Glass Fibre-optic Specifications

Construction:
Combination of optical glass fibre, stainless steel, PVC, brass, silicon rubber, Teflon™, moulded thermoplastics, and optical grade epoxy. Optical fibre is F2 core, EN1 clad, except where stated. Flexible steel interlock sheathing is 302 stainless, except where stated.

Sensing Range:
Refer to the range specifications shown on the glass fibre-optic drawing pages.

Bend Radius:
Inside bend radius must be 12 mm or greater for PVC covered fibre-optic assemblies, and 25 mm or greater for stainless steel armoured cable covered fibres.

Length:
Standard length for assemblies is 61 cm or 91 cm; see dimension drawings. Most models are available from the factory with shorter or longer cable lengths, up to 18 m maximum.

Operating Temperature:
- Fibre assemblies with stainless steel sheathing and metal end tips: -140 to +249° C.
- Fibre assemblies with PVC sheathing and/or plastic end tips: -40 to +105° C.
- Special order assemblies with stainless steel sheathing and metal end tips and model suffix "M600": -140 to +315° C.
- Special order assemblies with stainless steel sheathing and metal end tips and model suffix "M900": -140 to +480° C.

Numbering scheme for Banner glass fibres

FIBRE BUNDLE DIAMETER designator:
.44 = 0,7 mm
.5 = 0,8 mm
.75 = 1,2 mm
1 = 1,6 mm
1.5 = 2,3 mm
2 = 3,2 mm
2.5 = 4 mm

SHEATHING MATERIAL designator:
S = Stainless steel flexible conduit
P = PVC with galvanised monocoil reinforcing wire
L = Silicone rubber tubing (max. flexibility, min. fibre protection)
T = Teflon tubing (max. chemical resistance, min. flexibility)
HDP = High-density polyethylene (max. electrical isolation, min. flexibility)

I A T 2 3 S X X

ASSEMBLY STYLE designator:
B = Bifurcated: emitter and receiver to one sensing point
DB = Double Bifurcated: emitter and receiver to two sensing points
I = Individual: emitter or receiver to one sensing point

OVERALL LENGTH designator (length of the complete fibre-optic assembly in feet):
3 = 3 ft. = ±914 mm
6 = 6 ft. = ±1829 mm

MODIFICATIONS designator (suffix may be any length):
M600 suffix = available in 315° C
M900 suffix = available in 480° C

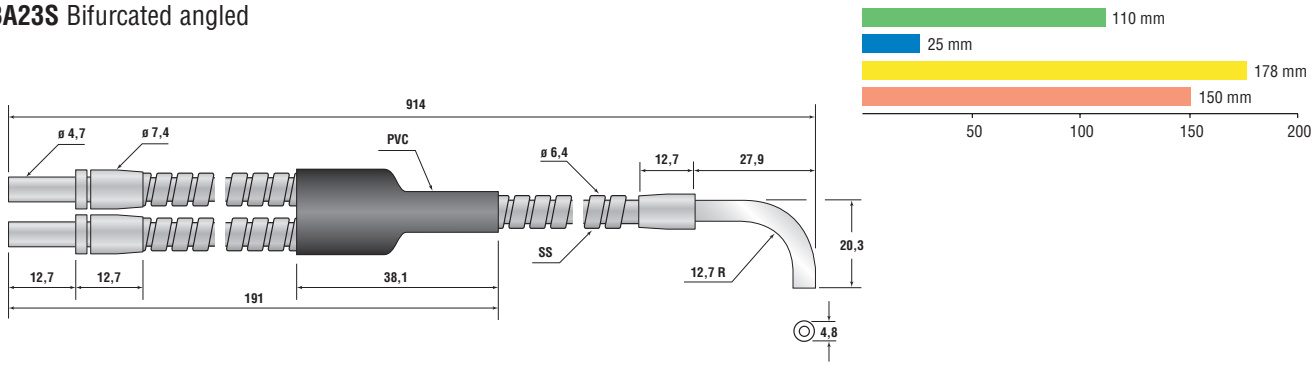
SENSING END TIP STYLE designator:
A = Angled tip (90°)
AM = Angled tip (90°), probe 1,5 mm ø
AMM = Angled tip (90°), probe 1,1 mm ø
AR = Angled tip (90°), rectangular bundle termination
AT = Angled (90°) and threaded tip
ATR = Angled (90°) and threaded tip, rectangular bundle
F = Ferruled tip, same as sensor end tip
FR = Ferruled tip, rectangular bundle termination
HA = Half-angled tip (45°)
HAR = Half-angled tip (45°), rectangular bundle
HAT = Half-angled (45°) and threaded brass tip
HATR = Half-angled and threaded tip, rectangular bundle
M = Miniature tip (ø 1,5 mm)
MAP = Miniature angled (90°) probe tip
MHAP = Miniature half-angled (45°) probe tip
MM = Micro-miniature probe tip (ø 1,1 mm)
MT = Threaded brass end tip
MTAP = Threaded brass, miniature angled (90°) tip
MTHAP = Threaded brass, miniature half-angled (45°) tip
MTP = Threaded brass, miniature probe (ø 1,5 mm)
P = Probe bendable tip (ø 2,3 mm)
R = Rectangular bundle termination
T = Threaded brass end tip
TA = Threaded angled (90°) end tip
TAR = Threaded, rectangular bundle
THA = Threaded, half-angled (45°) end tip
THAR = Threaded and half-angled (45°), rectangular bundle
TR = Threaded end tip, rectangular bundle termination



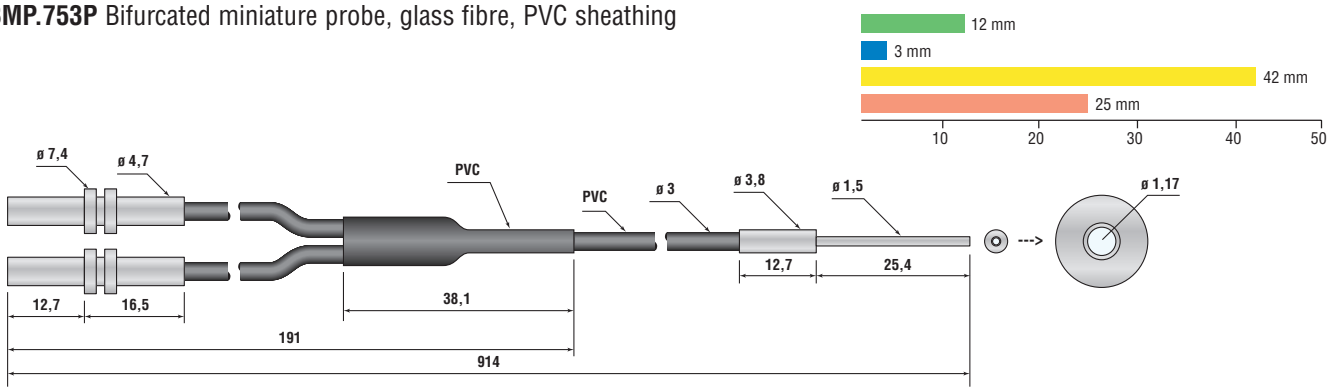
R55F ***SME312*** ***D12E*** ***D12***

Dimensions (in mm) **Range (in mm)**

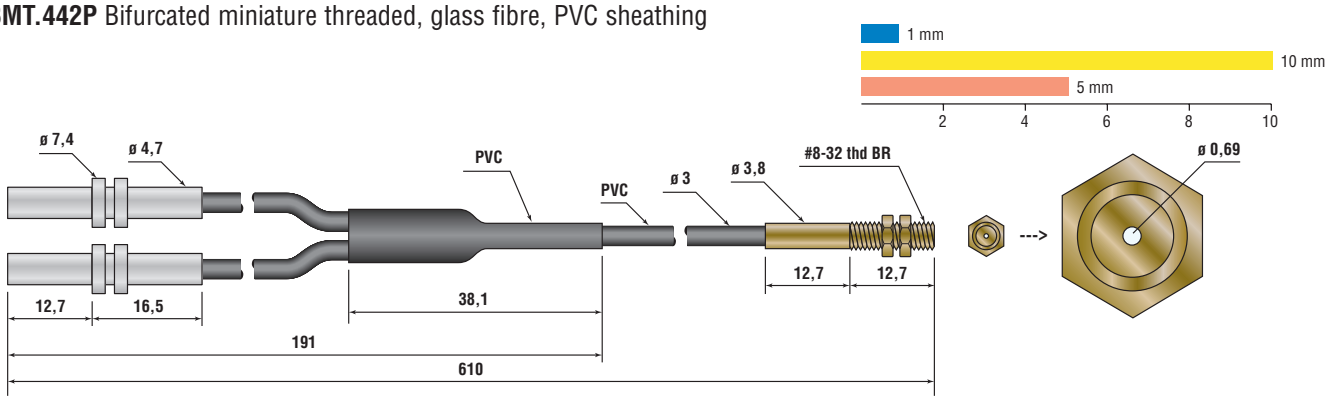
BA23S Bifurcated angled



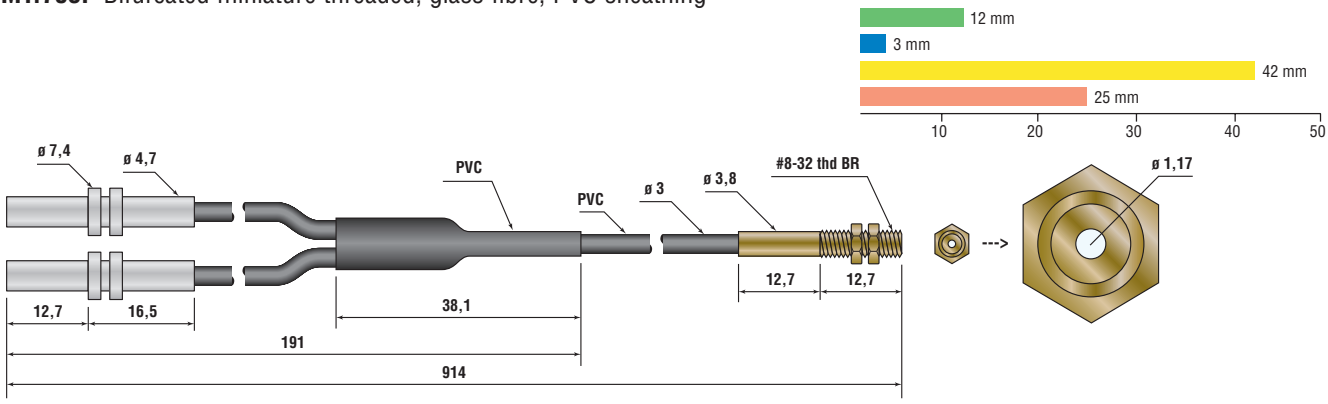
BMP.753P Bifurcated miniature probe, glass fibre, PVC sheathing



BMT.442P Bifurcated miniature threaded, glass fibre, PVC sheathing



BMT.753P Bifurcated miniature threaded, glass fibre, PVC sheathing

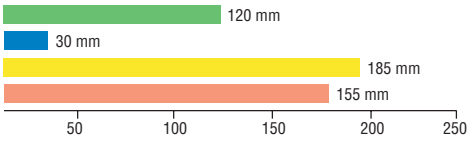


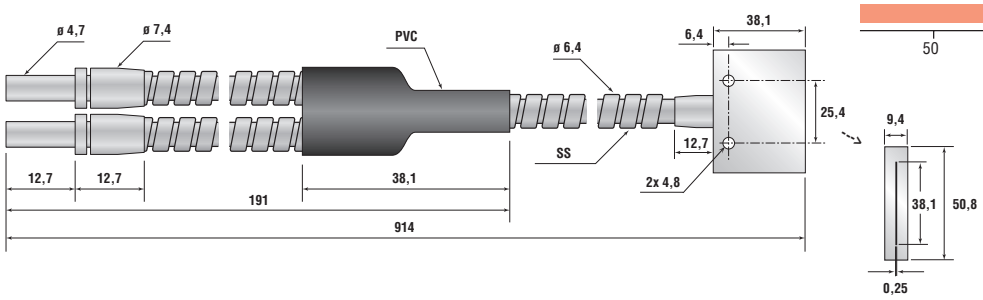


R55F ***SME312*** ***D12E*** ***D12***

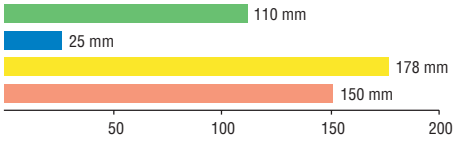
Dimensions (in mm)	Range (in mm)

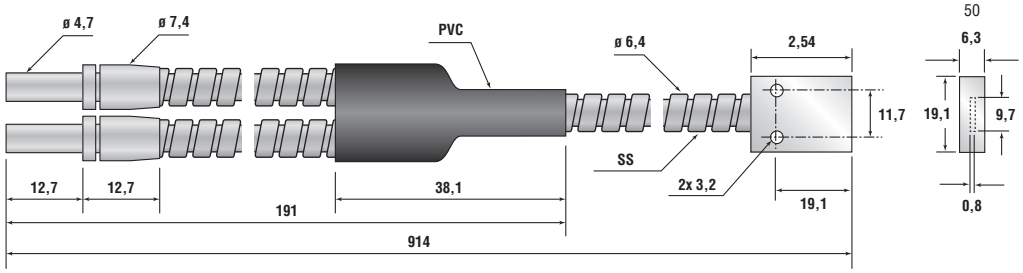
BR2.53S Bifurcated rectangular, 40 mm



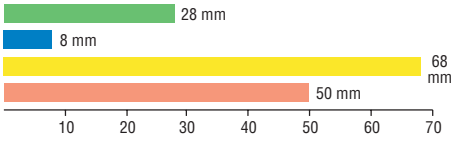


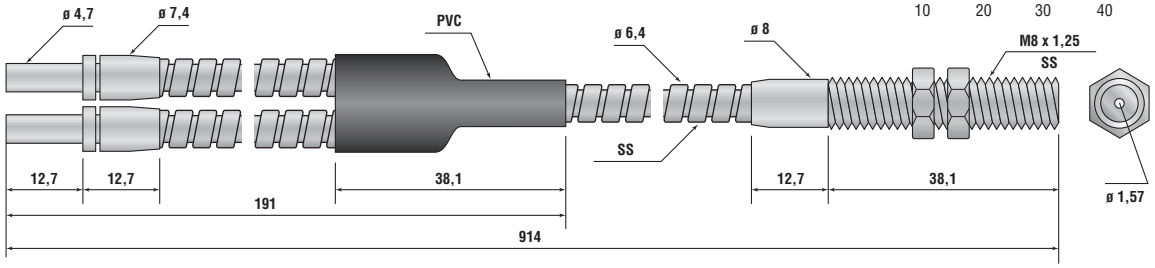
BR23S Bifurcated rectangular, 10 mm



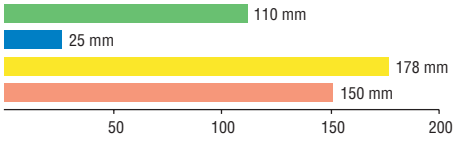


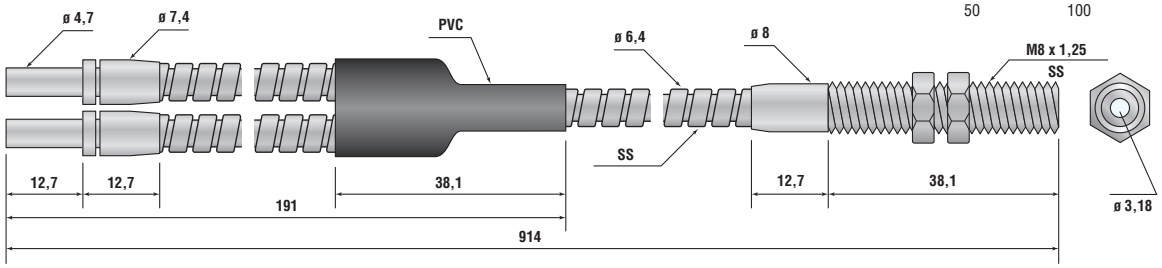
BT13SM8 Bifurcated threaded, glass fibre, SS sheathing





BT23SM8 Bifurcated threaded, glass fibre, SS sheathing



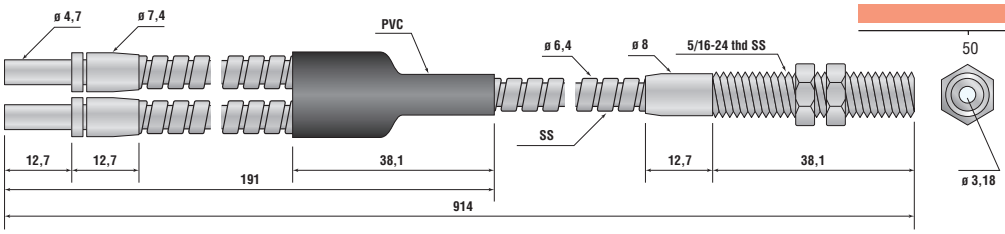


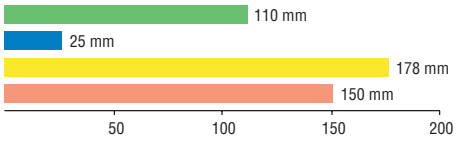


R55F *SME312* *D12E* *D12*

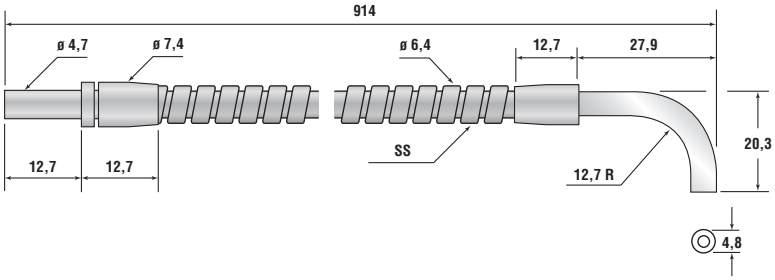
Dimensions (in mm) **Range (in mm)**

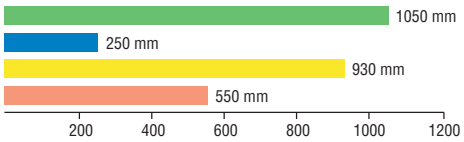
BT23SM900 Bifurcated threaded, glass fibre, SS sheathing, special high-temperature 480° C end tip construction



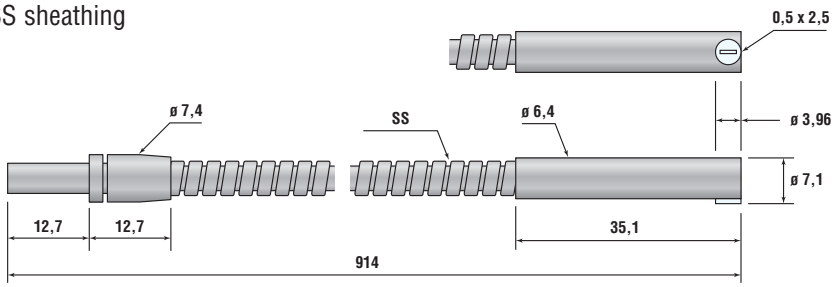


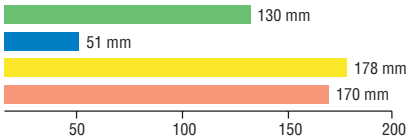
IA23S Individual angled



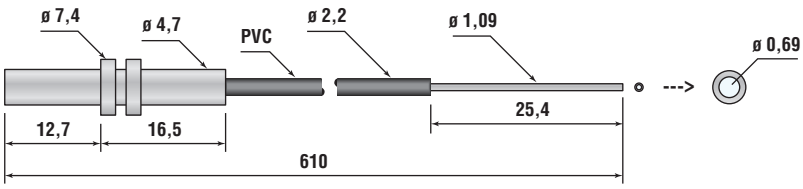


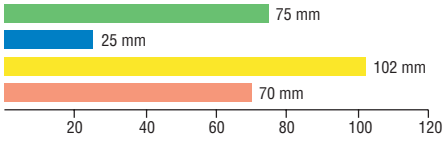
IAR.753SMTA Individual tight angle with rectangular bundle glass fibre, SS sheathing



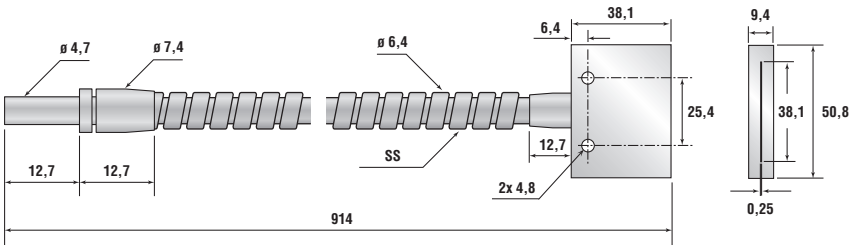


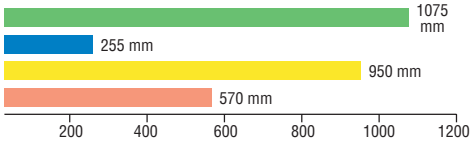
IMM.442P Individual miniature probe, glass fibre, SS sheathing





IR2.53S Individual rectangular, 40 mm



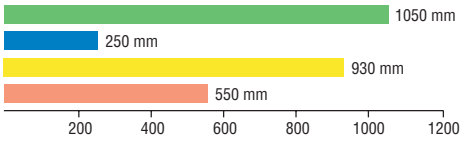


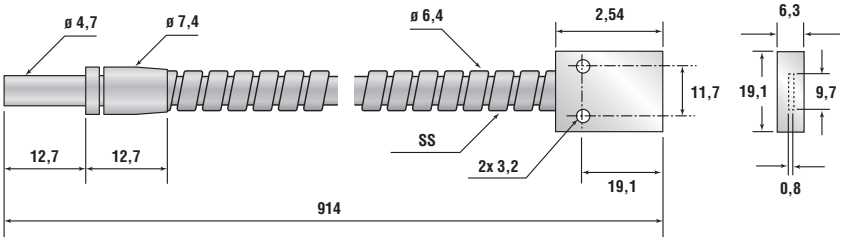


R55F ***SME312*** ***D12E*** ***D12***

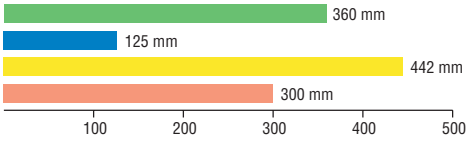
Dimensions (in mm) **Range (in mm)**

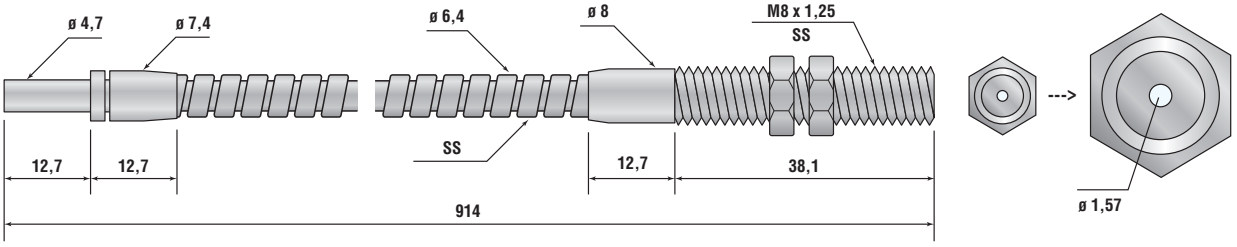
IR23S Individual rectangular, 10 mm



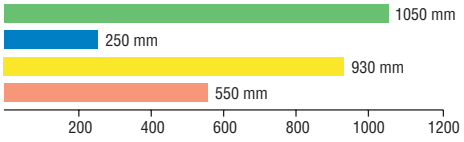


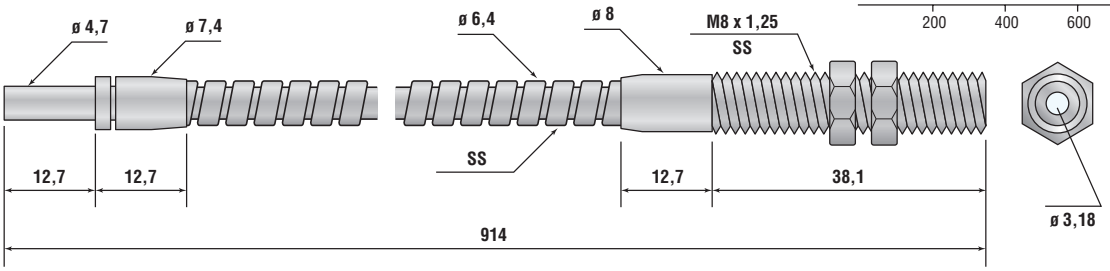
IT13SM8 Individual threaded, glass fibre, SS sheathing



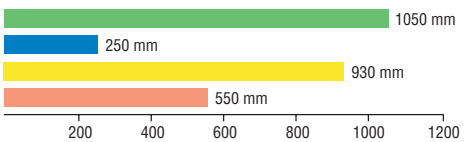


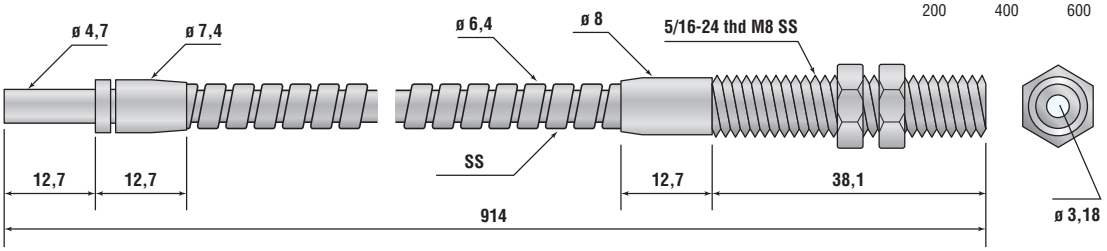
IT23SM8 Individual threaded, glass fibre, SS sheathing

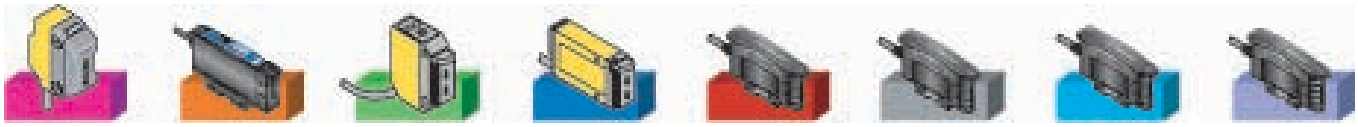




IT23SM8MM900 Individual threaded, glass fibre, SS sheathing, special high-temperature 480° C end tip construction



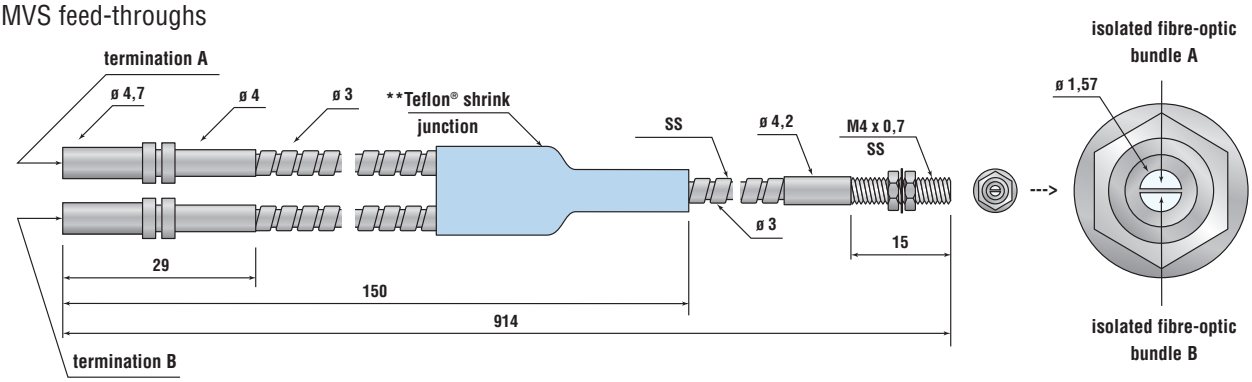




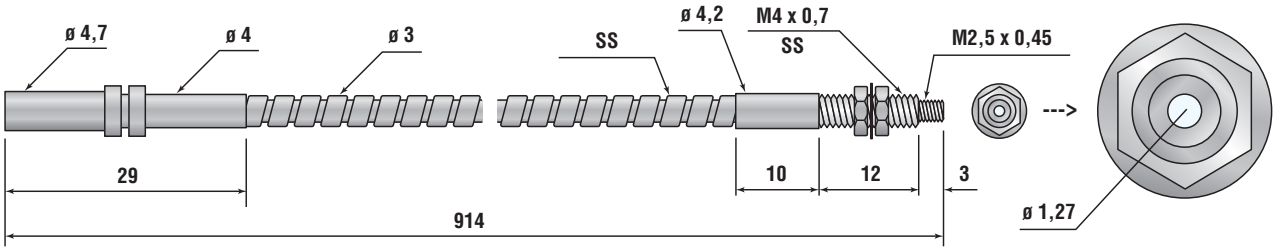
QS18 | D11(E) | Q23 | SME312 | D10SHP | D10HP | D10HS | D10SHS

Dimensions (in mm)

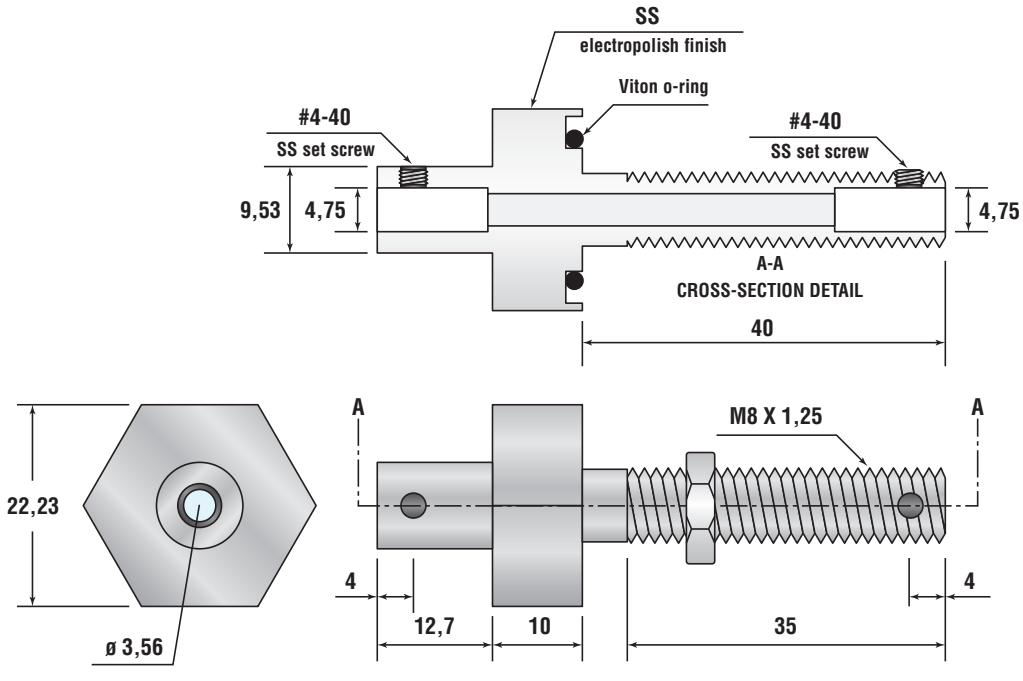
BMT13SMVF* Bifurcated miniature threaded, glass fibre, SS sheathing, special vacuum construction; may be used with VFT-M8MVS feed-throughs



IMT.753SMVF Individual miniature threaded, glass fibre, SS sheathing, special vacuum construction; may be used with VFT-M8MVS feed-throughs



VFT-M8MVS Individual vacuum feed-through, 8 mm threaded body; use with "MVF" glass fibres; seals to 1,3 x 10^{-9} mbar up to 120° C; use PIF66UM.52M.19D plastic fibre on the atmospheric side



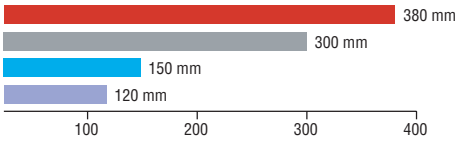
** Contact factory representative for range information ** Teflon® FEP is a registered trademark of Dupont Co.*

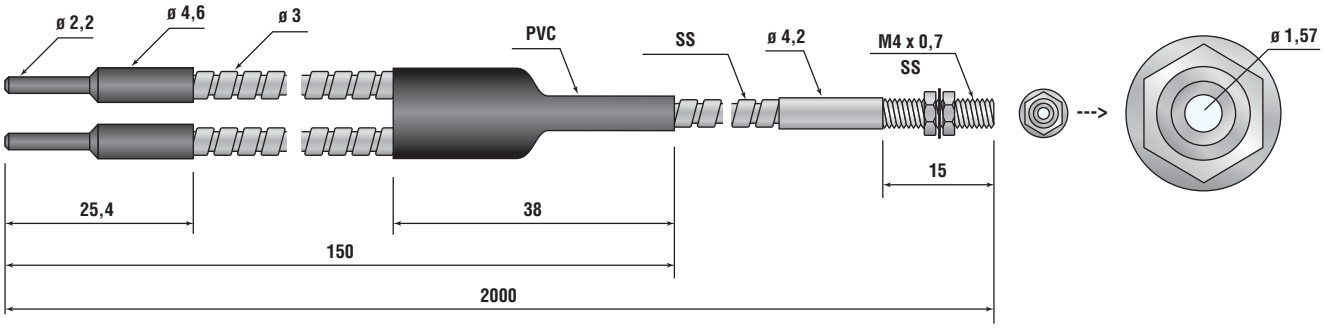


D10SHP ***D10HP*** ***D10HS*** ***D10SHS***

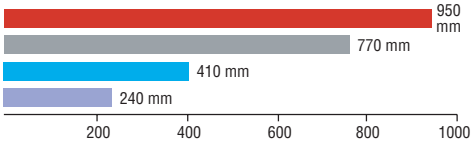
Dimensions (in mm) **Range (in mm)**

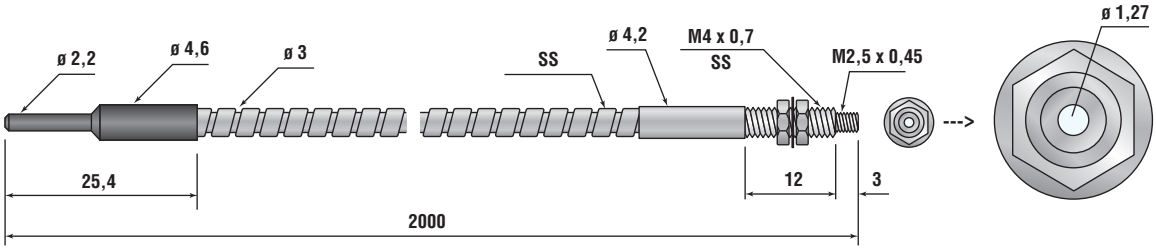
BMT16.6S-HT Bifurcated miniature threaded, glass fibre, SS sheathing, special high-temperature 315˚ C end tip construction; D10 sensors ONLY





IMT.756.6S-HT Individual miniature threaded, glass fibre, SS sheathing, special high-temperature 315° C end tip construction; D10 sensors ONLY





Glass Fibre-optic Lens Attachments

L9M8*

- Glass lens with anodised blue aluminum housing
- Used to extend the range of opposed mode glass fibre-optics systems (e.g. IT13SM8, IT23SM8)
- Used also with a bifurcated fibre (BT13SM8) for short-range retroreflective sensing
- The smaller fibre bundle 1,5 mm is desirable for retroreflective use
- Maximum temperature: 315° C

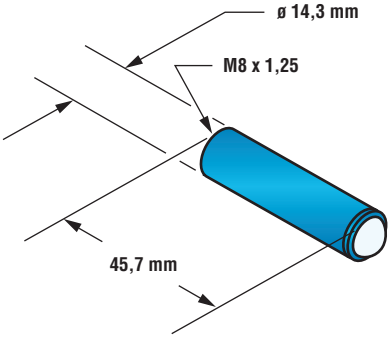
L10M8*

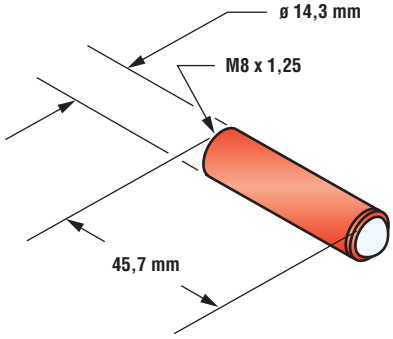
- Glass convergent lens with anodised red aluminum housing
- Used with bifurcated threaded glass fibres (e.g. BT13SM8, BT23SM8)
- The L10 lens focuses the light to a point as small as 0,8 mm when used with a 1,5 mm diameter fibre bundle
- Maximum temperature: 315° C
- Focal distance is 5 mm ±1 mm

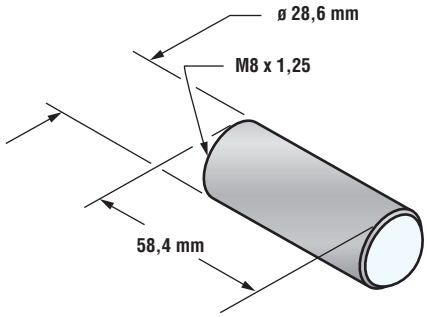
L16FSSM8*

- Glass lens with stainless steel housing
- Used for long-range opposed (e.g. IT13SM8, IT23SM8) or retroreflective sensing (e.g. BT23SM8)
- Maximum temperature: 480° C

** version with 5/16 inch - 24 threading available*



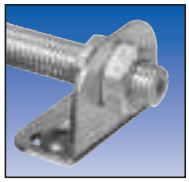


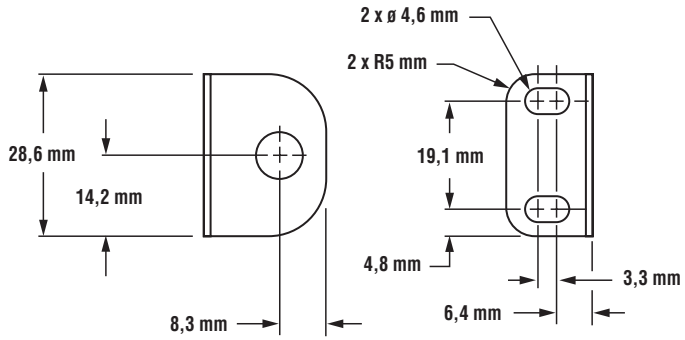


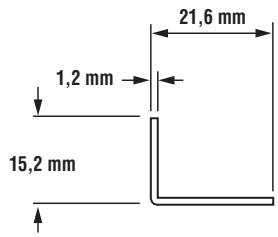
Fibre-optic Mounting Brackets

SMBF

- Right-angle bracket for glass fibre-optics with 5/16" x 24 threaded tip
- Stainless steel (1,2 mm)







D10 *Expert* Series Sensors



Advanced fibre-optic sensors for use with plastic fibres.

- Easy-to-set automatic *Expert*-style TEACH options* including static, dynamic, and single point programming plus manual adjustment for fine-tuning
- 16-bit micro-controller and 12-bit analogue-to-digital converter for high performance, low contrast sensing
- Easy-to-read 4-digit display for programming and signal strength readout, plus indicators for a continuous readout of operating status (user configurable)
- Four-mode power and speed selection with automatic cross-talk avoidance circuitry
- Selectable OFF-delay options
- Gate input wire can be used to selectively inhibit sensor outputs from switching
- Models available with visible red (680 nm) or visible green (525 nm) sensing beam
- Sleek, ultra-slim 10 mm housing, mounts to a standard 35 mm DIN rail

LED diagnostics.
Indicator LEDs keep you constantly informed of the output status of the D10 sensors. A separate, domed LED for each channel lights yellow when the output is conducting.

Two independently configurable outputs.
For the ultimate in versatility, the D10 *Expert* has two independent output channels, each with its own individually configurable set-point. This allows you to solve multiple applications with a single sensor.



Two discrete outputs, both are either NPN (sinking) or PNP (sourcing), depending on the model.



Analogue and discrete output models have one discrete output (either NPN or PNP), plus a 4-20 mA current analogue output or a 0-10V dc voltage analogue output, depending on the model.

Pre-wired or quick-disconnect wiring, 12 to 24V dc.**
The D10 has the wiring choices you need. Models are available with an integral, 2 m or 9 m pre-wired cable or quick-disconnect connection (8 mm) for plug-and-play convenience and interchangeability.

Four different response speeds.
The D10 sensor has four different response speeds. The maximum sensing distance depends upon the response speed settings. The icons shown on top of the pages with the range charts reflect the four different power settings.



D10SHP	D10HP	D10HS	D10SHS
Super **H**igh **P**ower	**H**igh **P**ower	**H**igh **S**peed	**S**uper **H**igh **S**peed
2,5 ms	1 ms	200 µs	50 µs

** U.S. Patent #5,808,296*
*** 15 to 24V dc for 0-10V dc analogue models*



D10 *Expert* Series Plastic Fibre-optic – Dual-Discrete Output Models

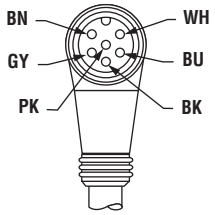
Light Source	Models	Cable	Supply Voltage	Output Type	Response Time
VISIBLE RED 680 nm	**D10DPFP D10DPFPQ**	2 m cable ø 8 mm QD, 6-pin	12 to 24V dc	PNP (sourcing)	Selectable: 50 µs, 200 µs, 1 ms, 2,5 ms
VISIBLE RED 680 nm	**D10DNFP D10DNFPQ**	2 m cable ø 8 mm QD, 6-pin	12 to 24V dc	NPN (sinking)	Selectable: 50 µs, 200 µs, 1 ms, 2,5 ms
VISIBLE GREEN 525 nm	**D10DPFPG D10DPFPGQ**	2 m cable ø 8 mm QD, 6-pin	12 to 24V dc	PNP (sourcing)	Selectable: 50 µs, 200 µs, 1 ms, 2,5 ms
VISIBLE GREEN 525 nm	**D10DNFPG D10DNFPGQ**	2 m cable ø 8 mm QD, 6-pin	12 to 24V dc	NPN (sinking)	Selectable: 50 µs, 200 µs, 1 ms, 2,5 ms



D10 *Expert* Series Plastic Fibre-optic – Analogue and Discrete Output Models

Light Source	Models	Cable	Supply Voltage	Discrete Output	Analogue Output	Response Time
VISIBLE RED 680 nm	**D10IPFP D10IPFPQ**	2 m cable ø 8 mm, 6-pin	12 to 24V dc	PNP (sourcing)	4-20 mA	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE RED 680 nm	**D10INFP D10INFPQ**	2 m cable ø 8 mm, 6-pin	12 to 24V dc	NPN (sinking)	4-20 mA	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE RED 680 nm	**D10UPFP D10UPFPQ**	2 m cable ø 8 mm, 6-pin	15 to 24V dc	PNP (sourcing)	0-10V	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE RED 680 nm	**D10UNFP D10UNFPQ**	2 m cable ø 8 mm, 6-pin	15 to 24V dc	NPN (sinking)	0-10V	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE GREEN 525 nm	**D10IPFPG D10IPFPGQ**	2 m cable ø 8 mm, 6-pin	12 to 24V dc	PNP (sourcing)	4-20 mA	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE GREEN 525 nm	**D10INFPG D10INFPGQ**	2 m cable ø 8 mm, 6-pin	12 to 24V dc	NPN (sinking)	4-20 mA	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE GREEN 525 nm	**D10UPFPG D10UPFPGQ**	2 m cable ø 8 mm, 6-pin	15 to 24V dc	PNP (sourcing)	0-10V	50 µs or 200 µs or 1 ms or 2,5 ms
VISIBLE GREEN 525 nm	**D10UNFPG D10UNFPGQ**	2 m cable ø 8 mm, 6-pin	15 to 24V dc	NPN (sinking)	0-10V	50 µs or 200 µs or 1 ms or 2,5 ms

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
ø 8 mm, 6-pin	**PKG6Z-2**	2 m	Straight	Pin-out ø 8 mm, 6-pin (Connector on Cable Shown) 
ø 8 mm, 6-pin	**PKG6Z-9**	9 m	Straight	
ø 8 mm, 6-pin	**PKW6Z-2**	2 m	Right-Angle	
ø 8 mm, 6-pin	**PKW6Z-9**	9 m	Right-Angle	

D11 Series Sensors

D11 *Expert* Series – economical TEACH-mode fibre-optic sensors.
Available with red, green, blue and white LEDs, D11E fibre-optic sensors provide powerful, compact, DIN-rail-mountable options for sensing and registration control. They are low-cost, high-power, plastic fibre-optic sensors with fast 0,2 ms response time. D11 *Expert* models feature push-button programming to "teach" dark and light sensing conditions in low-contrast applications.

- Easy push-button TEACH-mode programming automatically adjusts sensitivity to optimal setting
- Designed for high performance, even in low-contrast sensing applications (sensitivity set to just above the "dark" condition)
- D11E2 Series sensors set the switching point midway between the "dark" and "light" conditions to ignore subtle changes, such as web flutter
- Fast, 200 microsecond (0,2 millisecond) output response; a 40 millisecond output pulse stretcher may be programmed, when required
- Choose models with NPN (sinking) or PNP (sourcing) output
- Output may be programmed for either light or dark operate
- Sealed one-button programming* assures security of settings
- LED status indications for Power ON, output state, received signal strength, sensing contrast, and diagnostic trouble shooting
- Choose models with integral 2 m cable or quick-disconnect connector (8 mm); 9 m cables are also available

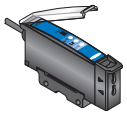




D11 Series–self-contained fibre-optic sensors.
D11 standard sensors feature a 15-turn sensitivity adjustment. LEDs indicate Power ON and Output ON, and flash to warn of problems including over-loaded output and marginal excess gain. They feature overload, shorted load and reverse polarity protection, and automatically reset when the problem is cleared.

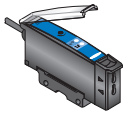
- Choice of NPN (sinking) or PNP (sourcing) complementary outputs – one normally open and one normally closed; 150 mA output load rating
- Normally closed output may be wired as a diagnostic alarm to alert personnel to marginal sensing conditions**
- 500 microsecond (0,5 millisecond) output response
- LED status indications for Power ON, Output Overload, Fibre Alignment, and Marginal Gain conditions**
- Choose models with integral 2 m cable or quick-disconnect connector (8 mm); 9 m cables are also available

** U.S. Patent #5808296*
*** U.S. Patent #5087838*

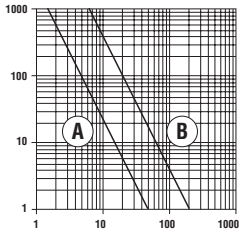
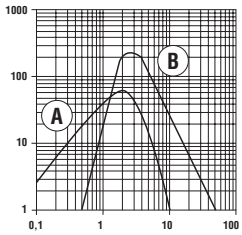


D11 *Expert* Series Plastic Fibre-optic Models (Visible Red* 680 nm)

Models	Switching Threshold	Cable	Supply Voltage	Output Type	Range Specs
D11EP6FP **D11EP6FPQ**	Just above dark condition	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	PNP (sourcing)	Range varies by sensing mode and fibre-optics used. • PIT46U fibres, opposed mode: 180 mm • PIT26U fibres, opposed mode: 50 mm • PBT46U fibres, diffuse mode: 50 mm • PBT26U fibres, diffuse mode: 10 mm Diffuse mode performance based on 90% reflectance white test card.
D11EN6FP **D11EN6FPQ**	Just above dark condition	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	NPN (sinking)	
D11E2P6FP **D11E2P6FPQ**	Midway between dark and light condition	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	PNP (sourcing)	
D11E2N6FP **D11E2N6FPQ**	Midway between dark and light condition	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	NPN (sinking)	

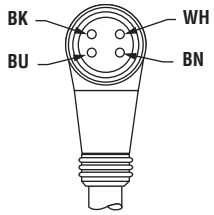


D11 Series Plastic Fibre-optic Models (Visible Red* 680 nm)

Models	Cable	Supply Voltage	Output Type	Excess Gain
D11SP6FP	2 m cable	10 to 30V dc	Complementary PNP (sourcing)	 Excess gain in relation to distance (in mm). A) PIT26U opposed B) PIT46U opposed
D11SP6FPQ	ø 8 mm QD, 4-pin	10 to 30V dc	Complementary PNP (sourcing)	
D11SN6FP	2 m cable	10 to 30V dc	Complementary NPN (sinking)	 Excess gain in relation to distance (in mm). Diffuse mode performance based on 90% reflectance white test card. A) PBT26U diffuse mode B) PBT46U diffuse mode
D11SN6FPQ	ø 8 mm QD, 4-pin	10 to 30V dc	Complementary NPN (sinking)	

** Contact your local Banner sales representative for versions with blue, green or white LEDs*

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
ø 8 mm, 4-pin	**PKG4-2**	2 m	Straight	Pin-out ø 8 mm, 4-pin (Connector on Cable Shown) 
ø 8 mm, 4-pin	**PKG4-10**	9 m	Straight	
ø 8 mm, 4-pin	**PKW4-2**	2 m	Right-Angle	

Mini-Beam™ *Expert* Series Sensors

Millions of sensors in use.
The MINI-BEAM is the world's most popular miniature photoelectric sensor. With millions of units in use worldwide, it has become the benchmark for small photoelectrics. Fact is, there are more MINI-BEAMs solving more sensing applications in more plants worldwide than any other sensor. Because there is a MINI-BEAM to solve every application in your plant, it is also your best single-sensor choice to standardise all of your sensing applications.

Advanced "TEACHABLE" microprocessor.
The MINI-BEAM™ *Expert* features a highly advanced, "teachable" microprocessor. With the sensor in TEACH mode, it can "learn" the ON and OFF sensing conditions required, compute the most accurate setting for recognising the difference in received light signals, and self-program that setting.

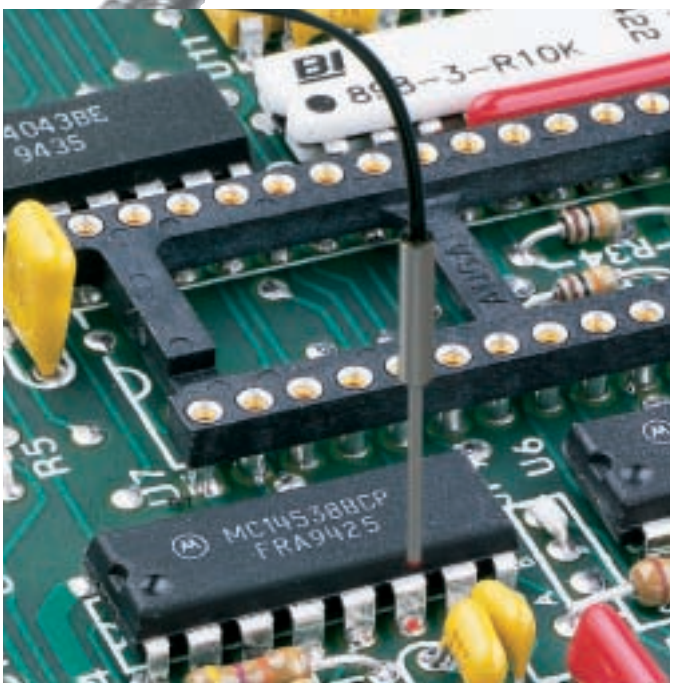
Simple, one-button operation.
The MINI-BEAM *Expert* "learns" each job with the push of a single button. Simply push it once with the sensor pointed at the ON condition, and once with it pointed at the OFF condition. Not only does it provide extremely accurate sensitivity settings, this single pushbutton is extremely easy to use, and it eliminates the potential for adjustment tampering on the production line.

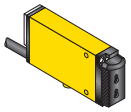


Pre-wired or quick-disconnect (QD) wiring, 10 to 30V dc.
The 10 to 30V dc sensors are available with an integral 2 m or 9 m cable, a 5-conductor PVC potted-in cable, or a 5-pin M12 x 1 quick-disconnect fitting.

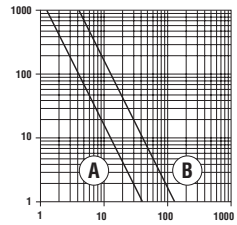
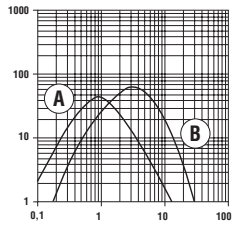
Rugged and sealed.
- Glass-filled polyester housing
- Epoxy-encapsulated electronics
- Sealed programming button
- Rated IEC IP67

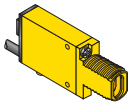




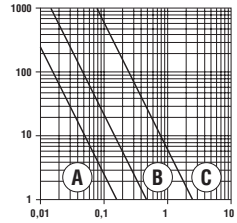
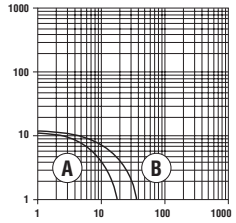
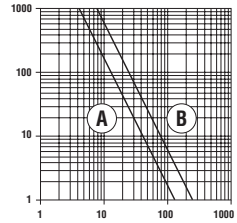
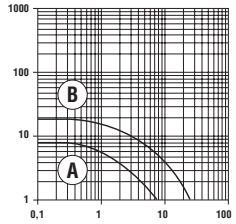


MINI-BEAM™ *Expert* Series Plastic Fibre-optic Models (Visible Red 650 nm)

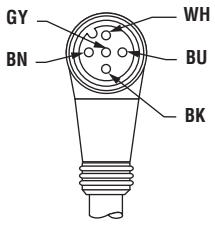
Models	Cable	Supply Voltage	Output Type	Excess Gain (in relation to distance in mm)
SME312FP	5-wire 2 m cable	10 to 30V dc	Bipolar NPN/PNP	 Opposed mode - individual fibres A) PIT26U fibre B) PIT46U fibre
SME312FPQD	M12 x 1, 5-pin	10 to 30V dc	Bipolar NPN/PNP	 Diffuse mode - bifurcated fibres (performance based on 90% reflectance white test card). A) PBT26U fibre, B) PBT46U fibre



MINI-BEAM™ *Expert* Series Glass Fibre-optic Models (Visible Red 650 nm and Infrared 880 nm)

Models	Cable	Supply Voltage	Output Type	Excess Gain (in relation to distance in mm)
SME312F	5-wire 2 m cable	10 to 30V dc	Bipolar NPN/PNP	 Opposed mode - individual fibres A) IT13S fibre, B) IT23S fibre, C) IT23S fibre with L9 lens
SME312FQD	M12 x 1, 5-pin	10 to 30V dc	Bipolar NPN/PNP	 Diffuse mode - bifurcated fibres (performance based on 90% reflectance white test card). A) BT13S fibre, B) BT23S fibre
SME312FV	5-wire 2 m cable	10 to 30V dc	Bipolar NPN/PNP	 Opposed mode - individual fibres A) IT13S fibre B) IT23S fibre
SME312FVQD	M12 x 1, 5-pin	10 to 30V dc	Bipolar NPN/PNP	 Diffuse mode - bifurcated fibres (performance based on 90% reflectance white test card). A) BT13S fibre, B) BT23S fibre

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
M12 x 1, 5-pin	**MQDC1-506**	2 m	Straight	Pin-out M12 x 1, 5-pin (Connector on Cable Shown) 
M12 x 1, 5-pin	**MQDC1-515**	4,5 m	Straight	
M12 x 1, 5-pin	**MQDC1-530**	9 m	Straight	
M12 x 1, 5-pin	**MQDC1-506RA**	2 m	Right-Angle	
M12 x 1, 5-pin	**MQDC1-515RA**	4,5 m	Right-Angle	
M12 x 1, 5-pin	**MQDC1-530RA**	9 m	Right-Angle	

R55F Series Sensors

Microprocessor-based programming achieves unsurpassed resolution.
Advanced programming features enable the R55F to reliably detect 16 levels of greyscale at up to 10.000 actuations per second, resulting in outstanding colour contrast sensitivity for all of your applications.

Advanced TEACH programming for unmatched simplicity & performance.
The R55F's innovative TEACH function offers you two options for sensing threshold programming. Static TEACH is used to set sensing conditions individually, and Dynamic TEACH is an automated method of "teaching" a series of conditions, and automatically updating the signal threshold while the sensor is operating.

Dynamic TEACH programs the sensor "on-the-fly".
Dynamic TEACH enables the R55F to "learn" a series of conditions "on-the-fly," sample the sensing events, compute the optimum threshold between "light" and "dark" conditions, then self-program that setting and periodically update it to compensate for any changes in sensing conditions during operation.

Static TEACH computes each sensing condition individually.
In Static TEACH mode, you simply point the R55F at an "on" condition and push one button to "teach" or program that condition. Simply repeat the procedure for the "off" condition and the sensor computes the optimal setting. You can also manually override the microprocessor-selected settings by simply pushing the "plus" or "minus" buttons.

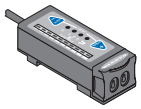




Precise indication of sensing contrast and switch point.
A highly visible, 10-segment green LED bar provides continuous signal strength and switch point indication to assist you during set-up and operation. Sensor provides visual indication of the sensing contrast level and application reliability.

LED diagnostics.
Easy-to-read diagnostic indicators keep you constantly aware of operating status. Green LEDs indicate "Light Operate," "Dark Operate," and selected output delay. A yellow LED indicates "Outputs Conducting".

Programmable sensor functions.
In SETUP mode, you can program the outputs for "Light Operate" or "Dark Operate" and select one of three output delay options.



R55F Series Plastic Fibre-optic Colour Mark Sensors

Light Source	Models	Cable	Supply Voltage	Output Type	Output Rating	Response	Repeatability
Red LED	**R55FP**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Red LED	**R55FPQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Green LED	**R55FPG**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Green LED	**R55FPGQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
White LED	**R55FPW**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
White LED	**R55FPWQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Blue LED	**R55FPB**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Blue LED	**R55FPBQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs

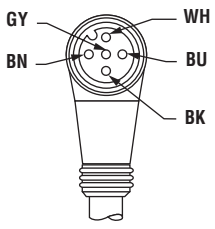


R55F Series Glass Fibre-optic Colour Mark Sensors

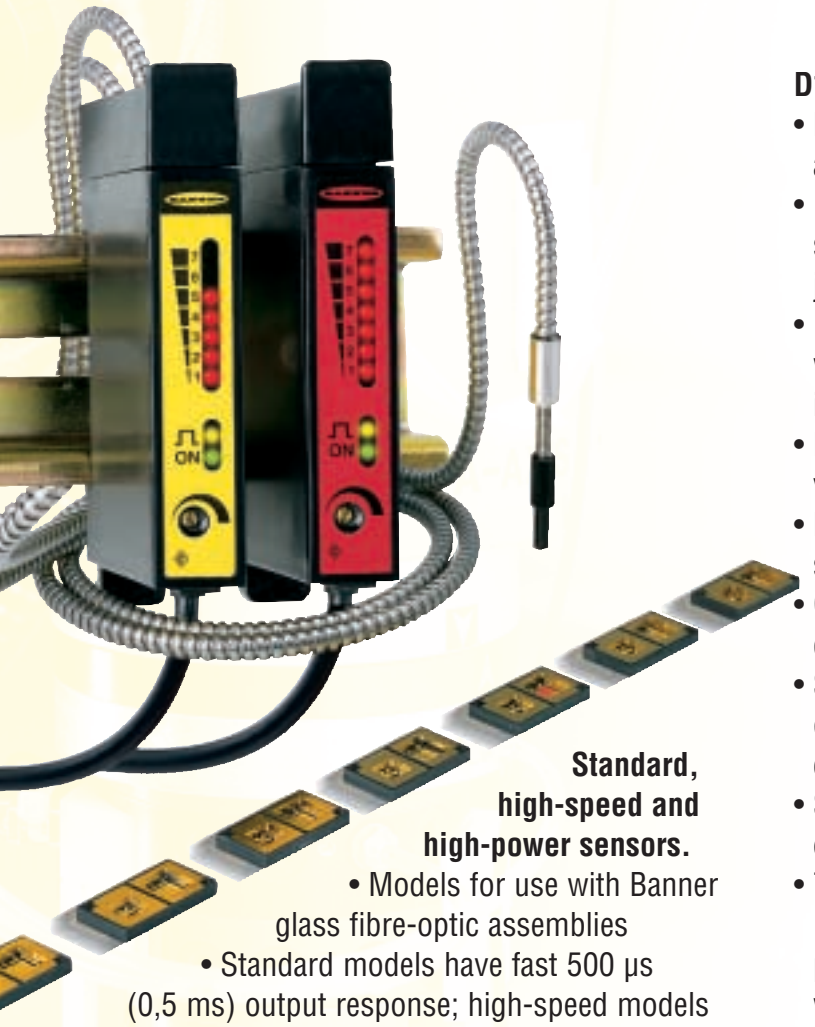
Light Source	Models	Cable	Supply Voltage	Output Type	Output Rating	Response	Repeatability
Red LED	**R55FV**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Red LED	**R55FVQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Green LED	**R55FVG**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Green LED	**R55FVGQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
White LED	**R55FVW**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
White LED	**R55FVWQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Blue LED	**R55FVB**	2 m cable	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs
Blue LED	**R55FVBQ**	M12 x 1	10 to 30V dc	Bipolar NPN/PNP	150 mA max.	50 µs on/off	25 µs

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
M12 x 1, 5-pin	**MQDC1-506**	2 m	Straight	Pin-out M12 x 1, 5-pin (Connector on Cable Shown)
M12 x 1, 5-pin	**MQDC1-515**	4,5 m	Straight	
M12 x 1, 5-pin	**MQDC1-530**	9 m	Straight	
M12 x 1, 5-pin	**MQDC1-506RA**	2 m	Right-Angle	
M12 x 1, 5-pin	**MQDC1-515RA**	4,5 m	Right-Angle	
M12 x 1, 5-pin	**MQDC1-530RA**	9 m	Right-Angle	



D12 Series Sensors



Standard, high-speed and high-power sensors.

- Models for use with Banner glass fibre-optic assemblies
- Standard models have fast 500 µs (0,5 ms) output response; high-speed models (model suffix "Y" or "Y1") have selectable 500 or 50 µs response
- Choice of either NPN (sinking) or PNP (sourcing) complementary outputs; 150 mA output load rating
- Normally closed output of standard models may be wired as a diagnostic alarm output to alert personnel of marginal sensing conditions*
- 7-segment LED bar-graph** indicates: received signal strength, output overload, and marginal signal strength (note: bar-graph is inoperative in the 50 µs mode of high speed models)
- Separate LED indicators for sensor power and output status
- "Y1" suffix high-speed models include a 20 ms output pulse stretcher
- Choose models with integral 2 m cable or 150 mm pigtail quick-disconnect (8 mm); 9 m cables are also available

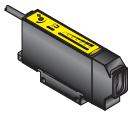
D12 *Expert* TEACH-mode fibre-optic sensors.

- Easy TEACH-mode programming automatically adjusts sensitivity to optimal setting*
- D12E sensors are designed for low-contrast sensing applications (switching threshold set to just above the "dark" condition)
- D12E2 sensors set their switching threshold mid-way between "dark" and "light" conditions to ignore subtle changes, such as web flutter
- Models for glass fibre-optics available in all versions
- Fast 200 µs sensing response; a 40 ms pulse stretcher may be programmed, when required
- Output may be programmed for either light- or dark-operate
- Secure one-button programming is easy to use; one button sets both TEACH and sensor configuration settings
- Separate input for remote sensor programming by external switch or a PLC
- 7-segment LED bar-graph** indicates relative received signal strength and sensing contrast, programming status and diagnostic trouble warnings
- Dedicated alarm output for signaling marginal sensing conditions

AC-coupled sensors.

- Highly sensitive to very small signal change; fast response
- Automatic gain control circuit continually adjusts emitter output to maintain system gain
- Ideal for low-contrast applications such as web flaw, thread break and falling part detection
- Bi-polar outputs: one NPN (sinking) and one PNP (sourcing)
- LED indicators for sensor power, output status and AGC lock condition
- Selectable light- or dark-operate; no false pulse on power-up
- Adjustable output pulse time

** U.S. Patent #5808296; ** U.S. Patent #4965548*

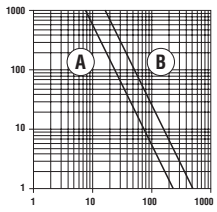


D12 Standard Series Glass Fibre-optic Models (500 µs Output Response – Visible Red 680 nm)

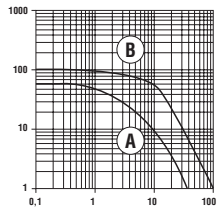
Models	Cable	Supply Voltage	Output Type
D12SP6FV **D12SP6FVQ**	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	Complementary PNP (sourcing)
D12SN6FV **D12SN6FVQ**	2 m cable ø 8 mm QD, 4-pin	10 to 30V dc	Complementary NPN (sinking)

Excess gain in relation to the distance (in mm).
Diffuse mode performance based on 90% reflectance white test card.

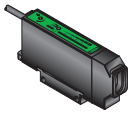
Excess Gain



A) IT13S fibre opposed mode
B) IT23S fibre opposed mode



A) BT13S fibre diffuse mode
B) BT23S fibre diffuse mode

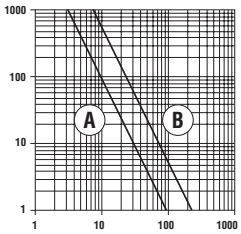


D12 High-Speed Series Glass Fibre-optic Models (50 µs or 500 µs Output Response – Visible Red 680 nm)

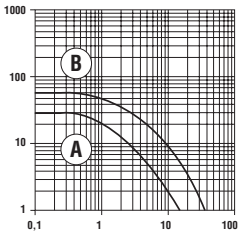
Models	Cable	Supply Voltage	Output Type
D12SP6FVY **D12SP6FVYQ**	2 m cable ø 8 mm, 4-pin	10 to 30V dc	Complementary PNP (sourcing)
D12SP6FVY1* **D12SP6FVY1Q***	2 m cable ø 8 mm, 4-pin	10 to 30V dc	Complementary PNP (sourcing)
D12SN6FVY **D12SN6FVYQ**	2 m cable ø 8 mm, 4-pin	10 to 30V dc	Complementary NPN (sinking)
D12SN6FVY1* **D12SN6FVY1Q***	2 m cable ø 8 mm, 4-pin	10 to 30V dc	Complementary NPN (sinking)

** Y1 models have 20 ms output pulse stretcher. Excess gain in relation to the distance (in mm).*
Diffuse mode performance based on 90% reflectance white test card.

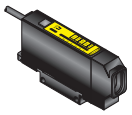
Excess Gain



A) IT13S fibre opposed mode
B) IT23S fibre opposed mode

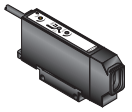


A) BT13S fibre diffuse mode
B) BT23S fibre diffuse mode



D12 *Expert* Series Glass Fibre-optic Models (Visible Red 680 nm)

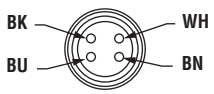
Models	Switching Threshold	Cable	Supply Voltage	Output Type	Maximum Range
D12EP6FV **D12EN6FV**	Just above the “dark” condition	2 m cable	10 to 30V dc	PNP (sourcing) NPN (sinking)	IT23S fibres, opposed: 930 mm IT13S fibres, opposed: 442 mm BT23S fibre, diffuse mode: 178 mm BT13S fibre, diffuse mode: 68 mm
D12E2P6FV **D12E2N6FV**	Midway between “dark” and “light”	2 m cable	10 to 30V dc	PNP (sourcing) NPN (sinking)	



D12 AC-Coupled Series Glass Fibre-optic Models (50 µs Output Response – Visible Red 680 nm)

Models	Cable	Supply Voltage	Output Type	Maximum Range
D12DAB6FV	2 m cable	10 to 30V dc	Bipolar NPN/PNP	IT23S fibres, opposed: 200 mm IT13S fibres, opposed: 75 mm BT23S fibre, diffuse mode: 60 mm BT13S fibre, diffuse mode: 25 mm
D12DAB6FVQ	ø 8 mm QD, 4-pin	10 to 30V dc	Bipolar NPN/PNP	

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
ø 8 mm, 4-pin *(except for D12 Expert)*	**PKG4-2**	2 m	Straight	Pin-out ø 8 mm, 4-pin (Connector on Cable Shown) 

QS18FP Series Sensors

An affordable solution for use with low-cost plastic fibres.
The QS18 accommodates large core 0,75 mm; 1 mm and 1,5 mm and small core 0,25 mm and 0,5 mm polyethylene jacketed plastic fibres. Banner's unique locking mechanism holds fibres securely in place. QS18FP photoelectric sensors feature a universal mounting design that allows them to fit or retrofit virtually every mounting situation. A sealed potentiometer allows accurate setting, featuring a mechanical moulded stop to prevent over-adjustment damage.

360° visible indicator LEDs.
Green and amber LEDs protrude above the top of the sensor, giving you visibility from the top and from all sides. A flashing green LED indicates an output overload. A steady amber LED indicates normally open output conduction and flashes to indicate marginal sensing conditions (excess gain between 1 and 1,5 times) in the light condition.

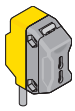


FI22FP Series Sensors

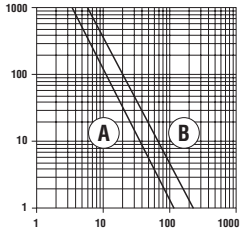
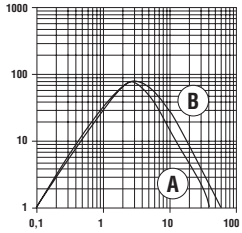
Easy-to-use, low-profile fibre-optic sensor.
The FI22FP is an easy-to-use, low-profile fibre-optic sensor for use with plastic or Banner's STEEL-SKIN™ fibres. It provides high-performance sensing in low-contrast applications and, because of its small size, can mount almost anywhere.

- Compact housing with easy-to-use 8-segment bar-graph display
- Bright LED's for easy programming and status monitoring
- Full functionality with *Expert* ™-style teach modes: static, dynamic or single-point
- FI22 housing is designed to withstand dirty environments and washdown applications (IP67)
- Integral cable or quick-disconnect (8 mm), custom snap-on bracket included

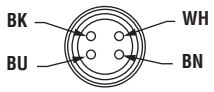




QS18FP Series Plastic Fibre-optic Models (Visible Red 660 nm)

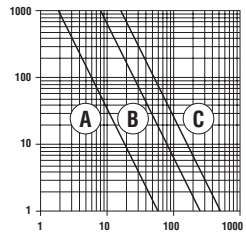
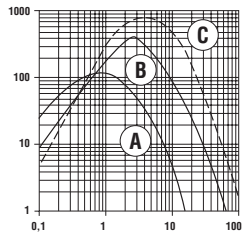
Models	Cable	Supply Voltage	Output Type	Excess Gain (in relation to distance in mm)
QS18VP6FP **QS18VP6FPQ**	2 m, 4-wire ø 8 mm QD, 4-pin, pigtail	10 to 30V dc	PNP	 A) PIT46U opposed mode B) PIT66U opposed mode  Diffuse mode performance based on 90% reflectance white test card. A) PBT46U diffuse mode B) PBT66U diffuse mode
QS18VN6FP **QS18VN6FPQ**	2 m, 4-wire ø 8 mm QD, 4-pin, pigtail	10 to 30V dc	NPN	

Quick-Disconnect Cables (Selection)

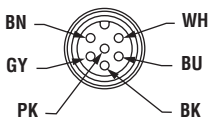
Style	Model	Length	Connector	Pin-out
ø 8 mm, 4-pin	**PKG4-2**	2 m	Straight	Pin-out ø 8 mm, 4-pin (Connector on Cable Shown)
ø 8 mm, 4-pin	**PKW4-2**	2 m	Right-Angle	



FI22FP Series Inline Plastic Fibre-optic Models (Visible Red 660 nm)

Models	Cable	Supply Voltage	Output Type	Excess Gain (in relation to distance in mm)
FI22FP	2 m cable, 5-wire	10 to 30V dc	Bipolar NPN/PNP	 A) PIT26U opposed mode B) PIT46U opposed mode C) PIT66U opposed mode  Diffuse mode performance based on 90% reflectance white test card. A) PBT26U diffuse mode, B) PBT46U diffuse mode, C) PBT66U diffuse mode
FI22FPQ	ø 8 mm QD, 6-pin, pigtail	10 to 30V dc	Bipolar NPN/PNP	

Quick-Disconnect Cables (Selection)

Style	Model	Length	Connector	Pin-out
ø 8 mm, 6-pin	**PKG6Z-2**	2 m	Straight	Pin-out ø 8 mm, 6-pin (Connector on Cable Shown)
ø 8 mm, 6-pin	**PKW6Z-2**	2 m	Right-Angle	

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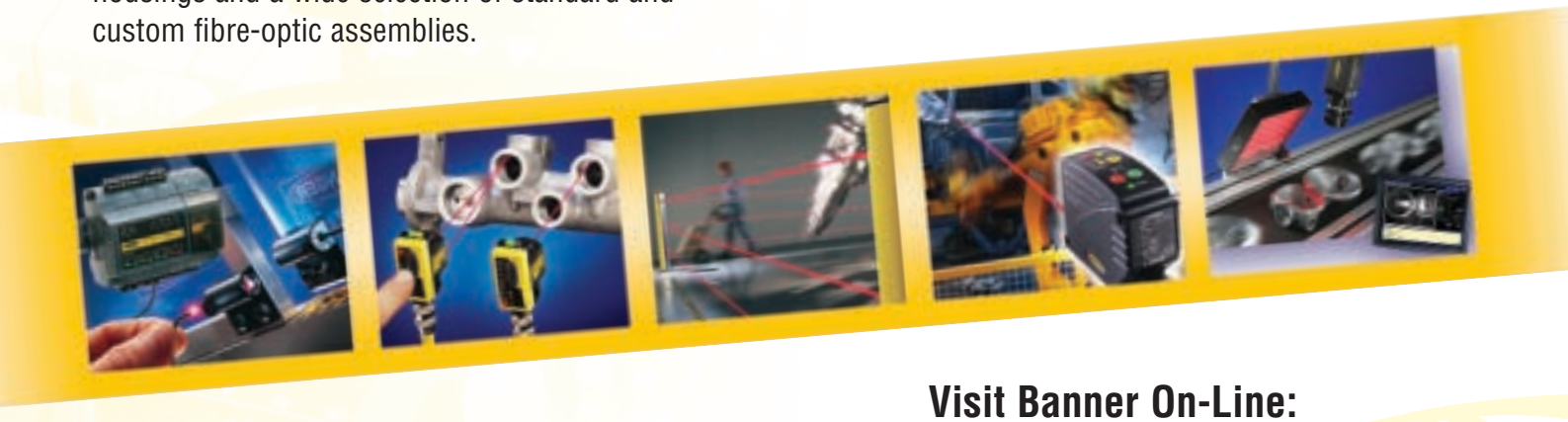
A . . . . . Acrylic
AL . . . . . Aluminium
NI Pltd BR . . . . . Nickel Plated Brass
P . . . . . Plastic
PE . . . . . Polyethylene
PP . . . . . Polypropylene
SS . . . . . Stainless Steel
thd BR . . . . . threaded Brass

XLPE . . . . . Cross-linked polyethylene
⌴ . . . . . Counterbore
→ ← . . . . . Inner
← → . . . . . Outer
. . . . . Bendable
. . . . . Do not bend

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