or converted to WITSML format (*2) to the HTTP server using PUT or POST.
9	SNTP server	3	The DTSX3000 runs as an SNTP client to synchronize its time with an SNTP server.

*1: Up to 4 connections of types 1 to 5 combined are allowed.
*2: Available only when the DTSX3000 is used with the DTSX3000 Data Conversion Software (DTAP3000D).

● Network Function (serial port)

The DTSX3000 can exchange data with other devices via the serial port.
Number of ports: Two (RS-232-C) communications ports
One port dedicated for maintenance

Destination	Description
Modbus master	The DTSX3000 runs as a Modbus serial slave.

● Modbus Connection Function

The DTSX3000 can connect with Modbus master devices and Modbus client devices supporting the Modbus communications protocol.

Item	Description
Destination device	Modbus compliant devices
Connection ports	Serial port Ethernet port
Available registers	Input registers (300001 to 365535) Holding registers (400001 to 465535)

The following communications functions are supported.

Communications Type	Communications Mode	Communications Functions
Serial communications	ASCII mode	Slave
	RTU mode	Slave
Ethernet communications	Modbus/TCP	Server

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● Time Synchronization Function

The DTSX3000 supports time synchronization between SNTP (Simple Network Time Protocol) enabled devices. The DTSX3000 can run as an SNTP client.

Item	Client Functions
Communications protocol	SNTP (Simple Network Time Protocol) UDP port: 123
Unicast mode (*1)	Available
Number of connections	3 servers
Time accuracy	±1s
Time correction method	Time retrieval from the server at hourly intervals (unicast mode) (*2)

*1: An SNTP client sends a time request to the SNTP server periodically.
*2: Smooth time transition is adopted to avoid sudden change in time. However, immediate time change (immediate change to specified time) is adopted at startup and exit.

■ CONFIGURATION TOOLS

● Operating Environment

System configuration of the DTSXL requires a PC running a Web browser and dedicated Windows application software. In addition, PDF reader software is required for reading the DTSXL documentation. The table below shows the system requirements for running these software tools.

Item	Operating requirement
Personal computer	IBM PC/AT compatible
CPU	Dual-core 32-bit processor 2 GHz or better
RAM	2 GB or more
Hard disk free space	2 GB or more
Ethernet adaptor	100BASE-TX or 10BASE-T is required
OS	Windows 7 (SP1), Windows 8.1
.NET framework	.NET framework 4.0 (Windows 7), .NET framework 4.51 (Windows 8.1)
Web browser	Internet Explorer 11
PDF reader	Adobe Reader X

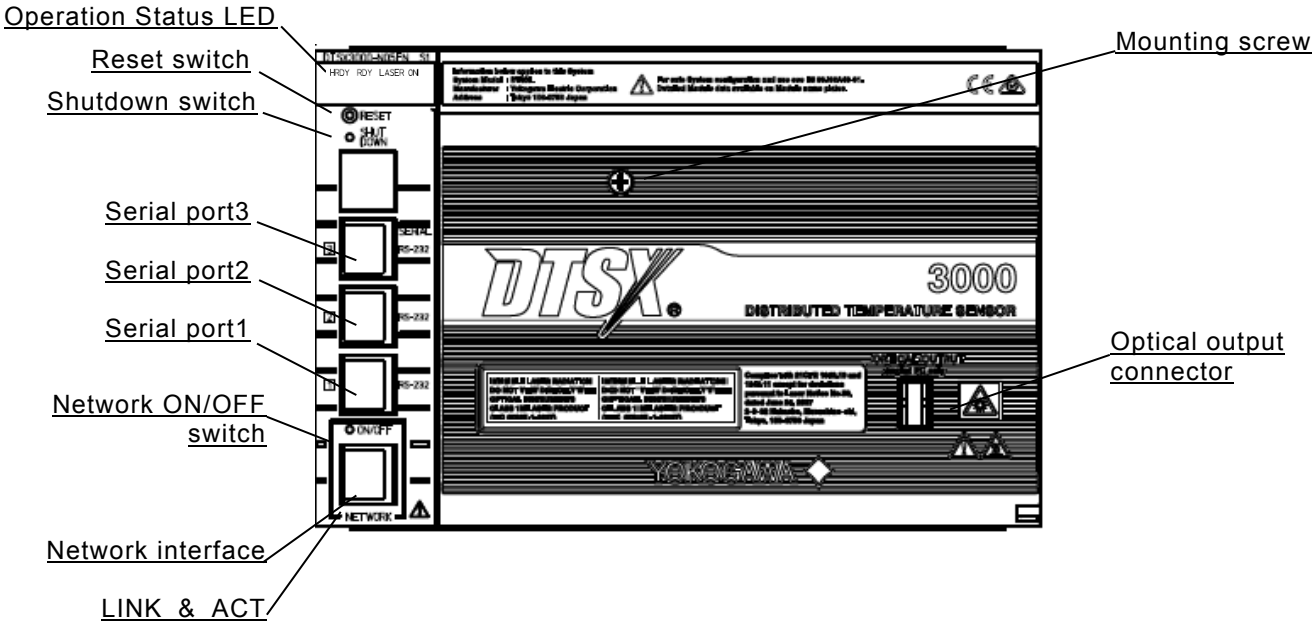
● Software Media

All users' manuals for DTSXL and the DTSX IP address configuration tool are supplied on a CD-ROM.

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Appearance

DTSX3000Front View



Pin Assignment

Table Pin Assignment of Serial Port (RS-232)

RJ45 Pin No.	RS-232C Signal Name	Conversion to D-sub Connector	
		D-sub 9pin Male (Straight Cable)	D-sub 9pin Female (Crossover Cable)
1	DCD (Data Carrier Detect)	1	1
2	DSR (Data Set Ready)	6	4
3	RXD (Received Data)	2	3
4	RTS (Request To Send)	7	8
5	TXD (Transmitted Data)	3	2
6	CTS (Clear To Send)	8	7
7	DTR (Data Terminal Ready)	4	6
8	GND (Common Ground)	5	5

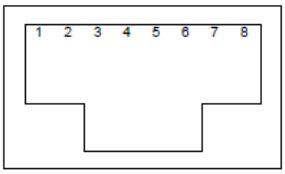


Figure: Front View of RJ45 Connector (RS-232)

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● LEDs

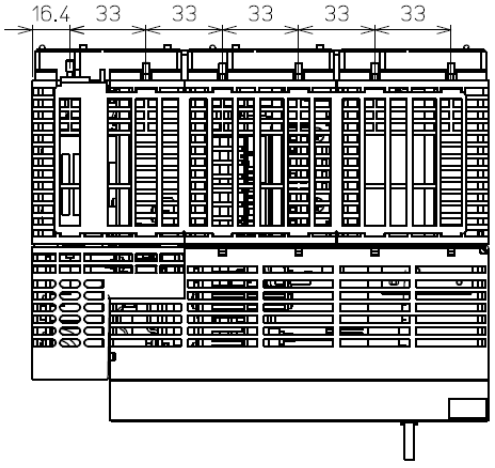
Status Indicators

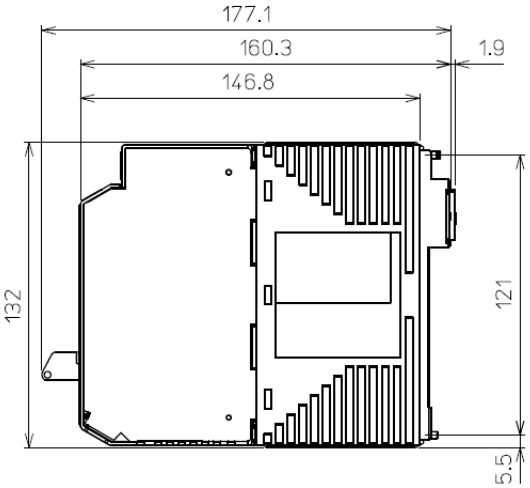
LED Indicator	Color	Description
HRDY	Green	Lit when the hardware is operating normally.
RDY	Green	Lit when the system is operating normally.
	Red	Blinks in the event of a failure.
Laser ON	Green	Lit when the laser is on.

LAN status indicators (near RJ45 modular jacks)

LED Indicator	Color	Description
NETWORK ON/OF	Green	Lit in normal communication mode. Unlit in power down mode.
LINK & ACT	Green	Lit when a LINK is established. Blinks when transmitting or receiving.

● External Dimensions (DTSX3000)





Unit: mm

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■ OPTICAL SWITCH MODULE (DTOS2L, DTOS4L, DTOS16L)

● General

Installing an optical switch module (2, 4 or 16-channel model) allows monitoring of multiple optical fibers using a single DTSX3000.
An optical switch module can also be used in double-ended measurement using DTSX3000.

● Model and Suffix Codes

		Description
Model	DTOS2L	Optical Switch module 2ch
	DTOS4L	Optical Switch module 4ch
	DTOS16L	Optical Switch module 16ch
Suffix Codes	-N	Standard type
	-S	Single Mode Fiber *1, *3
	5	Non explosion-proof, EAC mark
	E	Explosion-proof *2
	E	E2000/APC
	N	Basic type
	G	With ISA Standard G3 option *2
Option Codes	/Z	Tokuchu *4

*1: Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.
*2: The combination with the suffix code of “Single Mode Fiber” is not allowed.
*3: Combined with Distributed Temperature Sensor for single mode fiber.
*4: For products whose suffix code contains “/Z” an exclusive document is included. Please read it along with the standard document.

● Specifications (*4)

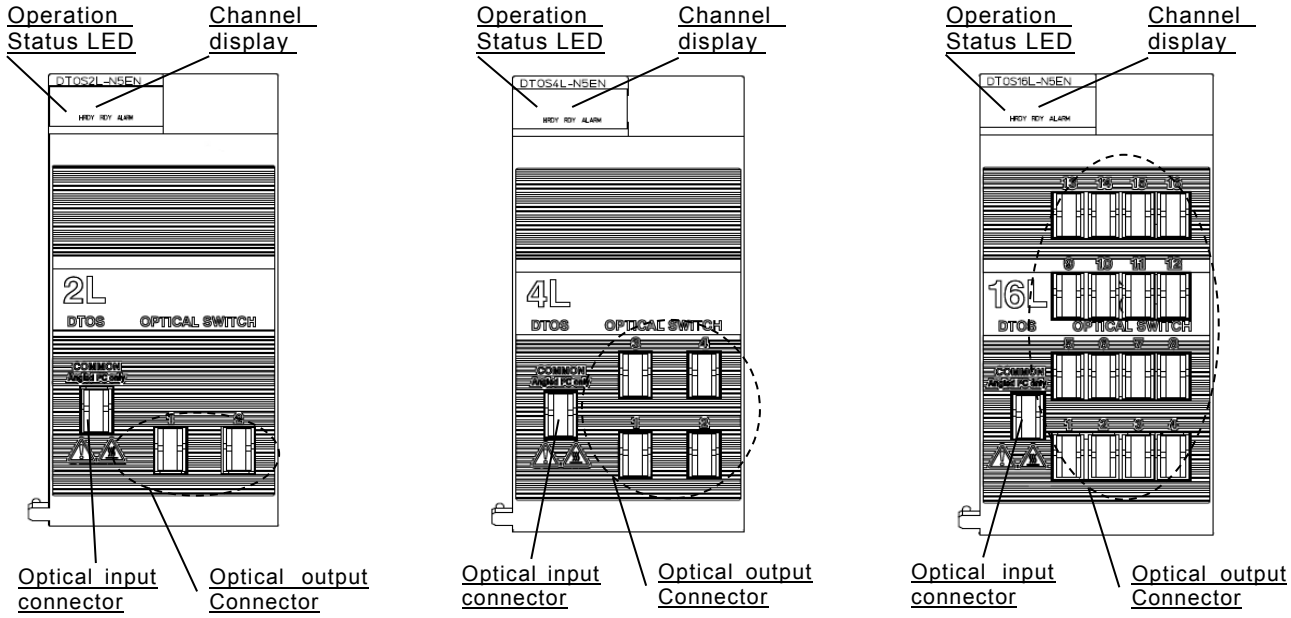
Item		Specifications		
Model		DTOS2L	DTOS4L	DTOS16L
Insertion loss (*1)		0.8 dB (Typical) (*2) 1.4 dB (Max.)		
Distributed temperature measurement	Measurement type	Single end, Double end		
Sensor optical fiber	Optical fiber	50/125 µm GI, closed end, non-reflection required		
	Optical connector	E2000/APC		
	Optical channels	2 channels	4 channels	16 channels
Interface	Control	Controlled by DTSX3000		
	Display	LEDs: HRDY, RDY, Alarm, Active channel		
Power supply	Consumption	Operating 4 W Power save 1 W		
Dimensions (W x H x D) (*4)		71.65 x 130.0 x 160.3 mm (2 slots width)		
Weight		0.63 kg	0.65 kg	0.75 kg

Note: As a guideline, the module should be replaced periodically every 4.7. 6 and 9.5 years for continuous operation of 15-second, 20-second and 30-second measurements, respectively.
*1: One-way loss
*2: These values indicate typical performance at 23°C ambient temperature but are not performance specification values.
*3: Dimensions exclude protective cap of optical connector.
*4: Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.

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● Appearance

Front View

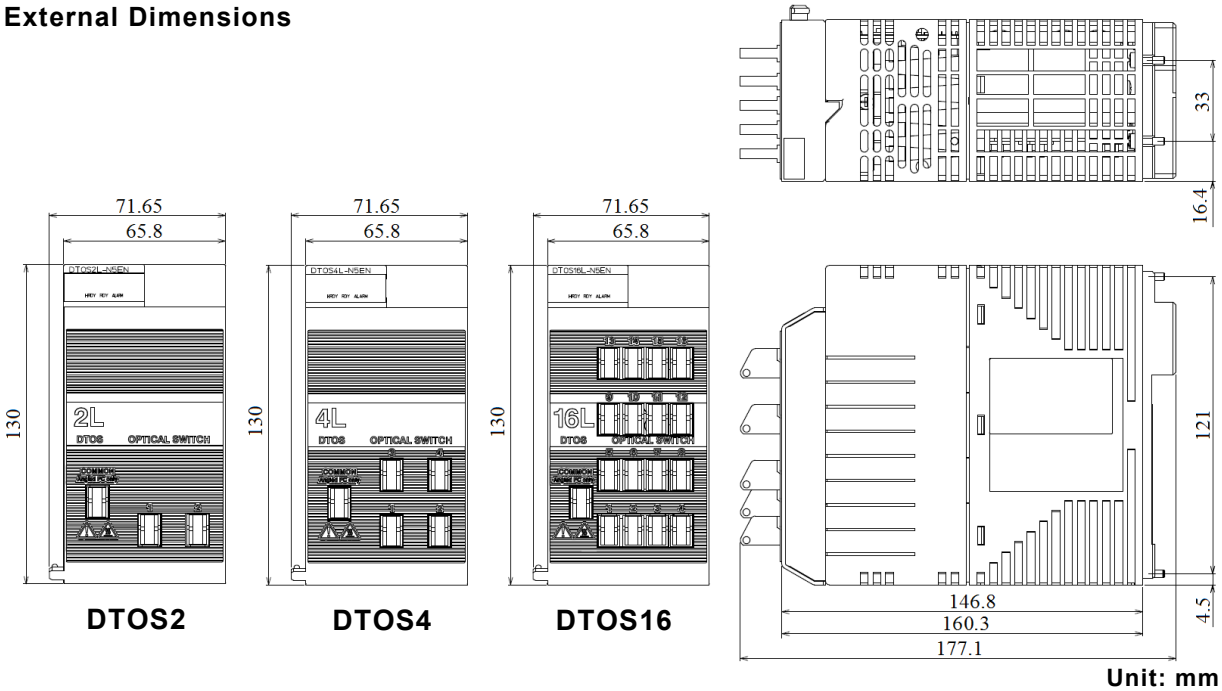


● LEDs

Status Indicators

LED Indicator	Color	Description
HRDY	Green	Lit when the hardware is operating normally.
RDY	Green	Lit when the system is operating normally.
ALARM	Green	Flashes when an alarm condition is present.
Active Channel	Green	Indicates an active channel.

● External Dimensions



Unit: mm

● Other Information

The optical switch module cannot be mounted on a STARDOM base module.

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■ BASE MODULE FOR DTSX (DTSBM10)

A base module (common with DTSX200) is required.

● **Model and Suffix Codes**

		Description
Model	DTSBM10	Base module
Suffix Codes	-N	Standard type
	0	Standard type
	9	EAC mark
	N	Basic type
	G	With ISA Standard G3 option

Refer to GS 39J06B45-01E “DTSXM Distributed Temperature Sensor Middle Range System” for details on the specifications of the DTSBM10 base module.

■ RACK MOUNT KIT FOR DTSX (DTRK10)

The rack mount kit can be used for laying optical fibers in a cabinet.
Refer to GS 39J06B45-01E “DTSXM Distributed Temperature Sensor Middle Range System” for details on the specifications of the optical fiber rack mount kit.

■ OPTICAL FIBER FOR DTSX (DTFB10)

The optical fiber for DTSX is used for checking the operation of the DTSX3000.
Optical fiber is 50/125μm GI.
It is not available for Distributed Temperature Sensor for Single Mode Fiber and Optical Switch Module for Single Mode fiber.
For checking the operation for Single Mode fiber, prepare single mode fiber cables on your own.
Refer to GS 39J06B45-01E “DTSXM Distributed Temperature Sensor Middle Range System” for details on the specifications of the DTS optical fiber.

■ POWER SUPPLY MODULE

One of the following power supply modules must be selected.
Dual-redundant configuration is not allowed for the power supply module.

Model	Reference (Input voltage range)
NFPW426	10 to 30 VDC
NFPW441	100 to 120 VAC
NFPW442	220 to 240 VAC
NFPW444	21.6 to 31.2 VDC

For the specifications of the power supply modules, see GS 34P02Q13-01E “FCN-RTU Low Power Autonomous Controller Hardware” and GS 34P02Q12-01E “FCN Autonomous Controller Hardware”.

■ CPU MODULE

This is the CPU module for the autonomous controller.
One CPU module of the following model may be optionally installed onto the DTSBM10 base module.

Model	NFCP050

For details on the specifications of the CPU module, see GS 34P02Q13-01E “FCN-RTU Low Power Autonomous Controller Hardware”.
Dual-redundant configuration is not allowed for the CPU module.
STARDOM modules including I/O modules, bus repeater modules and serial communication modules cannot be mounted on the DTSBM10 base module.

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■ COMBINING SYSTEM COMPONENTS

The tables below show how components can be combined to configure a DTSXL System to suit different applications.

Product	Model	Selection	Operating Temperature Range
Distributed Temperature Sensor	DTSX3000	◎	-40 to +65°C *1
Power supply module	NFPW426	○	-40 to +70°C
	NFPW441	○	0 to +55°C
	NFPW442	○	0 to +55°C
	NFPW444	○	0 to +55°C
Base module	DTSBM10	◎	-40 to +65°C
Optical switch module	DTOS2L	▲	-40 to +65°C *1
	DTOS4L	▲	-40 to +65°C *1
	DTOS16L	▲	-40 to +65°C *1
CPU module	NFCP050	△	-40 to +70°C
Rack mount kit	DTRK10	△	
Optical fiber for DTSX	DTFB10	△	
Control Visualization Software	DTAP3000	△	
Data conversion software	DTAP3000D	△	

◎: Required

○: Required, select one unit of any model

▲: Optional, select one unit of any model

△: Optional

*1: Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.

● Wide Operation Temperature Range Selection

Distributed Temperature Sensor	Power supply module	Base module for DTSX	Optical switch module	CPU module	Rack mount kit	Optical fiber for DTSX	Control Visualization Software	Data conversion software
DTSX3000	NFPW426	DTSBM10	DTOS2L DTOS4L DTOS16L	NFCP050	DTRK10	DTFB10	DTAP3000	DTAP3000D
◎	◎	◎	▲	△	△	△	△	△

● Standard Operation Temperature Range Selection

Distributed Temperature Sensor	Power supply module	Base module for DTSX	Optical switch module	CPU module	Rack mount kit	Optical fiber for DTSX	Control Visualization Software	Data conversion software
DTSX3000	NFPW426 NFPW441 NFPW442 NFPW444	DTSBM10	DTOS2L DTOS4L DTOS16L	NFCP050	DTRK10	DTFB10	DTAP3000	DTAP3000D
◎	○	◎	▲	△	△	△	△	△

● High Altitude (2000 m to 3000 m) Selection

Distributed Temperature Sensor	Power supply module	Base module for DTSX	Optical switch module	CPU module	Rack mount kit	Optical fiber for DTSX	Control Visualization Software	Data conversion software
DTSX3000	NFPW426	DTSBM10	DTOS2L DTOS4L DTOS16L	NFCP050	DTRK10	DTFB10	DTAP3000	DTAP3000D
◎	◎	◎	▲	△	△	△	△	△

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● Explosion Protection

Type	Model (*1)	Function	Explosion Protection		
			FM NI	ATEX Type “n”	CSA NI
Distributed Temperature Sensor	DTSX3000	Distributed temperature sensor	✔	✔	✔
Power supply module	NFPW426	Power supply module (10 to 30 V DC input)	✔	✔	✔
	NFPW441	Power supply module (100 to 120 V AC input)	✔	-	✔
	NFPW442	Power supply module (220 to 240 V AC input)	-	-	-
	NFPW444	Power supply module (21.6 to 31.2 V DC input)	✔	✔	✔
Base module for DTSX200	DTSBM10	Base module for DTSX200	✔	✔	✔
Optical switch module	DTOS2L	Optical switch module (2ch)	✔	✔	✔
	DTOS4L	Optical switch module (4ch)	✔	✔	✔
	DTOS16L	Optical switch module (16ch)	✔	✔	✔
CPU module	NFCP050	CPU module	✔	✔	✔
Rack mount kit	DTRK10	Rack mount for optical fiber	N.A.	N.A.	N.A.
Optical fiber for DTSX	DTFB10	Optical fiber for DTSX	N.A.	N.A.	N.A.

✔ : conforming
- : Not conforming yet
N.A. : Not applicable
*1 : Select suffix code for Explosion-proof. For the details of the power supply modules and the CPU module, see GS 34P02Q13-01E “FCN-RTU Low Power Autonomous Controller Hardware” and GS 34P02Q12-01E“FCN Autonomous Controller Hardware”. Refer to GS 39J06Z40-01E “DTSXL Distributed Temperature Sensor Long Range System (for SMF)” in the case of specification of DTSXL for single mode fiber.

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■ CABLING AND INSTALLATION PRECAUTIONS

For details on cable connection and installation procedures, see PART - A Hardware in IM 39J06B40-01E “DTSXL Distributed Temperature Sensor Long Range System Guide”.
For details on how to install power supply modules and CPU modules, also see TI 34P02Q91-01E “FCN/FCJ Installation Guide”.

■ OPTICAL FIBER HANDLING PRECAUTIONS

- Use optical connectors and optical fibers specified in the product specification.
- Clean the endface of the optical connector to remove dirt, dust, oil film and other contaminants before connection.
- Ensure that the endface of the optical connector is free of scratch marks. Otherwise, it may damage the peer optical connector.
- Ensure that optical connectors are securely connected and locked.
- Follow proper procedures when laying optical fiber cables. Do not subject the cable to excessive tension, lateral pressure, tight bending or twisting.

■ ORDERING INFORMATION

Specify the model and suffix codes when placing an order.

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■ PRECAUTIONS

- Before using the DTSXL System, read the user’s manual “Read Me First” (IM 39J06A40-01E) attached to DTSX3000.
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