

# FIP-400B Fiber Inspection Probe

FULLY AUTOMATED INSPECTION TOOL WITH EMBEDDED ANALYSIS



Connect<sup>or</sup>Max2  
ANALYSIS SOFTWARE

This intelligent and automated test tool transforms fiber inspection into a faster and simplified one-step process providing accurate and consistent test results, and preventing the reporting of false-positive results.

## KEY FEATURES

- Fully automated, one-step process:
- > Automatic fiber-connection detection
  - > Automatic image centering
  - > Automatic focus adjustment and optimization
  - > Automatic capture
  - > Automatic pass/fail analysis
  - > Automatic reporting

On-board connector endface analysis (IEC, IPC or custom standards) via ConnectorMax2

Pass/fail LED indicator for immediate diagnosis of connector health

Optimal digital image quality with three levels of magnification

## COVER ALL FIBER APPLICATIONS

More than 30 tip adaptors designed for:

FTTx and hybrid networks

Mobile fronthaul (FTTA) and backhaul

DAS and fiber-fed small cells

Data centers

Campus and private networks

Lab and research

## COMPLEMENTARY PRODUCTS



TK-MAX-FIP  
Stand-Alone Display Kit



FastReporter2  
Data Post-Processing  
Software



Cleaning Kits

EXFO

## HOW CONFIDENT ARE YOU ABOUT YOUR CONNECTOR CLEANLINESS?

Connector inspection using automated analysis software to assess connector quality is an essential step during fiber commissioning and installation, and an integral part of best practices. Maintaining connector certification records is important for future reference. When combined with fiber certification, connector inspection provides end-to-end certification.

However, users may not be aware of the fact that standards do not specify the focus level needed to achieve proper connector assessment. A slightly out-of-focus image may hide defects and trigger a “pass” result when analyzed in accordance with specific inspection standards. Unfortunately, if these hidden defects exceed acceptance criteria, the result will be a false positive.

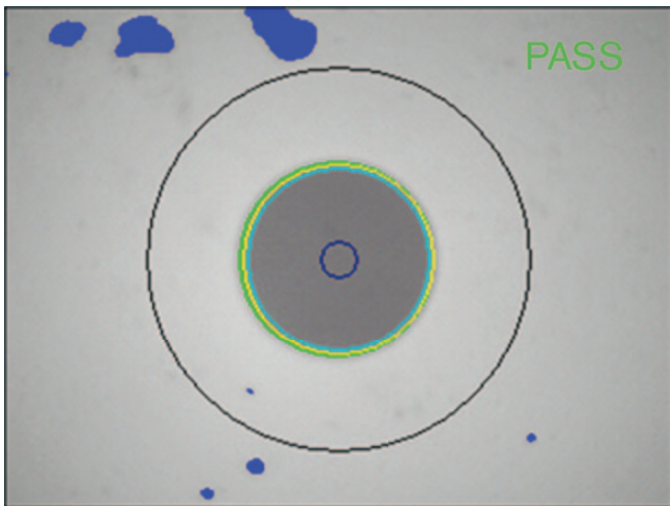


Figure 1. An out-of-focus image can hide critical defects capable of delivering a “pass” verdict.

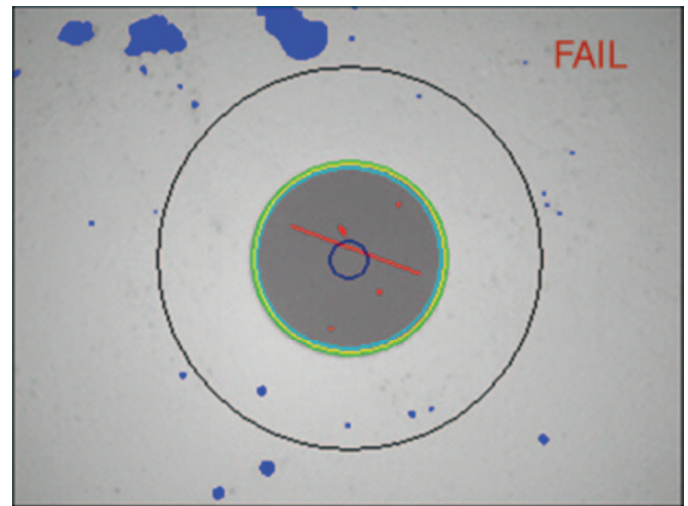


Figure 2. An optimized focus adjustment will ensure that all defects affecting performances are seen.

- › Such false-positive results are likely to mislead users and lead to costly consequences. Future upgrades to higher data rates such as 40G/100G may fail, as tolerances for insertion loss (IL) and optical return loss (ORL) become much tighter with higher data rates. For example, a connector hiding small defects in the core area may be able to handle 2.5G or 10G, but could fail at 100G. If a specific link is chosen for an upgrade to a higher data rate, and tied to a service-level agreement (SLA), there could be grave financial consequences.
- › False positives may also become the root cause of long and tedious troubleshooting tasks, because engineers will seek out issues at the fiber level (transmission cards, splice points) before rechecking connectors that are displaying pass results.
- › Bad connectors can also affect test results. A good example of this is higher OLR readings from the OTDR due to dirty connectors, which typically exhibit more reflection. Another commonly encountered example involves erratic readings during 40G or 100G OTN BERT testing. Problems such as forward error correction (FEC) may also arise and lead to unnecessary troubleshooting of TX and RX equipment, when in actual fact the problem is at the connector level. When these issues surface, the only solution is to obtain reliable results by returning on-site and retesting the link.

## AVOID FALSE POSITIVES

To avoid such issues, users are now requesting methods that optimize image quality to ensure the integrity of inspection results. This is exactly where the new FIP-430B inspection probe comes into play. Thanks to its fully automated features, the FIP-430B ensures optimized image quality. This inspection probe automatically adjusts and optimizes focus and image centering, and then automatically captures and analyzes in accordance with preprogrammed IEC, IPC or custom standards delivering accurate results—and all in just ONE step.

## THE ONLY FULLY AUTOMATED FIELD INSPECTION PROBE ON THE MARKET

**100%**  
Automated

- > Automatic fiber-connection detection
- > Automatic fiber image-centering system
- > Automatic focus adjustment and optimization\* (simultaneous with centering of the image)
- > Automatic image capture
- > Automatic connector endface analysis and reporting

## TURNING FIBER INSPECTION INTO A ONE-STEP PROCESS

**1-step**  
process

- > Over 57% in time savings as compared to the average inspection time (from the automatic image-centering function alone)
- > From frustration to elation—removes all the hassle associated with fiber inspection
- > So easy, and as fast as cleaning the connector: no one can afford the risk of not inspecting or following best practices

## ENSURE THE ACCURACY AND CONSISTENCY OF YOUR TEST RESULTS

**100%**  
Future proof

- > Avoid false positive results through optimized focus adjustment and focus protection
- > Endface analysis is based on IEC/IPC or custom standards
- > Ensure future high-speed network upgrades will be performed according to expectations and documentation

*\* Manual focus adjustment may be required with some connector types.*

## GET ACCURATE INSPECTION RESULTS

The autofocus feature in the new FIP-430B not only greatly facilitates inspection, but also enables optimized focus adjustment to ensure detection of all defects capable of affecting connector performances.

The system self-adjusts the image centering to ensure that all inspection zones are visible, and then automatically adjusts the focus to achieve the best optical resolution. Next, the IEC, IPC, or custom standard is applied to deliver accurate certification results in a snap.

Fussing with image focusing, centering and inaccurate analysis results is now a thing from the past. Get the best. Get the FIP-430B.

## RE-ENGINEERED DESIGN

The rubber casing and controls are designed for intense field operation. The controls are strategically positioned to make the inspection process easier. Plus, the very bright LED status can be easily viewed from different angles. The FIP-400B is designed for seamless handling by both right- and left-handed users.



## FAST-TRACKING CONNECTOR INSPECTION

When you outsource your fiber testing, you want to be certain that the technician will apply the best practices and properly certify every connector. Neglecting to do so, at this critical step, will lead to serious, time-consuming problems. The new FIP-400B Series is the result of years of fiber-inspection experience in the field. Its patent-pending, re-engineered design was developed from actual, end-user feedback for the purpose of optimizing and speeding up the inspection process.

### THE FIP-400B'S HASSLE-FREE, AUTOMATIC IMAGE-CENTERING FEATURE SAVES PRECIOUS TIME

# 57%

shorter  
inspection  
time

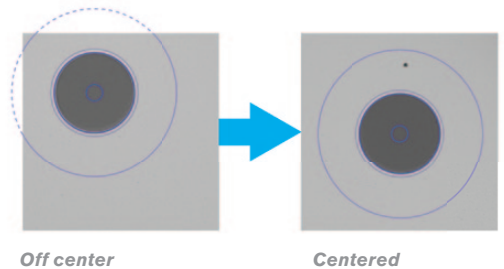
- > Save over two hours on a typical FTTH cabinet inspection - 432 fibers
- > 14-second inspection time per port (down from 32 seconds)\*
- > \$25 000 in potential savings in one year based on one cabinet inspection per day at a cost of \$50 per hour

*\* Data sourced from EXFO's case study, with calculation based on typical analysis time. Data based on time savings resulting exclusively from the automatic image centering function.*

## AUTOMATIC, FIBER IMAGE CENTERING

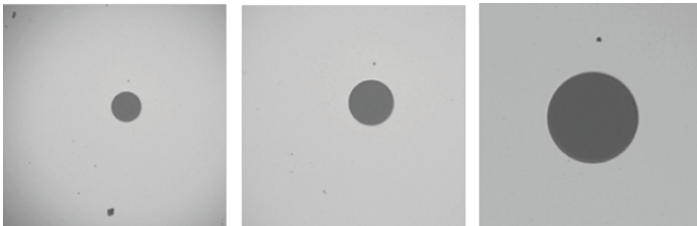
This function cuts inspection time in half, because it automatically detects the fiber endface and instantly centers the image. The user simply has to focus and capture. This is especially handy when inspecting patch panels and hard-to-reach connectors. It also ensures that users will not miss defects in the critical zones of the connectors.

**Hit the bull's-eye, every time.**



Off center

Centered



Low magnification

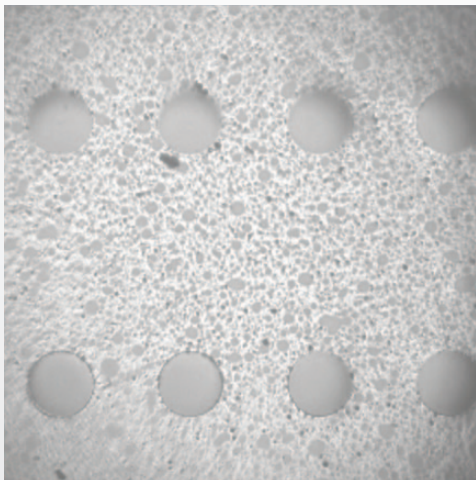
Medium magnification

High magnification

## TRIPLE MAGNIFICATION MODE

By optimizing the image size, users get a detailed view of all defects. This series features the only probes in the industry offering three magnification levels.

The FIP-430B's unique, large 912  $\mu\text{m}$  x 912  $\mu\text{m}$  FOV greatly facilitates visual MPO connector inspection by enabling multiple fibers to be viewed simultaneously, thus ensuring that you never miss a fiber.



## AUTOMATIC PASS/FAIL CONNECTOR CERTIFICATION WITH CONNECTORMax2 ANALYSIS SOFTWARE

- › Automatic pass/fail analysis of the connector endfaces
- › Lightning-fast results in seconds with simple one-touch operation
- › Complete test reports for future referencing
- › Stores images and results for recordkeeping



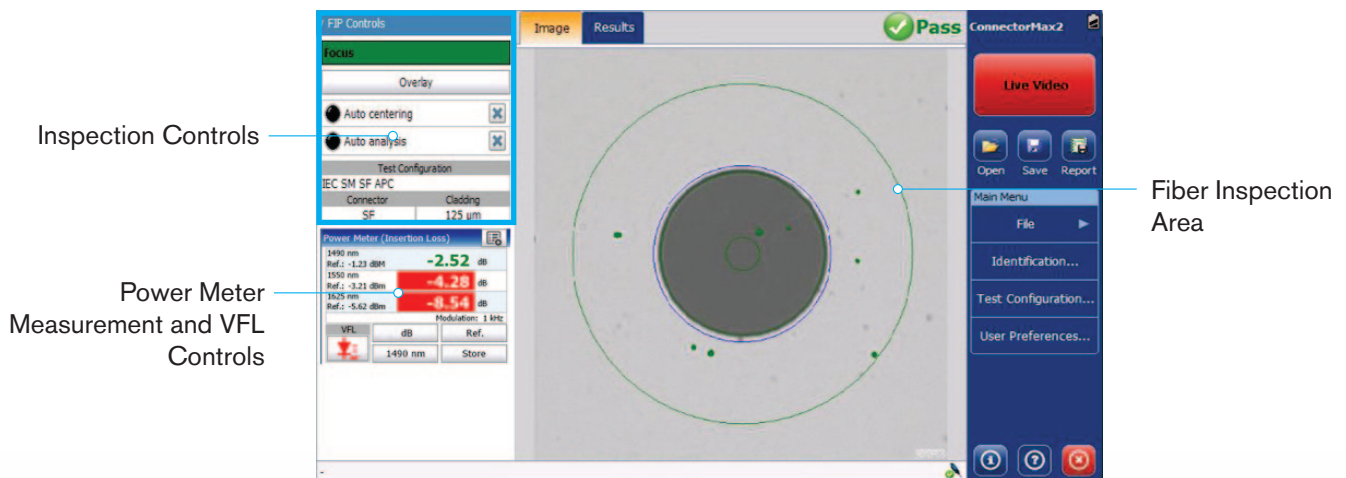
Delivering fast pass/fail assessment of connector endfaces, EXFO's ConnectorMax2 Analysis Software is designed to save both time and money in the field. The ConnectorMax2 automated inspection application eliminates guesswork by providing clear-cut connector endface analysis.

Using ConnectorMax2, field technicians are able to analyze defects and scratches, and measure their impact on connector performance. Results are then compared against preprogrammed IEC/IPC standards or user-defined criteria, leading to accurate pass/fail verdicts established right on-site.

ConnectorMax2 therefore helps avoid two-time, money-draining situations (i.e., undetected connector defects requiring that technicians return to the site at a later date) and unnecessary replacement of connectors with slight defects too small to provide a "fail" verdict.

Thanks to the ConnectorMax2's newly redesigned interface, the unit features a unique all-in-one integrated GUI\*, with a touchscreen providing quick access to all of the instrument's main functionalities.

*\* Available only on the MAX-FIP and MAX-700B test units. Will soon be available on the FTB-Ecosystem platforms.*



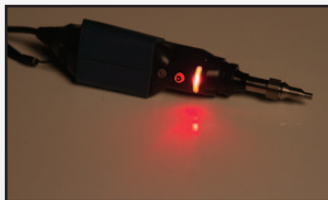
## HIGH-VISIBILITY LED PASS/FAIL INDICATOR

Located directly on the probe, this LED indicates the status of the connector under test following analysis, providing immediate diagnosis of connector cleanliness. Because there is no need to consult the platform or display screen, users can simply focus on getting ready for their next inspection.

Pass



Fail



Activity status



## FIP-400B UNIVERSAL COMPATIBILITY\*

Thanks to its USB port, the FIP-400B Series is compatible with the entire FTB ecosystem, the MaxTester 700B OTDR Series, the MAX-FIP display, as well as PCs and laptops.

### FTB Ecosystem\*\*



### MaxTester 700B OTDR Series



### Stand-Alone MAX-FIP Display



### PC and Laptops



\*For compatibility with EXFO's AXS and FOT Series, as well as legacy optical gear, see the FIP-400 model.

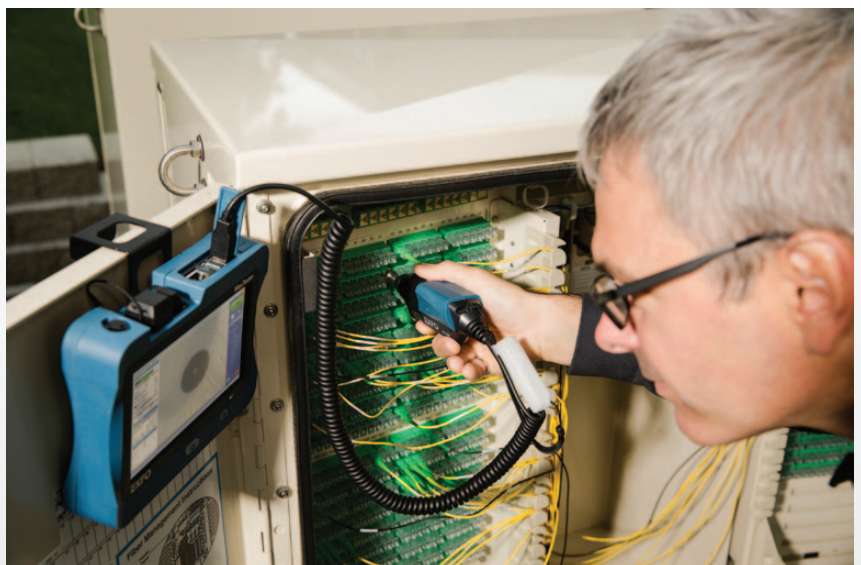
\*\*FTB-200v2 and FTB-500 compatibility will soon be available.

## THREE MODELS

The FIP-430B offers all the benefits listed above. However, EXFO also has a budget-friendly model (the the FIP-410B) for those who are interested in high optical performance without the automated connector certification.

FEATURES	FIP-410B	FIP-420B	FIP-430B
Three magnification levels	YES	YES	YES
Image capture	YES	YES	YES
Five-megapixel CMOS capturing device	YES	YES	YES
Automatic fiber image-centering function	NO	YES	YES
Automatic focus function	NO	NO	YES
Embedded pass/fail connector analysis	NO	YES	YES
Pass/fail LED indicator	NO	YES	YES

Inspecting and analyzing fiber connector endfaces has never been easier with this digital fiber inspection probe.



Using the optional GP-2176 hook for the MAX-FIP

**SPECIFICATIONS<sup>a</sup>**

Size (H x W x D)	47 mm x 42 mm x 162 mm (1 7/8 in x 1 5/8 in x 6 3/8 in) <sup>b</sup>
Weight	0.3 kg (0.66 lb)
Resolution	0.55 µm
Camera sensor	Five-megapixel CMOS
Visual detection capability	<1 µm
Field of view	304 µm x 304 µm (high magnification) 608 µm x 608 µm (mid magnification) 912 µm x 912 µm (low magnification)
Light source	Blue LED
Lighting technique	Coaxial
Capture button	Available on all models
Magnification button	Available on all models
Digital magnification	Three levels
Connector	USB2

**Note**

a. Typical.

b. Measurement excluding tip and including strain relief.

**GENERAL SPECIFICATIONS**

Temperature	Operating	-10 °C to 50 °C
	Storage	-40 °C to 70 °C
Relative humidity	0 % to 95 % noncondensing	

**CONNECTORMax2 SOFTWARE: PC OPERATING SYSTEM COMPATIBILITY AND REQUIREMENTS**

The following minimum requirements must be met in order to install and run ConnectorMax2 on a computer:

SYSTEM ELEMENT	MINIMUM REQUIREMENTS WINDOWS XP (32 BIT)	MINIMUM REQUIREMENTS WINDOWS 7 (32 AND 64 BITS)
Processor	Pentium (800 MHz or higher recommended)	Pentium (1.6 GHz or higher recommended)
RAM	256 MB (512 MB recommended)	512 MB (2 GB recommended)
Disk space	40 MB	40 MB
Other requirements	Latest version of .NET Framework 3.5 DirectX 9.0 USB 2.0, minimum	

**ACCESSORIES****Includes:**

- Video inspection probe (FIP-410B/420B/430B)
- Bulkhead and patch cord tips
- GP-2175: Protective cap and cord assembly
- FIPT-BOX: Compartmentalized plastic case for tips
- GP-10-094: Soft pouch for FIP-400 and FIP-400B

## ORDERING INFORMATION

## FIP-4XXB-XX-XX-XX

## Model

FIP-410B = Digital Video Inspection Probe  
Triple Magnification

FIP-420B = Analysis Digital Video Inspection Probe  
Automated pass/fail analysis  
Triple magnification  
Autocentering

FIP-430B = Automated Analysis Digital Video Inspection Probe  
Automated Focus  
Automated pass/fail analysis  
Triple magnification  
Autocentering

## Base Tips

APC = Includes FIPT-400-U25MA and FIPT-400-SC-APC

UPC = Includes FIPT-400-U25M and FIPT-400-FC-SC

## Extra FIP-400B tips

FIPT-400-LC-K = LC tip kit including: FIPT-400-LC: LC tip for bulkhead adapters, FIPT-400-LC-APC: LC/APC tip for bulkhead adapter, FIPT-400-U12M: Universal patchcord tip for 1.25 mm ferrules, FIPT-400-U12MA: Universal patchcord tip for 1.25mm ferrules APC

FIPT-400-SCA-K = 2.5 mm APC tip kit including: FIPT-400-U25MA, FIPT-400-SC-APC

FIPT-400-ADAPTER = Adapter tip

FIPT-400-D4 = D4 tip for bulkhead adapter

FIPT-400-E2000 = E-2000 tip for bulkhead adapter

FIPT-400-E2000-APC = E2000 APC tip for bulkhead adapters

FIPT-400-FC-APC<sup>a</sup> = FCAPC tip for bulkhead adapter

FIPT-400-FC-SC<sup>b</sup> = FC and SC tip for bulkhead adapter

FIPT-400-FC-SC-A6 = FC and SC angled tip for bulkhead adapter (60 degrees)

FIPT-400-LC = LC tip for bulkhead adapters

FIPT-400-LC-A6 = LC angled tip for bulkhead adapter (60 degrees)

FIPT-400-LC-APC = LC/APC tip for bulkhead adapter

FIPT-400-LC-L = Extended LC tip for PC bulkhead adapter

FIPT-400-LC-L-137 = 137 mm, Extended LC tip for PC bulkhead adapter

FIPT-400-LEMO = Lemo bulkhead adapter

FIPT-400-LX.5 = LX.5 PC Tip for bulkhead connector

FIPT-400-LX5-APC = LX.5/APC tip for bulkhead adapter

FIPT-400-MTP2 = MTP/MPO UPC tip for bulkhead adapter (includes a bulkhead adapter for patch cord inspection)

FIPT-400-MTP2-K = MTP/MPO tip kit including: Tip for MTP/MPO bulkhead adapter, Nozzle for MTP/MPO APCconnectors, Nozzle for MTP/MPO UPC connectors, Bulkhead adapter for patch cord inspection

FIPT-400-MTP2-TIP = MTP/MPO UPC replaceable nozzle for FIPT-400-MTP2 or FIPT-400-MTPA2 tip

FIPT-400-MTPA2 = MTP/MPO APC tip for bulkhead adapter (includes a bulkhead adapter for patch cord inspection)

FIPT-400-MTPA-TIP = MTP/MPO APC replaceable nozzle for FIPT-400-MTP2 or FIPT-400-MTPA2 tip

FIPT-400-MTRJ = MTRJ tip for MTRJ bulkhead

FIPT-400-MU = MU tip for bulkhead adapters

FIPT-400-MU-L = Extended MU tip for PC bulkhead adapter

FIPT-400-MU-L-149 = 149 mm, extended MU tip for PC bulkhead adapter

FIPT-400-ODC-4PIN-P = ODC 4 Pin Plug (female) Guide tip

FIPT-400-ODC-4PIN-P-K = ODC 4 Pin Plug (female) Guide and Universal tip

FIPT-400-ODC-2&4PIN-P-K = ODC 2 and 4 Pin Plug (female) Guides and Universal tip

FIPT-400-ODC-S = ODC Socket (male) tip

FIPT-400-ODC-U = ODC Universal Guide tip

FIPT-400-ODC-2PIN-P = ODC 2 Pin Plug (female) Guide tip

FIPT-400-ODC-2PIN-P-K = ODC 2 Pin Plug (female) Guide and Universal tip

FIPT-400-OTAP-APC = Optitap bulkhead adapter

FIPT-400-OTAP-MTP-APC = MT/APC type OptiTip (tm) and OptiTap multifiber adapter for male and female connectors. Comes into a kit compatible with male and female cable ends.

FIPT-400-OTAP-MTP-APC/M = Male adapter tube for FIPT-400-OTAP-MTP-APC tip

FIPT-400-OTIP-MT-APC/M = Male adapter tube for FIPT-400-OTIP-MT-APC tip

FIPT-400-SC-APC = SC APC tip for bulkhead adapter

FIPT-400-SC-APC-L = SC Angled extended tip for bulkhead connector

FIPT-400-SC-L = Extended SC tip for PC bulkhead adapter

FIPT-400-SC-L-149 = 149 mm, Extended SC tip for PC bulkhead adapter

FIPT-400-SC-UPC = SC UPC tip for bulkhead adapter

FIPT-400-SMA = SMA Tips for bulkhead connector

FIPT-400-SMAM = SMA Tip for male connector

FIPT-400-ST = ST tip for bulkhead adapter

FIPT-400-U12M = Universal patchcord tip for 1.25 mm ferrules

FIPT-400-U12MA = Universal patchcord tip for 1.25 mm ferrules APC

FIPT-400-U16M = Universal patch cord tip for 1.6 mm ferrules

FIPT-400-U20M2 = Universal patchcord tip for 2.0 mm ferrules (D4, Lemo)

FIPT-400-U25M<sup>b</sup> = Universal patchcord tip for 2.5 mm ferrules

FIPT-400-U25MA<sup>a</sup> = Universal patchcord tip for 2.5 mm ferrules APC

Example: FIP-420B-UPC

## Notes

- a. Included when APC base tips selected.  
b. Included when UPC base tips selected.

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