



TRIAx

# Triax TechInfo

Model

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## Triax Fibre Optic Cables

The Triax Fibre Optic Cable TFC Series (TFC01 thru TFC500) are 3.0 mm steel armored cables, perfect for protection against stepping, impact and bending in addition to provide an excellent rodent protection, but – as most fibre optic cables – are not perfectly suited for direct pulling.

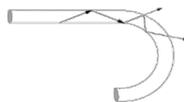


Triax TFC Series Fibre Optical Cables

Following rule number 1 above to the letter, this actually means that the suggested best possible pulling is to **ONLY** pull on the yellow strength members, which are fixed at connectors at both ends. This requires the installer to actually cut off the FC/PC connector at the pulling end, and attach his pulling tool to the yellow yarn directly. Most installers want to prevent this, because it is somewhat directly against the idea of using pre-connected cables and obviously requires him to subsequently mount a new FC-connector in place of the cut-off one, causing extra cost, hassle and installation time.

IF the installer attempts to pull the cable, by attaching his pulling-eye to the FC-connector, this is done on his own responsibility. It may actually work well, but it is important to have attention to a couple of things:

- 1) BEFORE you pull, ALWAYS measure and record the power thru-loss of the fibre cable to pull using an optical power meter (attenuation should be approximately 0,3 dBm per kilometer of fibre cable PLUS a slight attenuation of less than 0,3 dBm per connector). This ensures you know the cable is good before you start pulling. (Use an Optical LNB as the light source, either the one used in the installation, or an extra spare LNB you can use for end-to-end cable measurement)
- 2) BEFORE you start pulling, make 100% sure that the innerduct you attempt to pull through DOES NOT - anywhere along the cable - bend more than the minimum bending radius of the fibre cable (for TFC cables this is 30.0mm diameter), but a minimum of 60.0mm bending diameter is recommended.

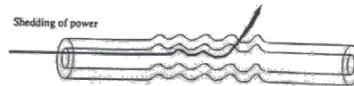


Too little bend diameter, smaller than specified minimum bending diameter (for TFC= 30.0mm)

This is because the pulling tension around corners can be very high, and a too small bending diameter, along with the pulling tension, will always cause the cable to get the same smallest bending as the duct, and put extra strain on the fibre.

REMEMBER: bending a fibre optic cable more than it is specified for may not break it, but it will simply let light escape through its buffer, which is equivalent to a loss/attenuation (= it will ruin your signal – and there is no way you can remove this type of attenuation once you have it unless the bend is removed again).

- 3) Make sure the FC/PC-Connectors fixation to the steel-armouring, and especially the yellow strength yarn buffer is tight and well fixed at the pulling end (otherwise it may slip, and the full pulling tension moves to the steel – which is flexible – or ultimately to the fiber, which will break)
- 4) Even if the pull via the connector is successful, the tension of the yellow yarn buffer, the steel armoring AND the outer grey plastic jacket, are all different, and more important: when the pull stops, the tension goes away DIFFERENT on the yarn, steel and plastic. So the result may be that tension is still on the inner cable, even if the pull has stopped. This can cause what is known as micro-bending, meaning the glass fibre ‘wobbles’ inside the cable, and every little ‘wobble’ causes attenuation (see below).



Microbending, small ‘wobbles’ cause light to escape = power loss/attenuation

- 5) After you have done the pulling, AGAIN do a thru-loss optical power measurement to the cable, compare to initial measurement to check if your pulling has caused any unwanted attenuation.

If it did: there are ways how you can attempt to remove it again:

- a. Using a sharp knife, cut through the outer grey plastic jacket some 40-50 centimeters from the pulling end. Be careful: DO NOT cut the yellow yarn. This may most often release the tension between the inner steel and fibre and the outer plastic jacket, and the cable attenuation may go away - cable is now OK. In some cases it may be necessary to also cut at the other end, in case the duct you have pulled through has a bend closer to the other end, the tension attenuation problem may come from there.
- b. If you don't cut as mentioned above, but measure the resulting attenuation several times you may notice that the attenuation may drop slightly, or fully, after some time. This is because the pull tension between the materials are released over time, and may go back to its original state by itself (this is dependant of many things such as bendings, cable fixation through the duct, lubrication – or lack of same, etc.)

- c. Attenuation caused by pulling forces is almost impossible to fully predict, as it is also dependent upon what causes friction along the pulling route (a duct or innerduct), connectors, other cables, their material and friction, bending, etc.

**6) Triax accepts no warranty claims for damages caused by pulling TFC cables.**

## Optical Measurements.

**Generally, it is always recommended to do an optical measurement to ANY new part of Fibre Optic cables you have installed – before – and immediately after you install them.**

*It helps you keep a close eye on unwanted installation attenuations caused by pulling, bending, dirt on connectors, broken fibres, etc, when and where it occurs. If you wait to measure and check until all cables are installed it may prove to be a VERY large fault-finding job to pin-point problem areas later. Always keep optical connectors protected using the provided end cap.*

*If your splitters have not been installed at the time of cable installations, simply use a spare Optical LNB as the light source for your measurements (TOL32 Optical LNB at one end of cable – level is approx +6dBm to +7dBm - and Optical Power Meter at the other end)*

For measuring Optical Power Levels an Optical Power Meter is needed. Any good Power Meter with a capability to measure 1310nm wavelength, and a power Level range of -18dBm to +8dBm will do. The Triax TOM010 (right) is an excellent choice that can also be used for other Fibre Optical installations (850nm and 1550nm).

Any attempt to install Fibre Optical cables without doing Optical Power Level Measurements as the installation progresses are hazardous and NOT recommended.



## ALWAYS clean connectors.

After EVERY handling of a Fibre Optical cable connector (connecting, dis-connecting, inspection, etc.) you MUST wipe clean the end face of the Optical Connector (the center white ceramic ferrule) as even small - practically invisible - dust particles can cause attenuation on the light and result in unwanted Power attenuation. Wipes, cleaning spray and cleaning pen accessories are available from Triax for this. Use them!



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## Fibre Inspection

Tools are available from Triax that will allow you to inspect the quality of your installation in addition to the Power Meter described above:

1. TFS001, Triax FibreScope, 307683  
Handheld 400x microscope to inspect the end-face of an FC/PC connector for cleanliness and damage.
2. TFT001, Test Tool, 307682  
Small handheld battery powered light source using visible red light to check that light does indeed pass through the cable.



## Repairing broken Fibre Optical Cables

If you chose to cut (or accidentally rip off) the FC/PC-connector at one (or both) ends of a Triax TFC cable, the recommended action is always to remove it, and run a new cable.

If running a new cable is not possible, the recommended solution is to attach a new Triax FC/PC-pigtail cable at the end(s) using a Fibre Optical Fusion Splicer. Pigtail means that the cable has a standard FC/PC connector in one end, and an open fibre at the other end for splicing.

If you do not have access to a Fusion Splicer, or do not have access to a third-party offering this service, you may use Triax Mechanical Splice Adaptors, or Triax SC/PC Field Connectors and TFB Adaptors to repair/fit the cable ends. You should be aware that the best and absolutely recommended solution is Fusion Splicing, even if you may have to pay a third-party to do it.

**WARNING:** use of Mechanical Adaptor Splice and/or Field Mountable Connector units DOES require training, and is NOT recommended for field use if you have not had proper prior training. They will simply cause you too much hassle and time consumption if you use them only the first time you have problems in the field.

If you choose NOT to use Fusion Splicing you should take that decision in due time BEFORE you start to do any Fibre Optical Cable installations and then spend time training the use and handling of the Adaptors and Connectors first. You CAN do this training without external supervision and on your own, but expect a minimum of half a day trial and errors before you get it right and are an expert. Furthermore you should make sure to have some stock of the units available, because when you need them in the field you probably have no time for training or shipment of connectors.

It is our experience that paying a Third Party Expert to do the Fusion Splicing for you in the field when needed will prove to be less expensive than trying to use the Field Adaptors or Field Connectors without prior training.

[triax.com/support](http://triax.com/support)



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