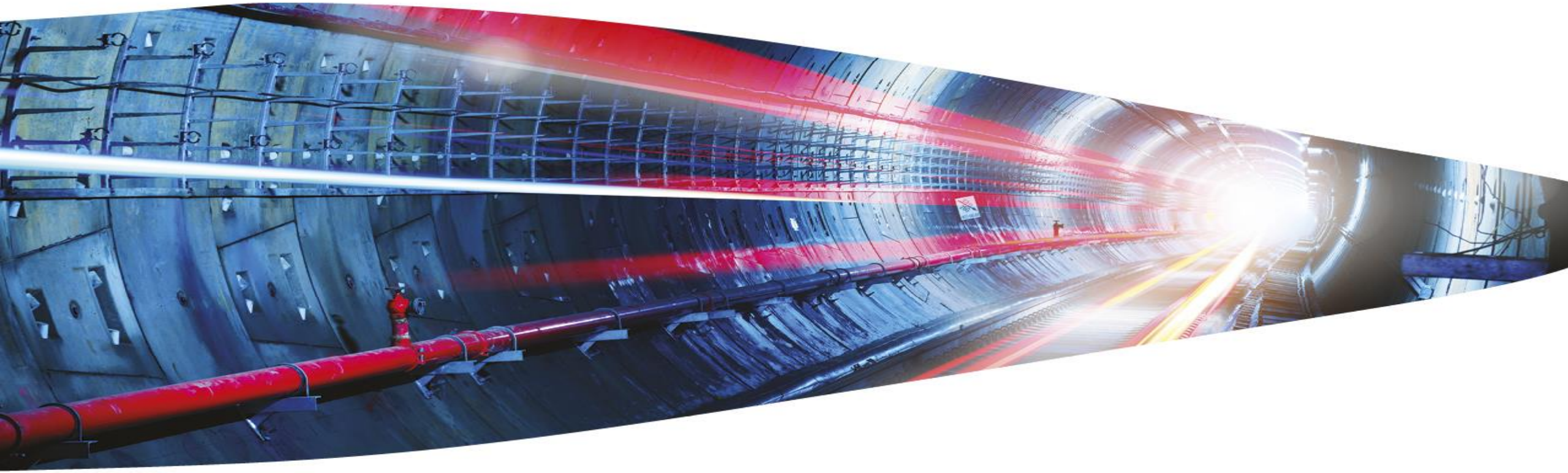
Bandweaver

monitored | secured | safe



Product Training: FireLaser V3

16 September 2019

Product Training: FireLaser V3

1	Introduction
2	Hardware Components
3	Fiber Optic Cable Setup
4	FireLaser DTS Setup
5	FireLaser DTS Configuration via Integrated LCD
6	FireLaser DTS Configuration via DTSCM2
7	Relay Mapping
8	Interfacing via Modbus Poll

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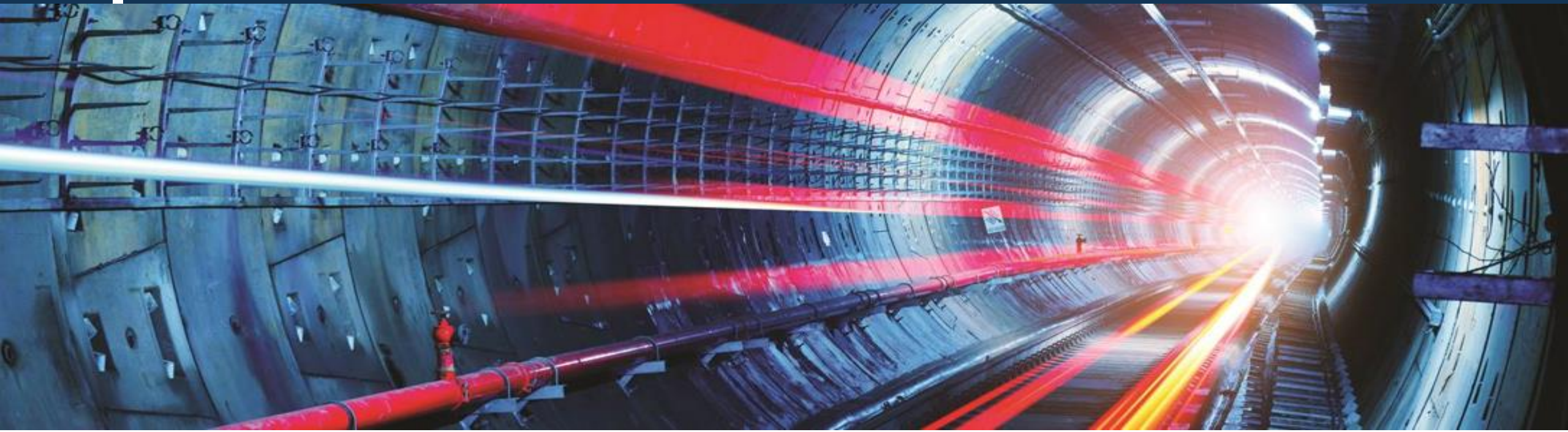
Product Training: FireLaser V3

1 Introduction



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Product Training: FireLaser V3

- Bandweaver's FireLaser V3 is a linear temperature sensor which consists of the following three parts:
  - ✓ Fiber Optic Cable as the Sensing Element.
  - ✓ FireLaser DTS (Distributed Temperature Sensing) Unit.
  - ✓ IPC (Industrial PC)/Laptop for advanced configuration via DTSCM2 (Distributed Temperature Sensor Configuration Management) software.

- The temperature monitoring is based on temperature-sensitive Raman scattering and OTDR (optical time-domain reflectometry) technology for distributed positioning.

- The FireLaser V3 models listed below differ in the number of channels and the Fiber Length they can monitor:

1.	DTS-FL-03-02-1CH	FireLaser 2km 1Channel, with LCD, with door
2.	DTS-FL-03-02-2CH	FireLaser 2km 2Channel, with LCD, with door
3.	DTS-FL-03-02-4CH	FireLaser 2km 4Channel, with LCD, with door
4.	DTS-FL-03-05-1CH	FireLaser 5km 1Channel, with LCD, with door
5.	DTS-FL-03-05-2CH	FireLaser 5km 2Channel, with LCD, with door
6.	DTS-FL-03-05-4CH	FireLaser 5km 4Channel, with LCD, with door
7.	DTS-FL-03-10-1CH	FireLaser 10km 1Channel, with LCD, with door
8.	DTS-FL-03-10-2CH	FireLaser 10km 2Channel, with LCD, with door
9.	DTS-FL-03-10-4CH	FireLaser 10km 4Channel, with LCD, with door

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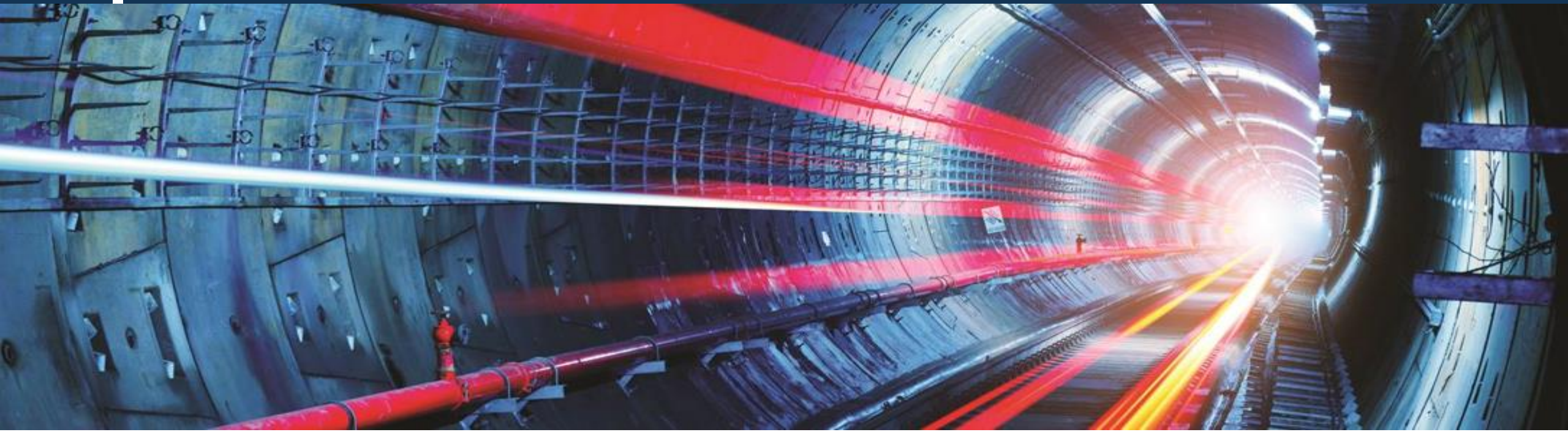
Product Training: FireLaser V3

2 Hardware Components



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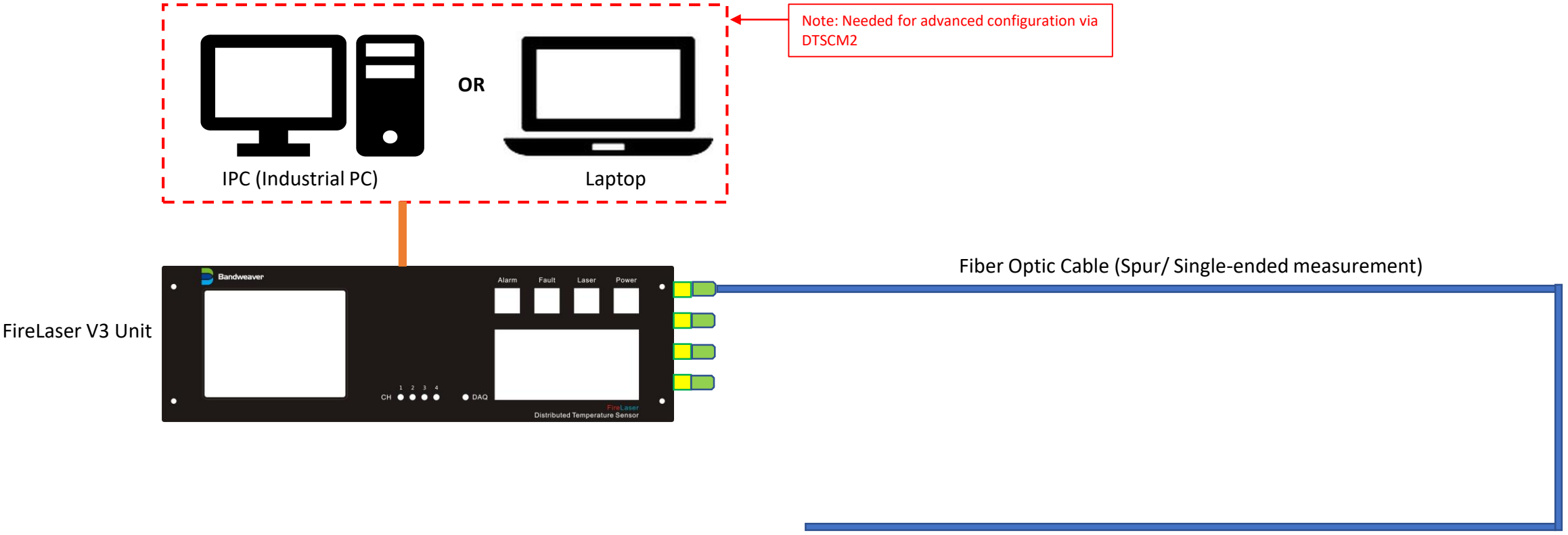
Product Training: FireLaser V3

- The main hardware components for the FireLaser V3 are as follows:
  1. Fiber Optic Cable
  2. FireLaser DTS (Distributed Temperature Sensing) unit

- The FireLaser V3 can operate independently without being connected to an IPC/Laptop. However, if you use an IPC/Laptop for interfacing with the DTS unit, you need to install Bandweaver's DTSCM2 software.



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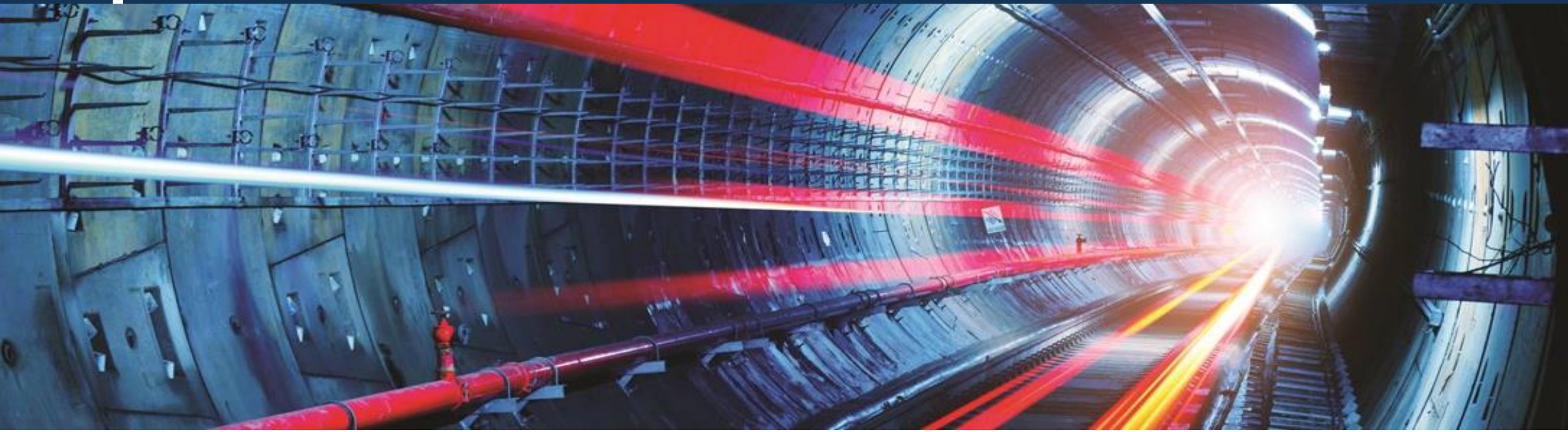
Product Training: FireLaser V3

3 Fiber Optic Cable Setup



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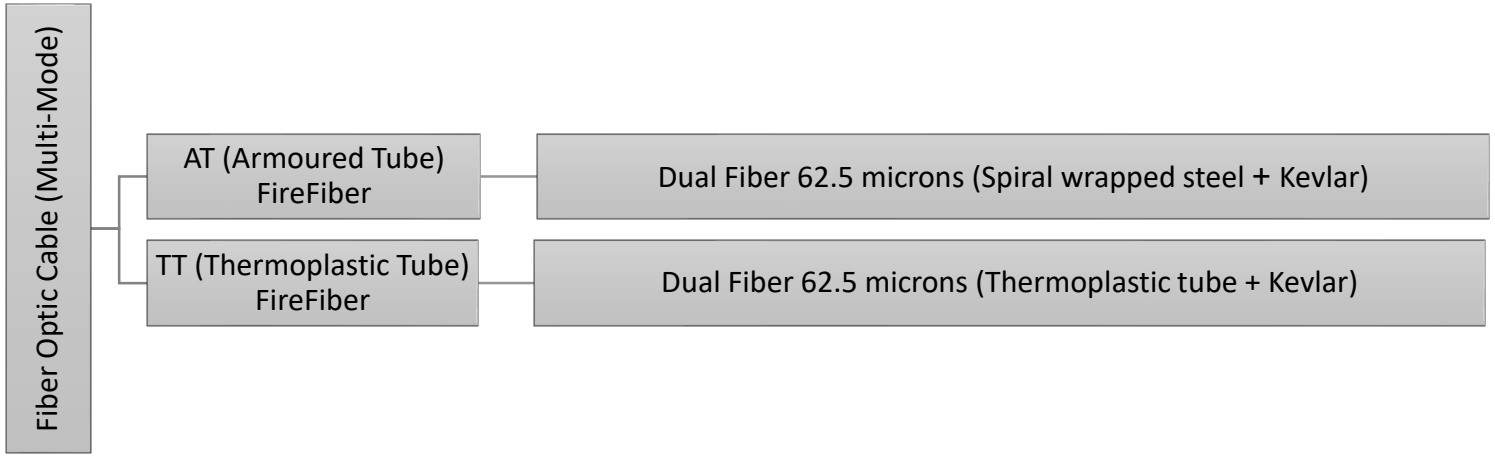
Product Training: FireLaser V3

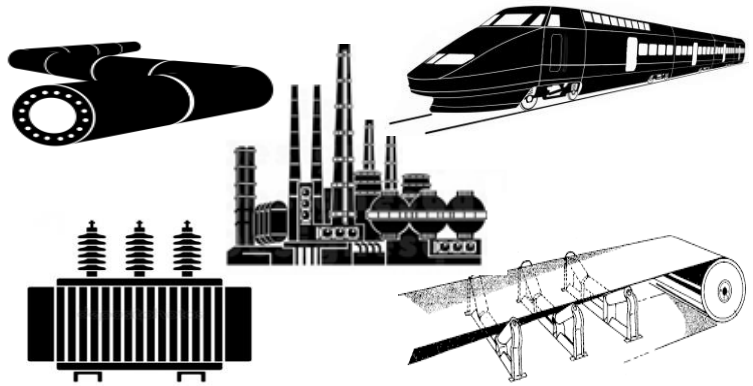
- The Fiber Optic Cable classification of the FireLaser V3 is given below:



- **Fiber Optic cable Installation guidelines:**

1. For local protection: Install the optical fiber in relative proximity to the potential fire risk
2. For room protection: Install the optical fiber close to the ceiling or roof of the area to be protected
3. Make sure there are no sharp bends in the Fiber Optic cable
   - Permissible bend radius for AT FireFiber: Long term- 120 mm & Short term- 80 mm
   - Permissible bend radius for TT FireFiber: Long term- 80 mm & Short term- 60 mm

Local Protection



Room Protection

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Product Training: FireLaser V3

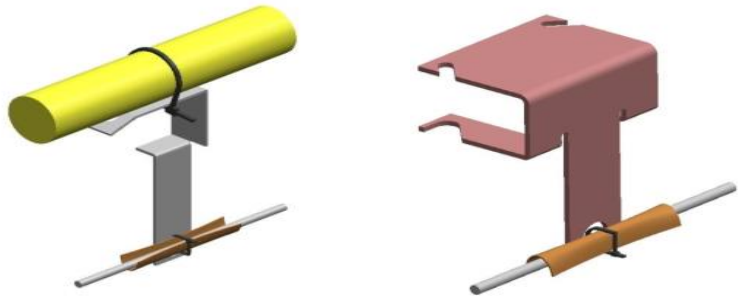
- **Fiber Optic cable Installation guidelines (contd.):**

4. Try to keep the number of splices and connectors used to a minimum. Cumulative Optical Loss should not exceed 10 dB per circuit. Typical connector loss is about 0.3 dB and splice loss is about 0.1 dB or less

5. Ensure that the Sensor Cable Fixings and Cable ties are properly installed. The cable ties should not be tightened excessively, and each fixing should be spaced no more than 1.5m apart

6. Termination of the FireFiber cable can be done in different ways as follows:
   - Splicing on Bandweaver's RMU (Reflection Mitigation unit) at the end of the fiber optic cable
   - Splicing an angled connector to the end of the fiber optic cable and covering it with a protector
   - Roughly breaking the end of the fiber optic cable and covering the end
   - Tying a knot of approximately 5 mm in diameter at the end of the fiber optic cable
   - Immersing the end of the fiber optic cable in matched refractive index liquid and covering the end

Sample Sensor Cable Fixings



Bandweaver's RMU device

E2000 Connectors

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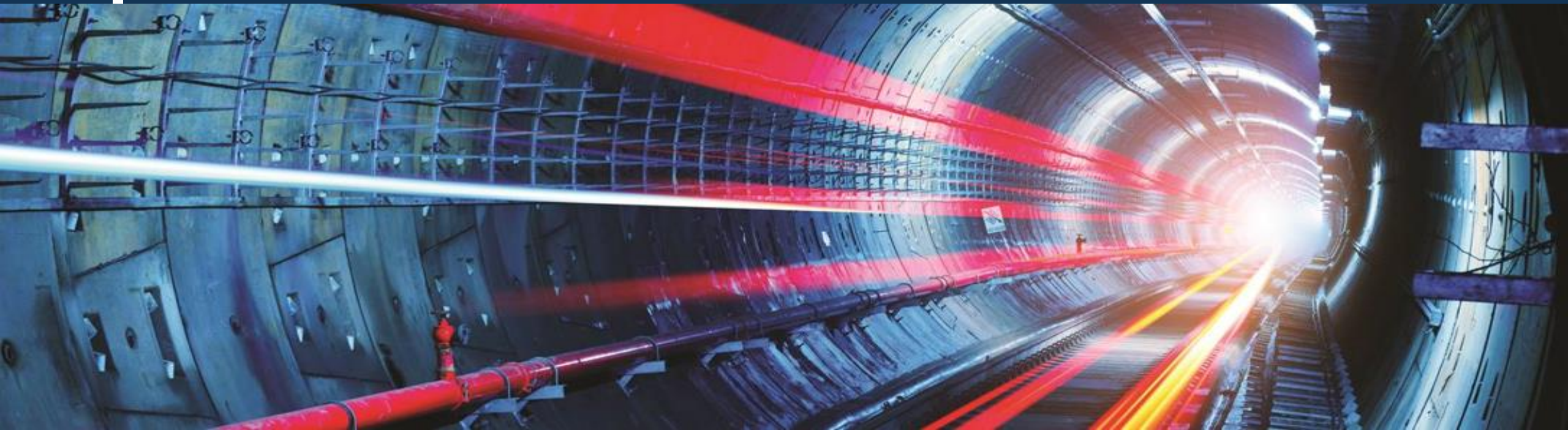
4 FireLaser DTS Setup



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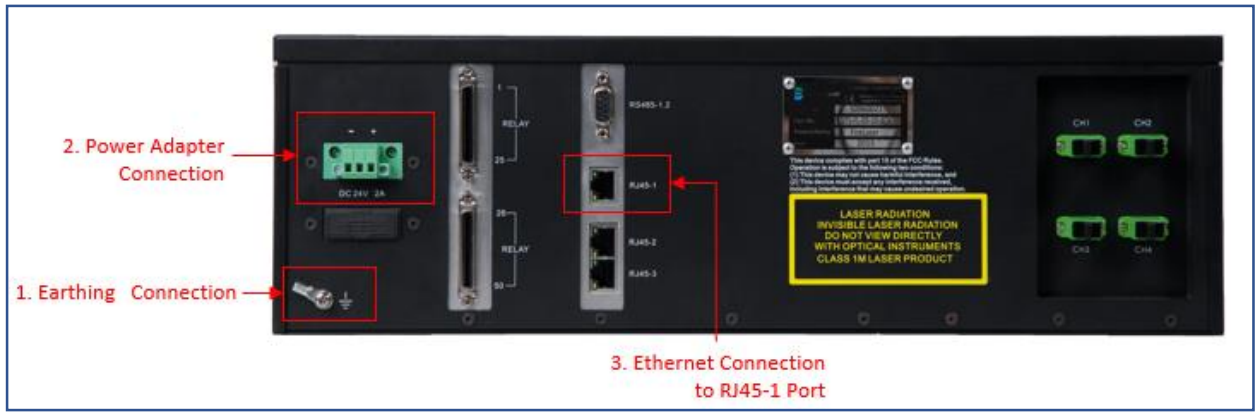
Product Training: FireLaser V3

- **Rear Panel connections of FireLaser DTS unit:**

1. Connect the Earthing wire to the Earthing terminal.

2. Connect the Power adapter terminals to the input terminals on the back of the DTS unit. The wire painted black goes into the –ve terminal and the red wire connects to the +ve terminal. For Long use ensure all screws are tightened

3. If you are using IPC/Laptop to interface with the DTS unit via DTSCM2, connect using Ethernet cable to the RJ45-1 port. This port uses UDP protocol to connect. For Laptop, use USB to Ethernet converter (If no Ethernet port available) and, make sure you turn off the Wi-Fi



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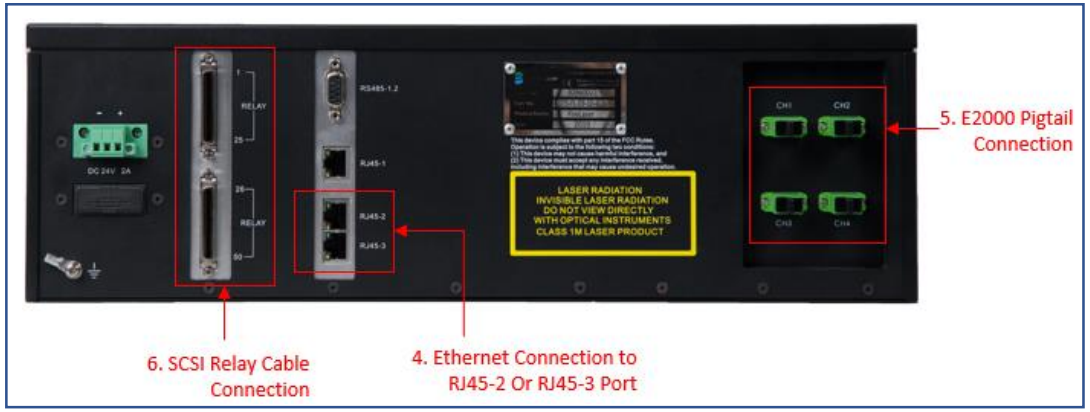
Product Training: FireLaser V3

- **Rear Panel connections of FireLaser DTS unit (contd.):**

4. If you are interfacing with the FireLaser DTS via MODBUS Protocol, then the ethernet cable should either be connected to RJ45-2 or RJ45-3 ports, both these support Modbus TCP in server mode

5. Connect Fiber to the FireLaser V3 unit through the E2000 connector pigtail to one of the Channels, make sure that the laser is off while doing the connection. You should hear a clicking sound if the connector is inserted properly

6. For interfacing to a Fire Alarm Control Panel (FACP) circuit, the FireLaser has two SCSI connectors on the rear panel, each SCSI connector is 50 pins and dual row for 25 relays. Together, both connectors provide 50 relay outputs. Two SCSI to PLC converters are provided in the FireLaser packing, they can be connected to the FireLaser unit via SCSI relay cable. You can then connect the relays directly from the terminals of the converter. ***Relay Mapping*** will be covered in later Slides



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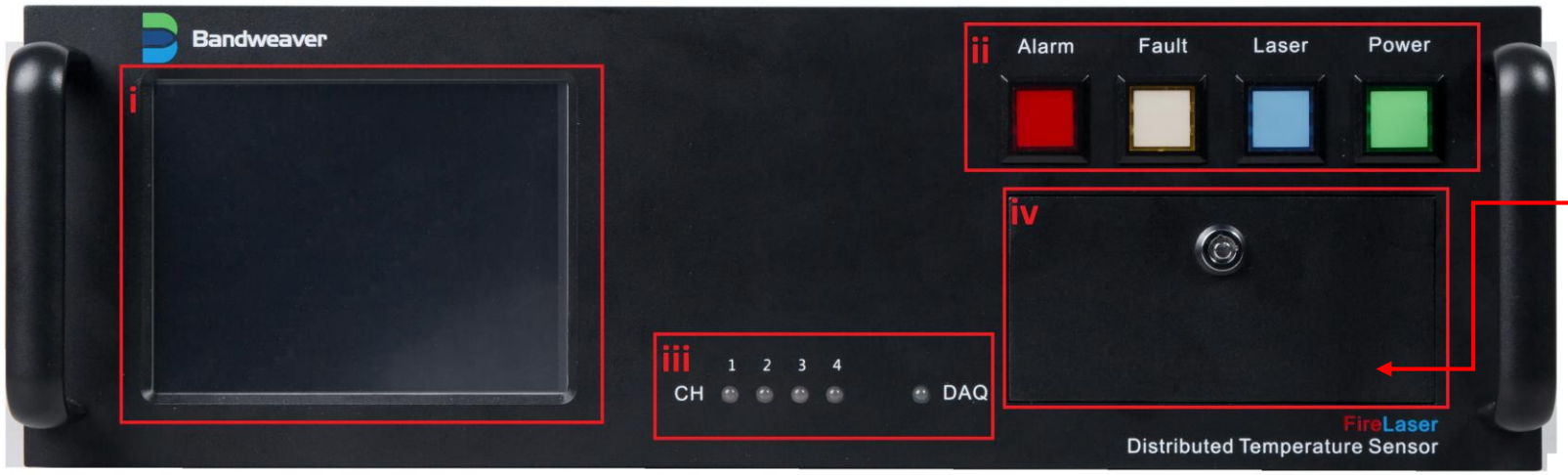
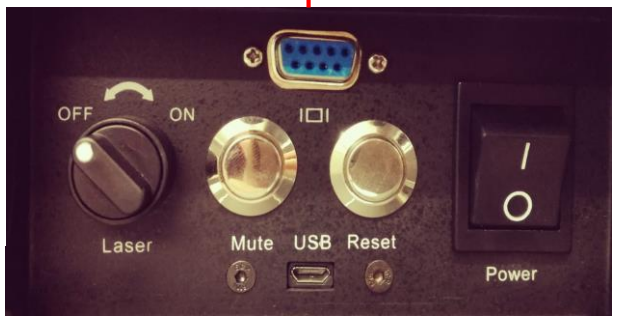
Product Training: FireLaser V3

- **Front Panel View of FireLaser DTS unit:**





- The Front Panel of the FireLaser consists of:
  - i. LCD touch screen display → Allows basic configuration of FireLaser DTS
  - ii. Indicator LEDs for Alarm, Fault, Laser & Power → Indicates the status of each when illuminated
  - iii. LEDs for → Channel indication: **Green**- Channel is in Operation, **Yellow**- Fiber break, **Red**- Fire Alarm
    - → DAQ status: Fast Flashing- automatic data acquisition mode, Slow Flashing- manual mode/ idle
  - iv. Lockable door for Security Control → Consists of Power Switch, Laser Switch, Alarm Mute, Alarm reset, USB OTG (on-the-go), DB9 terminal (Bandweaver use only)

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Product Training: FireLaser V3

- **Front Panel Main Functions for Initial Start-up:**

1. After completing all the required connections on the rear panel, you can turn ON the FireLaser DTS by switching the power switch to **I**

2. Once the FireLaser DTS is started, the system will carryout a self-test and initialisation. After which, the main user interface will be displayed, showing the most recent Alarm information

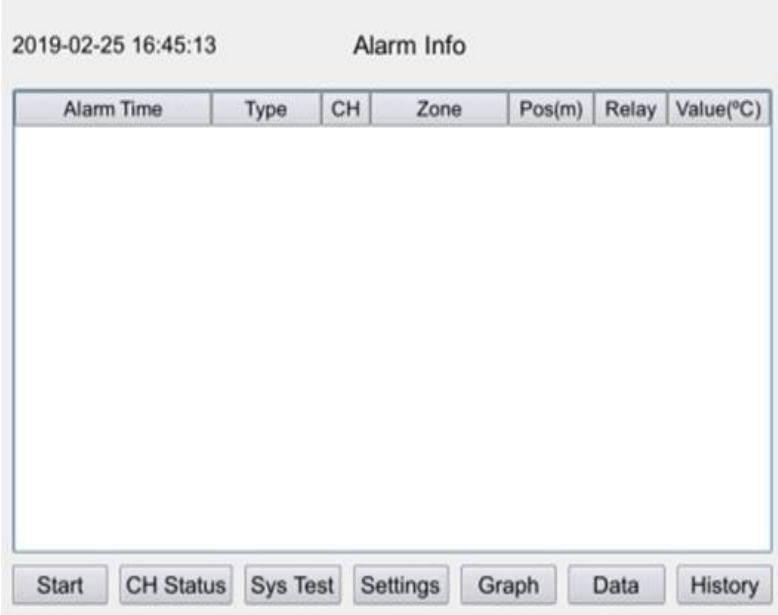
3. After the main interface is displayed the DTS will automatically load the internal storage configuration and start measurement within 30 seconds if there is no intervention. Ensure that the Laser is switched ON before this happens, if not, a Fault Alarm will be triggered

4. The Mute button is used to Silence the audible alarm

5. The Reset button clears all current alarms

Power Switch, Laser Switch, Mute & Reset buttons

Main User Interface



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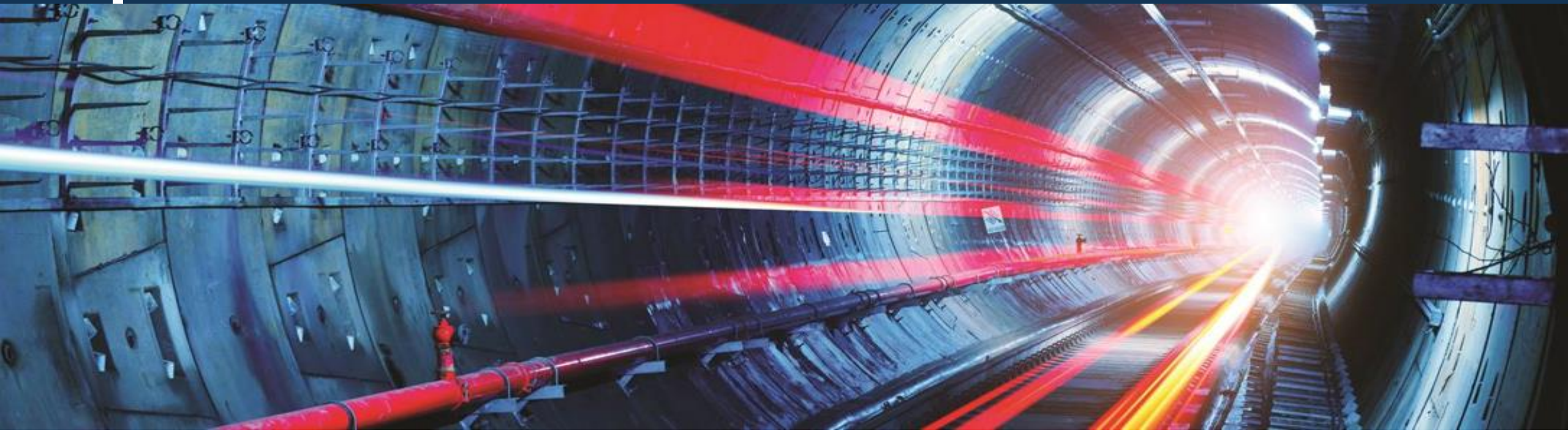
Product Training: FireLaser V3

5 FireLaser DTS Configuration via Integrated LCD



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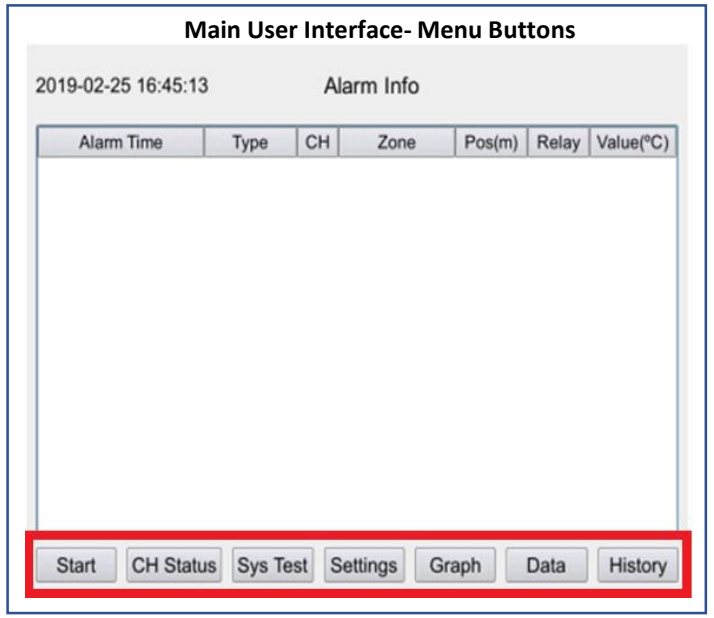
Product Training: FireLaser V3

- **The purpose of the Main User Interface- Menu Buttons are as follows:**

1. **Start/ Stop:** Allows the User to either Start or Stop the measurement depending on the current measurement status. **Password: 11111111**
2. **CH Status:** Displays the Enabled status of all the Channels and, the status of the Laser
3. **Sys Test:** Allows the User to carry out manual tests for the alarm or channel indicators
4. **Settings:** Allows the User to do the configuration settings for the measurement time, Fiber break, Alarm Index and, Alarm zones. **Password: 11111111**
5. **Graph:** Displays the temperature data curve
6. **Data:** Allows the user to access the Historical temperature data of the sensing fiber. **Password: 11111111**
7. **History:** Allows the User to access the Historical alarms and fault events

Main User Interface- Menu Buttons



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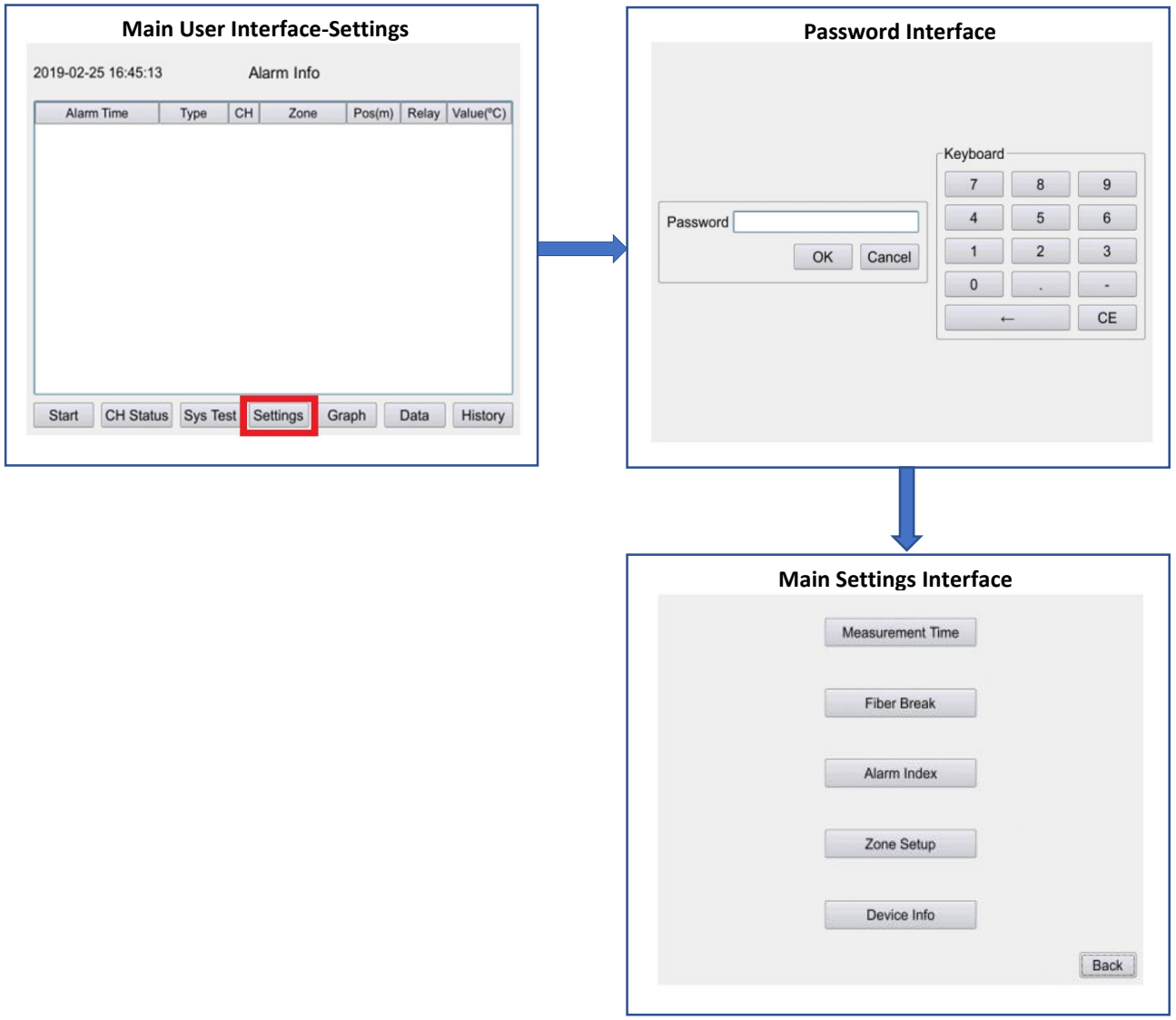
Product Training: FireLaser V3

- In the **Main User Interface**, click on the **Settings** button to access the **Main Settings Interface**

- A password is required to access the Main Settings Interface, therefore after clicking the Settings button, the Password Interface will appear. Enter the **Password: 11111111**

- The purpose of the different adjustments in the Main Settings Interface are as follows:

1. **Measurement Time:** Allows the User to set the Measurement time(s), Channel status for each Channel and set the Total Time(s)
2. **Fiber Break:** Allows the User to adjust the Fiber Break settings
3. **Alarm Index:** Allows the User to adjust the alarm Index settings
4. **Zone Setup:** Allows the User to configure the Zones
5. **Device Info:** Displays the device information of the FireLaser DTS i.e. the Device IP, Device No., S/W Version



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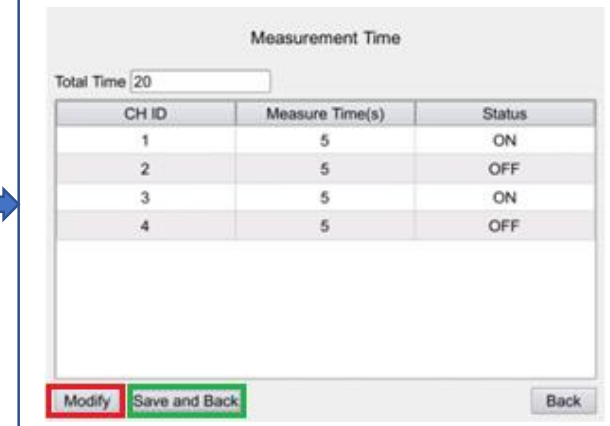
Product Training: FireLaser V3

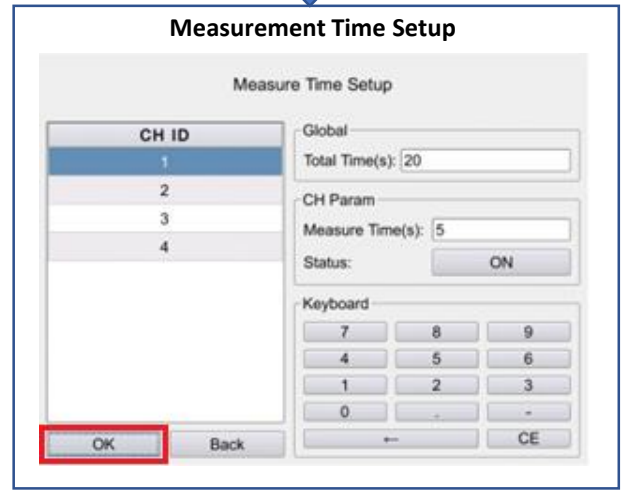
- In the **Main Settings Interface**, click on the **Measurement Time** button to access the **Measurement Time Interface**
- The **Measurement Time Interface** displays the Measurement Time and Channel Status for each Channel. To change these settings click on the **Modify** button, this will display the Measurement Time Setup
- In the **Measurement Time Setup**, first select the Channel for which the settings are to be modified under the **CH ID** section on the left-hand side
- Next set the **Measurement Time(s),** this is the time for which the Laser will be active for that Channel during each Measurement cycle. The channel **Status** can be toggled between ON & OFF to either Enable or Disable the Channel
- Then set the **Total Time(s)** which corresponds to the total sum of the measurement times of all the measuring Channels. This value can be set a few seconds higher than the total sum to allow some idle time for the Laser
- Click **OK** in the Measurement Time Setup to successfully record the entered values and return to the Measurement Time Interface, then click **Save and Back** in the Measurement Time Interface, to save the settings and return to the Main Settings Interface

Main Settings Interface- Measurement Time

Measurement Time Interface



Measurement Time Setup



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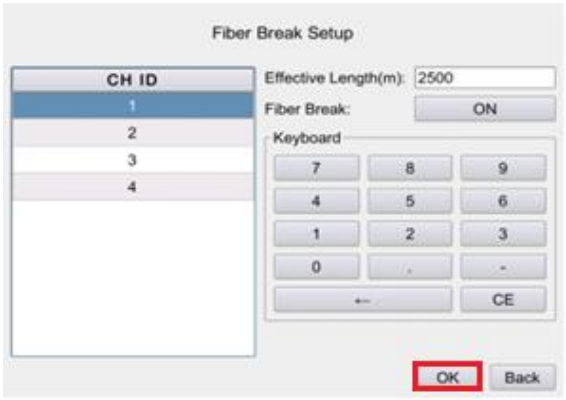
Product Training: FireLaser V3

- In the **Main Settings Interface**, click on the **Fiber Break** button to access the **Fiber Break Interface**
- The **Fiber Break Interface** displays the Effective length(m) and Fiber Break status for all the Channels. To change these settings click on the **Modify** button, this will display the Fiber Break Setup
- In the **Fiber Break Setup**, first select the Channel for which the settings are to be modified under the **CH ID** section on the left-hand side
- Then set the **Effective Length(m)**, which corresponds to the length of the sensing fiber that will be monitored for the Fiber length condition, any breakage that occurs within this length will trigger a Fiber Break alarm
- Next, the **Fiber Break** monitoring can be toggled to ON or OFF by click on the button at the side
- Click **OK** in the Fiber Break Setup to successfully record the entered values and return to the Fiber Break Interface, then click **Save and Back** in the Fiber Break Interface, to save the settings and return to the Main Settings Interface

Main Settings Interface- Fiber Break

Fiber Break Interface

Fiber Break Setup



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Product Training: FireLaser V3

- In the **Main Settings Interface**, click on the **Alarm Index** button to access the **Alarm Index Interface**

- The **Alarm Index Interface** shows the Max Temp(°C) threshold and Rate (°C/ min) threshold for all the Alarm Indexes,
  - ✓ To add a new Alarm index click on the **Add** button
  - ✓ To delete the last Alarm Index on the list click on the **Del Last** button
  - ✓ To change the parameter values of any of the existing Alarm Indexes first select the Alarm Index row and then click on the **Modify** button this will display the Alarm Index Setup

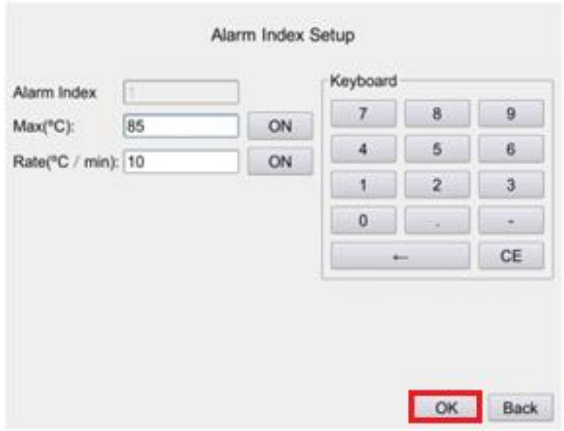
- In the **Alarm Index Setup**,
  - ✓ Adjust the **Max Temp(°C)** threshold, if the temperature of the sensing fiber goes beyond this value, an alarm will be triggered
  - ✓ Then set the **Rate (°C/ min)** threshold, which will trigger an alarm when the temperature of a Zone rises faster than this value
  - ✓ Both the thresholds have buttons on the side that can be toggled to either ON or OFF states to Enable or Disable the thresholds

- Click **OK** in the Alarm Index Setup to successfully record the entered values and return to the Alarm Index Interface, then click **Save and Back** in the Alarm Index Interface, to save the settings and return to the Main Settings Interface

Main Settings Interface- Alarm Index

Alarm Index Interface

Alarm Index Setup



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Product Training: FireLaser V3

- In the **Main Settings Interface**, click on the **Zone Setup** button to access the **Zone Setup Interface**

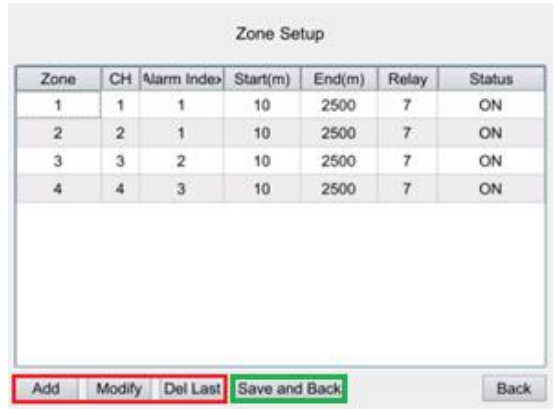
- The **Zone Setup Interface** displays the different Zone parameters of all the Zones that have been set,
  - ✓ To add a new Zone click on the **Add** button
  - ✓ To delete the last Zone on the list click on the **Del Last** button
  - ✓ To change the Zone parameter values of any of the existing Zones first select the Zone row and then click on the **Modify** button, this will display the Zone Setup

- In the **Zone Setup**,
  - ✓ Adjust the following: **CH ID** (which corresponds to the Channel), **Alarm Index**, **Start(m)** (Zone Start), **End(m)** (Zone End), **Relay**
  - ✓ The Status button can be toggled to either ON or OFF states to Enable or Disable the Zone

- Click **OK** in the Zone Setup to successfully record the entered values and return to the Zone Setup Interface, then click **Save and Back** in the Zone Setup Interface, to save the settings and return to the Main Settings Interface

Main Settings Interface- Zone Setup

Zone Setup Interface



Zone Setup

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- In the **Main Settings Interface**, click on the **Back** button to return to the **Main User Interface**
- In the **Main User Interface**, click on the **Start** button the begin the measurement
- Next, click on the **Graph** button in the Main User Interface, to access the **Graph Interface**
- The **Graph Interface** shows the Temperature Plot of the sensing fiber, the top right corner shows the current measuring Channel (it will change to N/A if measurement is stopped)
- By default the **Raw data** checkbox is unchecked, to see the Stokes & A-Stokes signal Raw data box will have to be checked
- Also by default, the **Automatic** checkbox is checked, this will grey out all the other options, such as Channel selection, Axis Setup, Pan, Zoom In and, Zoom Out

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Product Training: FireLaser V3

- Unchecking the **Automatic** Checkbox, allows to select all the other options that were previously greyed out

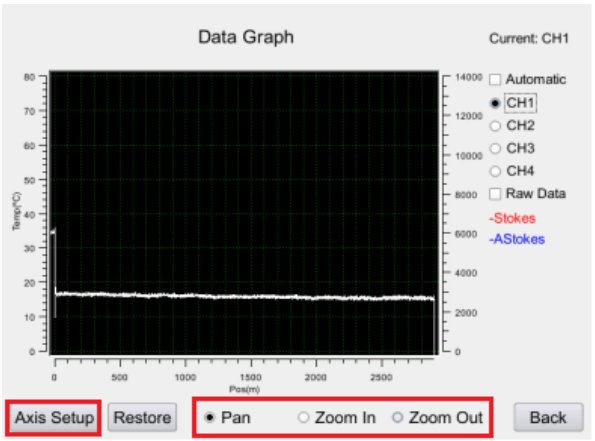
- The curve manipulation can be carried out using the **Pan**, **Zoom In**, and, **Zoom Out** options

- The **Axis Setup** option can be used to adjust the axis setting of the temperature plot

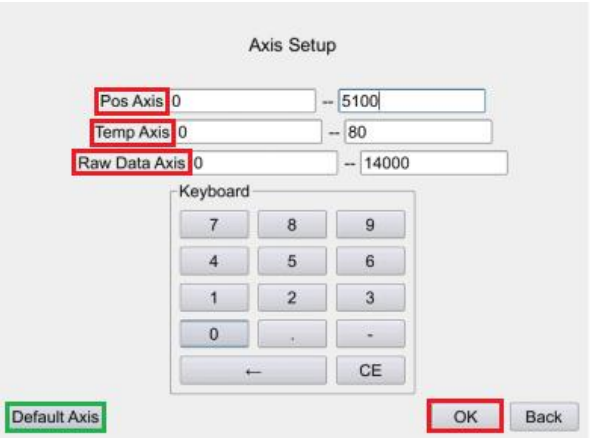
- In the Axis Setup,
  - ✓ **Pos Axis:** Corresponds to Start & End values of the X-axis
  - ✓ **Temp Axis:** Refers to Start & End values of the Y-axis on the left-hand side
  - ✓ **Raw Data Axis:** Refers to Start & End values of the Y-axis on the right-hand side

- Click **OK,** to record and apply the entered axis values to the temperature plot. Clicking on **Default Axis** will restore the default axis values.

Graph Interface-2



Axis Setup



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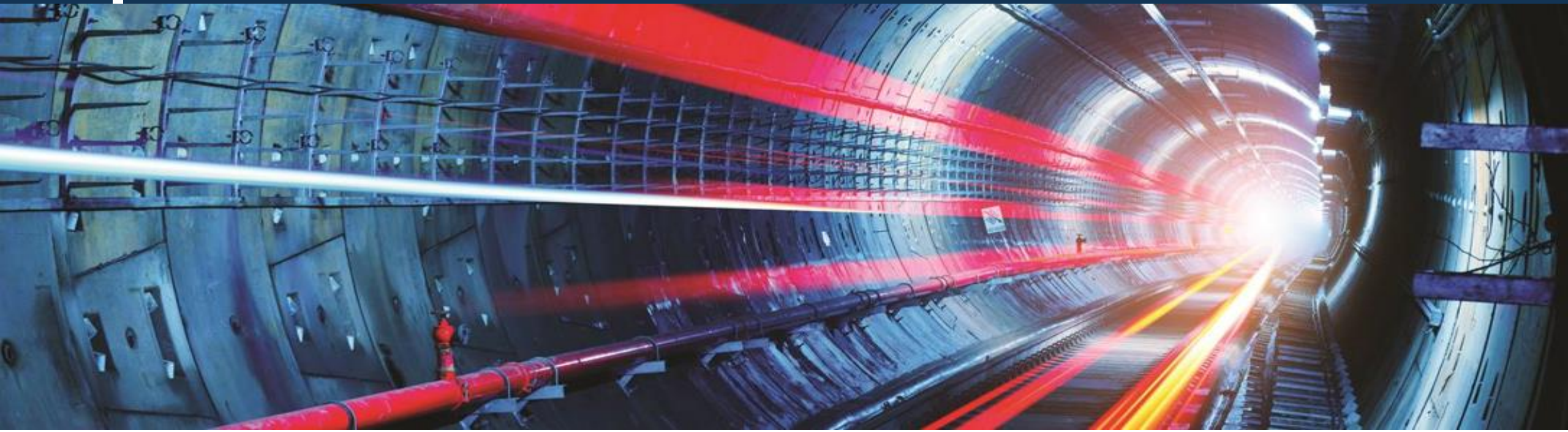
Product Training: FireLaser V3

6 FireLaser DTS Configuration via DTSCM2



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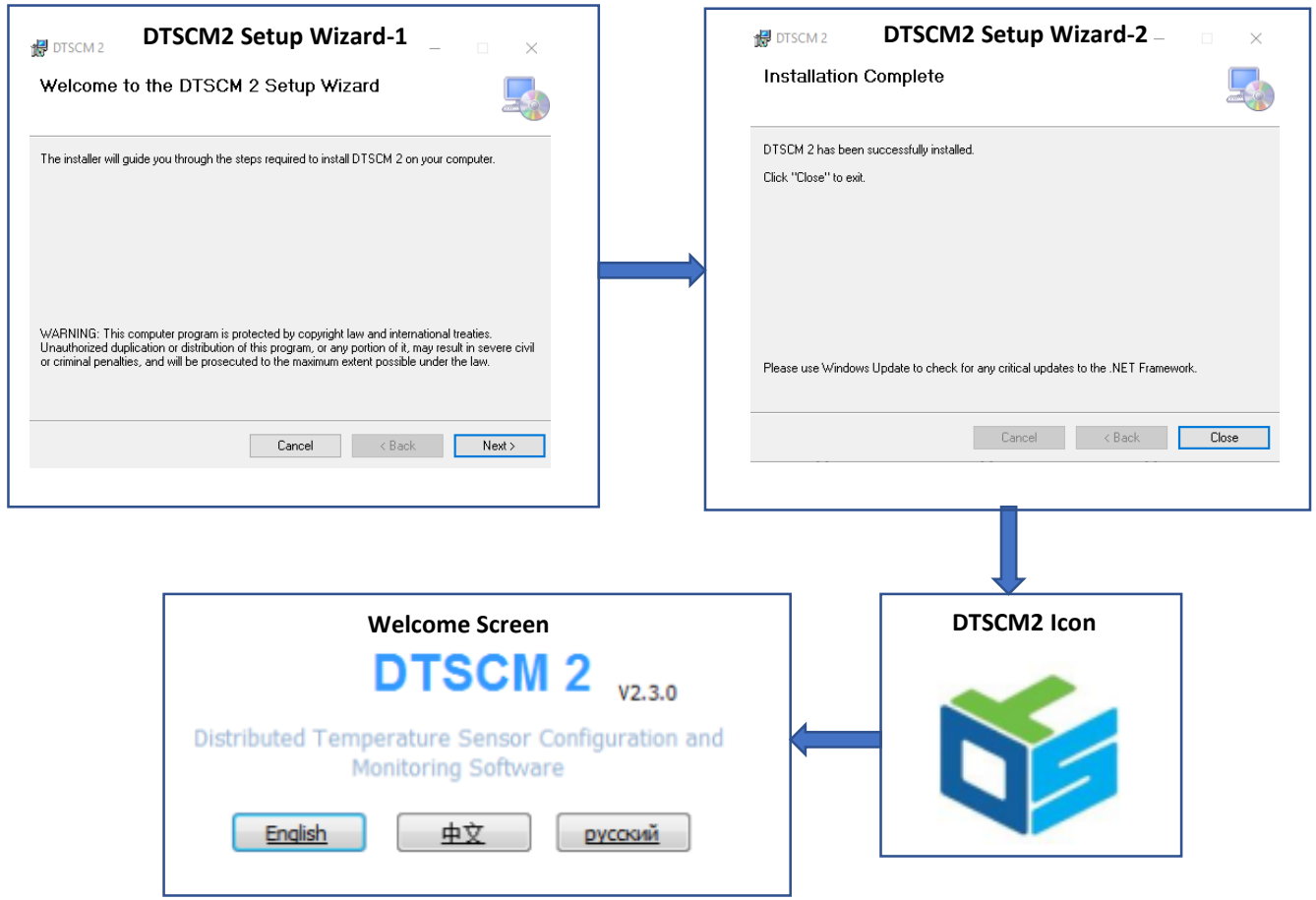
Product Training: FireLaser V3

- **Required Environment:**
  - ✓ Windows® XP + SP2 or later/ Windows7/ Windows10
  - ✓ .net Framework 4.0
  - ✓ Intel(R) Core (TM) I3 Series CPU or better
  - ✓ 512 MB or more available memory
  - ✓ 2GB or more available hard disk space

- **DTSCM2 Software Installation steps:**
  1. Uninstall any previous versions of the DTSCM software.
  2. Save the DTSCM2 setup file on your system.
  3. Double click on the file and choose RUN as administrator.
  4. When the DTSCM2 setup wizard appears, click on Next and follow the installation steps shown by the setup wizard.
  5. After the installation steps are complete close the setup wizard.

- Start the DTSCM2 software by double-clicking on the DTSCM2 Icon from the root directory

- When the welcome screen appears select the desired language (English/ Chinese/ Russian). If no selection is made, the software will automatically start with the language settings selected during the previous session



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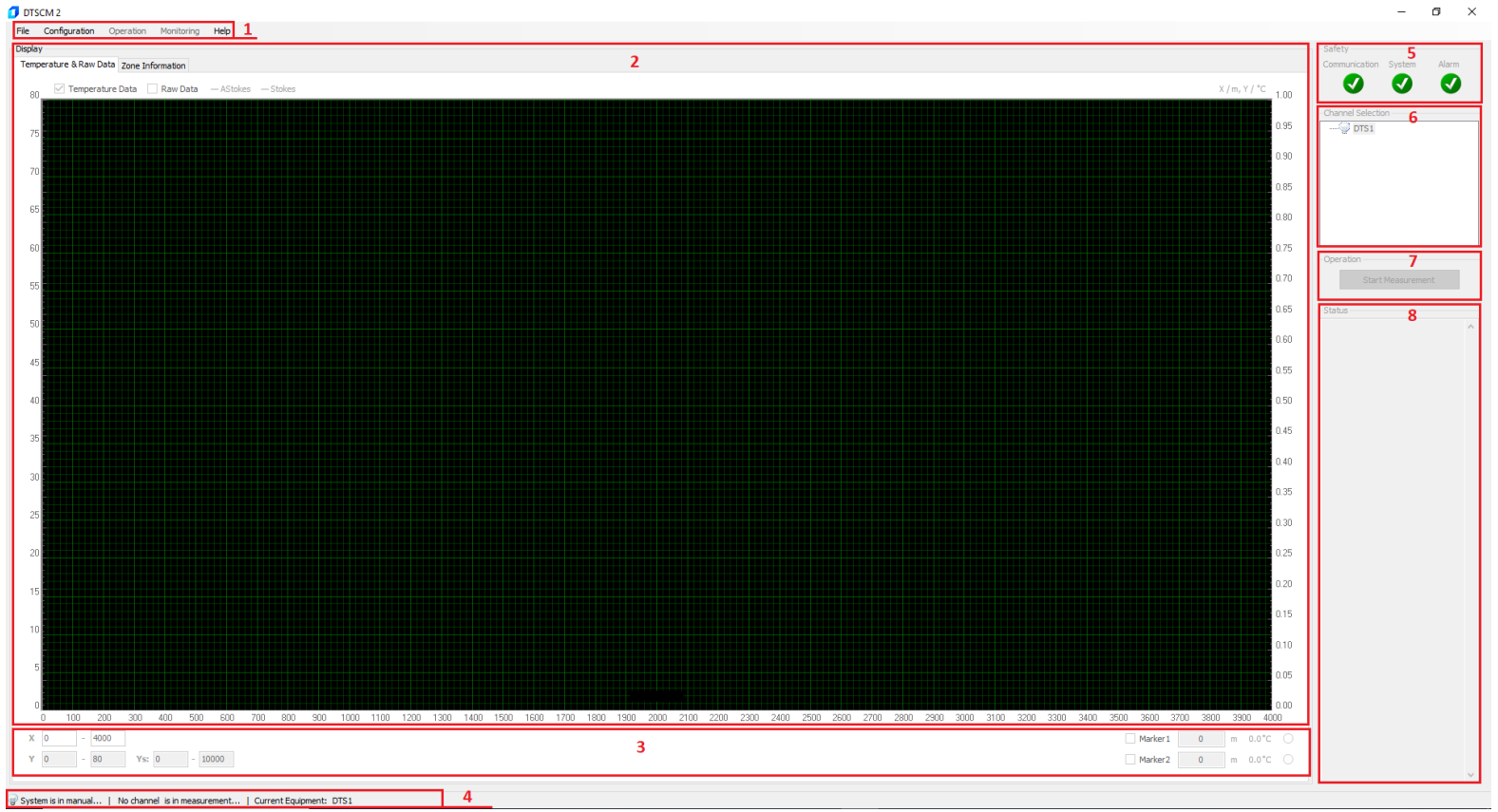
- The Main DTSCM2 Interface consists of 8 important part:

1. Main Menu Bar
2. Data and Information Display
3. Coordinate Configuration
4. Status Bar
5. Safety Panel
6. Channel Selection Panel
7. Operation Panel
8. Status Panel

Main DTSCM2 Interface



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- Most of the options on the Main DTSCM2 interface are greyed out when it first appears, to enable these option we can either:
  - A. Login & Initialise a new project and do all the configuration settings from the start, OR
  - B. Load a new .ecp2 file that has the predefined configuration settings

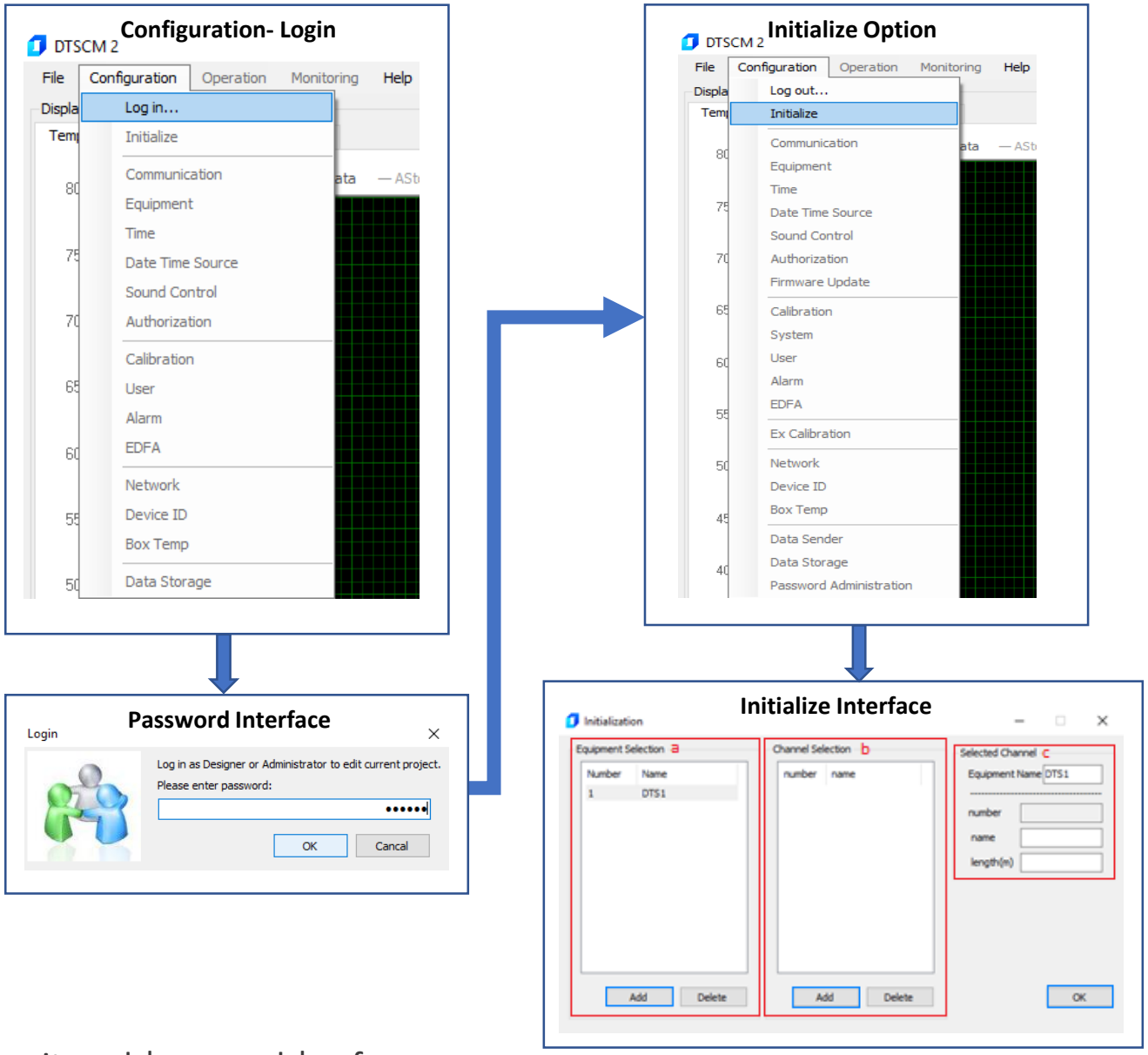
- Steps to Login & Initialise a new project and do the configuration settings from the start:
  1. Go to: **Main Menu Bar** < **Configuration** < **Login**. In the Password Interface, enter the Designer level **Password: 246810,** and Click **OK**

  2. Next, Go to: **Main Menu Bar** < **Configuration** < **Initialize**. In the Initialize Interface that appears, carry out the following changes:

     - In the **Equipment Selection** ,you can add multiple DTS units to DTSCM2, by clicking on **Add**. Maximum allowable number of DTS units under UDP connection is 10.

     - In the **Channel Selection**, you can add multiple Channels, by clicking on **Add**. This should not exceed the number of Channels that the DTS unit can support

     - In the **Selected Channel**, you can modify the Project name, Channel name and, Channel length(This should not exceed the maximum measuring capacity of the DTS unit). Click **OK** after doing all the required changes



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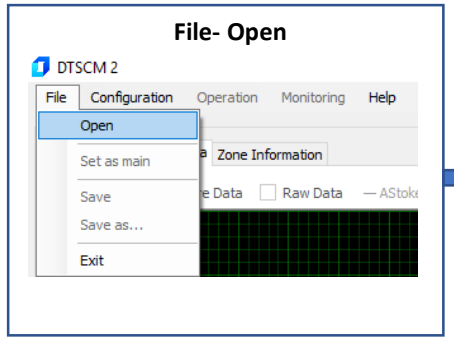
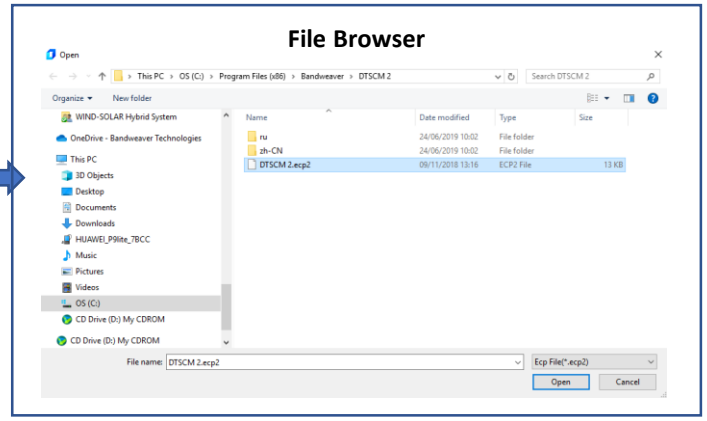
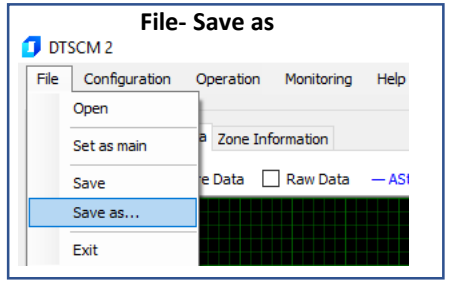
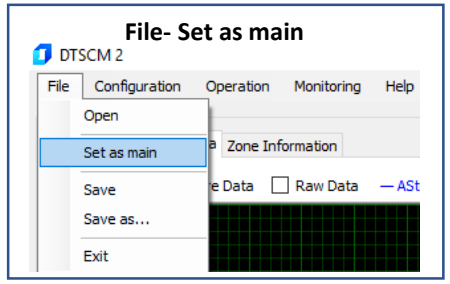
- Steps to load a new .ecp2 file that has the predefined configuration settings:
  1. Go to: **Main Menu Bar** < **File** < **Open**.
  2. In the **File Browser,** select the **DTSCM2.ecp2** file from the DTSCM2 folder
  3. After loading the new .ecp2 file, **Login** using the **Designer level** password, as explained in the previous slide.
  4. Next, under the **Initialize** option check if the settings are as needed.
  5. Make sure you do not overwrite the **original .ecp2** file. To save the modification that are done without overwriting the original .ecp2 file, go to: **Main Menu Bar** < **File** < **Save as**. Change the file name if saving in the same folder
  6. To load the same .ecp2 file each time DTSCM2 is started, go to: **Main Menu Bar** < **File** < **Set as main**

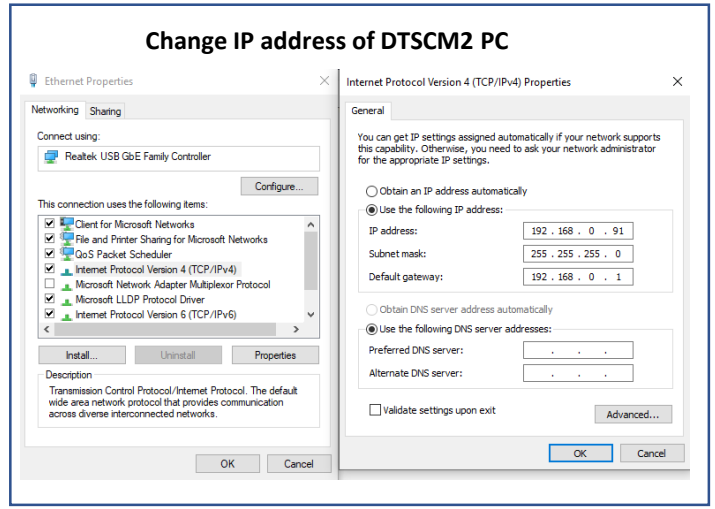




- Next, the Communication between the DTS unit and the PC must be established. First, change the IP address of the DTSCM2 PC:
  1. For Windows 10, go to: **Control panel** < **Network and Internet** < **Network and Sharing Center** < **Change Adapter settings**
  2. Right-click on the connected Ethernet port and select **Properties**. In the Ethernet Properties window, double-click on **Internet Protocol Version 4 (TCP/IPv4)**
  3. In the Internet Protocol Version 4 (TCP/IP) Properties window, select **Use the following IP address** option and enter:
     - **IP address:** 192.168.0.xyz, where **xyz** can be any value between 1~254 (excluding 100, which is the default IP of the DTS port RJ45-1)
     - **Subnet mask**: 255.255.255.0







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- Next, In DTSCM2, go to: **Main Menu Bar** < **Communication**.

- In the Communication Interface, enter the default IP address (**192.168.0.100**) for the RJ45-1 port, the default Port is **1025**

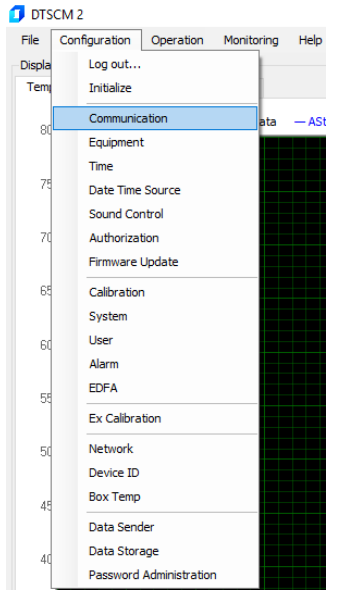
- If the **Online read parameters** option is checked, DTSCM2 will read all the current DTS settings, uncheck this if the settings in the .ecp2 file are to be applied

- Click **OK,** If the communication is properly established, the **Safety Panel** will show a tick mark. Otherwise, the Safety Panel will an exclamation mark

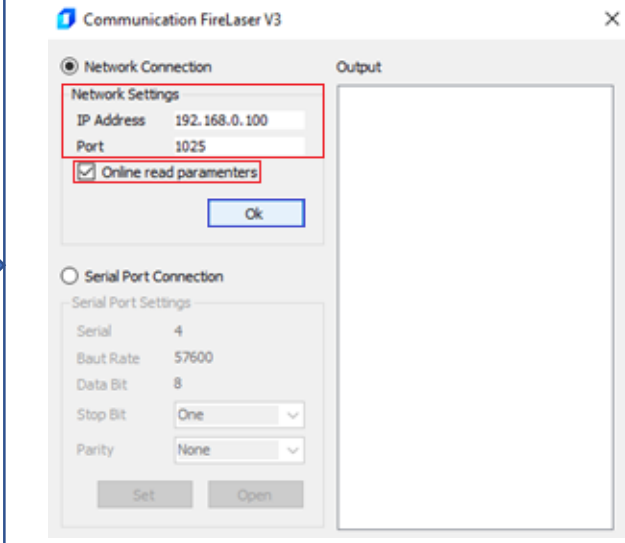
- If the connection is not properly established, carryout the following steps to diagnose:
  1. Check if all the previous steps are properly followed, check the IP address entered
  2. If using Laptop make sure that the Wi-Fi is turned OFF
  3. Ensure that the cable is not a crossover cable, and check if the cable is loosely fitted
  4. Open Command prompt and try pinging the IP address of the DTS and check the response

- After, the Communication is established, if there is no intervention the system will automatically start measurement within 30 seconds.

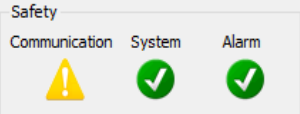
Configuration- Communication



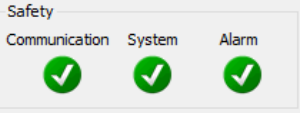
Communication Interface



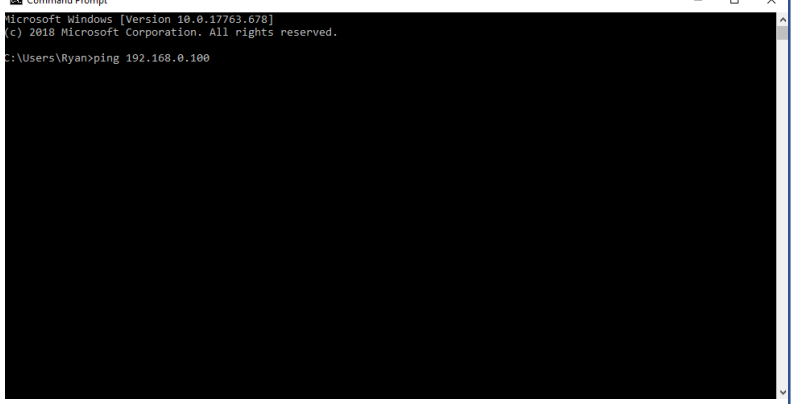
Communication- Error



Communication- OK



Command prompt- Ping



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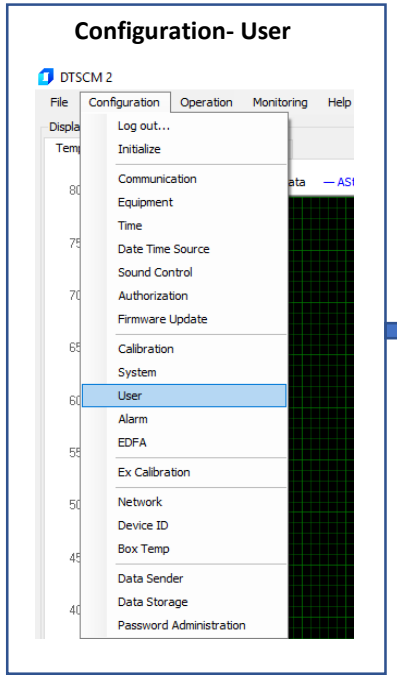
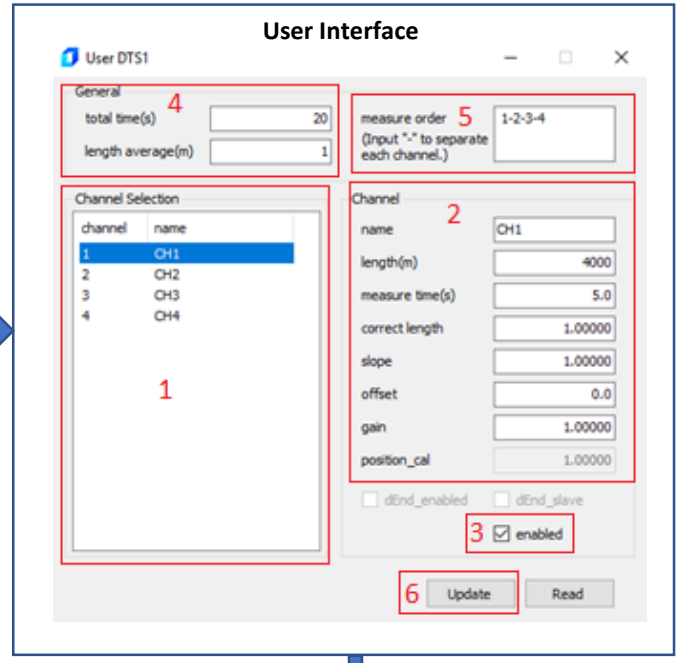
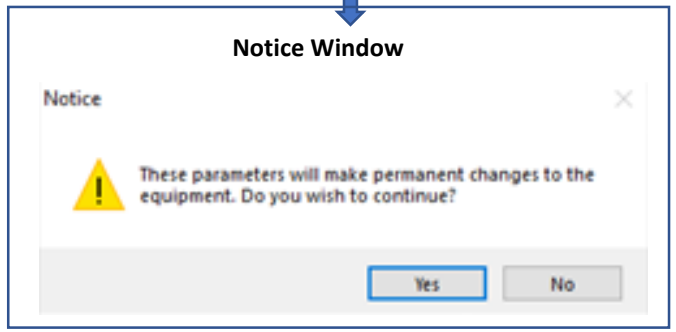
- Next, go to: **Main Menu Bar** < **Configuration** < **User**

- In the User Interface that appears, carryout the following steps:
  1. Select the Channel, for which, the User parameter are to be modified in the **Channel Selection** section. The Channel will be highlighted in blue
  2. Under the **Channel** section, the channel parameters can be modified:
     - **name**: Allows you to change the name of the selected Channel
     - **length(m)**: Allows you to change the measuring length for the selected Channel
     - **measure time(s)**: Allows you change the measuring time for that Channel Minimum value that can be set in 5 seconds
     - **correct length, slope, offset, gain**: these are the temperature slope calibration Parameters. They will be covered under the **Calibration** section later
  3. If the **enabled** checkbox is ticked the Channel will be ready to do measurement, if it is unchecked the Channel will be disabled
  4. In the **General** section, enter the **total time(s),** which is the sum of the measuring time of all the enabled Channels. This should be set slightly higher than the actual sum to allow some downtime for the laser to improve its life. The **length average(m)**, smoothens the noise in the temperature signal. It uses the boxcar averager to smoothen the peaks. Acceptable values lie between 1~8m
  5. **measure order**, allows the User to set the order in which the enabled channels will do the measurements
  6. Click on **Update** to accept all the parameter changes that you have done

- In the Notice Window that appears, click on **Yes** to confirm the modifications







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- Next, go to: **Main Menu Bar** < **Configuration** < **Alarm**

- In the Alarm Interface that appears, carryout the following steps:

1. Under the **Fiber Break Alarm** section, Select the Channel for which the Alarm parameters are to be modified

2. Then, Enter the **Effective Length(m)**, which corresponds to the length of the sensing fiber that will be monitored for the Fiber length condition, any breakage that occurs within this length will trigger a Fiber Break alarm. Tick the checkbox " **when fiber break triggered alarm**" to enable this feature

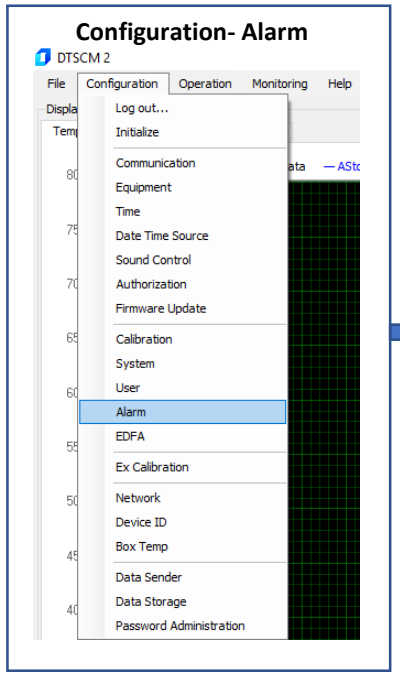
3. In the **Alarm Index** section, select the Alarm Index for which the Alarm Index parameters are to be modified. The **Add** button allows you the add more Alarm Indexes. At most 20 Alarm Indexes can be set

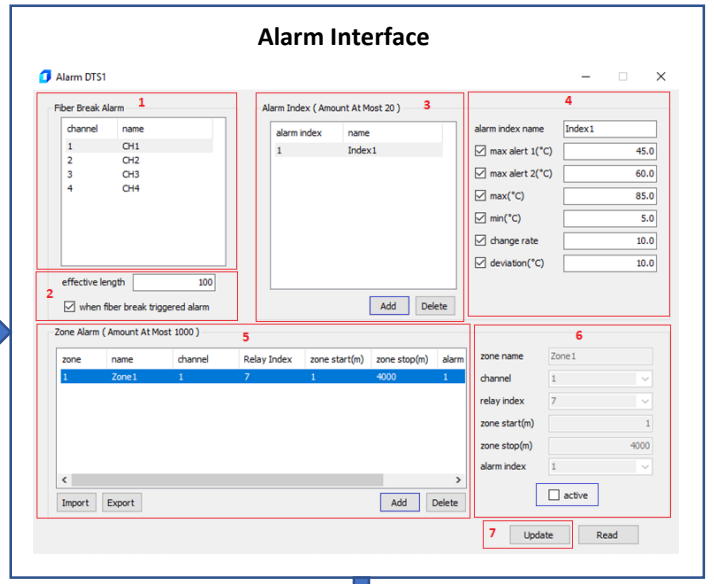
4. Set the Alarm Index parameters for the Alarm that are needed to be triggered while monitoring the asset

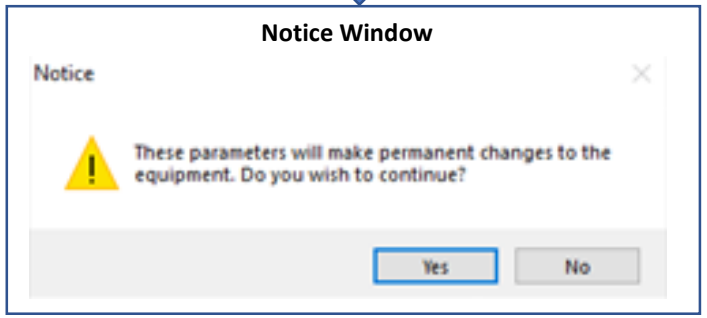
5. In the **Zone Alarm** section, select the Zone for which the Zone parameters are to be modified. The **Add** button allows you the add more Zones. At most 1000 Zones can be configured

6. Tick the **active** checkbox, this will allow the User to do changes to the Zone parameters

7. Click on **Update** to accept all the Zone parameter changes that you have done







- In the Notice Window that appears, click on **Yes** to confirm the modifications

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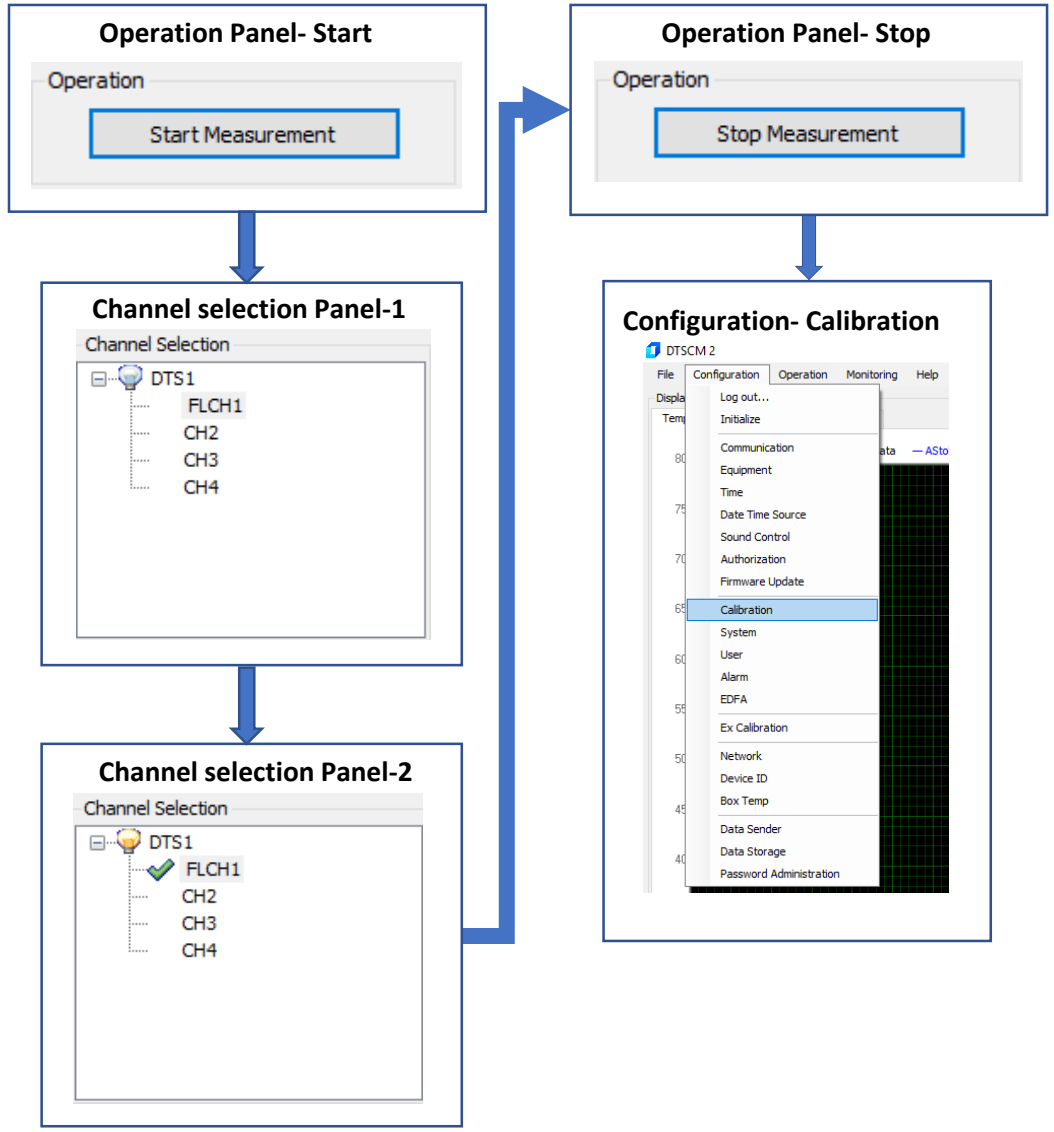
- Next, In the Operation Panel, click on **Start Measurement** to obtain the temperature plot of the sensing fiber. Notice that, before starting the measurement, in the Channel Selection Panel the DTS indicator is not on, and later it changes to orange

- After some time, observe the temperature plot when the Channel is measuring and check all the real-time temperature values, to check if the DTS unit requires Calibration

- The DTS units are normally calibrated properly in the factory before shipping. However, the temperature plot can vary for different types of Sensing Fiber

- In that case, the **Calibration** will have to be done again. First, stop the measurement in the Operation Panel, by clicking on **Stop Measurement**

- Then, go to: **Main Menu Bar** < **Configuration** < **Calibration**. This will then show the User the Calibration Interface, which will allow him to do changes to the temperature plot



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- In the **Calibration Interface** that appears, carryout the following steps:

1. Select the Channel for which the Calibration is to be done

2. Enter the Time (s) to collect the temperature data for calibration. This should ideally be in the range 30s~240s. Then click on collect Calibration data

3. Under the User Channel section:

✓ **Correct length:** Is used to match the end points of the Stokes and A-Stokes raw data signal. We will need to zoom in on the graph at the end peak and adjust the correct length by trial and error method to ensure that the peaks of the Stokes and A-Stokes are aligned as closely as possible

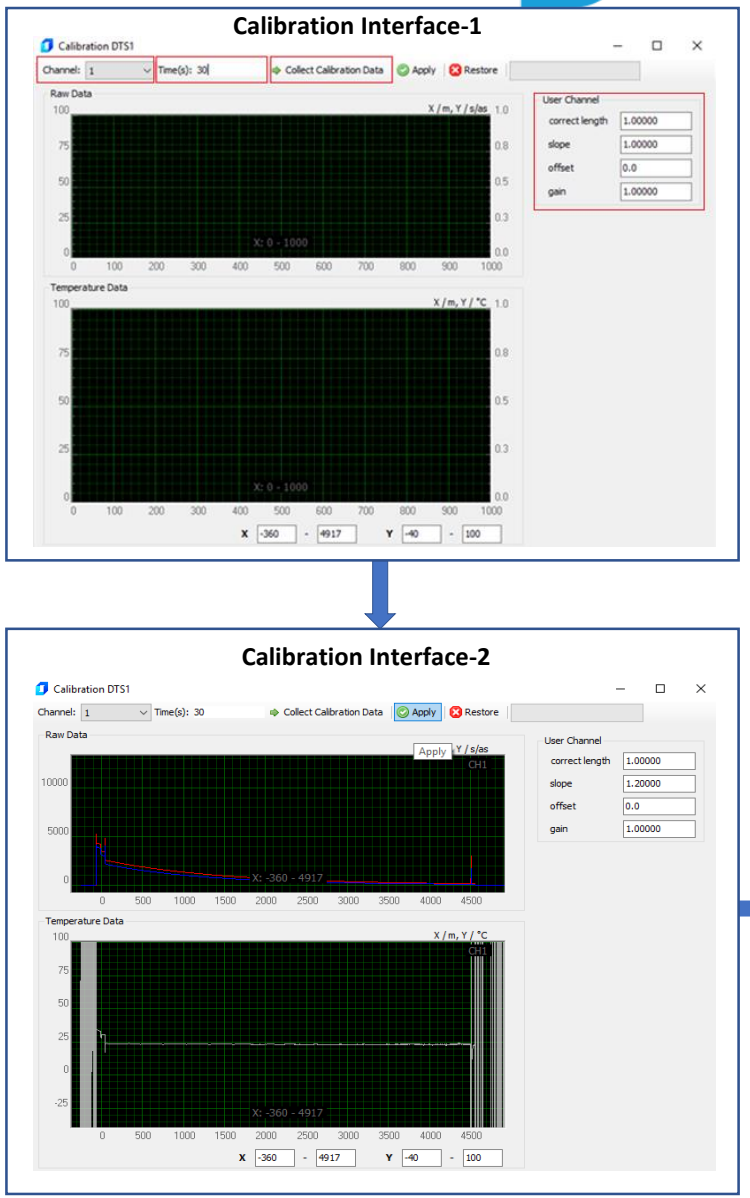
✓ **Slope:** Is used to align the entire temperature curve to make sure that the temperature plot if as flat as possible. This again is done by trial and error method; we need to refer to two points on the temperature plot. But first we need to check the Offset, then we adjust the Slope

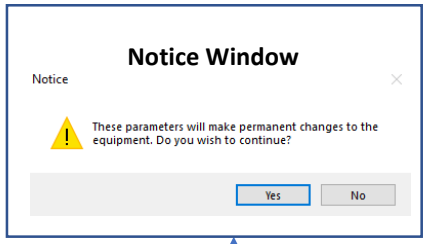
✓ **Offset:** Is used to adjust the temperature resolution of the temperature plot. To measure the actual temperature of the environment we need to use a calibrated temperature probe

✓ **Gain:** Is used to stretch the temperature plot in the x-axis direction. Usually we do not require to change this

4. After calibrating the temperature curve, if you are satisfied with how the curve looks, you can click on **Apply**, or else on **Restore** to get to the original settings

5. In the Notice Window that appears, click on **Yes** to confirm the modifications





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- Alarm Info:

1. When an Alarm is triggered the Alarm Zone Interface will automatically pop-up. If you close it and want to open it again you can find it in this location - Go To: **Operations < Open the alarm zone**

2. The Alarm Zone Interface provides the following Info:

✓ **Serial Number:** Relates to the alarm number that has triggered

✓ **Date & Time:** Shows the date & time of the triggered alarm. The latest alarm will be on top

✓ **Alarm Type:** Is Relates to the type of alarm triggered. E.g. Max., Min., Rate., Deviation

✓ **Channel:** Is Shows the Channel number for which the Alarm is triggered

✓ **Zone:** Provides Info on the Alarm zone number of the triggered alarm

✓ **Position(m):** Displays the location of the alarm signal on the fiber

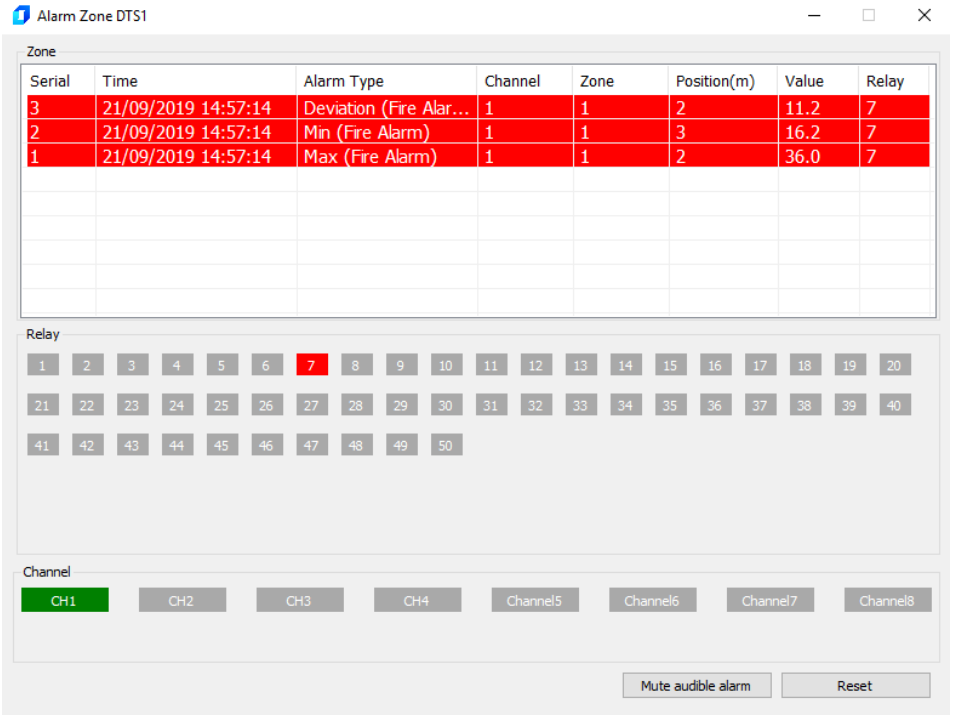
✓ **Value:** Tells the value at which the alarm was triggered

✓ **Relay:** Relates to the relay that changes to close position when the alarm is triggered

3. The Mute Audible Alarm button will silence the buzzer of the FireLaser DTS

4. The Reset button will reset all the current alarms. **Password: 119**

Alarm Zone Interface



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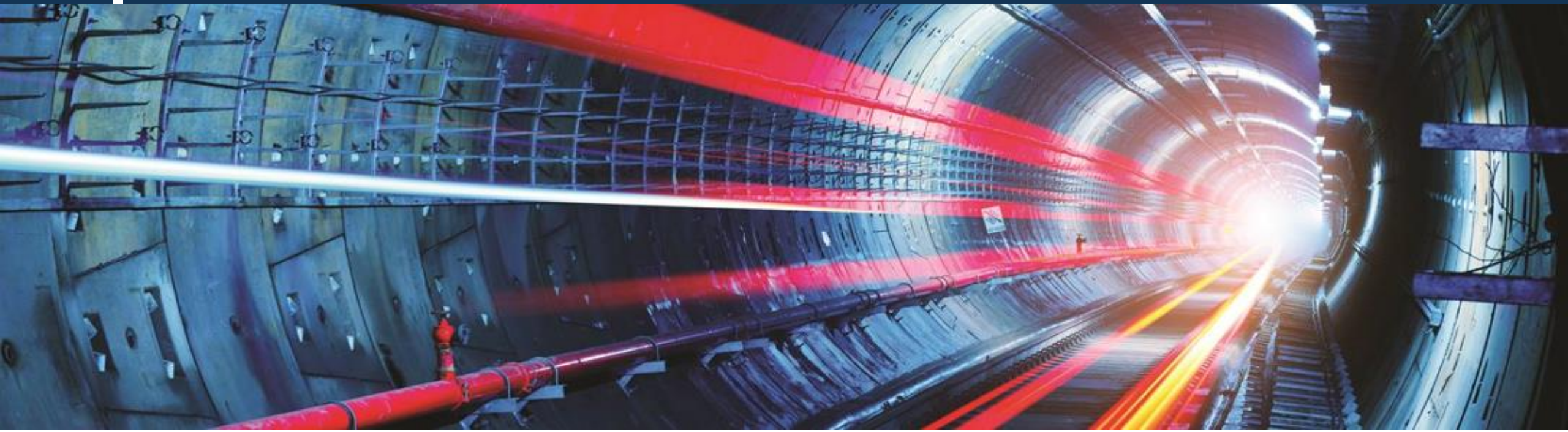
7 Relay Mapping



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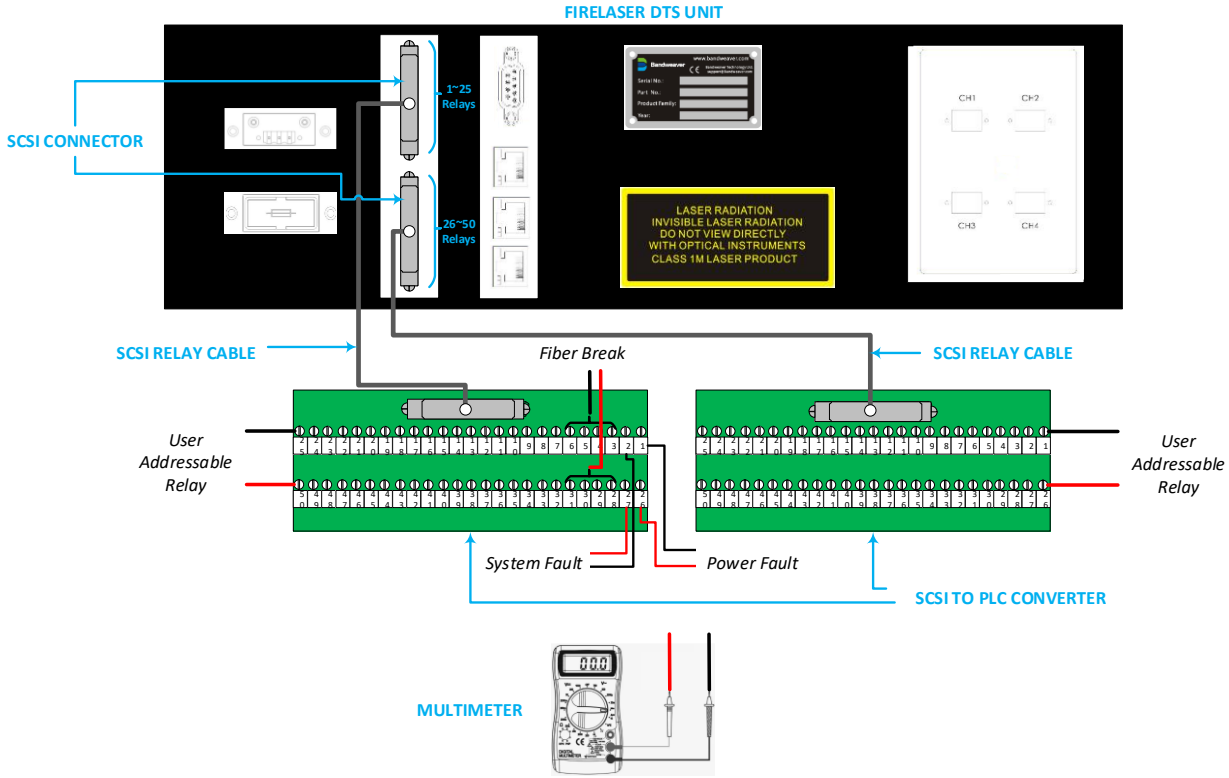
- Relay Mapping of the FireLaser DTS unit is as shown in the image on the side
- Relay definitions:
  1. Relay 1: Power indicator
  2. Relay 2: System status indicator
  3. Relay 3~6: Broken fiber indicators for channel 1 to channel 4 respectively
  4. Relay 7~50: User addressable alarm indicators
- The first 6 relays are reserved for system faults. Relay 7 is the first User addressable relay
- The setup below is for testing the relay output



Relay Mapping for FireLaser

Pin	Port 1 – Relays 1 to 25	Port 2 – Relays 26 to 50
1/26	Power Fault COM / NC	COM / NO
2/27	System Laser Fault COM / NO	COM / NO
3/28	Fibre break CH1 COM / NO	COM / NO
4/29	Fibre break CH2 COM / NO	COM / NO
5/30	Fibre break CH3 COM / NO	COM / NO
6/31	Fibre break CH4 COM / NO	COM / NO
7/32	COM / NO	COM / NO
8/33	COM / NO	COM / NO
9/34	COM / NO	COM / NO
10/35	COM / NO	COM / NO
11/36	COM / NO	COM / NO
12/37	COM / NO	COM / NO
13/38	COM / NO	COM / NO
14/39	COM / NO	COM / NO
15/40	COM / NO	COM / NO
16/41	COM / NO	COM / NO
17/42	COM / NO	COM / NO
18/43	COM / NO	COM / NO
19/44	COM / NO	COM / NO
20/45	COM / NO	COM / NO
21/46	COM / NO	COM / NO
22/47	COM / NO	COM / NO
23/48	COM / NO	COM / NO
24/49	COM / NO	COM / NO
25/50	COM / NO	COM / NO

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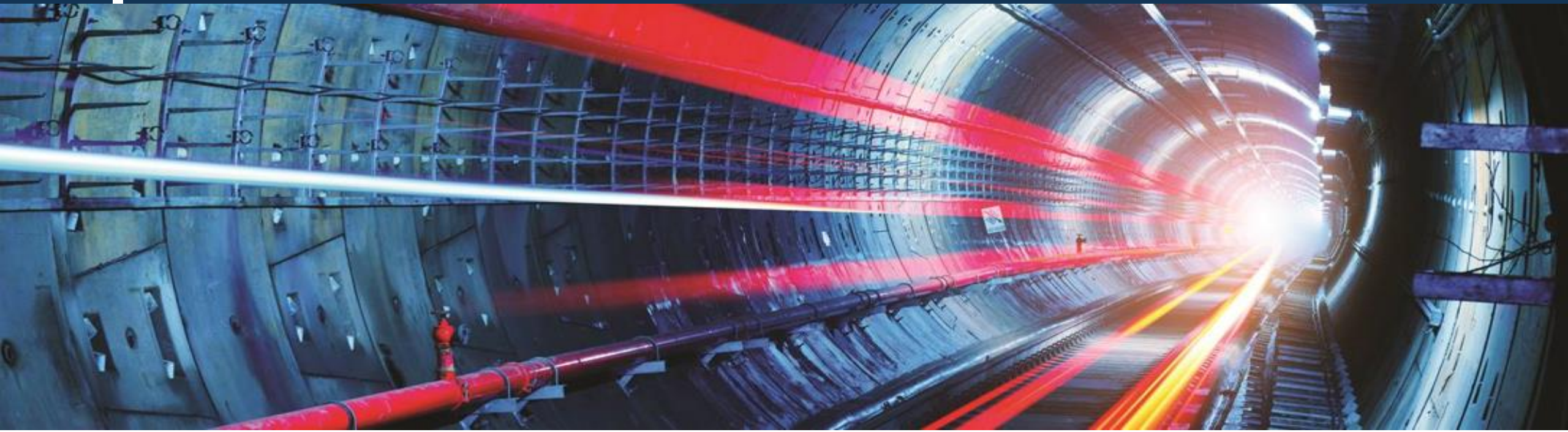
8 Interfacing via Modbus Poll



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- Steps to interface with the FireLaser DTS using the Modbus Poll:

1. we will need to refer to the MODBUS COIL & REGISTRY DEFINITION which is an Excel Spreadsheet,

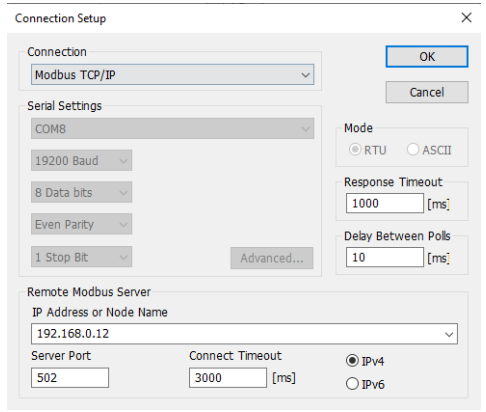
   C:\Users\Ryan\OneDrive - Bandweaver Technologies\Modbuspoll\MODBUS COIL & REGISTER Definition.xlsx

2. Enter the number of Channels of the DTS unit and the Zones that you want to set in the Excel spreadsheet. This will adjust the rest of the COIL & REGISTER addresses accordingly
3. To install Modbus Poll on your PC, you can either buy or use a trial version from the links below:
   - ✓ https://www.modbustools.com/order.html
   - ✓ https://www.modbustools.com/download.html
4. When you start Modbus Poll, the default screen is displayed with the connection status is displayed in red.
5. To establish the connection between the FireLaser DTS and Modbus Poll, connect the ethernet cable either to the RJ45-2 or RJ45-3 port at the back of the DTS unit.
6. In Modbus Poll, Go To: Connection < Connect, Enter the details as follows:
   - ✓ Connection: Modbus TCP/IP
   - ✓ Response Timeout: 1000ms
   - ✓ Delay Between Polls: 10ms
   - ✓ IP Address or Node Name: For RJ45-2 & RJ45-3 default IP address is 192.168.0.11 & 192.168.0.12 respectively
   - ✓ Server Port: 502
   - ✓ Connect Timeout: 3000ms
   - ✓ IPv4/ IPv6: IPv4
   - ✓ Click on: OK

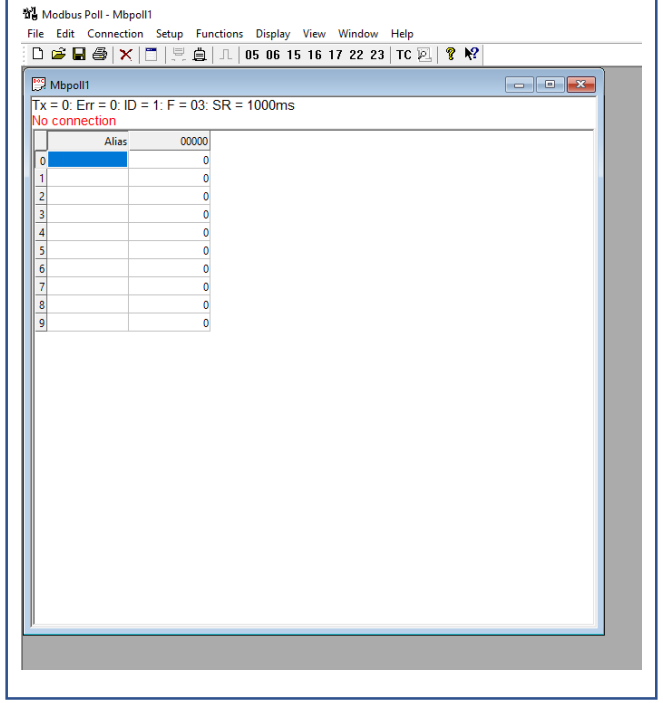
Step - 2

(Channels)	4
(Zone)	4

Step - 6



Step - 4



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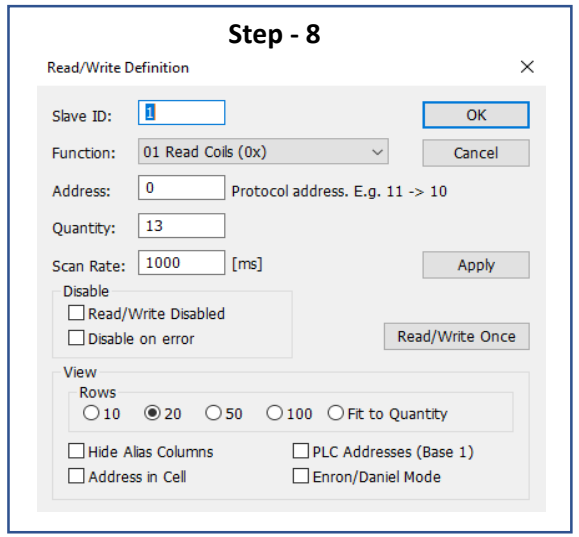
Product Training: FireLaser V3

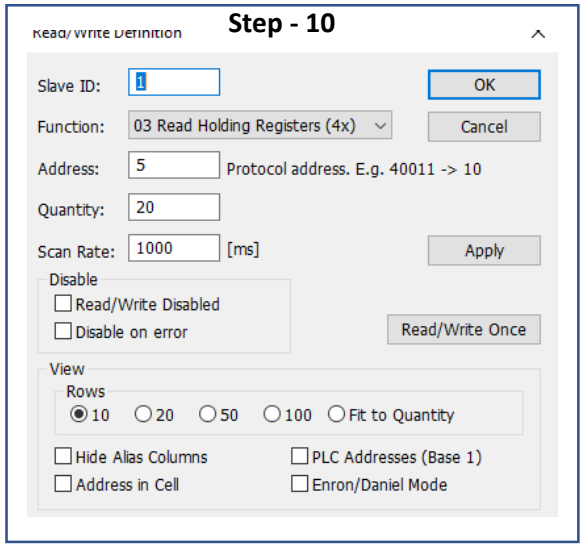
- Steps to interface with the FireLaser DTS using the Modbus Poll (Contd.):

8. To read the COILS, Go To: Setup < Read/ Write Definition, Enter the details as follows:
   - ✓ Slave ID: 1
   - ✓ Function: 01 Read Coils (0x)
   - ✓ Address: 0
   - ✓ Quantity: 13 (depends on the number of Channels and Zones)
   - ✓ Scan Rate: 1000 [ms]
   - ✓ Rows: 20 (select the value to match the rows of COILS in the MODBUS COIL & REGISTRY DEFINITION)
   - ✓ Click on: OK

9. Next, Go To: File < New. To create another file on the same page to read register values

10. To read the REGISTERS, Go To: Setup < Read/ Write Definition, Enter the details as follows:
    - ✓ Slave ID: 1
    - ✓ Function: 03 Read Holding Registers (4x)
    - ✓ Address: 5
    - ✓ Quantity: 27 (depends on the number of Channels and Zones)
    - ✓ Scan Rate: 1000 [ms]
    - ✓ Rows: 50 (select the value to match the rows of REGISTERS in the MODBUS COIL & REGISTRY DEFINITION)
    - ✓ Click on: OK





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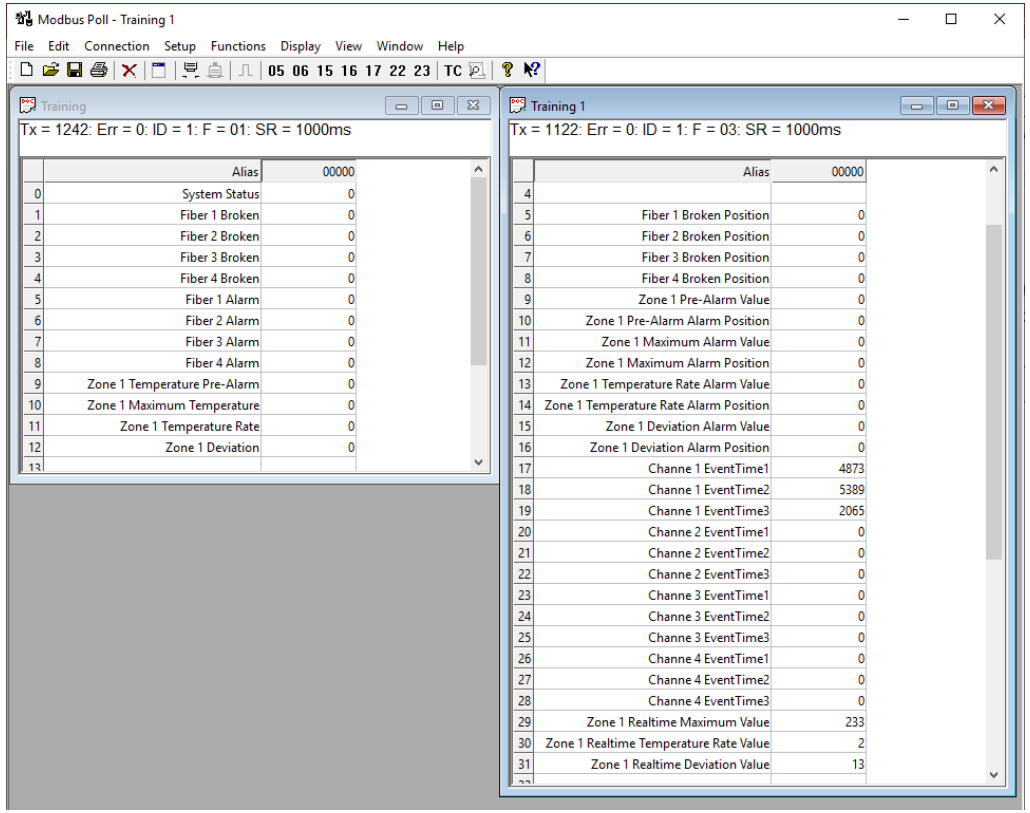
Product Training: FireLaser V3

- Steps to interface with the FireLaser DTS using the Modbus Poll (Contd.):
  11. Copy the first column of COIL & REGISTER names from the MODBUS COIL & REGISTRY DEFINITION under the Alias of the Modbus Poll files
  12. The page with the COIL & REGISTER values for a 4 Channel FireLaser Unit with 1 zone setup will be as shown in the image on the side
  13. Save the both Modbus Poll Files individually for future reference, Go To: File < Save as

- Tips to understand the COIL & REGISTER values that are displayed on:
  1. To understand the COIL reading is simple as the value will be:
     - ✓ 0: Normal Condition
     - ✓ 1: Failure/Alarm Condition
  2. To understand the REGISTER reading refer to the points below:
     - ✓ Position Values: Should be read as they are displayed on the screen
     - ✓ Real-Time/Alarm Values: Should be read by putting a decimal point before the last digit
     - ✓ Channel N Event Time 1:

       This value should first be converted from DEC to HEX. Then reconvert first two-digit from HEX to DEC to get the Year and, last two-digit reconversion from HEX to DEC will give the Month
     - ✓ Channel N Event Time 2: Follow same instructions as Event Time 1
     - ✓ Channel N Event Time 3: Follow same instructions as Event Time 1

Step - 12



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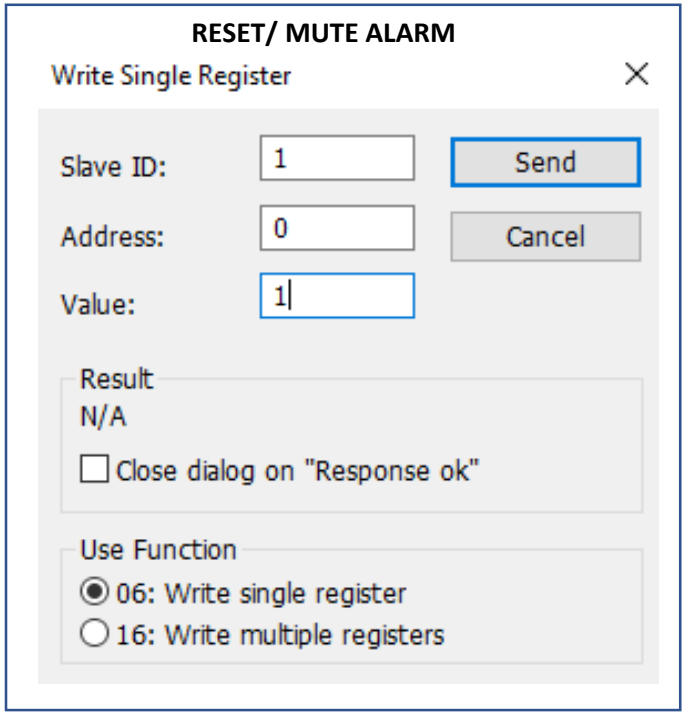
Product Training: FireLaser V3

- To Reset and Mute alarms via Modbus Poll:
  - Go To: Functions < 06: Write Single Register. Enter the details as follows:
    - ✓ Slave ID: 1
    - ✓ Address: 0
    - ✓ Value: 1 for RESET & 2 for MUTE
    - ✓ Click on: Send



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Thank you. Any questions?

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