

PM COUPLER

Fused Fiber Coupler

DATASHEET

The Gooch & Housego PM coupler enables the accurate monitoring and splitting of optical signals in polarization maintaining fiber.

Manufactured using industry-standard PM fiber, the PM coupler is available in any coupling ratio from 1 - 50%.

Based on G&H's fused fiber technology, the PM coupler demonstrates very low loss, high power handling and there is no price penalty for adding a second input port. The center operating wavelength may be chosen from within a wide variety of operating passbands, including 780, 820, 980, 1064, 1310, 14xx, 15xx and 16xx nm.

In common with all PM components, it is necessary to launch into either the slow or the fast axis to maintain polarisation. For the G&H PM coupler, specifications are based on slow axis launch, although fast axis versions are also available if requested.



Key Benefits

- All PM fiber construction
- Low excess loss
- High power handling
- 780 nm, 820 nm, 980 nm, 1064 nm, C, L, S bands available
- Slow axis operation as standard
- Fast axis operation also available

Applications

- Power monitoring of PM sources
- Coherent communications
- Fiber gyroscopes
- High power fiber lasers
- Fiber amplifiers



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Optical Specification¹

Parameter	Specification									
Center wavelength range	(nm)	7xx ⁵	8xx ⁵	9xx	10xx	11xx	1310	14xx	15xx	16xx
Available wavelengths ²	(nm)	780	800	900	1000	1100	1310	1425	1500	1600
		-799	-899	-999	-1099	-1199		-1499	-1599	-1650
Coupling ratio		1/99%								
Ratio tolerance		+/- 0.5%								
Extinction ratio (dB) ³	Grade A			20	20	20	20	20	20	20
	Grade B	17	17	17	17	17	17	17	17	17
Coupling ratio		5/95%								
Ratio tolerance		+/- 1.5%								
Extinction ratio (dB) ³	Grade A			20	20	20	20	20	20	20
	Grade B	17	17	17	17	17	17	17	17	17
Coupling ratio		10/90%								
Ratio tolerance		+/- 3.0%								
Extinction ratio (dB) ³	Grade A			20	20	20	20	20	20	20
	Grade B	17	17	17	17	17	17	17	17	17
Coupling ratio		33/67								
Ratio tolerance		+/- 4.0								
Extinction ratio (dB) ³	Grade A			17	17		20	20	20	20
	Grade B	15	15	15	15	15	17	17	17	17
Coupling ratio		50/50%								
Ratio tolerance		+/- 5.0%								
Extinction ratio (dB) ⁴	Grade A			17	17		20	20	20	20
	Grade B	15	15	15	15	15	17	17	17	17
Excess loss (dB)	Grade A			0.3	0.3		0.3	0.3	0.3	0.3
	Grade B	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Return loss/directivity		50 dB								
Optical power handling ^{6,7}		4 W								
Pigtail tensile load		5 N								
Operating temperature		-5°C - +75°C ¹								
Storage temperature		-40°C - +85°C								
Fiber type		Polarization maintaining fiber (industry-standard profile)								

¹ All specifications are for operation at room temperature.

² The center wavelength may be selected from within the available wavelength ranges supplied.

³ Defined for signal path P1-P2.

⁴ Defined for both signal path P1-P2 and tap path P1-P3.

⁵ Fiber single mode cut-off ≤ 770 nm.

⁶ For operation at powers of greater than 4 W the component housing and fibre must be adequately heat-sunk (for additional information contact G&H sales). Components intended for high power operation are only available in the 2x2 configuration. Component performance and reliability under high power must be determined within the customer system.

⁷ The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

⁸ For connectorized component, operating temperature range is -5 - +75°C.

PM FUSED FIBER COUPLER

Housing Options

Housing Code	Description	1x2, 2x2 Dimensions (mm)	Pigtail
3	Regular	3.0 (Ø) x 60 (L)	Primary-coated fiber
5	Semi-ruggedized slim	3.0 (Ø) x 85 (L)	Ø0.9 mm loose-tube
7	High power housing	5 (W) x 5 (H) x 85 max (L)	Primary-coated fiber
C	Regular high power	3.0 (Ø) x 60 (L)	Primary-coated fiber

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFP) followed by code letters or numbers which correspond to available options.

Sample: FFP- CK7250A00 (PM fused fiber coupler, 1550 nm center wavelength, 50/50 coupling ratio, high power housing, 2x2 port configuration, A grade, 0.5 m pigtail length, no connectors).

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	P	-									
①	Passband			7XX	8XX	9XX	10XX	11XX	1310	14XX	15XX	16XX
	Code			D	E	5	8	J	4	S	C	L
②	Coupling ratio⁴			1%	5%	10%	33%	50%				
	Code			1	5	A	F	K				
③	Housing^{5,6}			Regular	Semi-ruggedized slim	High power	Regular high power					
	Code			3	5	7	C					
④	Port configuration⁵			1x2			2x2					
	Code			1			2					
⑤	Last two digits of center wavelength¹			e.g. XX20	e.g. XX50	e.g. XX70	e.g. XX80					
⑥	Code			20	50	70	80					
⑦	Grade			Grade A				Grade B				
	Code			A				B				
⑧	Pigtail length²			0.5 m				1 m				
	Code			0				1				
⑨	Connector^{3,6}			None		FC/APC-PM		FC/PC-PM				
	Code			0		P		R				

1 Channel center must be within the wavelength ranges shown in the optical specifications table.

2 Minimum pigtail length. Other pigtail lengths are available on request. Where connectorized, pigtail length is to connector end face.

3 Optical specifications in specification table do not include connector loss.

4 Other coupling ratios available on request.

5 7 & C not available in 1x2 Configuration.

6 Connectors can only be fitted to housing type 5. For connectorization of other housings contact G&H sales.

PM products are manufactured using 250 μm PANDA PM fiber, 400 μm PANDA PM fiber available at wavelengths higher than 400 nm.

For further information

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PM FUSED FIBER COUPLER

PM FUSED COUPLER FOR 2 μm OPERATION

Fused Fiber Coupler

DATASHEET

Gooch & Housego's PM fused coupler range has been expanded to include the 2 μm operating window.

The G&H PM fused coupler enables the accurate splitting and monitoring of optical signals in single mode fiber. G&H proprietary manufacturing technology provides uniquely low excess loss, with high polarization extinction ratio.

The all fiber construction offers excellent reliability and high power handling characteristics.

These high performance parts are available in a wide variety of tap ratios, wavelength ranges, housing and connector options and can therefore be readily specified in a wide variety of applications, enabling rapid design cycles and new project builds.

In common with all PM components, it is necessary to launch into relevant axis to maintain polarization. For the G&H PM Fused Coupler, specifications are based on slow axis launch, fast axis versions may be available on request.



Key Features

- Any coupling ratio available
- Low loss
- High PER
- PM fiber on all ports
- Slow axis operation as standard
- High power handling
- Custom product

Applications

- Telecoms
- Instrumentation
- IR Imaging
- Biomedical
- Industrial
- Defense
- IR counter measures

Typical Optical Specifications⁴

Coupling Ratio (%) ³	Available Wavelength(s) ⁵	PER ⁷	Coupling Ratio Tolerance ^{1,2}	Excess Loss ^{1,2,6}
1%	1900 - 2199 nm	>15 dB	±0.5%	0.30 dB
5%	1900 - 2199 nm	>15 dB	±1.5%	0.30 dB
10%	1900 - 2199 nm	>15 dB	±3.0%	0.40 dB
20%	1900 - 2199 nm	>15 dB	±4.0%	0.40 dB
30%	1900 - 2199 nm	>15 dB	±4.0%	0.50 dB
40%	1900 - 2199 nm	>15 dB	±5.0%	0.50 dB
50%	1900 - 2199 nm	>15 dB	±5.0%	0.50 dB

1 In 2x2 couplers performance through second input port P4 (colored blue) not measured

2 Maximum limit at center wavelength. Not including TDL, PDL or connector losses.

3 Any coupling ratio available. Please contact us for specifications of coupling ratios not listed.

4 Custom specifications, including 1700 nm and 1800 nm windows available on request.

5 Performance specified for center wavelength selected from within available range.

6 Based on 1 m pigtails at 1900 nm, fiber IR absorption leads to higher losses for longer wavelengths and fiber pigtail lengths.
Example: Additional fiber loss ranges from 0.0075 dB/m at 1901 nm to 0.20 dB/m at 2199 nm

7 Signal path (P12) only for tap < 40%

Parameter	Specification
Operating wavelength	Specified wavelength within the range 1900-2199 nm
Operating/storage temperature range ¹	-40 - +75°C/-40 - + 85°C
Optical power handling ^{2,3}	4 W
Pigtail tensile load	5 N
Fiber type	Speciality PM fiber

1 For connectorized component, operating temperature range is -5 - +75°C.

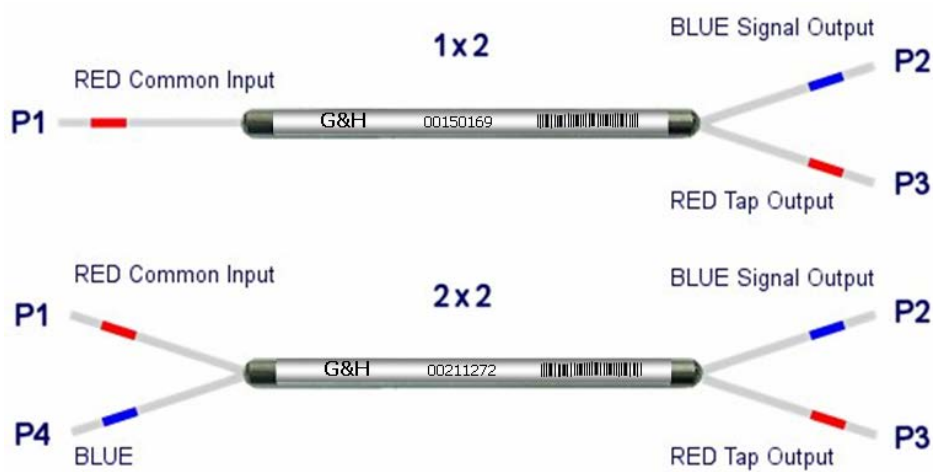
2 For operation at powers of greater than 4 W the component housing and fiber must be adequately heat-sunk (for additional information contact G&H Sales). Components intended for high power operation are only available in the 2x2 configuration. Component performance and reliability under high power must be determined within the customer system.

3 The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

Housing Options

Housing Code	Description	1x2, 2x2 Dimensions (mm)	Pigtail
3	Regular	3.0 (Ø) x 60 (L max)	Primary-coated fiber
7	High power	5 (W) x 5 (H) x 85 (L max)	Primary-coated fiber
C	Regular high power	3.0 (Ø) x 60 (L max)	Primary-coated fiber

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFP) followed by code letters or numbers which correspond to available options.

Sample: FFP-ZA3100110 (2000 nm, 10% tap coupling ratio, regular housing, 1x2 port configuration, PM1950 fiber, 1 m pigtail lengths, no connectors)

Order code				①	②	③	④	⑤	⑥	⑦	⑧	⑨
F	F	P	-									
①	Passband			17XX	18XX	19XX	20XX	21xx				
	Code			V	W	Y	Z	T				
②	Coupling ratio³			1%	5%	10%	33%	50%				
	Code			1	5	A	F	K				
③	Housing^{4,5}			Regular		High power		Regular high power				
	Code			3		7		C				
④	Port configuration⁶			1x2			2x2					
	Code			1			2					
⑤	Last two digits of center wavelength			e.g. XX20		e.g. XX50		e.g. XX70		e.g. XX80		
⑥				Code			20		50		70	
⑦	Fiber Type⁶			PM1950			PM10/130 0.15NA ⁷					
	Code			1			2					
⑧	Pigtail length¹			0.5 m			1 m					
	Code			0			1					
⑨	Connector^{2,4}			None		FC/APC-PM		FC/PC-PM				
	Code			0		P		R				

1 Minimum pigtail length. Further pigtail lengths available on request. Where connectorized, pigtail length is to connector end face.

2 Specification table does not include connector losses.

3 Any coupling ratio available – contact G&H for specification and ordering codes of coupling ratios not listed.

4 Connectors may be fitted to housing type 3. For connectorization of other housing types please contact the Sales Office.

5 7 & C not available as 1x2 Port Configuration.

6 Other fiber types available on request.

7 Connectors are not available with fiber type 2.

For further information

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PM FUSED COUPLER FOR 2μM OPERATION

PM COMBINER

Fused Fiber Combiner

DATASHEET

The Gooch & Housego PM combiner enables the efficient combination of two orthogonally polarized sources of light such that they are output through the same, single fiber output.

In optical amplifiers this provides a doubling of pump power whilst ensuring pump redundancy should a pump failure occur.

Applications include high power optical amplifiers and undersea systems. All ports consist of polarization maintaining fiber.



Key Features

- Low insertion loss
- High power handling
- 9xx, 10xx, 14xx and 15xx nm variants

Applications

- Erbium doped fiber amplifiers (EDFAs)
- Raman amplifiers
- Undersea systems
- Coherent optical communications



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Optical Specifications

Parameter	9xx	10xx	14xx	15xx	16xx
Range of available center wavelengths ^{1,2}	915-999 nm	1000-1099 nm	1400 - 1499 nm	1500-1599 nm	1600-1650 nm
Insertion loss (fast axis)³					
Grade M (max)	0.40 dB	0.40 dB	0.40 dB	0.50 dB	0.50 dB
Grade W (max)	0.60 dB	0.60 dB	0.60 dB	0.70 dB	0.70 dB
Housing Option	3, 5, 7, C				
Insertion loss (slow axis)³					
Grade M (max)	0.35 dB				
Grade W (max)	0.40 dB				
Return loss/directivity (min)	50 dB				
TDL (typical)	0.15 dB				
Pigtail tensile load (max)	5 N				
Optical power handling (max) ^{4,5}	4 W				
Fiber type	All ports PM fiber				
Pigtail	Primary coated fiber				
Operating temperature range	-5 - +75°C				
Storage temperature range	-40 - +85°C				

¹ The center wavelength may be selected from within the operating wavelength ranges supplied.

² Other wavelengths are available. Please contact the sales office.

³ Insertion loss at center wavelength (not including TDL or connector losses).

⁴ For operation at powers of greater than 4 W the component housing and fiber must be adequately heat-sunk (for additional information contact G&H sales). Components intended for high power operation are only available in the 2x2 configuration. Component performance and reliability under high power must be determined within the customer system.

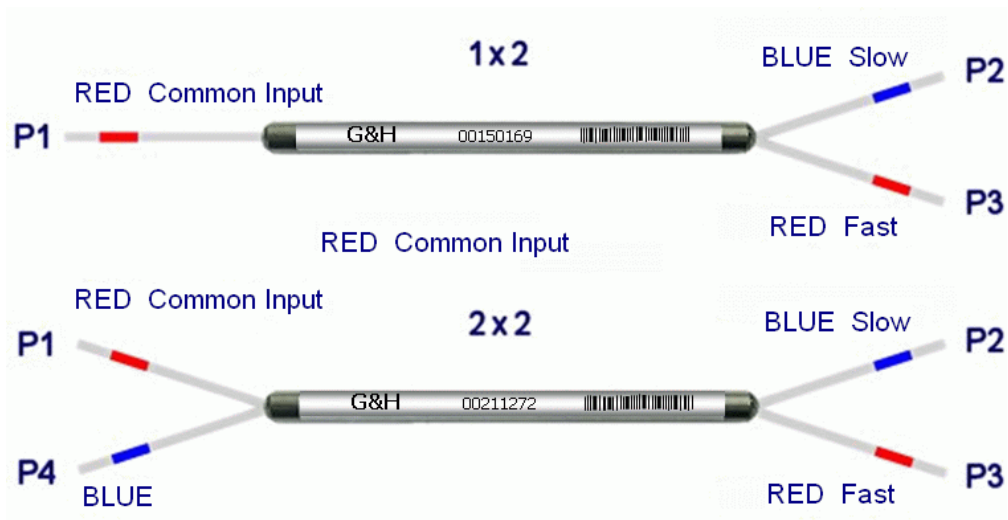
⁵ The performance and reliability of optical connectors is not guaranteed for optical powers of greater than 1 W.

⁶ For connectorized component, operating temperature range is -5 - +75°C.

Housing Options

Housing Code	Description	Dimensions (mm)	Pigtail
3	Regular	3.0 (Ø) x 71 (L)	Primary-coated fiber
5	Semi-ruggedized slim	3.0 (Ø) x 85 (L)	Ø0.9 mm loose-tube
7	High power	5 (W) x 5 (H) x 85 (L max)	Primary-coated fiber
C	Regular high power	3.0 (Ø) x 71 (L)	Primary-coated fiber

Configuration



Order code

Order codes are comprised of a standard device prefix (e.g. FFP) followed by code letters or numbers which correspond to available options.

Sample: FFP- CM3250F10 (PM fused fiber combiner, 1550 nm wavelength, M grade, regular housing, 2x2 port configuration, telecoms PM fiber 250 µm buffer, 1 m pigtail length, no connectors.).

Order code	①	②	③	④	⑤	⑥	⑦	⑧	⑨	
F	F	P	-							
① Passband (nm)	9XX		10XX		14XX		15XX		16XX	
Code	5		8		S		C		L	
② Grade	Grade M					Grade W				
Code	M					W				
③ Housing ^{4,5}	Regular		Semi-ruggedized slim		High power		Regular high power			
Code	3		5		7		C			
④ Configuration ⁵	1x2				2x2					
Code	1				2					
⑤ Last two digits of center wavelength (nm) ¹	e.g. XX20		e.g. XX50		e.g. XX70		e.g. XX80			
Code	20		50		70		80			
⑦ Fiber type	Telecoms PM fiber 400 µm buffer			Telecoms PM fiber 250 µm buffer		980 nm PM fiber 250 µm buffer				
Code	E			F		G				
⑧ Pigtail length ²	0.5 m				1 m					
Code	0				1					
⑨ Connector ^{3,4}	None			FC/APC-PM		FC/PC-PM				
Code	0			P		R				

1 Channel center must be within the wavelength ranges shown in the optical specifications table.

2 Minimum pigtail length. Other pigtail lengths are available on request. Where connectorized, pigtail length is to connector end face.

3 Insertion loss in specification table does not include connector loss.

4 Connectors may be fitted to housing type 5. For connectorization of other housing types please contact the sales office.

5 7 & C not available as 1x2 port configuration.

PM Products are manufactured using 250µm PANDA PM fiber, 400µm PANDA PM fiber available at wavelengths higher than 1400nm.

For further information

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PM COMBINER