



TRIAX

connecting the future

TRIAX

TOFsat – TRIAX Optical Fibre Satellite

Fibre without limits

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TOFsat – TRIAX Optical Fibre Satellite

State of the art in satellite fibre optics transmission

TOFsat is the scalable system for reception and passthrough transmission of satellite and terrestrial broadcast services distributed over a Fibre Optic (FO) network, to a virtually unlimited number of homes. It is intended to be used in multi-dwellings or multiple service FO networks.

All-round satisfaction with TOFsat

- **Satisfied residents** – low cost for almost unlimited access to all broadcast services.
- **Satisfied house owners and housing associations** – reduced installation, maintenance and troubleshooting costs.
- **Satisfied installers** – TOFsat is the most competitive and complete end-to-end SAT FO system, with dedicated support from TRIAX technicians



Regional experts dedicated to your business

TRIAX Support and Service

At TRIAX, we're committed to delivering exceptional service before, during and after installation to help you get the very best from our high-quality, reliable products.

Our team of dedicated project support staff are at your side to provide design services, advice or technical support for your next installation. We talk your language and stay fully up to date with local requirements and regulations.

Simply contact one of our offices below, or for details of all 10 regional locations, visit triax.com/offices.

Key to schematics

-  Optical signal on fibre lines
 -  Terrestrial on coaxial lines
 -  Sat on coaxial lines
 -  Sat, Terrestrial or DC on coaxial lines
-
-  Re-convertor
 - O – Optical in/out
 - E – Electrical in/out

Glossary

Abbreviations used throughout this brochure:

ASIC	Application-Specific Integrated Circuit
CPE	Customer Premises Equipment
EDFA	Erbium-Doped Fibre Amplifiers
FO	Fibre Optic
MSW	Multiswitch
ONT	Optical Network Termination
PON	Passive Optical Network
WDM	Wavelength Division Multiplexing

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Benefits

The TOFsat advantage

- **Fibre cabling has some significant advantages compared to coax cabling in general:**
 - Higher bandwidth – a 3mm fibre cable substitutes 5x7mm coax drop cables for transmission of the full bandwidth for one Sat position and the terrestrial signals
 - Allows enlarged cabling distances because of the low attenuation of a fibre cable – about 0.35dB per 1 km
 - Prevention of electromagnetic ingress noise from LTE mobile services, for example, and disturbance from DC potential and transient currents because of the natural galvanic isolation of fibre cables

- **High flexibility**
 - Reception of the vertical and horizontal polarised frequency ranges of a satellite position, plus terrestrial FM, DAB and DTT bands over one mutual fibre line
 - Optional use of different LNBS: Standard wideband LNB, K-band LNB or dCSS LNBS for operator-specific satellite programme bouquets
 - Enlargement of the FO networks by active FO Repeaters or EDFAs

- **Cost saving**
 - TOFsat is highly competitive because it uses frequency stacking and de-stacking for the Sat-IF-High, -Low and TER bands using specific ASIC chips. Thus only one laser transmitter and one optical receiver is sufficient for one entire Sat position and terrestrial transmission. (Comparing frequently-used wavelengths multiplexing in alternative systems needs 3 laser transmitters and 3 optical receivers in the re-converter for the same constellation. This increases the cost on the reception side, especially if large numbers of re-converters are connected.)
 - FO networks require less maintenance effort, and also less power consumption.



Application examples

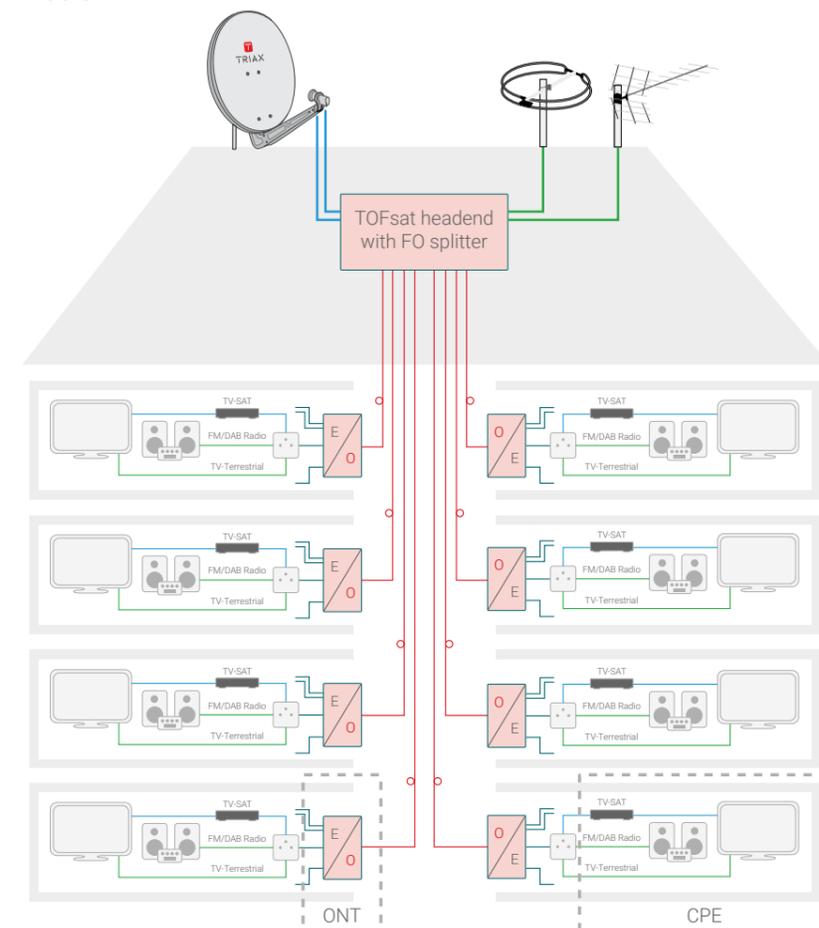
The following three schematic samples represent the broad fields of application for the TOFsat system. Their individual components can also be mixed together in order to adapt the network to the specific customer requirements of the housing associations.

These system designs are only general guidelines. The final specific network architecture needs some pre-evaluations and planning. Please do not hesitate to contact TRIAX if you need our help.

FTTH network in multi-dwellings

The simplest and very common way for broadcast reception and distribution of Sat and Terrestrial broadcast:

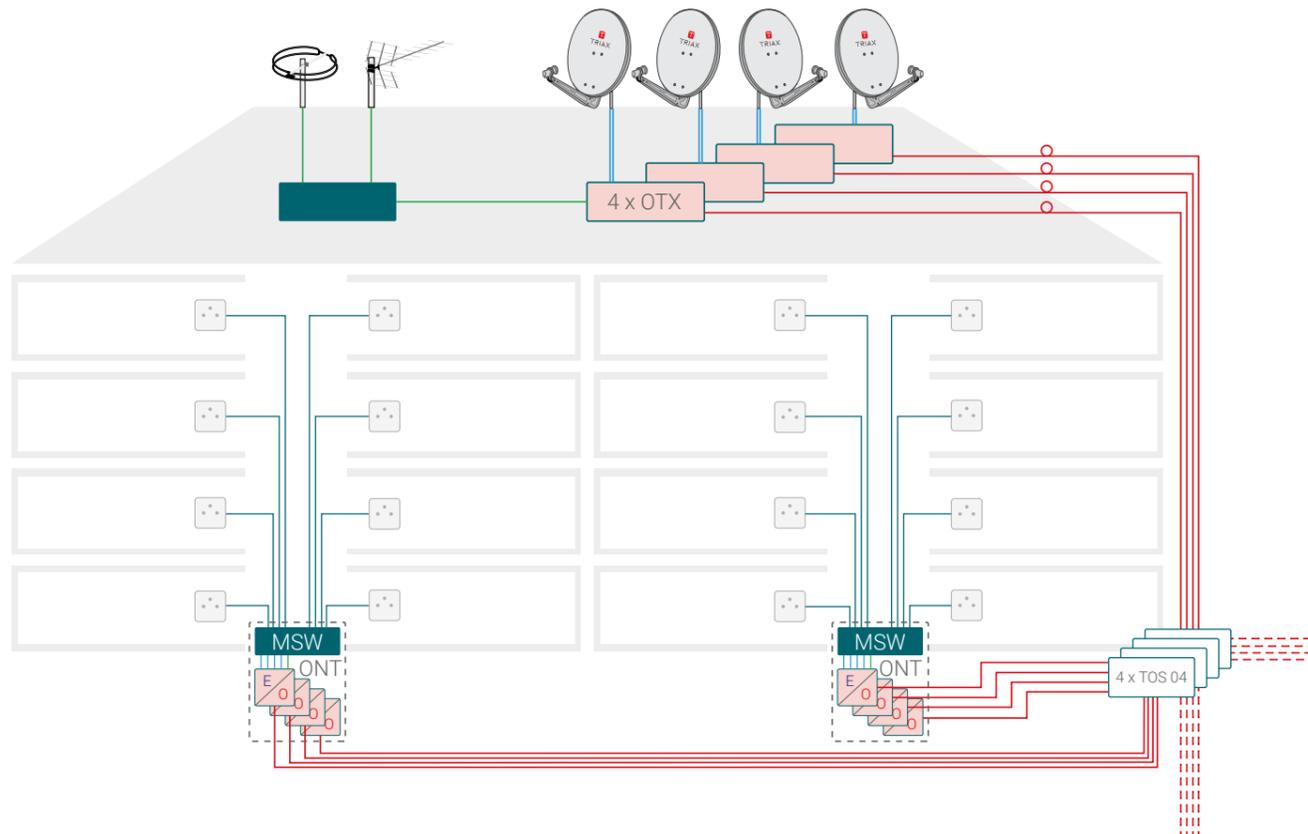
- The system is scalable for reception of one Sat position to a large number of homes (here simplified for one Sat position to 8 apartments only).
- One fibre line per Sat position connects the homes with the TOFsat headend over the passive optical network (PON), including the optical splitters too.
- The optical network termination (ONT) reconverts the optical signal to an electrical RF signal and drives the coaxial home network for direct connection of the Customer Premises Equipment (CPE) like TV sets, set-top boxes and HiFi radio.



FTTB network to connect a multiple TOFsat headend with multi-dwelling blocks

A dish farm and the terrestrial antennas are installed on the roof of one of the multi-dwellings or on a separate aerial station. For each satellite position there is an OTX optical transmitter installed, near to the satellite dishes. The OTX FO transmitters drive the Passive Optical Network (PON) over one fibre line for each Sat position.

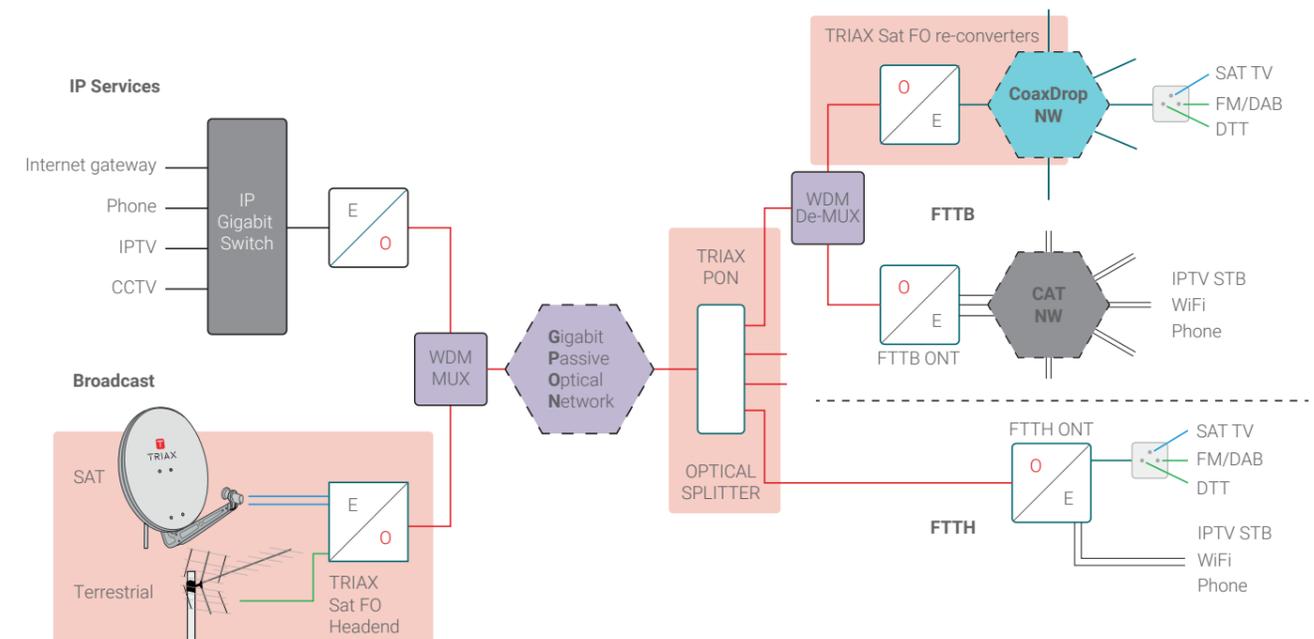
- The PON connects the TOFsat headend with the multi-dwelling blocks where, usually in the basements, ONTs terminate the fibre lines. The TOFsat headend provides signals for up to 32 multi-dwelling units. The optical split can be extended by optical repeaters to connect even more dwellings.
- In this example the ONTs consist of Quatro re-converters connected with a multiswitch (MSW) which provides the Sat and Terrestrial signal over the coaxial in-house network to the homes. CPEs such as TV sets and HiFi receivers can be connected to the coaxial network directly.



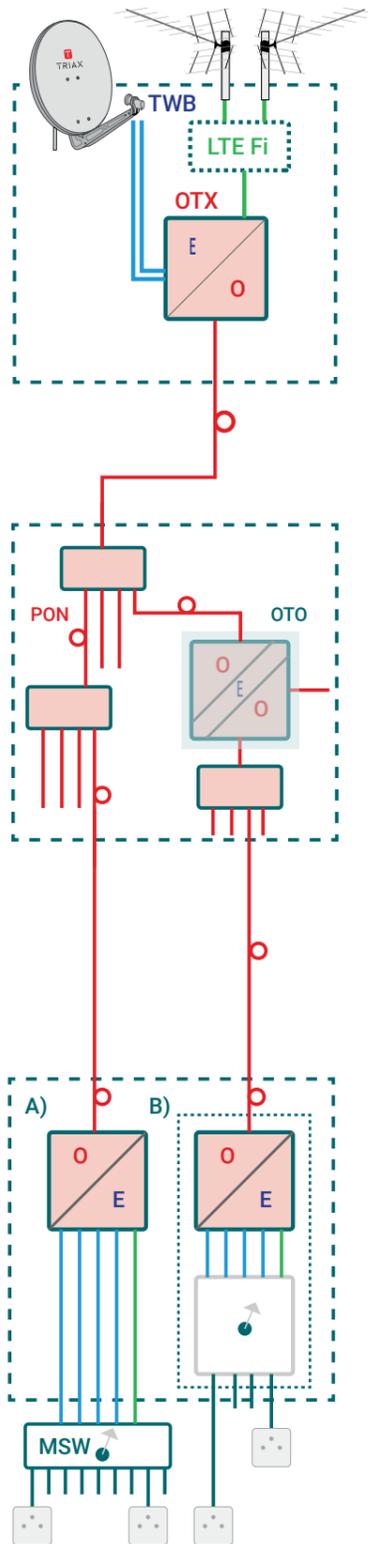
Sat signal distribution in multiple service networks

In an increasing number of countries, operators provide data and phone services together with Sat and Terrestrial broadcast services over their Fibre Optic network to the subscribers. Separate wavelengths are used for transmission of these very different signals in such applications. The schematic shows the principle structure of a multiple service FO network. The TOFsat components (highlighted in light red) support the transmission of the Sat broadcast signals.

- It is most common to use the 1550nm variant of the OTX transmitter because signals on these wavelengths can be amplified by EDFAs (Erbium-Doped Amplifiers) together with data services on other wavelengths. The standard wideband LNB receives the full transponder bouquet of one satellite position. In special cases, this LNB could be replaced by one or two static programmed dCSS LNBs to receive a choice of operator-specific transponders from one or two satellite positions.
- The 1550nm Sat signal is implemented via a WDM multiplexer to the downstream into the GPON or EPON access network.
- Different optical network terminations (ONT) are used to re-convert the signals for direct connection to the Customer Premises Equipment.



Typical TOFsat system structure



Optical headend:

OTX 1310 Sat FO Headend Kit:

- TWB 40 Wideband LNB
- OTX 1310 Optical Transmitter 1310nm
- OTX-MB Mast Mount Bracket (optional)

Article no. Page

307785 10
307784
307782
307789

OTX 1550 Sat FO Headend Kit:

- TWB 40 Wideband LNB
- OTX 1550 Optical Transmitter 1550nm
- OTX-MB Mast Mount Bracket (optional)

307786 10
307784
307783
307789

LTE Filter – Terrestrial pre-amplifier

- TMB 1500 Terrestrial Channel Processor
- GNS 34 Terrestrial Multiband Amplifier

306231
339134

Optical distribution network:

PON – Passive Optical Network

Up to 32 direct optical splits can be deployed within the PON

- TOS D/F Optical splitters FC/PC
- TOS SC Optical splitters SC/APC
- TFC Fibre patch cords steel armoured, FC/PC
- TDB Fibre burial cables, FC/PC
- TSC Fibre patch cords, SC/APC

18
19
20
21
21

PON extension

The number of fibre lines can be significantly increased by inserting:

- OTO 32 Optical Repeater
- Additional split per fibre line up to 2x32 means up to 32x2x32 = 2048 in total.

307782 12

Optical network termination:

A) Opto re-converter to drive external Multiswitches (MSW)

- TVQ 06 Quatro Opto Re-converter

307640 14

B) Opto re-converters with integrated Multiswitch

- TVC 06 Quad Opto Re-converter for up to 4 outlets
- TOM 08 M Opto Multiswitch Master for up to 8 outlets
- TOM 08 S Opto Multiswitch Slave
- for enhancement of the network up to 4 Sat positions

307641 14
307698 16
307699 16

Explanation of terms:

PON

The Passive Optical Network (PON) is the distribution part of the network between the optical headend and Optical Network Termination (ONT). The PON consists of passive fibre optic components, such as fibre cables and optical splitters.

Optical Budget

The optical budget of the TOFsat system is the most important characteristic to calculate the FO links in the PON. The insertion loss of a link is the sum of the attenuation of all single network elements such as splitters, couplers, cables and connectors, which are in a cascaded line of this optical link. This link attenuation should not be higher than the optical budget of the system.

The optical budget value is the output level of the OTX optical transmitter or OTO optical repeater, subtracted by the minimum input level of the optical receiver in order to reach an acceptable signal performance on the ONT side. The TOFsat system typically offers an optical budget for passive links of 20dB (= OTX output level [+8dBm] – min. ONT input level [-12dBm]).

Optical Split

This budget of 20dBm allows passive balanced splitting of the output signal from the OTX transmitter to up to 32 fibre lines. This split value also includes sufficient budget for the insertion loss of the batch cables and their connectors. TRIAX recommends using optical budget and maximum optical split for an easy way to calculate the network as a first approximation.

Slightly higher splits than 32 need detailed analysis of the link attenuation and cannot be guaranteed because of many influences on the absolute upper limit of the optical budget. Significantly enlarged splits can be deployed by inserting OTO 32 Optical Repeaters (see p.12) or EDFAs at the FO headend output or at any place in the PON.

EDFA

The use of EDFAs (Erbium Doped Amplifiers) is another option to gain the required optical level for increasing the optical split in the fibre network to a very large number of subscriber lines. They are mostly used to drive large EPON or GPON networks of multiple service fibre networks as described on page 7. EDFAs work at a wavelength range around 1550nm. Thus, the 1550nm variants OTX 1550nm or OTO 32-1550 need to be implemented as optical transmitters for insertion of the SAT-IF signal to be gained by an EDFA.

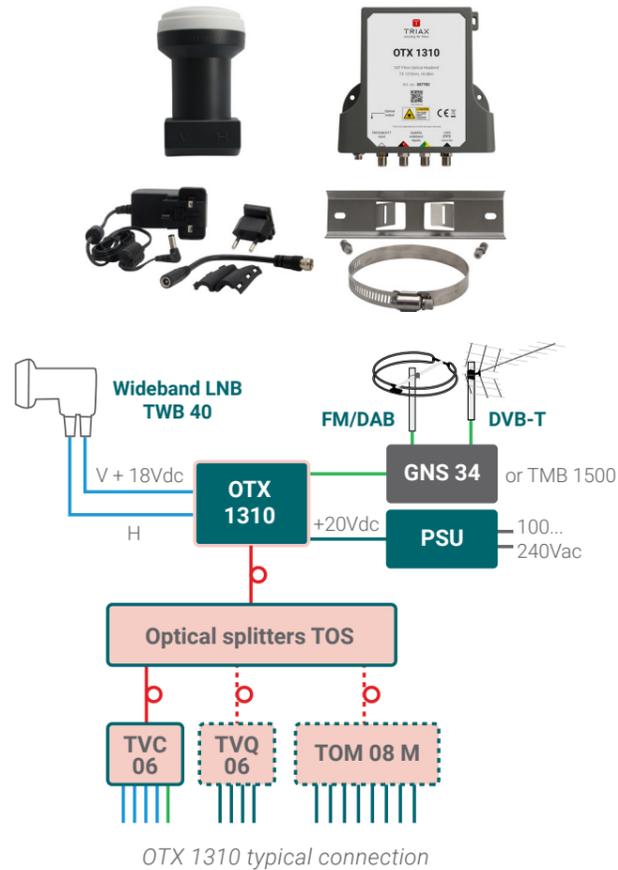
EDFAs are available in a wide range of output levels and number of outputs. The EDFA choice depends on the network architecture that should be comprehensively planned in advance. Therefore they are not part of this TOFsat brochure. Please ask TRIAX for support in finding an optimised solution for your network and to provide the right EDFAs for your specific application.

OTX Fibre Optical Headend

The compact headend kit for SAT wideband and terrestrial transmission

TRIAX Wideband FO Headend

The OTX SAT Fibre Optic Headend Kits consist of the TWB 40 Wideband LNB, the OTX SAT FO transmitter and the wall plug PSU. This headend enables the distribution of the vertical and horizontal SAT-IF widebands combined with terrestrial broadcast channels over a passive optical network to a large number of buildings and homes. Furthermore, the well-established TRIAX optical re-converters TVQ 06, TVC 06 and TOM 08 M/S can be connected as termination to the PON.



- Most cost efficient because the frequency stacking solution needs only one DFB laser as transmitter.
- Only one headend transmitter device for SAT-IF and terrestrial reception entirely.
- Easy "plug+play" provisioning without any manually adjustable elements in the OTX.
- Most compact FO headend transmitter in the market
- In- and outdoor installation is possible. Mast or pole mount with OTX-MB Mast Mount Bracket.
- Improved RF transmission performance compared to previous Opto LNB.

Two OTX models

OTX 1310 designed with a 1310nm laser transmitter supports standard applications like those shown in the diagram above. The OTX 1310 can drive a Passive Optical Network (PON) with up to 32 fibre lines directly. The network can be expanded by using TRIAX OTO 32 active FO Repeaters.

OTX 1550 with 1550nm laser transmitter is recommended for large installations using EDFAs for enabling very high optical splitting rates in the optical network. The 1550nm variant of the OTX is also appointed for WDM operation in GPON or EPON in order to combine SAT broadcast with data service applications.

Installation tips

- Please order the SAT FO headend as kits: OTX 1310 kit (307785) or OTX 1550 kit (307786)
- The Wideband LNB TWB 40 is optimised for installation on a TRIAX dish with diameter 85-120cm.
- The OTX transmitter unit can be mounted in- or outdoor. A special bracket for mounting on the mast or pole can be ordered as OTX-MB (307789).
- Terrestrial antennas need to be connected to the OTX transmitter over a selective Multiband Amplifier like TRIAX GNS 34 (339134) or the Terrestrial Channel Processor TMB 1500 (306231) in order to isolate the terrestrial antennas to each other, align the levels and protect against interference from LTE mobile phone services.

Type Art. no.	TWB 40 307784	
Functionality	SAT Wideband LNB	
RF parameters		
SAT input frequency range	GHz	10.7 12.75
IF output frequency range	MHz	290...2340
Gain flatness across full band (p-p)	dB	7
Gain flatness across 26MHz channel (p-p)	dB	1
Noise figure	dB	0,5
LO frequency	GHz	10,41
Image rejection (typ.)	dB	40
XPOL rejection (typ.)	dB	30
Impedance nominal	Ohm	75
Return loss output (min.)	dB	8
General characteristics		
Input supply voltage via V port	Vdc	8...21
Current consumption (max.)	mA	125
Output connector H and V	F-female	
Operating temperature	°C	-30...+60
Weight	kg	0,45
Dimensions	mm	60x50x100

Type Art. no.	OTX 1310 / OTX 1550 307782 / 307783	
Functionality	SAT Fibre Optic Transmitter	
Optical		
Wavelength	nm	1310 / 1550
Optical output power	dBm	+8
Return loss	dB	20
Output connector	FC/PC	
RF SAT-IF wideband paths vertical and horizontal		
Input frequency range	MHz	290...2340
Input level range (for 40 transponders)	dBµV	70...85
Gain flatness across band	dB	3
Impedance nominal	Ohm	75
Input connectors	F-female	
RF Terrestrial path (FM, DAB, DVB-T)		
Input frequency range	MHz	87.5...694
Input level	dBµV	70...75
Impedance nominal	Ohm	75
Input connector	F-female	
General data		
Input supply voltage OTX unit	Vdc	20
Current consumption OTX unit (max.)	mA	350
Remote current LNB + Terr. (max.)	mA	500
Input connector LNB-V, LNB-H, TER	F-female	
Input connector DC	F-female	
Operating temperature	°C	-20...+60
Weight	kg	0.45
Dimensions (WxHxD)	mm	160x168x28
Accessories		
PSU wall plug mains adapter	Included in OTX: TPS 323 PSU (100...240VAC +20VDC/1.2 (spare part no.: 307657)	
Mast mount bracket for OTX	Order separately: OTX-MB (307789)	
Wideband LNB TWB 40 (Spare part aricle no.: 307784)	Included in OTX 1310 SAT FO Headend Kit (307785) Included in OTX 1550 SAT FO Headend Kit (307786)	

OTO 32 Optical Repeater*

For enlarging the fibre distribution network

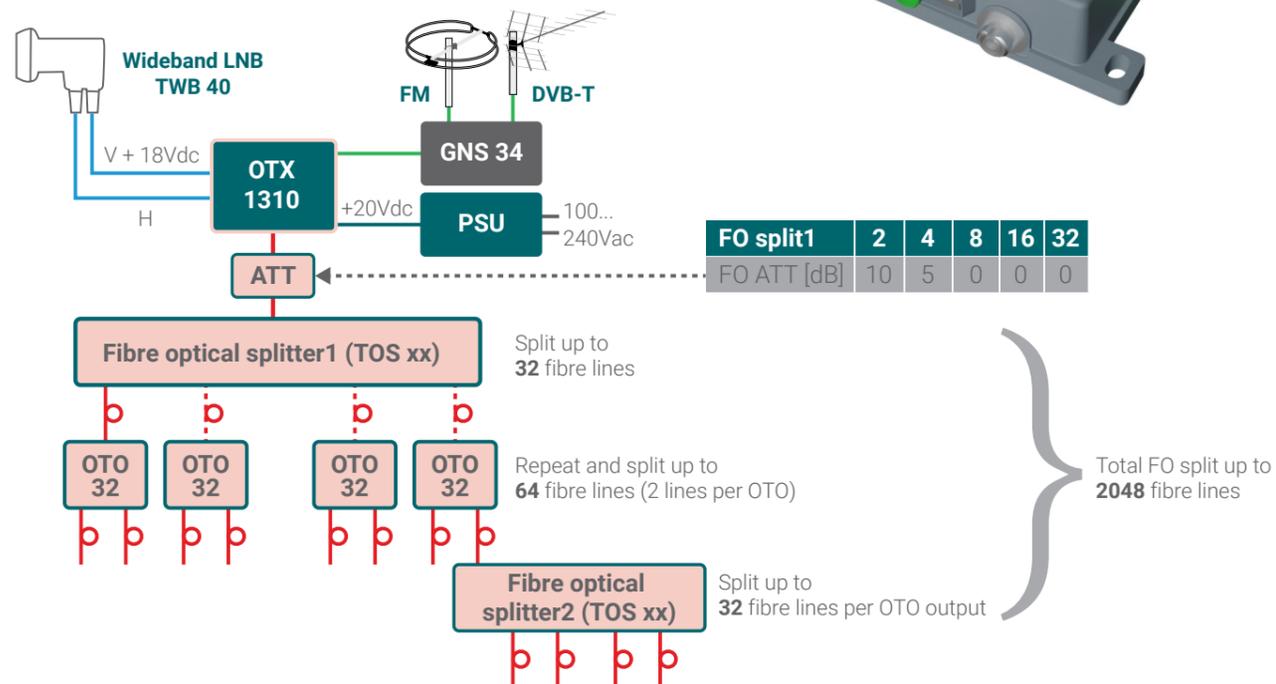
TRIAX Optical Repeater

The FO Repeater OTO 32 refreshes the optical signal within the PON in order to increase the number of fibre lines. The schematic shows the typical application. The OTO unit is powered by an external wall plug mains adapter in the same way as used for the OTX.

The OTO Repeater has two optical FC/PC outputs. Each provides an optical output level of +7dBm and can drive another optical split up to 32 fibre lines, resulting in 2x32 lines driven from one OTO for connecting the optical re-converters TVQ 06, TVC 06 or TOM 08M/S.

- Very cost-efficient option for extending the number of fibre lines from an OTX headend.
- Flexible use of the OTO 32 (307787) with OTX 1310 or OTX 1550. (Please note: the output wavelength is independent of the input wavelength from the OTX).

*Still under development, thus preliminary information



TECHNICAL SPECIFICATIONS

Type Art. no.	OTO 32 / OTO 32-1550 307787 / 307788 OTO 32-1550 (307788) on request only	
Functionality	SAT Fibre Optic Repeater	
Optical		
Wavelength (input)	nm	1100...1650
Wavelength (output)	nm	1310 / 1550
Optical output power	dBm	+7
Return loss	dB	20
Output connector	FC/PC	
RF Signal		
Frequency range	MHz	88...5450
Gain variation across band	dB	5*
Gain ripple across on channel (30MHz)	dB	1
*) additional variation can occur due to satellite transmitted signal levels		
General data		
Input supply voltage OTO unit	Vdc	20
Current consumption OT= unit (max.)	mA	150
Operating temperature	°C	-10...+50
Weight	kg	t.b.d.
Dimensions (WxHxD)	mm	t.b.d.
Accessories		
PSU wall plug mains adapter (included)	TPS 323 PSU (100...240VAC +20VDC/1.2A, Spare part art. no.: 307657)	
Optical attenuator (order separately)	5dB: TFA 05 FC/PC art. no.: 307688	
Optical attenuator (order separately)	10dB TFA 10 FC/PC art. no.: 307690	

Installation tips

- The OTO repeater can be installed directly at the OTX headend location or at every place in the PON where mains power supply is available. This allows very flexible planning of the FO network architecture.
- If the FO split is less than 8 between OTX and OTO, insert an optical attenuator in order to avoid overload of the OTO input.

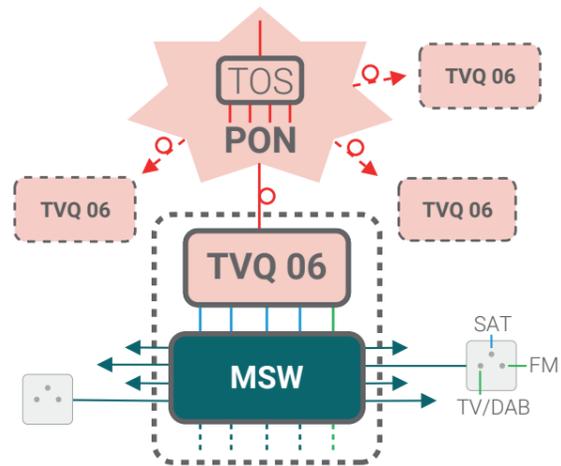
Opto Re-converters

TVQ 06 Quatro and TVC 06 Quad

The compact ONTs of the TOFsat system

The Opto Re-converters terminate the fibre lines of the PON. They receive the light wave signal, convert it back to an RF signal and de-stack it to the four Sat IF ranges, as known from standard Quatro or Quad Universal LNBs.

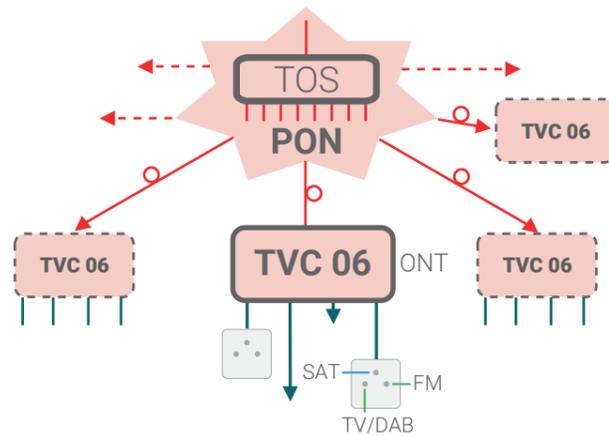
- TVQ and TVC are compatible with 1310nm and 1550nm OTX optical headend or OTO repeaters.
- AGC provides a constant Sat IF output level over a wide range of optical input level.
- Energy saving by DC power fed over the RF ports of the TVQ from the multiswitch or from the Sat receiver using the TVC. Alternatively the re-converters can be permanently supplied with the optional mains plug adapter TPS 323.
- LED indicators for DC power supply and optical input level.
- Very compact and cost-efficient device due to the specific customised chip technology.



ONT with TVQ 06 for reception of one Sat position



TVQ 06 TRIAX Virtual Quatro Re-converter delivers the Sat IF LV, LH, HV, HH and TER signals over the 5 legacy coaxial outputs separately. Thus the ONT consisting of TVQ 06 with the external multiswitch can drive a coaxial distribution in-house network to the outlets located in the subscriber rooms – most common in multi-dwellings and FTTB networks.



ONT with TVC 06 for reception of one Sat position



TVC 06 TRIAX Virtual Quad Re-converter is a compact ONT deployed with an integrated 4-way multiswitch within the re-converter unit. Thus four coaxial lines to the outlets can be connected directly with the TVC. It is a cost-efficient recommendation for FTTH application with the capability to provide the full Sat program bouquet independently to four outlets within the home.

TECHNICAL SPECIFICATIONS

Type Art. no.	TVC 06 307641	TVQ 06 307640
Design	Quad + terrestrial	Quatro + terrestrial for the use with multi-switches
Optical input		
Input power	dB	-12...0 / -15...0
Wavelength	nm	1310/1550
Input RF frequency range, vertical	GHz	0.95 – 3.0
Input RF frequency range, horizontal	GHz	3.4 – 5.45
Terrestrial frequency range, DVB-T	MHz	470...854
Terrestrial frequency range, DAB	MHz	174...241
Terrestrial frequency range, DTT	MHz	87...108
Input connector	FC/PC	
Outputs SAT		
Horizontal High Band (input: 4.4 to 5.45 GHz)	MHz 1100-2150, > 15.5 V 22 kHz	fix
Vertical High Band (input: 1.95 to 3.0 GHz)	MHz 1100-2150, < 14.5 V 22 kHz	fix
Horizontal Low Band (input: 3.4 to 4.4 GHz)	MHz 950-1950, > 15.5 V	fix
Vertical Low Band (input: 0.95 to 1.95 GHz)	MHz 950-1950, < 14.5 V	fix
Impedance, nominal	Ohm	75
Return loss (min.)	dB	10
Automatic Gain Control (AGC)	dB	30
Output Level SAT	dBµV	ca. 75
Outputs Terrestrial		
Terrestrial frequency range, DVB-T	MHz	470...854
Terrestrial frequency range, DAB	MHz	174...240
Terrestrial frequency range, DTT	MHz	87...108
Output Level DTT	dBµV	ca. 65
General data		
Output connectors	4 x Ff (4 x SAT/TER)	5 x Ff (4xSAT+1xTER)
Current consumption	mA	125 @ 20V; 225 @ 10V
Input Voltage	V	10...20
Operating temperature	°C	-15...+60
Weight	kg	0.8
Dimensions	mm	128 x 94 x 27
Accessories		
Power supply TPS 323 PSU (optional)	TPS 323 PSU (100-240 VAC +20VDC/1.2A), Art. No. 307657	

Installation tips

- If the optical attenuation of the PON between OTX or OTO transmitter and the ONT is less than 10dB, insert an optical attenuator TFA 10 or 5 in order to avoid overload of the ONT inputs.
- Recommended 3 port wall outlets: TRIAX EDA 302 F (306121) or FS 302 F (306151).



Opto-Multiswitch

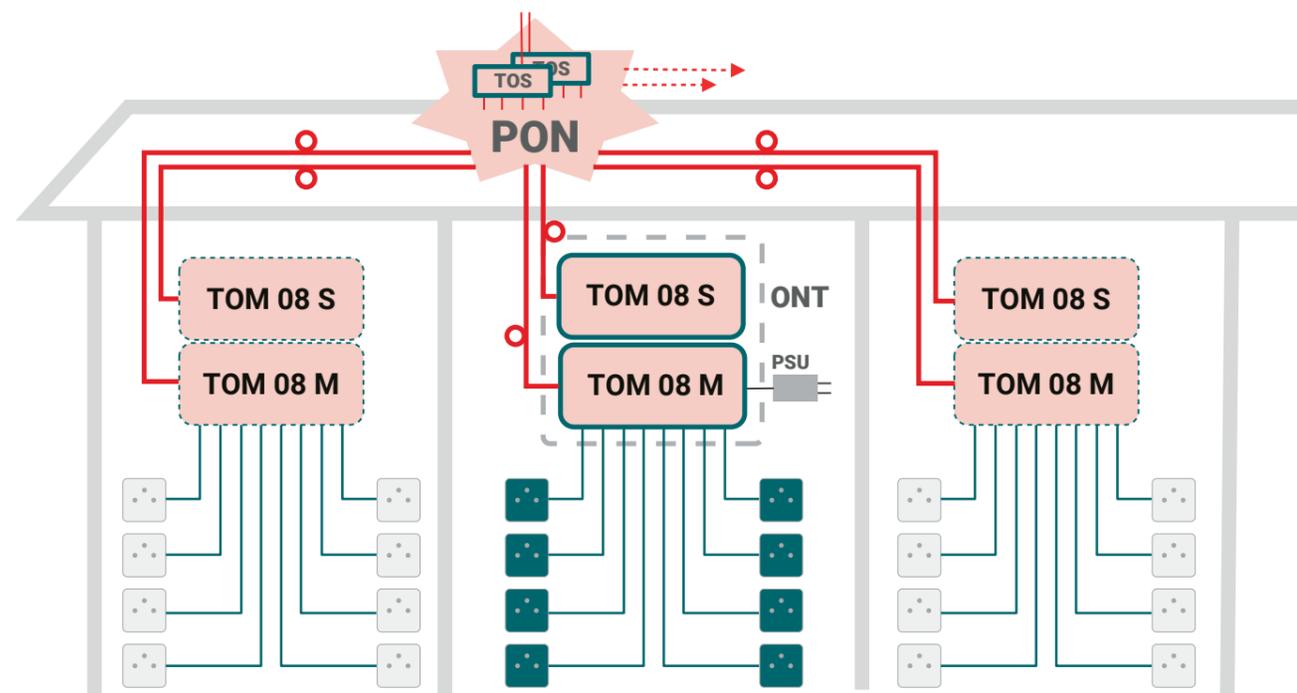
TOM 08 M Switch Master and TOM 08 S Switch Slave

TRIAX Opto-Multiswitch is a compact ONT including the optical receiver, the de-stacker for the Sat IF bands and an octuple multiswitch. Thus a fibre line terminated by a TOM 08 can drive up to eight outlets with the Sat and Terrestrial channels received and processed directly from the OTX headend.

TOM 08 M – the Switch Master is the base unit of the Opto-Multiswitch system. It realises the full functionality as described above in a standalone device for one Sat position.

TOM 08 S – the Switch Slave is a plug-on module that extends the TOM 08 M for receiving an additional Sat position. Thus the compact ONT can consist of the Switch Master TOM 08 M, plus up to 3 stacked Switch Slaves TOM 08 S.

- Scalable compact ONT for up to 4 Sat positions
- Easy, space saving and reliable installation because of no coaxial cabling between optical re-converters and external multiswitch
- Power supply with desktop mains adapter to TOM 08 M Switch Master also feeds the Switch Slaves TOM 08 S
- ONT with Opto-Multiswitch is preferred for FTTH installations in terraced housing or multi-dwellings with large apartment homes



ONT with TOM 08 for reception of two Sat positions in row housing

TECHNICAL SPECIFICATIONS

Type Art. no.	TOM 08 M 307697	TOM 08 S 307699
Functionality	Master 8 way	Slave 8 way
Optical input		
Input power	dBm	-12...-3
Wavelength	nm	1100...1650
SAT-IF frequency range, vertical	GHz	0.95 – 3.0
SAT-IF frequency range, horizontal	GHz	3.4 – 5.45
Terrestrial frequency range, DTT	MHz	470...854
Terrestrial frequency range, DAB	MHz	174...240
Terrestrial frequency range, FM	MHz	87...108
Input connector	FC/PC	
Output SAT on ports		
1...8		
Horizontal High Band (input: 4.4 to 5.45 GHz)	MHz	1100-2150, > 15.5 V 22 kHz
Vertical High Band (input: 1.95 to 3.0 GHz)	MHz	1100-2150, < 14.5 V 22 kHz
Horizontal Low Band (input: 3.4 to 4.4 GHz)	MHz	950-1950, > 15.5 V
Vertical Low Band (input: 0.95 to 1.95 GHz)	MHz	950-1950, < 14.5 V
Selection of satellite by DiSEqC	1.0	
Current from receiver	mA	<35
Impedance, nominal	Ohm	75
Return loss	dB	>10
Automatic Gain Control (AGC)	dB	30
Output Level SAT (@ -7 dBm input)	dBμV	75
Output TER on ports		
1...8		
Terrestrial frequency range, DTT	MHz	470
Terrestrial frequency range, DAB	MHz	174...240
Terrestrial frequency range, FM	MHz	87...108
Output Level DTT (6 multiplexes)	dBμV	ca. 69
General data		
Output connectors	8 x F-f	
Current consumption	A	<1.2
Supply voltage	V	11...20
Mains desktop adapter (PSU)	VAC	+12V, 3,5A
Interface for frequency morphing (GUI)	UART /WinXP, Win7, Linux, M-OS	
Operating temperature	°C	-20...+50
Weight	kg	1.65 (incl. PSU)
Dimensions of a single unit	mm	227 x 138 x 67.5
Dimensions		
2 satellites	mm	227 x 220 x 67.5
3 satellites	mm	227 x 303 x 67.5
4 satellites	mm	227 x 385 x 67.5

Passive FO components

Optical Splitters

TOS TRIAX Optical Splitters with FC/PC connectors

- Single mode couplers in technology FBT (Fused Biconical Tapered) or PLC (Planar Lightwave Circuit)
- Low insertion loss
- Protected in reliable metal sheet enclosures
- Fit with all TOFsats components with FC/PC connectors



Type Art. no.	TOS 02 D 307636	TOS 03 D 307637	TOS 04 F 307736	TOS 08 F 307737	TOS 16 F 307734	TOS 32 F 307735
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FC/PC pre-terminated, balanced couplers							
No. of inputs	1	1	1	1	1	1	1
No. of outputs	2	3	4	8	16	32	
Connection	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	
Technology	FBT	FBT	PLC	PLC	PLC	PLC	
Coupling ratio	% 50/50	33/33/33	4x25	8x12.5	16x6.25	32x3.125	
Through Loss	dB 3.5	5.6	7.2	10.2	13.6	16.7	
Wavelength	nm 1310/1550	1310/1550	1260...1650	1260...1650	1260...1650	1260...1650	
Wavelength band width	nm ± 40	± 40					

Type Art. no.	TOS 02 D-1090 307730	TOS 02 D-2080 307731	TOS 02D-3070 307732	TOS 02 D-4060 307733
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FC/PC pre-terminated, unbalanced couplers					
No. of inputs	1	1	1	1	1
No. of outputs	2	2	2	2	2
Connection	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC
Technology	FBT	FBT	FBT	FBT	FBT
Coupling ratio	% 10/90	20/80	30/70	40-60	
Through Loss	dB 10.9/0.9	7.6/1.5	5.8/2.1	4.4/2.6	
Wavelength	nm 1310/1550	1310/1550	1310/1550	1310/1550	
Wavelength band width	nm ± 40	± 40	± 40	± 40	

TOS SC TRIAX Optical Splitters with SC/APC connectors

- Single mode couplers in PLC (Planar Lightwave Circuit) technology
- Enclosed in plastic cassettes 19" 3 RU



Type Art. no.	TOS 02 SC 307902	TOS 03 SC 307903	TOS 04 SC 307904	TOS 08 SC 307905	TOS 16 SC 307906	TOS 32 SC 307907
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SC/APC terminated, balanced couplers							
No. of inputs	1	1	1	1	1	1	1
No. of outputs	2	3	4	8	16	32	
Connection	SC/APC	SC/APC	SC/APC	SC/APC	SC/APC	SC/APC	
Technology	PLC	PLC	PLC	PLC	PLC	PLC	
Coupling ratio	% 50/50	33/33/33	4x25	8x12.5	16x6.25	32x3.125	
Through Loss	dB 3.8	5.6	7.1	10.2	13.5	17.0	
Wavelength	nm 1260...1650	1260...1650	1260...1650	1260...1650	1260...1650	1260...1650	

TOS Fibre Distribution Cabinets

For TOS xx SC splitters, splice trays, layout pigtailed to match trunk and drop fibre cables of the PON. Usable in- and outdoor.

- Plastic enclosure in light grey (RAL 7035), flame retardant, aging and UV resistant
- In- or outdoor (IP 65) mounting on wall or on pole
- Special screw and key for door lock
- Dual layer structure of the box: bottom for splicing and upper layer for splitting and distribution
- Special lock device for outlet of drop cables

TOS – Cab16 (307910)

- Slot for max. 1:16 or 2 x 1:2, 1:4, 1:8 splitter cassettes (max. splitting 16)
- Slot for 2 splice trays

TOS – Cab32 (307911)

- Slot for max. 2 x 1:16 or 4 x 1:2, 1:4, 1:8 splitter cassettes (max. splitting 32)
- Slot for 2 splice trays



Fibre Optic Patch Cords

FC/PC connector terminated

Using single mode fibre G 657A, 9/125µm

- TFC fibre optic drop cable
 - Crush protected by flexible steel-reinforced intermediate coat protects against pressure loads
 - Grey-coloured LSZH sheath
 - 4 aramid strands for strain relief when laying, allowing tension on the cable up to 80N permanently and 100N briefly



Type Art. no.	TFC 01 307661	TFC 03 307662	TFC 05 307663	TFC 10 307664	TFC 15 307665	TFC 20 307666	
Assembled with	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	
Attenuation 1310/1550 nm	dB/km		0.35/0.25				
Min. bending radius - one-time/permanent	mm		30/60				
Diameter cable	mm		3				
Diameter connector	mm		10				
Cable length	m	1	3	5	10	15	20

Type Art. no.	TFC 30 307667	TFC 40 307668	TFC 50 307669	TFC 75 307670	TFC 100 307671	TFC 150 307660	TFC 200 307672	TFC 500 307675	
Assembled with	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	FC/PC	
Attenuation 1310/1550 nm	dB/km		0.35/0.25						
Min. bending radius - one-time/permanent	mm		30/60						
Diameter cable	mm		3						
Diameter connector	mm		10						
Cable length	m	30	40	50	75	100	150	200	500



- TDB fibre optic burial cables for outdoor
 - Robust black PE sheath, UV resistant
 - Moisture proofing by gel insert
 - Aramid reinforced inserts allow high tensile forces up to 600N permanently and 1500N briefly

Type Art. no.	TDB 050 307760	TDB 100 307761	TDB 200 307762	
Assembled with	FC/PC	FC/PC	FC/PC	
Number of optical fibers	2			
Attenuation 1310/1550 nm	dB/km		0.35/0.25	
Min. bending radius - one-time/permanent	mm		60/120	
Diameter cable	mm		5.9	
Diameter connector	mm		10	
Cable length	m	50	100	200

SC/APC connector terminated

- TSC fibre optic drop cable
 - Using single mode fibre G 625D, 9/125µm
 - LSZH jacket
 - Preferred for indoor installations in cable ducts and cabinets



Type Art. no.	TSC 01 307010	TSC 02 307011	TSC 05 307012	TSC 10 307013	TSC 20 307014	TSC 30 307015	TSC 50 307016	
Connector Type EN	SC/APC							
Optical Attenuation 1310/1550	dB/km		0.3	0.3	0.3	0.3	0.3	
Wave length	nm	1310 - 1550	1310 - 1550	1310 - 1550	1310 - 1550	1310 - 1550	1310 - 1550	
Jacket - dimension	mm	3.0	3.0	3.0	3.0	3.0	3.0	
Minimum bending radius	mm	50	50	50	50	50	50	
Cable length	m	1	2	5	10	20	30	50

Fibre Optic Accessories

Type Art. no.	FC/PC - Pigtail 307581	SC/APC - Pigtail 307584
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Terminated pigtails for splicing

	mm	3	3
Diameter cable			
Cable length	m	1	1

Type Art. no.	SC/APC - SC/APC 307580	SC/APC - SC/APC 307582
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Adaptor patch cords

	mm	3	3
Diameter cable			
Cable length	m	2	2

Type Art. no.	TFB 001 307684	TFB 002 307686
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Barrel adaptors

Description	Adapter	Adapter
Assembled with	FC/PC - FC/PC	FC/PC - SC/APC

Type Art. no.	TFA 05 FC/PC 307688	TFA 10 FC/PC 307690	TFA 15 FC/PC 307692
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Attenuators

Description	Attenuator	Attenuator	Attenuator	
Attenuation	db	5	10	15

Type Art. no.	TFA 03 SC/APC 307001	TFA 10 SC/APC 307002	TFA 15 SC/APC 307003
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Attenuators

Description	Optical attenuator	Optical attenuator	Optical attenuator	
Attenuation	db	3	5	10



Optical Level Meter TOM 011

Measurement of the optical signal level in fibre links

- Display of measured values in dBm or mW
- Facilitates troubleshooting
- Calibrated for different wavelengths: 850, 1300, 1310, 1490, 1550 or 1625 nm
- Backlit, easy to read display

Type Art. no.	TOM 011 307967
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Wavelength	nm	800 - 1700
Reading area	dBm	-50 - +30
Inaccuracy	%	+/- 5%
Calibrated wavelength	nm	850, 1300, 1310, 1490, 1550, 1625
Connections		FC/PC and SC/PC
Operating time		140 Std. with 3 x 1.5V AA-Batteries
Size (H X W X D)	mm	190 x 100 x 50
Weight	g	370





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Our Solutions combine our hardware and software expertise to deliver value to hospitality and related markets, through a partner network of system integrators, large installers and operators.

Our combined company of 260 employees is jointly owned by Polaris Private Equity and Velatia Group. See www.triax.com for further info.

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