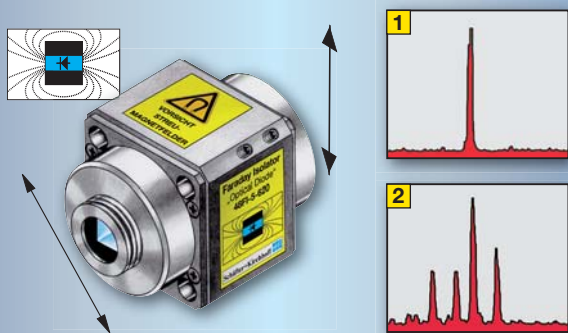


# Faraday Isolators 48FI-...

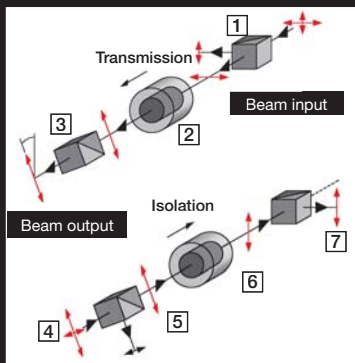


**Figure 1:** Faraday Isolator (optical diode) compatible with microbench system aperture Ø 5 mm or Ø 2 mm, isolation >30 dB, insertion loss <0.5 dB

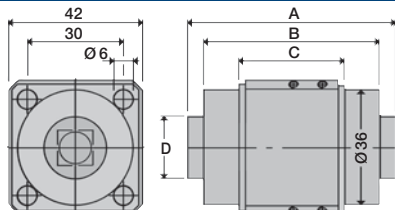
- 1 Spectrum of an undisturbed laser beam source
- 2 Disturbed spectrum because of back-reflections (mode hopping)

### Function

- 1 Polarizing beam splitter eliminates the s-polarized portion (typically 1 %) of the laser (diode) radiation
- 2 Faraday crystal in a strong magnetic field rotates the input polarization plane 45°
- 3 Polarizing beam splitter exactly aligned with the output polarization plane, i.e. by 45° with respect to the input polarization
- 4 Reflective or scattering surfaces cause polarized or depolarized reflected signals
- 5 Polarizing beam splitter 3 eliminates the s-polarized portion of the reflected signal
- 6 Faraday rotator 2 rotates the polarization plane by a further 45° so that the polarization plane of the reflected signal is now rotated by 90° from the polarization plane of the input beam
- 7 Polarizing beam splitter 1 blocks the reflected signal



### Dimensions



Dimension [mm]				Aperture [mm]		Center Wavelength $\lambda$	Order Code
A	B	C	D	2	3	[nm]	
80	70	48	19.5		x	400	48FI-5-400
39	27	20	18	x		532	48FI-2-532
65	55	33	19.5		x	532	48FI-5-532
39	27	20	18	x		633	48FI-2-633
65	55	33	19.5		x	633	48FI-5-633
91	70	32	19.5		x	660	48FI-5-660
80	70	48	19.5		x	670	48FI-5-670
65	55	33	19.5		x	780	48FI-5-780
65	55	33	19.5		x	810	48FI-5-810
65	55	33	19.5		x	850	48FI-5-850
100	90	68	19.5		x	980	48FI-5-980
92	82	60	19.5	x		1064	48FI-3-1064
100	90	68	19.5		x	1080	48FI-5-1080

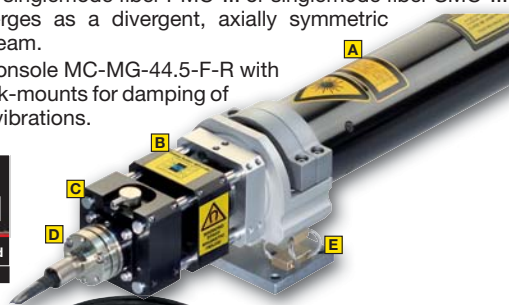
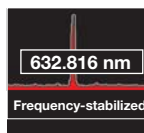
Faraday Isolators are used to protect laser sources from back-reflection (optical diode), which causes mode hopping, laser noise, frequency instability and a shorter laser lifetime. The Faraday Isolators made by Schäfter+Kirchhoff are characterized by:

- high isolation >30 dB
- low insertion loss <0.5 dB
- aperture Ø 5 mm
- compatibility with "multicube" and microbench systems
- through-holes for mounting rods
- standard wavelengths in a range of 400 to 1080 nm
- bandwidth: center wavelength  $\pm 20$  nm

**Applications:** Laser sources with integrated Faraday Isolators

## Frequency-stabilized HeNe Laser

- A Frequency-stabilized HeNe Laser (typically <500 kHz over several minutes, <5 MHz over hours). More information, page 81.
- B Faraday Isolator 48FI-5-820 to prevent unwanted back-reflections from entering the laser system.
- C Mechanical shutter 48AT-S or attenuator for laser power output adjustment.
- D Laser beam coupler 60SMS-... transfers the beam into polarization-maintaining singlemode fiber PMC-... or singlemode fiber SMC-... and it emerges as a divergent, axially symmetric Gaussian beam.
- E Mounting console MC-MG-44.5-F-R with spring shock-mounts for damping of shock and vibrations.



## Frequency-defined Standards

Besides the conventional frequency-stabilized HeNe Lasers, Schäfter+Kirchhoff also offers fiber coupling to HeNe laser sources used as frequency or primary length standards. These kinds of laser sources, such as from Winters Electro-Optics, Inc., are stabilized by iodine cells and provide a long-term absolute frequency stability of 12 kHz. The average laser power is 100–125  $\mu$ W.

For a laser source used in frequency standardization, fiber coupling is only possible with a high feedback suppression of >40 dB. This is ensured by Schäfter+Kirchhoff using only selected Faraday isolators for this task. The laser source and fiber coupling is mounted on a ruggedized platform with handles to facilitate transport.

- Frequency-stabilized <12 kHz
- Singlemode and polarization-maintaining fiber coupling
- External attenuator
- No back-coupling
- Robust and transportable platform



## Further Applications

Laser Diode Collimator **48TE-SOT-...** with Faraday Isolator and Peltier Elements, see page 73.

Fiber-to-Fiber Coupler **60FF-...** with Faraday Isolator, see page 61.