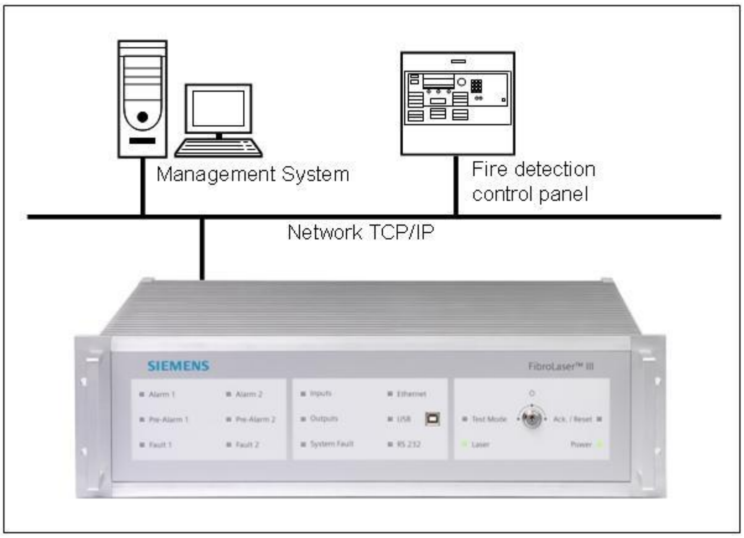
SIEMENS



FibroLaser™ III

Installation Manual

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Building Technologies
Control Products and Systems

1 About this Document

1.1 Documentation Structure

This Installation Manual is part of the FibroLaser III documentation. The various elements of the technical documentation for FibroLaser III are listed below:

- System introduction and planning:
  The document provides an overview of the FibroLaser III system and includes important notes to be adhered to during the project planning.
- **Installation Manual:**
  The document includes all relevant information required for the successful installation of a FibroLaser III system.
- Operating Manual:
  This document comprises all information required to commission the device with the commissioning software FibroManager.
- Maintenance and Repair:
  This document contains the information required for the system maintenance.
  In addition, the document contains instructions for field repair work.

1.2 Purpose of the Document

This Installation Manual provides all relevant information needed for the successful installation of a FibroLaser III system. These instructions are intended for electrical engineers.

General knowledge of electrical engineering, optical fibers, electrical safety and laser safety is needed to understand the installation instructions.

1.3 Qualified Personnel

The FibroLaser III may only be installed in conjunction with this documentation. Installation, commissioning and operation of the FibroLaser III may only be performed by qualified personnel. Within the context of the safety instructions in this documentation qualified persons are defined as persons who are authorized to install systems in accordance with established safety practices and standards.

Non-authorized opening or modification of the FibroLaser III controller as well as non-intended use leads to loss of any warranty and product liability.

1.4 Legal Notices

We have reviewed the contents of this publication to ensure consistency with the hardware and software described herein. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

It is our policy to constantly improve the design and specifications. Accordingly, the details represented in this manual cannot be regarded as final and binding.

2 Safety

2.1 Safety Notices

This manual contains notices you have to consider in order to ensure your personal safety, as well as to prevent damage to property.

WARNING!	This symbol and label indicate that death or severe personal injury may result if proper precautions are not taken.

WARNING!	This symbol and label indicate that death or severe personal injury may result from electricity if proper precautions are not taken.

WARNING!	This symbol and label indicate that severe personal injury may result from laser radiation if proper precautions are not taken.

CAUTION!	This label indicates that property damage can result if proper precautions are not taken.

2.2 General Safety

The FibroLaser III shall only be used as intended by the manufacturer.

CAUTION!	Switch the FibroLaser III off before connecting or disconnecting any optical fiber sensor cable.

Never pull-off an optical fiber connector from an E2000 optical port during an active measurement.

The emitted laser radiation may damage the fiber end face of pigtail and FibroLaser III.

CAUTION!	Never connect pigtails with contaminated ferrule end face to the FibroLaser III.

Contaminated end face may easily be damaged by laser radiation.

2.3 Electrical Safety

WARNING!	Electricity can be a danger to health and life. See a doctor immediately after contact with dangerous voltages.

The FibroLaser III contains components carrying dangerous voltages. Do not open or repair the FibroLaser III.

Do not operate the Siemens FibroLaser III with damaged housing.

Verify that the supply voltage is within the range given at the DC or AC supply socket of the Siemens FibroLaser III before connecting the power supply cable.

The AC power supply cable has to be disconnected before replacing the fuse at the power supply of the FibroLaser III.

Accumulator terminals may never be shorted or come into contact with the FibroLaser III housing.

National safety regulations for using electricity must be considered. Electricity supply and earthing must be carried out in accordance with national regulations.

2.4 Laser Safety

WARNING!	The FibroLaser III contains a laser source. Caution, the laser radiation is invisible!

The Siemens FibroLaser III is classified as laser class 1M product. The following label is attached close to the fiber connector(s) on the Siemens FibroLaser III:

INVISIBLE LASER RADIATION
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 1M LASER PRODUCT EN 60825-1

The laser emits continuously modulated laser radiation at a wavelength of 1550 nm (OTS30xx) or 1064 nm (OTS30xxS models). The modulation frequency is between 500 Hz and 500 MHz.

The maximum average optical power of OTS30xx controllers (laser wavelength 1550 nm) is 100 mW, and the maximum peak power at this wavelength is 200 mW. The maximum average optical power of OTS30xxS controllers (laser wavelength 1064 nm) is 39 mW, and the maximum peak power at this wavelength is 78 mW.

The accessible laser radiation represents no danger for the human eye or skin assuming that:

- The radiation is not focused by optical instruments like magnifying glasses, lenses or microscopes and
- The end of an optical fiber or cable is not approached closer than 10 cm to the eye or skin.

With optical instruments or during direct approach of the optical fiber to the human body, laser radiation can generate heat that damages the skin or the cornea of the eye. Such damages are wet bulges, cataract and burnings of cornea and skin. See a doctor immediately in case of eye damages.

National regulations on laser safety have to be considered during installation and operation of the FibroLaser III.

The FibroLaser III must be switched off before directly viewing on fiber ends, splices or optical fiber connectors with or without optical instruments. In addition, a warning label has to be placed close to the mains switch of the FibroLaser III.

Use only CE marked fiber scopes equipped with a 1550 nm or 1064 nm “S” version DIR LB3 laser safety filter according to EN 207.

Optical fiber ends must not be directly approached to the eye or the skin. Laser radiation emitted from fiber ends must not be focused with optical instruments onto the eye or the skin.

The FibroLaser III must be operated with attached fiber(s). Unused E2000 optical fiber ports of the Siemens FibroLaser III must be terminated using dummy connectors.

Emission of laser radiation at the end of a sensor fiber or cable must be prevented by using an optical termination box or a termination kit.

The laser is automatically switched on by starting a measurement. The LEDs designated with “LASER ACTIVE / LASER ON” at the front and rear panels of the FibroLaser III indicate laser operation.

If an optical fiber sensor cable, pigtail or optical fiber is broken, it must be repaired, terminated or replaced immediately.

2.5 Application Specific Safety

During the commissioning and testing of FibroLaser III it must be ensured that:

- false triggering of transmission devices is securely prevented,
- the fire brigade is informed before test triggering of transmission devices,
- triggering of fire extinguishing controls is blocked,
- the responsible person is present when third party devices are triggered,
- the collective fault output of the FibroLaser III is connected to the alarm control system,
- the collective alarm output of the FibroLaser III is connected to the alarm control system, and
- a programmable output is assigned to the test mode and connected to the alarm control system if the test mode shall be used.

2.5.1 Railway Tunnels

WARNING! A safe distance from high voltage lines must be maintained in railway tunnels with electrical traction lines

The safety distance depends on the maximum operating voltage and national or local regulations. Safety distances must be confirmed and signed by the tunnel operator.

Only splice boxes with grounding may be used for metal containing optical fiber sensor cables. Alternatively, metal-free sensor cables may be used without grounding.

2.5.2 Power Cables

WARNING!	Power cables may carry life threatening voltage levels.

Consider the danger of electrical voltage when working in the vicinity of power cables.

Only splice boxes with grounding may be used for metal containing optical fiber sensor cables. Alternatively, metal-free sensor cables may be used without grounding.

The grounding of metal containing optical fiber sensor cables must take into account induced currents and has to be compliant with the overall grounding concept of the power cable installation.

3 Installation

3.1 General Information

3.1.1 System Structure

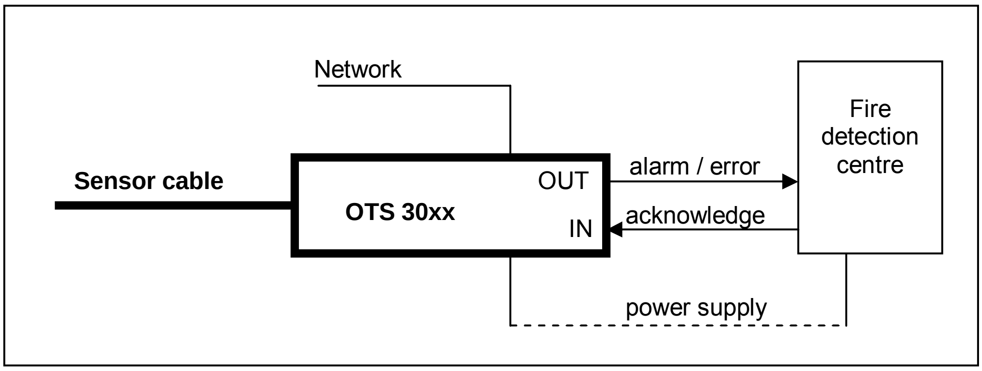

Fig. 1 System Structure (1-channel system)

The linear heat detector system has the following system architecture:

- fiber optic sensor cable
- OTS 30xx controller with laser light generation, measurement signal evaluation and control functions
- up to maximal 106 voltage-free outputs (logic freely selectable) for alarm and malfunction reporting
- up to maximal 40 opto-decoupled inputs, e.g. for resetting, external alarms or monitoring
- Network connection to connect the OTS controller to a PC for alarm and temperature visualization or to integrate the OTS controllers into a danger management system
- external power supply 24V DC (optional 115 / 230 VAC available)

3.1.2 Controller

The FibroLaser III models are listed in the following table.

Model	Range per Channel	No. of Channels
OTS3001S	1 km	1
OTS3002S	2 km	1
OTS3004S	4 km	1
OTS3006	6 km	1
OTS3010	10 km	1
OTS3001S-SC	1 km	2
OTS3002S-SC	2 km	2
OTS3004S-SC	4 km	2
OTS3006-SC	6 km	2
OTS3010-SC	10 km	2

Tab. 1 Controller Models

Standard models are equipped with a DC power supply. The use of an AC power supply may not be compliant with certain fire detection approvals.

3.1.3 System Components and Tools

The following components are required for the installing the FibroLaser III:

- Installation Manual
- FibroLaser III controller
- DC or AC power supply cable according to the FibroLaser III model
- Four M6x15 screws for rack mounting
- Optical fiber sensor cable(s)
- E2000/APC pigtail(s) for each optical fiber sensor cable
- Splice box(s) with or without grounding for each optical fiber sensor cable
- Termination box(s) with or without grounding for each optical fiber sensor cable
- Sensor cable termination kits if termination boxes are not available
- Sensor cable ties or clamps
- Input and/or output cables if required

The following tools are required for installation of the FibroLaser III:

- Torx T30 or Phillips 2 screw driver for mounting the FibroLaser III
- Splicing equipment including fiber cleaver for installing sensor cable(s)
- Hot air gun if a termination kit will be used
- Fiber scope for ferrule end face inspection
- Fiber cleaning set including
  - lint-free optical wipes (e.g. Kimwipes EX-L)
  - ultra-pure (99.9%) ethanol or iso-propanol solvent (We would recommend solvent for UV spectroscopy grade for residual-free cleaning.)
  - ferrule mate cleaner if required
- Computer or Laptop compliant to requirements

3.1.4 Preparation

The following points help to be well prepared for the FibroLaser Installation.

Make sure that the following persons, tools and information are available:

- mobile lifting platform with space for two people for commissioning and test releases
- mobile telephone or radio for communication
- a specialist for splicing (fiber optical connections)
- sufficient lighting
- block diagram including input and output functions/connections
- sensor cable installation plan and zone table

3.2 Sensor Cable Installation

3.2.1 Fibre and Sensor Cable Recommendations

For OTS3-series controllers, the fibre and sensor cable specifications given in Table 2 are essential to obtain the controller performance as indicated in the datasheets. In fire detection, OTS3-series controllers must use approved NKT Photonics GmbH sensor cables having less than 0.75 dB/km attenuation @ 1300nm after installation.

Fibre	Attenuation	Bandwith @ 1300 nm	Standard
SM 9/125	< 0.22 (+ 0.03)[1] dB/km @ 1550 nm		ITU-T G.652 Tabelle C oder D
MM GI50/125	< 0,50 (+0,05) dB/km @ 1300 nm < 0.28 (+0.07) dB/km @ 1550 nm	> 1000 MHz*km	
MM GI62.5/125	< 0,70 (+0,05) dB/km @ 1300 nm < 0.33 (+0.07) dB/km @ 1550 nm	> 500 MHz*km	

Tab. 2 OTS3 fibre and sensor cable specifications

A variation of attenuation along the installed sensor cable may make calibration difficult. Avoid such variations by use of similar or identical fibre qualities throughout the whole sensor cable, strain-free sensor cable laying and proper fibre splicing.

Weaker specified fibres may be used for OTS3-series controllers if unavoidable. A higher attenuation affects the distance range and temperature resolution of the controller. A lower bandwidth of fibres affects the spatial resolution at larger distances.

The fibre and cable sections must be connected using fibre splices. Do not use detachable connectors. Proper splices between fibres have less than 0.05 dB attenuation. If a detachable connector cannot be avoided, use an APC connector type with an attenuation below 0.3 dB and a return loss of 40 dB or higher (multimode) or with an attenuation below 0.1 dB and an return loss of 85 dB or higher (single-mode). An attenuation caused by connectors and splices may affect distance range and temperature resolution of the controller.

[1] Attenuation values in parenthesis indicate the permitted additional attenuation due to cable manufacturing and installation.

3.2.2 Handling of Sensor Cables

CAUTION! Optical fibers are made of glass and are thus brittle.

For sensing applications, the fibres are protected by various types of sensor cables making the sensing element much more robust than a bare optical fiber. Never-theless, certain restrictions must be considered in handling optical fiber sensor cables.

Each sensor cable is specified for minimum bending radius, maximum tension force and maximum crush impact. Choose a proper sensor cable being robust enough for your application. The sensor cable specifications must be considered in laying. Avoid too tight bending, any kinking, too high pulling forces, strong crushing and too tight fixing of the cable! Pull less robust sensor cables by hand only.

Pigtails provide a weaker mechanical protection than a sensor cable. Thus, the pigtails must be handled with special care. Pull and fix the pigtails very gently only. Never pull out a latching connector by pulling the fiber pigtail only.

Improper handling of fibers, pigtails and sensor cables may lead to excessive attenuation and even immediate or delayed fiber breaks. The fiber breaks and damages are not necessarily visible from the outside and may only be detected during use of the sensor cable.

The sensor cables are delivered on cable drums. The drum sheathing must only be removed shortly before cable laying. The cable drums must permanently stand upright to avoid damage during handling and storage. Empty cable drums should not be sent back since they are one-way packing materials.

3.2.3 Cable Length

The total active sensor cable length must be shorter than the distance range of the controller. When calculating the total sensor cable length, cable lengths outside the measurement section must be taken into account. These are:

- feed cable from controller to measurement section,
- connection cables and fibers,
- avoidance of obstacles,
- test and reference lengths,
- height differences and
- about 5 m of fiber length in the controller cabinet.

In addition to the active sensor cable length, a few sampling intervals (e.g. 20 m at a sampling interval of 3 m) of inactive fiber length are required at the end of the measurement section to suppress influences of a possible fiber end reflex. The controller accepts an inactive fiber length of up to 100 m in addition the distance range. By this, proper temperature readings are obtained for the full distance range.

Only use the controller with a minimum total fiber length of at least 100 m.

3.2.4 Laying Plan

The laying plan of the sensor cable should be outlined in a table. Meter markings of the cables at the object beginning, splicing locations, zone boundaries, etc., should be registered in the laying plan during laying.

Consider test sections for regular testing of controller function using cable heating equipment (e.g. FibroTester). Place test segments outside the monitored cable section to enable testing without deactivation of alarm transmission

3.2.5 Laying Plans for Fire Detection

Applications according to EN 54-22, the standard DIN VDE 0833-2, or the guideline VdS 2095 on the installation of automatic fire detection systems in buildings require a detailed analysis of the instructions given in the standards and the guideline.

Basically, the sensor cable must be installed at the highest point within a room or a tunnel with a distance of 5 to 20 cm from the ceiling.

According to the standard DIN VDE 0833-2, the maximum height for mounting the sensor cable of a linear heat detector is 9 m for response class A1 and 7.5 m for response class A2.

According to the guideline VdS 2095, the maximum height for mounting the sensor cable of a linear heat detector is 7.5 m for response class A1N and 6 m for the other response classes. For meander-like laying schemes in rooms larger than 30 m2 and with a roof slope of less than 20°, the maximum horizontal distance of any point of the ceiling to the sensor cable must be less than 3.5 m. The horizontal distance between parallel sensor cables must be less than 7 m and the distance between sensor cables and walls must be between 0.5 and 3.5 m. Larger distances specified in the guideline may be applied in smaller rooms and for steeper roofs.

When installed in the United States, the OTS3-series controllers are to be installed in accordance with NFPA No. 70 “National Electric Code” and NFPA No. 72 “ National Fire Alarm and Signalling Code”.

When installed in Canada, the LHD3-series controllers are to be installed in accordance with:

- ULC-S524 Standard for the Installation of Fire Alarm Systems, and CSA 22.2
- The National Building Code of Canada
- The Canadian Electrical Code, Part 1
- The National Fire Code of Canada

For the fire detection in tunnels, a maximum horizontal distance of 6 m between any monitored location and the sensor cable is considered to be acceptable, if the sensor cable is installed at the maximum height mentioned above. Thus, a tunnel with two road lanes and a width of up to 12 m may be monitored using a single sensor cable. Additional sensor cables are required for wider tunnels and according to national fire safety regulations.

Redundant fire detection systems are required by most fire detection standards. The easiest way to achieve full redundancy is to measure the two fibres of a sensor cable from the opposite ends of the cable using two controllers. A redundancy with respect to the sensor cable only is achieved by measuring the two fibres of a cable loop from the opposite ends using a single controller.

If an unambiguous mapping of events within fire compartments is required, we recommend using an extra length of sensor cable in between the alarm zones of the fire compartments (see Operation Manual). Accordingly, a respective extra length of sensor cable has to be laid at the boundary of two fire compartments. The extra length should be three sampling intervals on each side of the boundary, i.e. in total six sampling intervals, but not less than 2 m. Check the sampling interval of the measuring parameter set to be used and calculate the extra length accordingly. Sampling intervals are between 3 m and 0.25 m depending on controller model, sensor cable length and application. Thus, extra lengths between 18 m and 2 m are required. Depending on the application, the extra length may not be covered by a zone or covered by an inactive zone, a zone without alarm parameter set or an alarm zone not assigned to a fire compartment.

The laying plan has to consider possible sources of false alarms. Keep a safe distance from heat sources such as lamps and avoid locations with sudden temperature changes. If compliance with EN 54-22 is not required, less sensitive alarm parameter sets (see Operation Manual) may be used to prevent false alarming in such locations.

3.2.6 Cable Mounting

Ceiling mounting is the typical way of sensor cable installation in fire detection applications.

The sensor cable must be placed in about 5 cm distance from the ceiling to minimize heat conduction. It also needs a line of sight to the monitored object to be sensitive for heat radiation. Use a single, continuous length of sensor cable if anyhow possible since splicing reduces measurement quality and is an extra effort.

Keep a save distance from heat sources such as lamps or heating's to avoid false alarms due to heating.

WARNING! Keep a save distance from high voltages lines!

The sensor cable may be fixed using different kinds of fastenings such as cable ties, nail plug clips, cable clips or tube clamps. A tension rope may be used for secure mounting of a sensor cable without strain on the cable.

Always avoid excessive crushing of the cable by strong tightening of the fastenings. As a rule of thumb, a fixed cable should be slightly pullable through the fastenings with a normal level of force.

Recommend distance between the fastenings for mounting depends on the type of sensor cable and cable brackets:

– approx. 1 m for metal free cable with clipex cable holders (Fig. 2)
– approx. 2 m for metal cable with clipex cable holders
– approx. 2 m for metal free cable with clamp cable brackets
– approx. 3 m for metal cable with clamp cable brackets (Fig. 3)

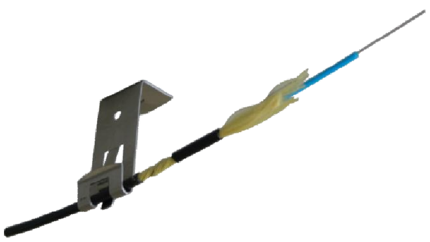

Fig. 2 Metal free sensor cable with clipex cable holders

Fig. 3 Metal sensor cable with clamp cable brackets

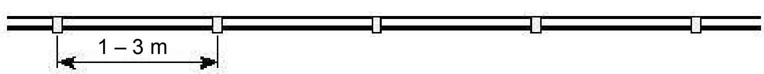

Fig. 4 Ties or clamps spacing for mounting in a straight line

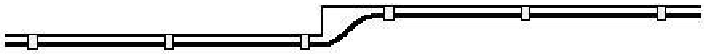

Fig. 5 Laying at small steps

A tension rope may be used to support a sensor cable with limited number of wall or ceiling fastenings.

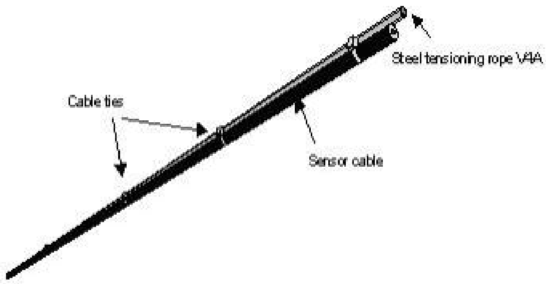

Fig. 6 Sensor cable mounted to a tension rope using metal cable ties

3.2.7 Termination of Sensor Cable

A length corresponding to a few sampling intervals (20 m at a sampling interval of 3 m) of the sensor fiber at the remote end should not be used for temperature monitoring or heat detection because of a possible optical interference from the fiber-end. Correspondingly, the last 20 meters of sensor cable should be deposited in a cable duct, or the same length of bare sensor fiber should be deposited in a proper splice.

The fiber-end must be properly terminated to avoid excessive back reflection of laser radiation into the sensing fiber. Otherwise, measurement accuracy close to the fiber-end might be affected.

We supply optional termination boxes including properly terminated fibers with a length of 20 meters each. The fiber lengths inside the box or cassette just have to be spliced to the sensor fibers for correct termination.

Fig. 7 Termination box

The termination kit may be used if no termination box is available.

The kit is used as follows:

- Remove 50 mm of the cable sheath.
- Remove 45 mm of the inner cable tube.
- Remove 20 mm of the fiber coating.
- Clean the fiber.
- Cut the fiber end almost diagonally using the fiber cleaver. The resulting cleaving angle must be larger than 20°.
- Slide the fiber end into a 60 mm long hot-melt splice protection sleeve. Locate the fiber end in the middle of the splice protection sleeve. Melt the adhesive using a hot air gun (220°C).
- Slide the black heat-shrinkable tubing 25 mm over the cable sheath. The heat-shrinkable tubing should protrude 25 mm over the splice protection sleeve. Fix the tubing using the hot air gun. Press the end of the hot tubing slightly together to securely seal the end.

Fig. 8 Termination kit

3.3 Controller Installation

3.3.1 Unpacking the Controller

Check the FibroLaser III package for visible damages directly after receipt. Check the shock label outside the package before opening the package. A red shock indicator proves rough handling during transport. Note red shock indicator on the bill of lading. Report damages and red shock indicators immediately in writing, including pictures of the damage, to the freight forwarder and to the NKT Photonics GmbH Technical Support.

Fig. 9 Transport box and Shock Label

Check the controller and accessory for visible damages immediately after unpacking. Afterwards, check the completeness of the shipment using the packing list. Reporting damages and missing components in writing to the NKT Photonics GmbH Support.

Ensure that no condensation (dewing) develops on or inside the controller after transport at low temperatures or after exposure to extreme temperature fluctuations. The controller must have acquired room temperature before it is put into operation. Do not expose the controller to direct radiation from a heater in order to warm it up. If dewing has developed, wait approximately four hours until the controller has dried completely before switching on the controller.

3.3.2 Controller

3.3.2.1 Controller Hardware

The following figures show the front and the rear panel of a FibroLaser III controller (2-channel system with maximum number of In- and Outputs).

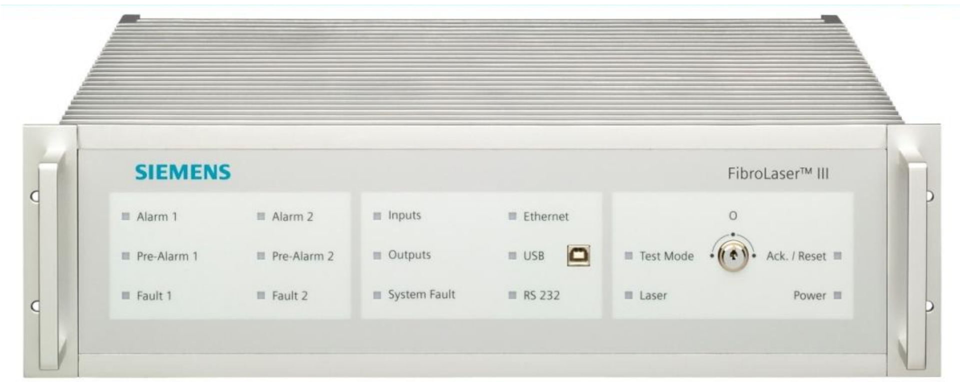

Fig. 10 Front view of a 2-channel controller (OTS30xx-SC)

Fig. 11 Rear view of a 2-channel controller (OTS30xx-SC)

The rear side of the controller consists of three panels:

Optical ports panel

The optical ports panel comprises the LASER ON LED, the laser warning label and one or two optical ports corresponding to the controller model. Each optical port is marked with the channel number.

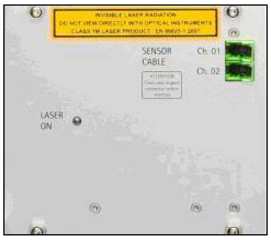

Fig. 12 Optical ports panel

Electrical interfaces

In dependence on the controller model, a standard or an extended interface panel is provided. The standard interface panel comprises the interface sockets (Output, Input, Ethernet and RS232), a memory card slot and the FibroLaser III nameplate. The extended interface panel in addition comprises optional sockets for extra inputs and outputs.

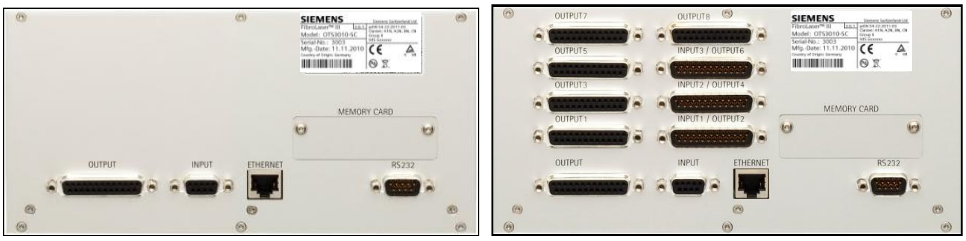

Fig. 13 Standard and extended interface panel

Power supply

The power supply panel comprises the POWER switch, the POWER ON LED, the fuse and the AC or DC supply socket.

Fig. 14 DC and AC power supply panel

3.3.3 Controller Location

The controller must be installed in a dry and low-dust room, rack or outdoor box. Any condensation of moisture must be avoided.

The controller must not be thermally insulated during operation. For example, it must not be wrapped with foams, plastics films or other low thermal conductivity or air flow blocking materials. Free air circulation around the controller is essential if the operating temperature is higher than 50°C.

The controller may be installed inside a hermetic box, e.g. for applications in very dirty environmental, if sufficient heat transfer is guaranteed to maintain the required range of operating temperatures.

In case of an overheating and if the LON protocol is enabled, the controller sends an ENVIRONMENTAL CONDITIONS WARNING address point (> 60°C ambient temperature and / or too low heat transfer) and an ENVIRONMENTAL CONDITIONS ERROR address point (> 65°C). At 65°C, the controller also stops the measurement and activates the COLLECTIVE FAULT output. At even higher temperatures (> 70°C), the controller disconnects from the power supply. It starts up again if the temperature is within the permitted range.

The specifications given in Table 12 apply to the operation of the controller.

Examples of applications where the use of the Siemens FibroLaser III requires additional protection:

- Locations with a high degree of ionizing radiation
- Locations with extreme operating conditions resulting from situations such as the following:
  - Corrosive vapors, gases, oils or chemicals
  - Electric or magnetic fields of high intensity
  - Greater shock and vibration levels
- Plants requiring special monitoring features, for example:
  - Elevator systems
  - Systems in especially hazardous rooms

3.3.4 Rack Mounting

The controller may be installed in a suitable 19-inch rack. The rack may also be used for installing the splice box, a computer, network switch, UPS and other devices. Forced air cooling or even air conditioning of the rack must be considered depending on the total power consumption of the devices.

The controller may be mounted in any vertical, horizontal or inclined position.

Screw the controller tightly to the fixing brackets attached to the left and right of the front panel using the four M6 x 15 screws.

3.3.5 Connecting Electrical Cables

3.3.5.1 Power Supply

WARNING!	Check the supply voltage to be within the range given at the supply socket of the controller before connecting the power supply cable.

In fire detection applications according to pr EN 54-22, OTS3 controllers must be operated using an approved EN 54-4 DC power supply. Controller and power supply must be located in the same enclosure.

The Power Supply Cable 12-48V DC provides a connector for the controller Sub-D3 WK3 socket at one end and three single leads at the other end. Connect the leads as follows:

- Brown lead: +12 to +48V DC
- Blue lead: 0V DC
- Green-yellow lead: Earth

The DC powered controller has an internal reverse-polarity protection. It does not operate with wrong polarity.

If you connect the controller to a 12 V battery supply, the battery voltage decreases while the battery is discharged. If the LON protocol is enabled, the controller sends an ENVIRONMENTAL CONDITIONS WARNING address point when a voltage of 11.4 V or lower is reached.

At a voltage of 10.8 V or lower, the controller sends an ENVIRONMENTAL CONDITIONS ERROR address point and activates the COLLECTIVE FAULT output. The controller shuts down at 10 V and starts up again if at least the start-up voltage is applied. Please charge the battery when the ENVIRONMENTAL CONDITIONS WARNING address point is sent.

Fig. 15 Power supply cable 12-48 V DC

The connector of the DC power supply of the OTS30xx controllers is different to the connector used for OTS-X controllers. Therefore the new power supply cable delivered with the OTS30xx controller must be used.

The optional AC power supply comprises IEC320 C14 socket to be connected to the standard Power Supply Cable 230V AC, European Plug or to an optional national Power Supply Cable AC.

Fig. 16 Power supply cable 230 V AC, European plug

3.3.5.2 Standard Outputs

The standard outputs are available at the OUTPUT socket on the rear panel. The pin assignments and output cable lead colors are given in Table 2.

There are 10 programmable outputs available at the OUTPUT socket. The FibroManager software is used to configure the type, assignment and normal status (open or closed) of each programmable output.

The COLLECTIVE FAULT output is closed during normal operation, and it is open in case of:

- power off,
- controller is not ready,
- no measurement is running,
- test mode is active,
- fiber break or
- system fault.

The COLLECTIVE ALARM output is open if no alarm is active or not yet acknowledged and closed in case of an active or not yet acknowledged alarm.

Outputs are galvanically isolated and not connected to a common ground.

Signal	Pin	Color		Signal	Pin	Color
+ Output 1	1	white		- Output 1	14	brown
+ Output 2	2	green		- Output 2	15	yellow
+ Output 3	3	grey		- Output 3	16	pink
+ Output 4	4	blue		- Output 4	17	red
+ Output 5	5	black		- Output 5	18	violet
+ Output 6	6	grey/pink		- Output 6	19	red/blue
+ Output 7	7	white/green		- Output 7	20	brown/green
+ Output 8	8	white/yellow		- Output 8	21	yellow/brown
+ Output 9	9	white/grey		- Output 9	22	grey/brown
+ Output 10	10	white/pink		- Output 10	23	pink/brown
+ COLLECT. FAULT	11	white/blue		- COLLECT. FAULT	24	brown/blue
+ COLLECT. ALARM	12	white/red		- COLLECT. ALARM	25	brown/red
Not used	13					

Tab. 3 Pin and lead color assignment of outputs

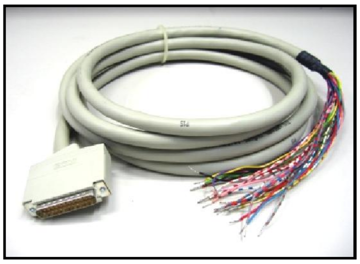

Fig. 17 Output cable

Figure 18 shows an example for connecting an alarm control system to outputs of the controller. The upper part of the figure shows the connection of a current monitored alarm input of the alarm control system to a normally open output of the controller. The alarm control system applies a voltage to its input and monitors the integrity of the cable by detecting the current flowing through the resistor R_p. In case of an alarm, the controller closes the output, and additional current flows through the resistor R_s. The alarm control system recognizes the alarm by the increase of current. For specifications of R_p and R_s check the manual of the alarm control system.

The lower part of the figure shows the connection of an input of the alarm control system to a normally closed output of the controller. The alarm control system applies a voltage to its input and monitors the current flowing through the closed output of the controller. In case of a fault, the controller opens the output, and the alarm control system recognizes the fault by detecting no current flow.

In principle, alarms may also be transmitted using normally closed outputs. However, interruption of the power supply of the controller or a break of the cable between both devices would trigger a false alarm at the alarm control system. Therefore, we strongly recommend only using normally open outputs for alarm transmission.

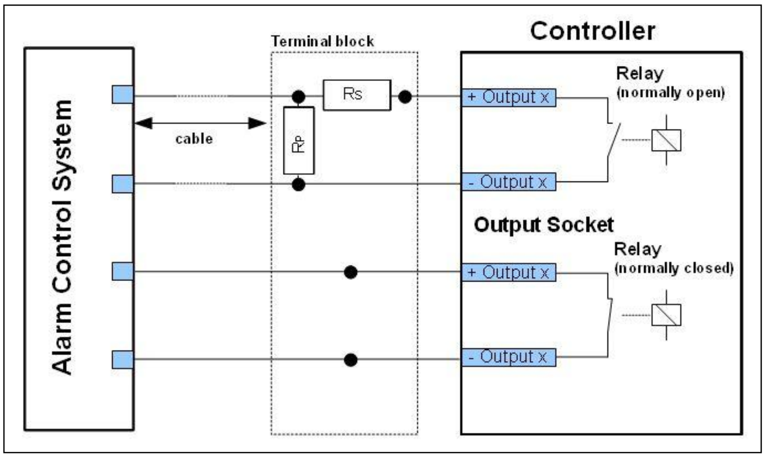

Fig. 18 Example for connecting an alarm control system to outputs of the controller

3.3.5.3 Extra Outputs

Extra outputs are available at the optional OUTPUT 1 to OUTPUT 8 sockets on the rear panel. Each socket connects to 12 outputs with pin assignment as given in Table 3. Extra outputs use the same type of output cable as the standard outputs. Table 4 gives the relative output number for each socket.

Signal	Pin		Signal	Pin
+ Output 1	1		- Output 1	14
+ Output 2	2		- Output 2	15
+ Output 3	3		- Output 3	16
+ Output 4	4		- Output 4	17
+ Output 5	5		- Output 5	18
+ Output 6	6		- Output 6	19
+ Output 7	7		- Output 7	20
+ Output 8	8		- Output 8	21
+ Output 9	9		- Output 9	22
+ Output 10	10		- Output 10	23
+ Output 11	11		- Output 11	24
+ Output 12	12		- Output 12	25
Not used	13			

Tab. 4 Pin assignment of extra outputs

The output numbers used by the FibroManager software for each socket are summarized in Table 4. The FibroManager output number is calculated as follows: Output number = 10 + (number of OUTPUT socket -1)*12 + relative output number, e.g. output 3 on OUTPUT 4 socket has the output number 10 + 3*12 + 3 = 49.

Output sockets	Output numbers

OUTPUT	1 to 10
OUTPUT 1	11 to 22
OUTPUT 2	23 to 34
OUTPUT 3	35 to 46
OUTPUT 4	47 to 58
OUTPUT 5	59 to 70
OUTPUT 6	71 to 82
OUTPUT 7	83 to 94
OUTPUT 8	95 to 106

Tab. 5 FibroManager output number range for each output socket

3.3.5.4 Standard Inputs and 24 V Output

The four standard inputs are available at the INPUT socket on the rear panel. Pin assignment and input cable lead colors are given in Table 5. Standard inputs refer to a common ground. They are activated by applying the specified voltage (Table 10) between the input pin and ground. Polarity must be considered. Inputs will not operate with wrong polarity.

A 24 V DC auxiliary voltage for switching the standard inputs is provided at the same Sub-D9 socket. The voltage refers to ground. The maximum current is 20 mA. The voltage output is protected by a self-resetting fuse.

Signal	Pin	Color		Signal	Pin	Color
Input 1	1	White		Ground	6	Brown, grey
Input 2	2	Green		Ground	7	Blue
Input 3	3	Yellow		Ground	8	Black
Input 4	4	Pink		+ 24 V DC output	9	Red
Not used	5	Violet				

Tab. 6 Pin and lead color assignment of standard inputs

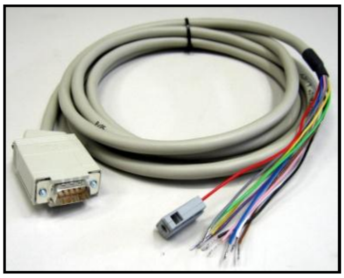

Fig. 19 Input cable (4 Inputs, 24 V DC Output)

Figure 20 shows examples for connecting relay outputs of fire detectors to inputs of the controller. Since both, the output and the input are relays, a voltage source is required. For the standard inputs, you can use the +24 V DC from the controller supplied at the standard inputs socket as shown in the upper part of the figure. You may also use a 24V DC voltage supply from the fire detector or another device as shown in the middle part of the figure. Extra inputs can only be used with external voltage supply from the fire detector or another device as shown in the lower part of the figure.

CAUTION!	The 24V voltage supply of the controller can only supply current for up to 4 inputs. Do not connect higher numbers of inputs to this voltage supply!

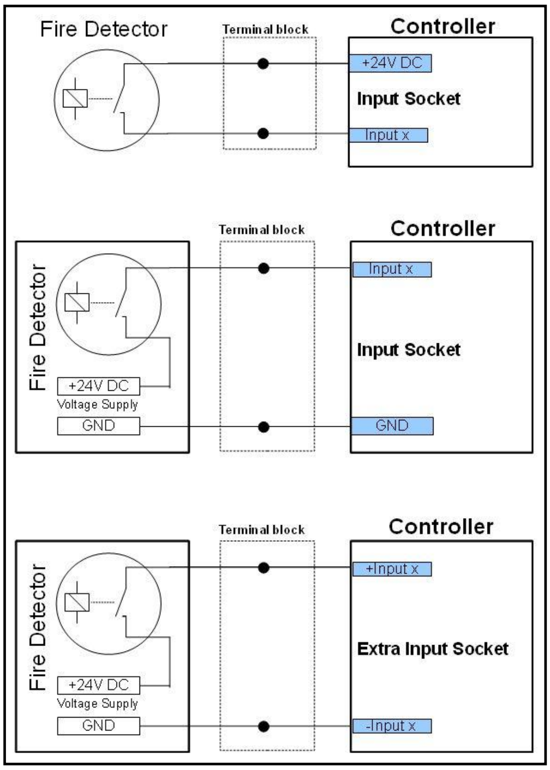

Fig. 20 Examples for connecting fire detectors to inputs of the controller

3.3.5.5 Extra Inputs

Extra inputs are available at the optional INPUT 1 to INPUT 3 sockets on the rear panel. Each socket connects to 12 inputs with pin assignment and input cable lead colors as given in Table 7. The table gives the relative input number for each socket.

The input numbers used by the FibroManager software for each socket are summarized in Table 6.

Input socket	Input numbers
INPUT	1 to 4
INPUT1	5 to 16
INPUT2	17 to 28
INPUT3	29 to 40

Tab. 7 FibroManager input number range for each input socket

The FibroManager input number is calculated as follows:
Input number = 4 + (number of INPUT socket -1)*12 + relative input number,
e.g. input 3 on INPUT 2 socket has the input number 4 + 12 + 3 = 19.

Extra inputs are galvanically isolated and not connected to a common ground. They are activated by applying the specified voltage (Table 10) between both respective input pins. Polarity must be considered. Inputs will not operate with wrong polarity.

Signal	Pin	Color		Signal	Pin	Color
+ Input 1	1	white		- Input 1	14	brown
+ Input 2	2	green		- Input 2	15	yellow
+ Input 3	3	grey		- Input 3	16	pink
+ Input 4	4	blue		- Input 4	17	red
+ Input 5	5	black		- Input 5	18	violet
+ Input 6	6	grey/pink		- Input 6	19	red/blue
+ Input 7	7	white/green		- Input 7	20	brown/green
+ Input 8	8	white/yellow		- Input 8	21	yellow/brown
+ Input 9	9	white/grey		- Input 9	22	grey/brown
+ Input 10	10	white/pink		- Input 10	23	pink/brown
+ Input 11	11	white/blue		- Input 11	24	brown/blue
+ Input 12	12	white/red		- Input 12	25	brown/red
Not used	13					

Tab. 8 Pin and lead color assignment of extra inputs

Fig. 21 Input cable (12 Inputs)

3.3.5.6 PC and Network Connections

Serial Interface

A shielded null modem cable may connect the controller to another device using the EIA-232 (RS232) serial interface. The cable must have cross-over linked wires as indicated in the following table. Serial cables without cross-over linking are not suitable. The length of the cable should not exceed 5 m.

Controller Signal	Controller Plug Pin	2nd Plug Pin
DCD	1	4
RxD	2	3
TxD	3	2
DTR	4	1
Signal Ground	5	5
DSR	6	6
RTS	7	8
CTS	8	7
RI	9	9

Tab. 9 Null modem cable cross-over linking scheme

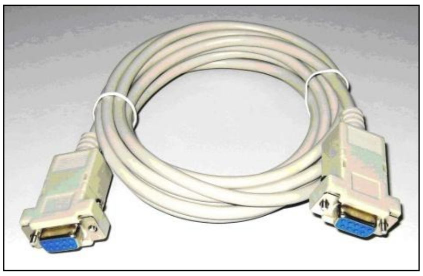

Fig. 22 Serial interface cable

USB

Any standard USB cable may connect the controller to a computer using the USB interface. The length of the cable should not exceed 5 m.

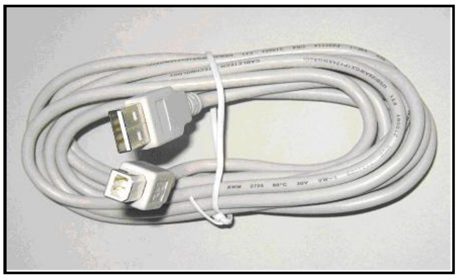

Fig. 23 USB cable

Ethernet

An Ethernet cable of category 5 or above may connect the controller to other devices using an Ethernet interface. Standard patch cables are used for connections to hubs or switches, whereas cross-over cables are used for direct connection to laptops and personal computers.

Cross-over cables supplied by SIEMENS have a red sheath, whereas the Siemens patch cables have a light grey sheath. Cross-over cables from other suppliers may be identified by the different lead color sequences inside the two connectors.

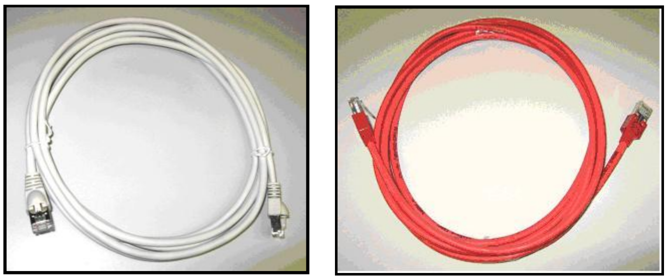

Fig. 24 Siemens Ethernet patch cable

3.4 Connecting Sensor Cables

Connect sensor fibers in cable sections, pigtails and terminations by fusion splicing. A suitable splicing apparatus and preparation tools including fiber cleaver are essential. The splicing of fibers requires a certain level of experience. Please ask a local telecommunications service company for support if you do not have sufficient experience.

3.4.1 Sensor Cable on Splice Box

Lay splices in a splice cassette and splice box with or without grounding. We strongly recommend using the robust splice boxes in any rough environment such as tunnels, cable ducts and outdoor installations. Even in buildings, the protection of the sensitive splice in a box is advantageous.

CAUTION!	The splice boxes with grounding are required for metal containing sensor cables if there is any risk of interaction with electricity.

Please consider not only electrical cables and wires, but also lightning, ESD and electromagnetic induction.

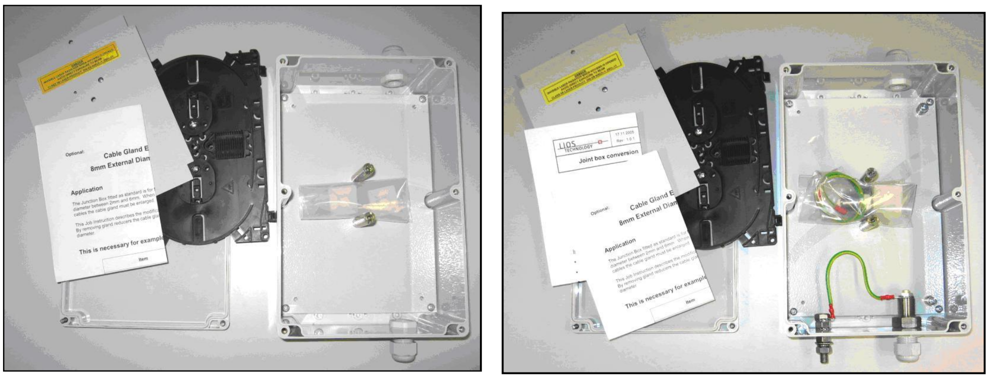

Fig. 25 Splice box with and without grounding

Follow the procedure below for laying a splice in a splice box:

- Fix the splice box at a solid structure.
- Clean sensor cable ends of rough dirt.
- Feed sensor cable and pigtail into the splice box through the cable feeds. Pull at least 2 m of cable and pigtail through the feeds. The cable and pigtail lengths outside the box must be sufficient to safely avoid any strain, tight bending with less than 60 mm radius and kinking.
- Remove 2m of sensor cable sheath (outer plastics layer) and armor.
- Remove the stainless steel or plastics tube on the same end, but with 5cm excess length measured from the end of the sheath. Take care not to damage the fibers.
- Earthen the stainless steel tube, if present, using the multi-contact cylinder of the feed through.
- Remove 2m of pigtail sheath. Take care not to damage the fibers.
- Feed unsheathed fibers from cable and pigtail into the splice cassette.
- Let sensor cable and pigtail sheath extend for about 5 cm into the splice box and relieve strain at the support points provided with cable ties.
- Splice fiber ends.

- Stabilize the splice using a hot-melt adhesive or crimp protection sleeve.
- Fasten the protection sleeve in the sleeve holder of the cassette, and lay fibers in the splice cassette. Consider a minimum bending radius of 60 mm.
- Close the splice cassette carefully and fix the cassette cover.
- Close the cover of the splice box and fix it.

3.4.2 Pigtail on Splice Box

Fiber type
The controller is suited for graded index fibers with a core diameter of 62.5µm and a N.A. of 0.27. Only sensor cables, fibers and pigtails with matching core diameter and N.A. must be connected to the controller.

Connector type

CAUTION!	The controller comprises one or two optical ports for E2000/APC (angled physical contact) connectors with 8° angular polished ferrule end face. Do not use other types of connectors.

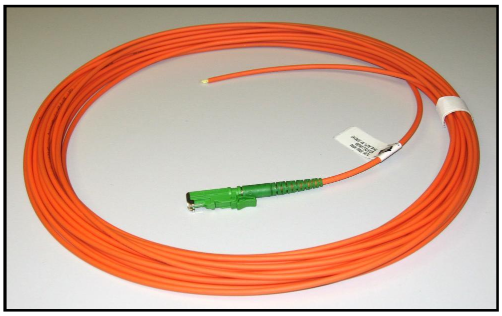

Fig. 26 Pigtail with E2000/APC connector

The best measuring performance is achieved by using pre-assembled E2000/APC connectors (so-called pigtails) that are spliced to the sensor cable. The splices need mechanical protection by a splice cassette and a splice box.

We would not recommend field assembly of connectors because of the lower precision of ferrule end face and thus higher attenuation leading to reduced measuring performance of the controller.

Do not uses patch cables for connecting other connector types or straight PC (physical contact) connectors, because of the additional attenuation and return loss.

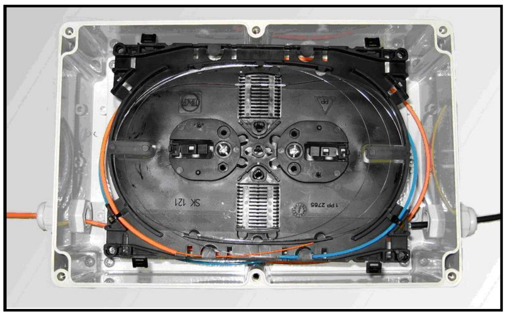

Fig. 27 Splice box with cable and pigtail

3.4.3 Laying Pigtails and Sensor Cable(s) in the Rack

The pigtail(s) and splice box(s) must be laid and mounted in a way that securely avoids any strain on pigtails, splices and E2000/APC connectors as well as any kinking of the pigtail or the sensor cable. Bend excessive lengths of pigtail and sensor cable to loops with sufficient diameter (> 100 mm) and loosely attach them to the rack or other solid structures connected to the controller. Loosely fastened plastics cable ties may be used for attaching the loops. Avoid any crushing of the sensor cable or pigtail.

Mount the splice box in close proximity to the controller. For metal containing sensor cables, use a splice box with grounding. Connect the grounding bolt of such splice boxes to an earth cable being connected to an appropriate earthing point of the facility.

3.4.4 Cleaning and Inspection of Connectors

WARNING!	Switch off the controller before any direct viewing with or without optical instruments on fiber ends, splices or optical fiber connectors

In addition, the warning label has to be placed close to the mains switch of the controller.

Use only CE marked fiber scopes equipped with a 1550nm or 1064nm “S” version DIR LB3 laser safety filter according to EN 207.

Check the ferrule end face of any connector for dirt and damages using a fiber scope.

Fig. 28 Fiber scope with up to 200x magnification, built-in laser filter and LED illumination

If any dirt is present on the end face of a ferrule (Fig. 29), carefully open the protective flap of the E2000 connector. Moisten a lint-free optical wipe slightly with ultra pure solvent, and carefully clean the end surface of the ferrule (Fig. 30). Repeat the procedure using a dry wipe to remove any residues of the solvent. Check the end face of the ferrule again using the scope. If any dirt remains, the cleaning procedure must be repeated.

Fig. 29 View of clean (left), contaminated (middle) and damaged (right) pigtail end face

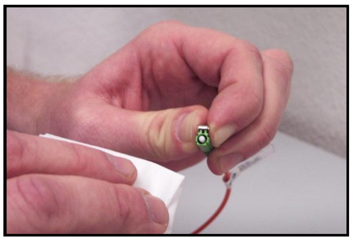

Fig. 30 Cleaning of a ferrule end face of an E2000/APC connector using an optical wipe

Pigtails must be replaced if there is any damage or non-removable dirt on the end face of the fiber core. A few slight scratches on the fibre cladding or end face of the ferrule are acceptable if the attenuation and return loss of the connector are within specification. The pigtail must also be replaced if there is any sever damage (digs, excavations, deep scratches ...) or non-removable dirt on fiber cladding or end face of the ferrule.

We ship the controller with clean internal pigtail(s) being terminated by dummy connector(s) plugged into the port(s). Dummy connectors must only be removed shortly before plugging a pigtail into the port. No cleaning of the internal pigtail(s) is required for a new controller whose ports have been permanently terminated by dummy connectors.

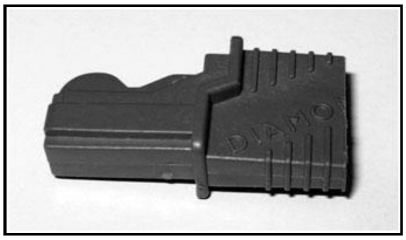

Fig. 31 Dummy connector

A cleaning of the end face of internal pigtails is required before plugging any pigtail into a previously used or non-permanently terminated port. Use a ferrule mate cleaner or equivalent tool for cleaning the internal pigtails. Follow instructions of the cleaner. Stick type cleaners are less reliable and may only be used if a fiber scope suited for internal pigtails is available for subsequent inspection. If any dirt remains, the cleaning procedure must be repeated.

Fig. 32 Ferrule mate cleaner

3.4.5 Plugging-In the Optical Connectors

CAUTION!	The controller power must be switched off or the measurement must be stopped.

Check that the “LASER ON” LED is off.

After proper cleaning, carefully insert the E2000/APC connector into an optical port on the rear side of the controller until it securely locks in place. Unused E2000/APC ports must stay terminated using dummy connectors.

4 Technical Data

4.1 General Technical Data

Group	Parameter	Value
Mechanical	Weight, net	13 kg
	Height	131 mm
	Width (without flange)	483 mm (448 mm)
	Depth (without handles)	338 mm (304 mm)
	Rack space	3U, 19-inch wide, 60 cm deep (80 cm with swiveling frame)
Electrical	DC supply voltage, nominal	12 to 48 V
	DC supply voltage, max. range	10 to 60 V
	DC start-up voltage, max.	11.5 V
	DC power consumption using 24 V @ 25°C	25 W
	DC power consumption using 24 V @ 60°C	45 W
	DC current, max. @ 12 V	3.5 A
	DC fuse	4 A (T) 5x20 mm
	AC supply voltage, nominal (option)	100 to 240 V
	AC supply voltage, max. range	85 to 264 V
	AC frequency, nominal	50 to 60 Hz
	AC frequency, max. range	47 to 63 Hz
	AC power consumption using 230 V @ 25°C	35 W / 50 VA
	AC power consumption using 230 V @ 60°C	60 W / 85 VA
	AC current, max. @ 100 V	0.6 A
	AC fuse	2 A (T) 250 V 5x20 mm
	DC supply voltage at AC supply (option), nominal	110 to 220 V
	DC supply voltage at AC supply, max. range	95 to 275 V
	DC power consumption at AC supply using 110V	28W @ 25°C, 50W @ 60°C
	Output voltage (INPUT socket)	24 V DC
	Output current	≤ 20 mA
Laser	Laser class	1M
	Laser wavelength	1550nm / S-Version: 1064nm version
	Laser power	< 100 mW / S-Version < 39 mW
Environmental	Transport and Storage	See table 11
	Operation	See table 12
	Protection rating	IP51
Operation	Measuring performance	See datasheets
	Warm-up time	< 1 min + 1 measurement cycle

Tab. 10 General technical data

4.2 Interfaces

Group	Interface	Parameter	Value
Optical	Optical port(s)	Socket type	E2000/APC (8°)
		Channels	1 or 2
		Fibre type	GI 62.5µm
Power supply	DC supply	Socket type	Sub-D 3WK3-G3
	AC supply (option)	Socket type	IEC320 C14
Data transmission	USB	Socket type	B (USB device)
		Standard	USB 2.0
	Ethernet	Socket type	8P8C (RJ45)
		Data rate, max.	10 or 100 MBit/s
	EIA-232 (RS-232)	Socket type	Sub-D 9, male
		Data rate	115.2 or 19.2 kBit/s
		Data/parity/stop bits	8N1
		Handshake	Hardware RTS/CTS
	Inputs	Type	Opt coupler, isolated
		External voltage / current	12-30 V DC / 5 mA
		Socket type	Sub-D 9, female
		Number	4
	Extra inputs (option)	Socket type	Sub-D 25, male
		Number	12, 24 or 36
	Outputs	Type	Photo relay, isolated
		External voltage / current	< 60 V / < 100 mA
		Resistance	< 1.2 Ω
		Socket type	Sub-D 25, female
	Programmable outputs	Number	10
	Collective fault output	Status	Normally closed
	Collective alarm output	Status	Normally open
	Extra outputs (option)	Socket type	Sub-D 25, female
		Maximum number	96
Memory card	CF card	Grade	Industrial
		Capacity / GB	2

Tab. 11 Interface specifications

4.3 Transport-, Storage and Operation Conditions

The specifications given in Table 11 apply to the transport and storage of the controller in its original transport package. Operation conditions are given in Table 12.

Proper transport, storage, installation and operation conditions are required for a trouble-free and safe operation of the controller. Warranty for the controller is deemed void if these specifications are ignored.

Condition	**Range**
Drop test	< 1 m
Temperature	- 35 to + 75 °C
Air pressure (corresponding elevation)	1140 to 540 hPa (- 1000 to + 5000 m)
Relative humidity	10 to 95 % (non-condensing)
Sinusoidal vibration	10-150 Hz: < 20 m/s^2
Shock	< 100 m/s^2, 11 ms

Tab. 12 Transport- and storage conditions

Condition	**Range**
Temperature	-10 to + 60 °C
Relative humidity	10 to 95 % (non-condensing)
Air pressure (corresponding elevation)	DC supply: 1140 to 540 hPa (-1000 to 5000 m) AC supply: 1140 to 790 hPa (-1000 to 2000 m)
Sinusoidal vibration (EN 54-22)	10-150 Hz: < 5 m/s^2

Tab. 13 Operation conditions

4.4 Standards and Approvals

The controller is compliant to standards and European directives listed in Table 13. The compliance was approved by the notified bodies TÜV Rheinland AG and VdS Schadenverhütung GmbH as far as required. Application-specific approvals such as the Siemens FibroLaser III fire detection approval are explained in detail in the Operation Manual. A full list of applicable safety standards is given in the Declaration of Conformity.

Requirement	Standard/Directive	Classification
Electrical safety	IEC 61010-1	CAT II, height 5000 m
	UL 61010-1	
	IEC 60529	IP51
EMC	EN 61326-1	Equipment for measurement, control and laboratory use
	IEC 61000-6-2	Immunity to industrial environment
	IEC 61000-6-3	Emission in residential properties
	IEC 61000-4-2,3,4,5,6,8,11	RF, burst, surge, magn. field, U-var
	EN 61000-3-2,3	Harmonics and flicker
	EN 50130-4	Immunity to EMS
	EN 55011	ISM equipment, Gr. 1, class B
	FCC 47 CFR CH. 1 Part 15	USA EMI class B
Laser safety	IEC 60825-1,-2	Laser class 1M
	US 21CFR1040.10	
	FDA accession number	1131367-000
Fire detection	pr EN 54-22	A1N, A2N, BN, CN
	UL 521	Heat detector also suitable as heat actuated device for special applications
	ULC-S530	
Environmental testing	IEC 60068-2-6	Sinus vibration 20 m/s^2
	IEC 60068-2-14	Temperature cycle -10 / +60°C
	NAVMAT P-9492	Random vibration 6.05 g_{rms}
	ISO 13628-6	Sinus vibration 50 m/s^2 Shock 10g, 11ms Temperature -10°C, 60°C Overpressure 199kPa
	MIL-STD-810F	Vibration 25.4mm 4.3Hz
	(with IP66 box)	Blowing rain 0.5-4.5mm, wind 18 m/s
	FED-STD-101C	Drop test 21'' (in transport case)
	pr EN 54-22	Environmental group II
RoHS directive	2011/65/EU	
WEEE directive	2012/19/EU	
Low voltage directive	2014/35/EU	

Tab. 14 Standards and classifications

5 Documentation and Contacts

5.1 Documentation

All FibroLaser III documents are stored in the Siemens STEP Asset Portal.

https://step.bt.siemens.com/portal/index.html

The document FibroLaser_III_Documentation_Overview_A6V10345800 contains an overview of the FibroLaser III system documentation provided and maintained by IC BT CPS FS.

To get all FibroLaser III documents enter in the keyword filed the keyword FibroLaser.

5.2 Technical Support

You can reach the Technical Support for all LIOS sensing products of NKT Photonics GmbH using

e mail	lios-support@nktphotonics.com
Phone	+49-221-99887-555
Fax	+49-221-99887-150

5.3 Contacts

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Fax.: +49 221 99887 150
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Siemens Customer Support Center

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Mail:
fs.support.sbt@siemens.com
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Mail:
support.ap.i-bt@siemens.com
Phone: +86 10 6296 0119
Fax: +86 10 6296 3020

6 Annexes

6.1 Abbreviations

AC	Alternating current
ADC	Analogue digital converter
APC	Angled physical contact
CD	Compact disk
CF	Compact Flash
CFR	Code of Federal Regulations
CTS	Clear to send
DC	Direct current
DCD	Data carrier detect
DHCP	Dynamic host configuration protocol
DNS	Domain name system
DSR	Data set ready
DTR	Data terminal ready
EC	European Commission
EMC	Electromagnetic compatibility
EN	European standard
ESD	Electrostatic discharge
FRNC	Flame retardant non-corrosive
GI	Graded index
HU	Height units
IEC	International Electronic Commission
IP	International protection rating / Internet protocol
LAN	Local area network
Laser	Light amplification by stimulated emission of radiation
LED	Light emitting diode
MEMS	Micro-electromechanical system
MM	Multimode
N.A.	Numerical aperture
NTP	Network time protocol
OTS	Optical temperature sensing
PC	Personal computer
PDF	Portable data format
RAM	Random access memory
RI	Ring indicator
RoHS	Restriction of hazardous substances
RTS	Request to send
RxD	Receive data
TCP	Transmission control protocol
TxD	Transmit data
UL	Underwriters Laboratory
USB	Universal serial bus
UPS	Uninterruptible power supply
UV	Ultraviolet
VGA	Video graphics array
WEEE	Waste electrical and electronic equipment

6.2 Glossary

Acknowledgement	Acknowledging an alarm confirms that you have noted it. The buzzer is deactivated by the acknowledgment.
Backscattering curve	Set of anti-Stokes or Stokes signal power data in dependence on distance.
Controller	General term for Siemens FibroLaser III devices.
Cycle time	Time for measuring a complete sequence of channels.
Distance range	Maximum length of optical fiber to be measured.
EMC	Electromagnetic compatibility is the ability of electrical equipment to function properly in its electromagnetic environment without influencing this environment.
Measuring time	Time required to measure temperatures along a fiber.
Output, manual reset	A manual reset output does not automatically deactivate when the activating condition is no longer present. Deactivation requires a reset of the output. Manual reset outputs may be used for alarm and fault indication.
Output, self-reset	A self-reset output is automatically deactivated when the activating condition is no longer present. Self-reset outputs may be used to control other devices.
Pigtail	A pigtail is a short optical fiber cable with an optical connector on one end and a length of exposed optical fiber at the other end.
Ping	Ping is a computer network utility for testing a connection between computers on an Internet protocol (IP) network.
Reset	Resetting the controller confirms that events triggering alarms and failures have been properly handled. All alarms, failure states and manual reset outputs are reset.
Return loss	In fibre optics, return loss is the loss of signal power due to a reflection, e.g. caused by a discontinuity of refractive index at a connector, another optical component or the fiber end face.
Sampling interval	Distance between measuring data locations along a fiber.
Spatial resolution	Length of a hot spot required for 90% temperature reading response.
Temperature accuracy	Deviation between averages measured temperature and true temperature.
Temperature profile	Set of temperature data in dependence on distance.
Temperature resolution	Standard deviation of local temperature data taken in a measuring sequence.
Warm-up time	Time between power-on and readiness to take measurements according to the specification.

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