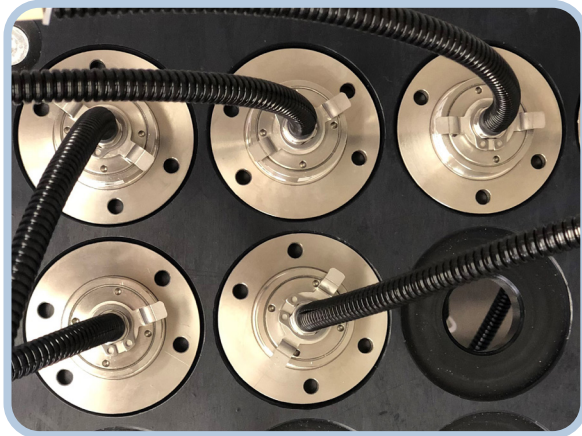


FIBRE OPTIC ROTARY JOINTS

Singlemode & Multimode

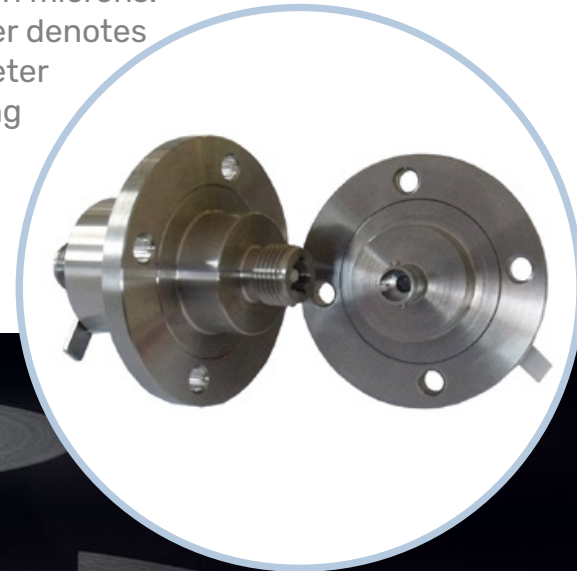
Singlemode and multimode fibre are types of fibre that can be thought of as Hi-Fi and Lo-Fi respectively. Not to be confused with the number of channels (single-channel/multi-channel), the type of fibre that is used depends on the application and hardware around it.

Typically, multimode fibre circuits are used for distances under 500m, whereas single mode fibre can be used in systems up to 100km in length.



A common stumbling point when first looking into Fibre Optic Rotary Joints is confusion between singlemode, single channel, multimode and multichannel. The “mode” refers to the way that the light propagates down the core of the cable. Singlemode (Hi-Fi) has a smaller fibre core diameter and Multimode (Lo-Fi) has a larger core diameter^[1]. Therefore, the mode is used in reference to the type of fibre that is used.

Identification of the fibre type is normally straightforward, distinguished by markings on the side of the cable sheath and the colour of the cable sheath. The markings normally read: 9/125, 50/125 or 62.5/125. The first number before the stroke denotes the core diameter in microns. The second number denotes the cladding diameter which is the coating that restricts light to the central core in a cable.



FIBRE OPTIC ROTARY JOINTS

Singlemode & Multimode

Singlemode fibres are 9 microns in diameter, with multimode being 50 and 62.5 microns most commonly. Singlemode fibre is normally yellow, multimode cable is normally orange or aqua depending on the grade.

The Fibre Optic Rotary Joint (FORJ) fibre type must be matched to the application and the surrounding hardware. Assuming that the application is data communication, a multimode FORJ would be suited to sub 500m optical circuit lengths and a singlemode FORJ would work in a circuit up to 100km in length. Contrary to intuition, the smaller the fibre diameter the lower the cost per metre ^[2].

It is the cost of the peripherals that can make single-mode fibre circuits more expensive. Multimode FORJs tend to be in higher demand (at the time of writing), where industrial applications lend themselves to shorter circuit lengths. To avoid unnecessary signal losses and operational issues that are difficult to resolve the fibre type of the transceiver should be matched to that of the optical circuit and FORJ.



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- [2] BGB Engineering, Supplier information, 2021.