FIP-400B Fiber Inspection Probe

FULLY AUTOMATED INSPECTION TOOL WITH EMBEDDED ANALYSIS

ConnectorMax2

FROST & SULLIVAN

2014 BEST PRACTICES AWARD

GLOBAL
PORTABLE FIBER OPTIC TEST EQUIPMENT
MARKET LEADERSHIP AWARD

Feature(s) of this product is/are protected by one or more of: US design patents D713751 and equivalents in other countries; US design patent D742394; and /or US patent 9,921,373; US patent 9,880,359.

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) including MPO/MTP analysis.

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, research and cable manufacturing

COMPLEMENTARY PRODUCTS

TK-MAX-FIP
Stand-Alone Display Kit

FastReporter2
Data Post-Processing Software

Cleaning Kits

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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.
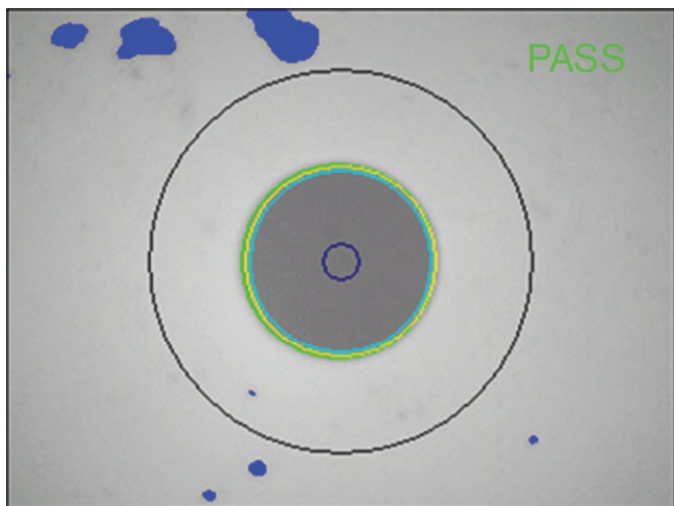

Figure 1. An out-of-focus image can hide critical defects capable of delivering a "pass" verdict.
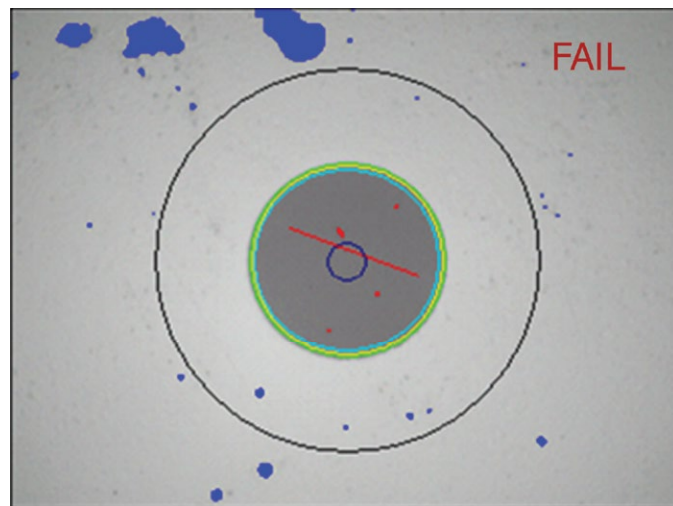

Figure 2. An optimized focus adjustment will ensure that all defects affecting performances are seen.

› 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 ORL 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 it's 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.

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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 strategicially 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.

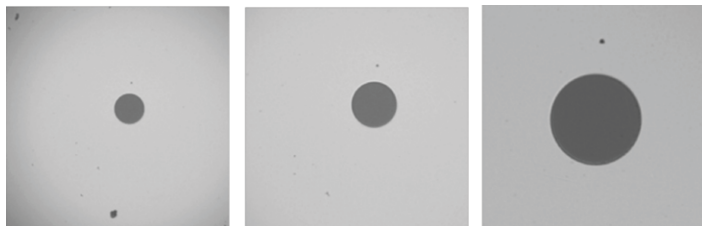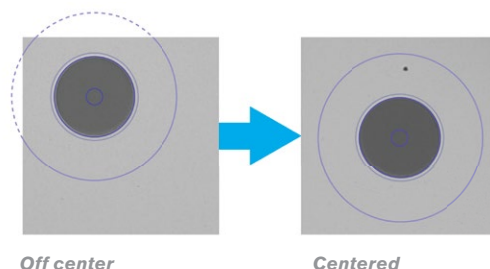### THE FIP-400B'S HASSLE-FREE, AUTOMATIC IMAGE-CENTERING FEATURE SAVES PRECIOUS TIME

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*

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.

Low magnification   *Medium magnification*   *High magnification*

SIMULTANEOUS MULTIFIBER VIEW WITH PICTURE-IN-PICTURE (PIP)

The FIP-430B's unique 912 µm x 912 µm FOV greatly facilitates visual MPO connector. Plus, ConnectorMax2 includes a picture-in-picture, low-magnification window that displays multiple fibers (4 or 8 at a time), ensuring that you never miss a fiber while scanning.
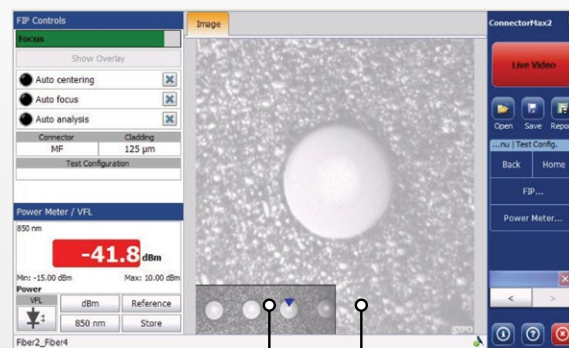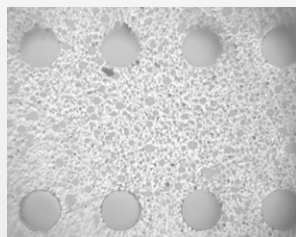
Low-Magnification View with Picture-in-Picture (PIP)
See and track which fiber is being inspected

High-Magnification View
Analyze each fiber for contamination and defects

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AUTOMATIC PASS/FAIL CONNECTOR CERTIFICATION
WITH CONNECTORMAX2 SOFTWARE

Powerful connector endface image viewing and 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 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 in conjunction with FIP-400B series of fiber inspection probes (models with on-board analysis feature), 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.

Therefore, running a pass/fail analysis 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.

The ConnectorMax 2 Software is included with all FIP-400B Fiber inspection Probes Series as the default image viewer and results saving tool. Although, please note that the automated pass/fail analysis functionality is only enabled if used in conjunction with an FIP-420B or FIP-430B probe models, which offer on-board analysis feature.
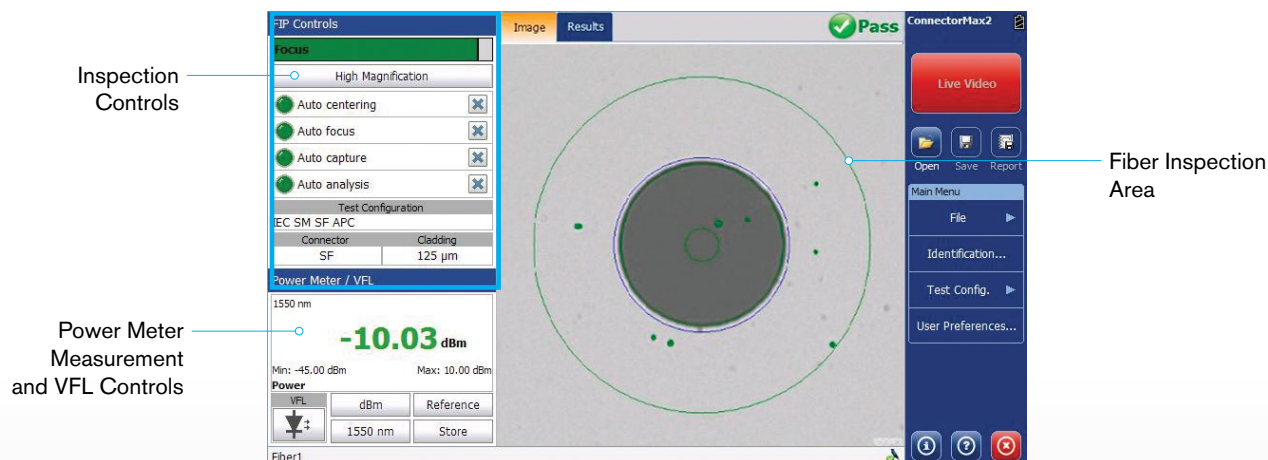
ConnectorMax2 also offers the smoothest MPO/MTP connector analysis process thanks to its unique PIP multifiber view that is paired with the automated centering and focusing functions of the FIP-430B. Your hands are free to control the X and Y scanning tool so that you can sequentially run the Pass/Fail analysis on each fiber of the connector to get a global status as per the standards.

Less manipulations. Less time taken. Productivity guaranteed.
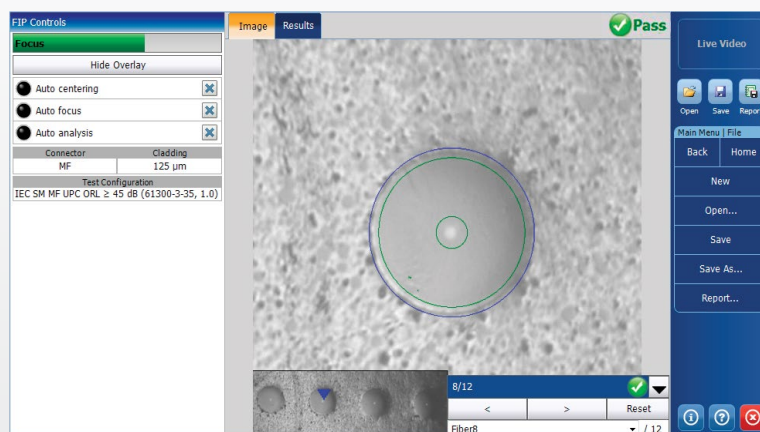
HIGH-VISIBILITY LED PASS/FAIL INDICATOR

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
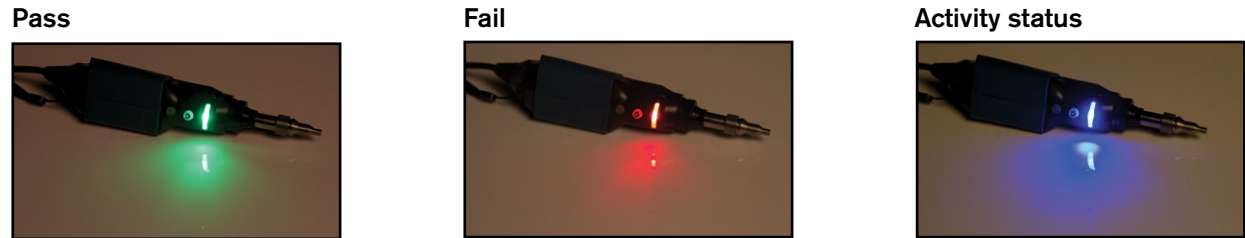
FIP-400B UNIVERSAL COMPATIBILITY*

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, IQS benchtop platforms as well as PCs and laptops.

FTB Ecosystem

MaxTester 700B OTDR Series

Stand-Alone MAX-FIP Display

IQS Platform

PC and Laptops

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

THREE MODELS

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

FEATURES	Basic FIP-410B	Semi-Automated FIP-420B	Fully-Automated FIP-430B
Three magnification levels	√	√	√
Image capture	√	√	√
Five-megapixel CMOS capturing device	√	√	√
Automatic fiber image-centering function	X	√	√
Automatic focus function	X	X	√
On-board pass/fail analysis	X	√	√
Pass/fail LED indicator	X	√	√

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VERSATILE BENCHTOP SOLUTION FOR LABS AND CABLE MANUFACTURING

The FIP-400B can be quickly transformed into a benchtop inspection solution by mounting the probe on a desktop support stand (GP-2182, sold as accessory). This leaves your hands free for repetitive manipulations and inspection of fiber jumpers and connectors. This makes the FIP-400B probes quite a handy solution for the production floor having to inspect both patch chords and bulkheads.

› Stable hold and rugged design

› Adjustable angle up to 7 different positions

› Allows male and female connector inspection using the same tool

› Quick release handle

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

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SPECIFICATIONS [a]

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) [b]
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 Storage	−10 ℃ to 50 ℃ −40 ℃ to 70 ℃
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 REQUIREMENTS	MINIMUM REQUIREMENTS WINDOWS XP (32 BIT)	MINIMUM REQUIREMENTS WINDOWS 7 (32 AND 64 BIT)	MINIMUM REQUIREMENTS WINDOWS 8 (32 AND 64 BIT)
Processor	Pentium (800 MHz or higher recommended)	Pentium (1.6 GHz or higher recommended)	Pentium (1.6 GHz or higher recommended)
RAM	256 MB (512 MB recommended)	512 MB (2 GB recommended)	1 GB for 32; 2 GB for 64 (2 GB or more recommended)
Disk space	40 MB	40 MB	40 MB
Other	Latest version of .NET Framework 3.5 DirectX 9.0 USB 2.0, minimum	Latest version of .NET Framework 3.5 DirectX 9.0 USB 2.0, minimum	Desktop applications supported

ACCESSORIES

Includes:

Video inspection probe (FIP-410B/420B/430B)

Bulkhead and patch cord tips

ConnectorMax2 software

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

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ORDERING INFORMATION

FIP-4XXB-XX-XX

Inspection Probe Model [a]
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 [b]
Bulkhead tips
FIPT-400-FC-APC = FCAPC tip for bulkhead adapter
FIPT-400-FC-SC = FC and SC tip for bulkhead adapter [c]
FIPT-400-LC = LC tip for bulkhead adapters
FIPT-400-LC-APC = LC/APC tip for bulkhead adapter
FIPT-400-MU = MU tip for bulkhead adapters
FIPT-400-SC-APC = SC APC tip for bulkhead adapter [d]
FIPT-400-SC-UPC = SC UPC tip for bulkhead adapter
FIPT-400-ST = ST tip for bulkhead adapter

Patchcord tips
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 patchcord tip for 1.6 mm ferrules
FIPT-400-U20M2 = Universal patchcord tip for 2.0 mm ferrules (D4, Lemo)
FIPT-400-U25M = Universal patchcord tip for 2.5 mm ferrules [c]
FIPT-400-U25MA = Universal patchcord tip for 2.5 mm ferrules APC [d]

Multifiber tips [e]
FIPT-400-MTP2 = MTP/MPO UPC tip for bulkhead adapter
FIPT-400-MTPA2 = MTP/MPO APC tip for bulkhead adapter
FIPT-400-MTP-MTR = MTP/MPO multirow UPC tip for bulkhead adapter
FIPT-400-MTP-MTRA = MTP/MPO multirow APC tip for bulkhead adapter

Tip kits
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 1.25 mm ferrules APC
FIPT-400-LC-K-APC = LC tip kit including: FIPT-400-LC-APC: LC/APC tip for bulkhead adapter
     and FIPT-400-U12MA: universal patchcord tip for 1.25 mm ferrules APC
FIPT-400-LC-K-UPC = LC tip kit including: FIPT-400-LC: LC tip for bulkhead adapters and
     FIPT-400-U12M: universal patchcord tip for 1.25 mm ferrules
FIPT-400-MTP-MTR-K = MTP/MPO multirow APC and UPC tip for bulkhead adapter [e]

Example: FIP-420B-UPC-FIPT-400-FC-SC-FIPT-400-U25M

Notes
a. Includes ConnectorMax2 software.
b. This list represents a selection of fiber inspection tips that covers the most common connectors and applications but does not reflect all the tips available. EXFO offers a wide range of inspection tips, bulkhead adaptors and kits to cover many more connector types and different applications. Please contact your local EXFO sales representative or visit **www.EXFO.com/FIPtips** for more information.
c. Included when UPC base tips are selected.
d. Included when APC base tips are selected.
e. Includes a bulkhead adapter for patch cord inspection.

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