connecting the future

TRIAX

SAT Fibre Optics

TRIAX fibre integrated reception systems
- remove the limits from your installation

triax.com/fibre-optics

The Fibre Advantage

Advantages for the installer, tenant and landlord in residential complexes

TRIAX offer a complete range of solutions for your fibre installation.

TRIAX fibre is your preferred choice when you want:

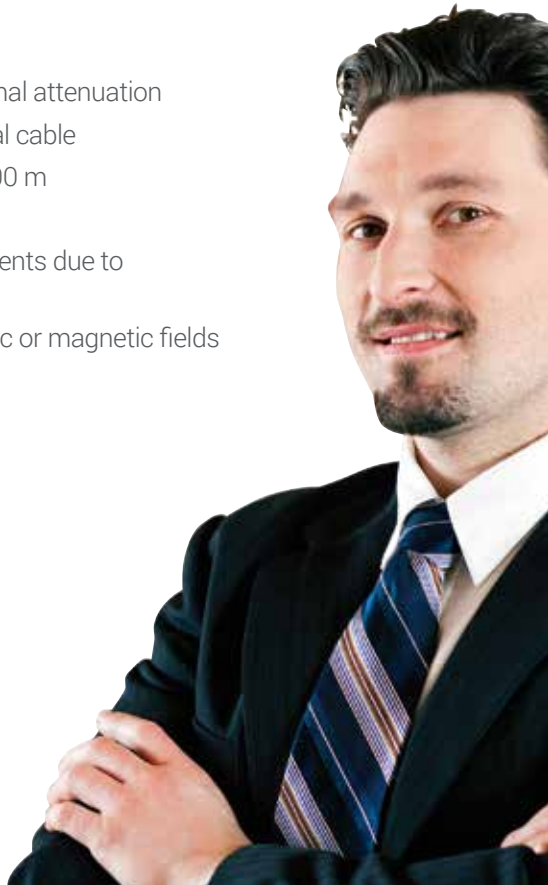
- One discreet headend - distribute satellite, digital terrestrial and radio signals from a single location
- Design a system over a large area without jeopardising signal and quality
- Install a single fibre cable only rather than multiple coaxial cables

Advantages for installers

- Great for saving time
- High reliability
- Significant infrastructure savings
- Future-proof
- Noise distortion and interference-free transmission

The fibre possibilities

- Very long distances with minimal attenuation
- Lighter and thinner than coaxial cable
- Pre-assembled cables up to 500 m
- UV-resistant
- No potential and transient currents due to natural/galvanic isolation
- No influence by external electric or magnetic fields



Advantages for tenant and landlord

- Reduced installation times
- Best possible quality
- Maximum flexibility
- High fire safety
- Future-proof

When upgrading or new installation

- Receive all broadcast via satellites
- Supply several hundred apartments with only one Satellite dish station
- Building aesthetics
- A fibre optic cable replaces 4 coaxial cables per satellite position plus one for terrestrial reception
- 30 - 60% cost savings* compared to large installations to supply an extensive amount of subscribers with TV programmes from several satellites

Television at the speed of light

* Based on the calculation of a net service company

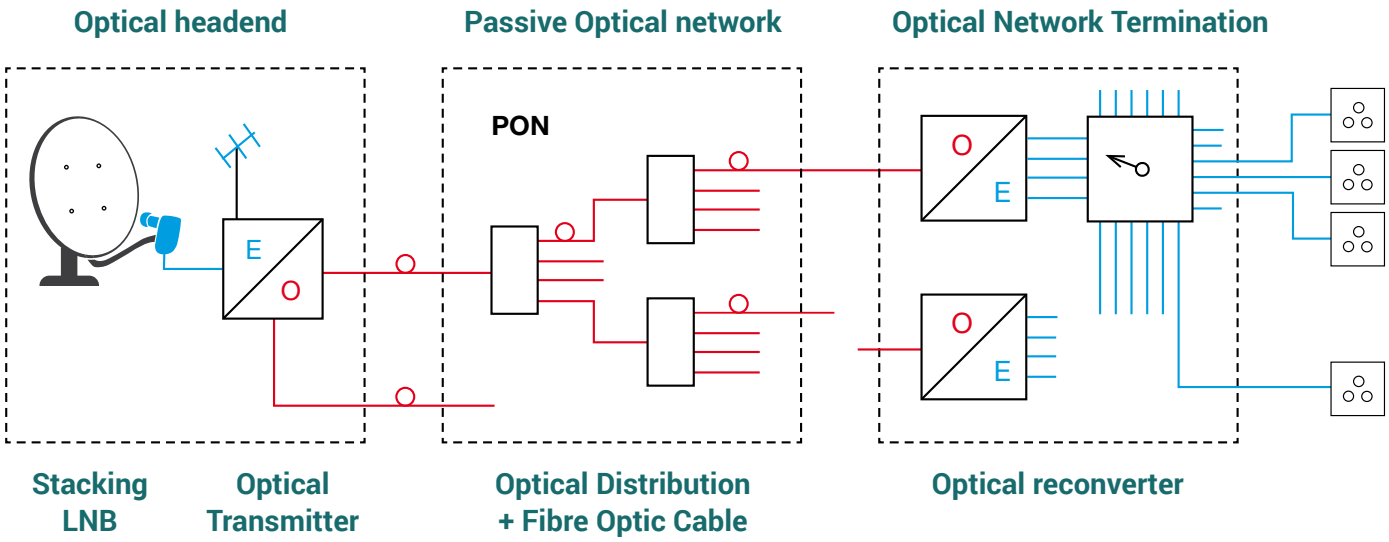
SAT Fibre Optics

Optical tranmission technology - the SAT-TV coverage of tomorrow

Television at the speed of light - the transmission choice for the future

- SAT IF distribution over fibre optics (FO) can supply many households over larger distances, with feed from a central satellite dish station
- Almost lossless transmission of satellite, DVB-T and DAB signals. Attenuation per 1000 m only about 0.3 dB
- Future-proof and widest possible variety of channels
- All 4 SAT IF signals are transmitted over one optical fibre by using a Full Band Stacking LNB
- Space-saving installation - a 3 mm optical fibre replaces five 7 mm coaxial cables
- Optical fibre with galvanic isolation
- Quick and easy installation by using pre-assembled fibre optical cables

Typical structure of optic fibre distribution system



Overview of TRIAX products for optical satellite IF transmission technology

System	Opto-LNB	Opto-IRS
Transmission capabilities		
SAT	1 SAT position/4 polarities	1 SAT position/4 polarities
Terrestrial	-	FM, DTT, DAB
Technical concept	Stacking-LNB included with optical transmitter 1310 nm	Full band stacking-LNB with external optical transmitter 1310 nm
System components		
Stacking LNB	TOL 32, incl. integrated optical transmitter TOL 64, incl. integrated optical transmitter	TWL 01 with N connector
Optical transmitter		TOU 232 SA with 2 x opt. output
Optical re-converter (sidecar)	TVC 05/TVQ 05 TVC 06/TVQ 06	TVC 05/TVQ 05 TVC 06/TVQ 06
Components for extension		
Coaxial Active Splitter		TAS 04 + TUC 02 + TOU 232SA
Opto Repeater	TOE 02 + TOU 232 SA	TOE 02 + TOU 232 SA
Optical budget (max.)	TOL 32: 19 dB TOL 64: 22 dB	2 x 19 dB
Max. optical splitting	TOL 32: 32 TOL 64: 64	2x32 = 64
- with extension 4x (TAS 04+TOU 232SA)		256
- with extension 2x16x (TOE 02+TOU 232 SA)	1024	2048
- in total (TAS 04 + TOE 02)		8192

What we mean by...

PON

The Passive Optical Network (PON) is the distribution part of the network between optical headend and optical network termination with the Opto-Re-converters. The PON consist of passive fibre optic components like fibre cables and optical splitters.

Optical Split

The max. optical split defines how many fibre lines with an optical termination unit on the optical reception side can be driven from the output of the optical transmitter. The max. optical split of 32 for a Opto-LNB TOL 32 means that the optical signal can be split to up to 32 fibre lines. Until that symmetrical split the input signal on the optical re-converters still have a level to provide an electrical output signal in sufficient quality.

Optical Budget

The optical budget is the most important characteristic of an optical link. It defines the upper limit of the insertion loss of a fibre link in the PON. The insertion loss of a link is the sum of the attenuation of all single network elements like splitters, cables and connectors in an optical link of the PON.

The max. optical budget defines also the the min. input level of the optical re-converter. The min. input level is the optical output power of the in dBm minus the max optical budget. Example: the optical output power of the Opto-LNB TOL 32 is (+7 dB) and the max. optical budgets is 19 dB. Thus the level of the optical signal on the input of the optical re-converter should not be less than 7 dBm - 19 dB = -12 dBm.

The optical budget in this brochure is the fix specified max. optical link attenuation for all network design. The output power of the transmitters and the min. input level of the re-converters are for rough information only.

Opto-LNB

| Stacking LNBs with integrated optical transmitter

Opto-LNB for 1 satellite position, fibre splitting 32/64, 1310 nm.

The Opto-LNB consists of a low noise block converter and an optical transmitter. The LNB stacks the 4 SAT-IF-bands into a super broad band IF of 950...5450 MHz frequency range. Thus the 4 SAT-IF-bands can be transmitted over one fibre line.

- Two versions of optical stacking LNBs are available with optical outputs for splitting to max. 32 or 64 fibre links.
- Optical wavelength 1310 nm
- The LNB is powered through the F Type connector or via included external power supply
- Compatible with optical re-converter TVQ (Quatro) and TVC (Quad) as well as Opto Multiswitch TOM

Overview of TRIAX Optical-LNB

Type		TOL 32	TOL 64
Art. No.		307610	307611
System		LNB for 32 fibre links	LNB for 64 fibre links
RF-Frequencies			
Input frequency range	GHz	10,7 – 12.75	
Band stacking, vertical/ horizontal	GHz	0.950 – 3.0	
Frequency range horizontal, L+H, stacked	GHz	3.4 – 5.45	
Polarization	Linear	horizontal and vertikal	
Characteristics			
Optical wavelengths	nm	1310	1310
Optical power, (nominal @ 25°C)	dBm	7.0	8.5
Optical budget for PON (with TVQ/TVC)	dB	19.0	22.0
Noise figure (typical/max. @ 25°C)	dB	0.5	0.5
Gain	dB	62...72	62...72
L.O-Frequency, vertical	GHz	9.75	9.75
L.O-Frequency, horizontal	GHz	7.3	7.3
Image rejection (min.)	dB	40	40
Cross polarization (typ./min.)	dB	30/25	30/25
Power consumption			
Supply voltage, nominal/ maximum survival voltage	VDC	12	20
Current consumption	mA	< 450	< 300
General			
DC input connector		F-female type	F-female type
Optical output connector		FC/PC	FC/PC
Feedhorn diameter	mm	40	40
Operating temperature range	°C	-30 - +60	-30 - +60
Power supply unit (included)		TPS 322 PSU (12 V/0.5A),	TPS 323 PSU (20 V/1,2A),
Spare part - Power supply- Art.No.		307658	307657

Opto-LNB

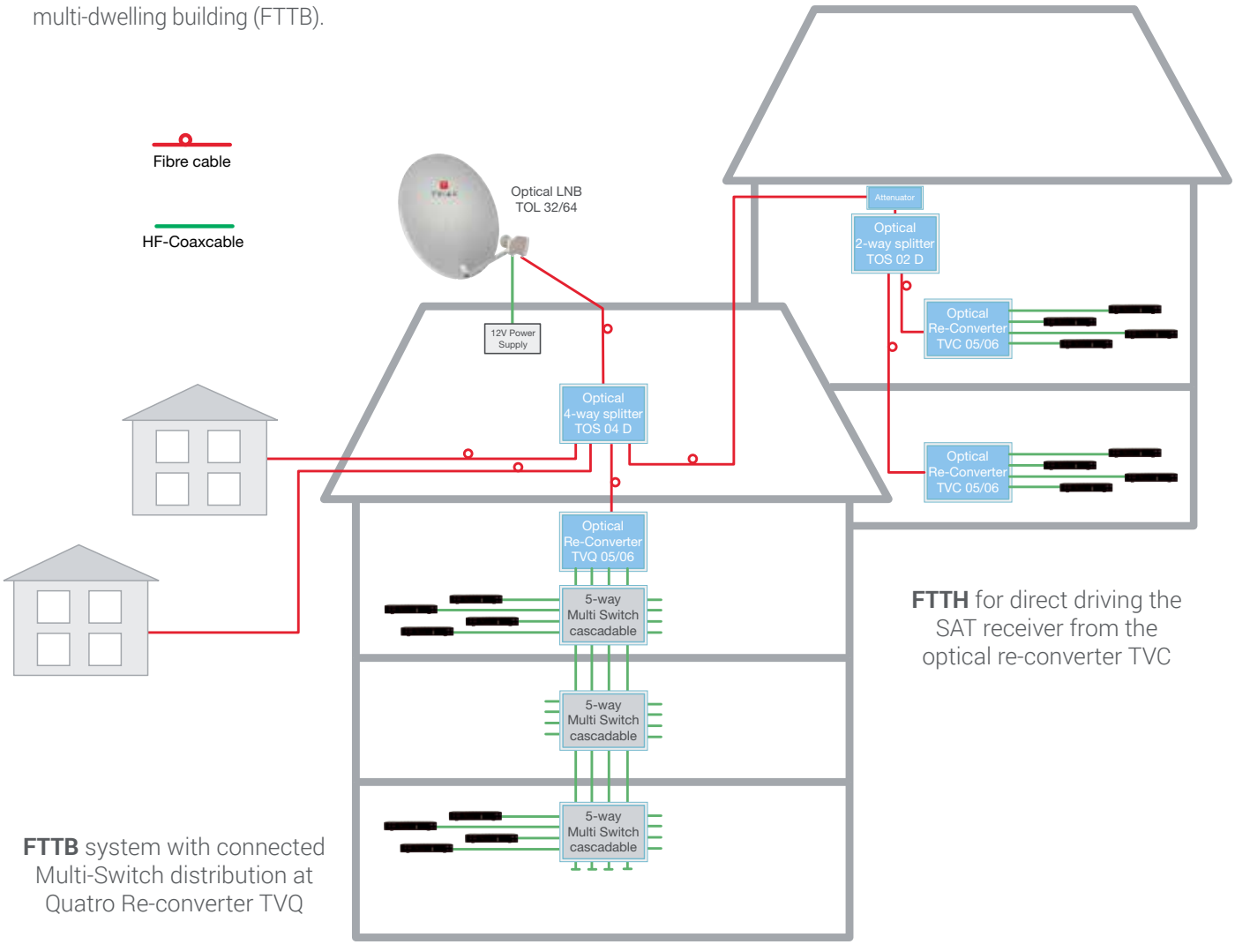
Optical receiver - 1 x SAT

Typical network structure for the reception and distribution of optical satellite signals via a satellite position

Reception of 1 SAT position with an Opto-LNB TOL 32 / TOL 64

Installation tips

- Insert optical attenuator TFA (see page 21) if optical input level at optical re-converter TVQ/TVC is more than 0 dBm.
- Usually the optical splitters TOS and re-converters TVQ are installed in a distribution box in the basement of the multi-dwelling building (FTTB).



FTTH for direct driving the SAT receiver from the optical re-converter TVC

FTTB system with connected Multi-Switch distribution at Quatro Re-converter TVQ

Integrated Reception System

| IRS 1 for 1 SAT-Position + DTT/DAB/FM

The TOU 232 kit consists of the stacking LNB TWL 01, Optical Transmitter TOU 232 SA (SAT + Terrestrial), N-cable TUC 02 (2m), PSU 20V, Mast mounting plate, terminator.

- The 4 SAT bands are stacked in the full-band LNB TWL 1. The SAT IF signal 950...5450 MHz is connected via the high performance coaxial N-cable TUC to the optical transmitter TOU 232 SA.
- The terrestrial signals are connected to the optical transmitter directly.
- The optical transmitter converts the SAT and Terr signal into 2 optical output signals with 1310 nm wavelength
- Each optical output can be split upto 32 ways with each output feeding a TVC 05/06 or TVQ 05/06 re- converter or a TOM multiswitch
- External PSU 20V (included)

- The optical signal can be split up to 8 x 32 ways by using the active coaxial splitter TAS 04 that can drive up to 4 x TOU 232 SA optical transmitters

Technical specification

Type		TWL 01	TOU 232 SA	TOU 232 Kit
Art. No.		**307612**	**307615**	**307614**
System		Full stacking LNB, coaxial output	Opt. transmitter for 1xSAT + terr. max. splitting 2 x 32	Kit, consisting of TWL 01, TOU 232 SA, N-cable, PSU, accessories
SAT range				
Input frequency range	GHz	10.7 – 12.75	0.95...5.450	10.7 – 12.75
Output frequency range LNB	GHz	0.95...5.450		0.95...5.450
Frequency range vertical, stacked, VL+VH	GHz	0.950 – 3.0		0.950 – 3.0
Frequency range horizontal, stacked, HL+HH	GHz	3.4 – 5.45		3.4 – 5.45
Polarization	Linear	horizontal and vertical		horizontal and vertical
Terrestrial frequency and input level range				
DVB-T	MHz		470...854 (70 -3 +27 dBµV)*	
DAB	MHz		213...230 (58 -3 +27 dBµV)	
FM	MHz		87...108 (70 -3 +27 dBµV)	
Remote feed terr. amplifiers			11,5 V/<80 mA	
Characteristics				
Optical wavelength	nm		1310	1310
Optical output level (nom. @25 °C)	dBm		2 x 7.0	2 x 7.0
Optical budget for PON (with TVQ/TVC05)	dB		2 x 19.0	2 x 19.0
Noise figure (typ. @25°C)	dB	0.5		0.5
Gain	dB	62...72		62...72
L.O frequency, vertical / horizontal	GHz	9.75 / 7.3		9.75 / 7.3
Image frequency rejection (min.)	dB	40		40
Isolation (typ.)	dB	30		30
Spurious output (950MHz-3GHz, 3.4GHz-5.45GHz)	dBc	-25		-25
LNB				
Connector RF output, DC power supply		N female		N female
Diameter feed	mm	40		40
Operating temperature range	°C	-30 - +60		-30 - +60
Optical transmitter				
Port SAT in / Port DTT/DAB in			N female / F female	
Port Opt out1 and Opt out 2			2 x FC/PC	
Operating temperature range			-20 - +50	
Power supply (via opt. receiver)				
Power supply, nominal	VDC		20	
Power consumption	mA		< 450	
Power supply unit (included)			TPS 323 PSU (20 V/1,2A)	
Spare part - Power supply- Art.No.			307657	

*) 6 transponders of digital multiplexes

Integrated Reception System

| TAS 04 Active Coax-Splitter

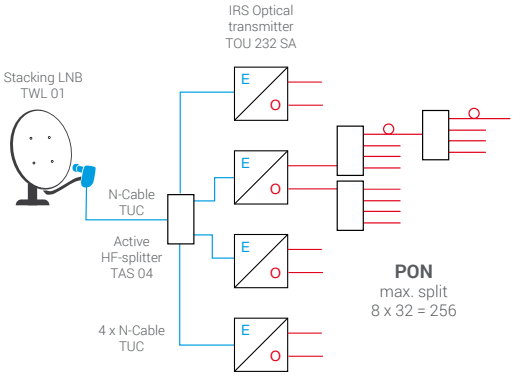
Expanding the Fibre network on Opto-Transmitter side

TAS 04 is an active coaxial splitter to drive up to 4 optical transmitters TOU 232 SA connected by the N-cable TUC 002 (not supplied)

- Active splitter without insertion loss
- The optical splitting of an IRS 1 system can be expanded up 4 x (2x32) = 256 by using the TAS 04 connected to 4 x optical transmitter TOU 232 SA.
- The distributor TAS 04 is connected via coaxial cable TUC with the Stacking LNB TWL 01 and the IRS-transmitters TOU.
- Power is supplied via the coaxial cable TUC from the IRS transmitter TOU.

Technical specification

Type		TAS 04
Art. No.		307616
Frequency range	GHz	0.95 - 5.5
No. of inputs		1
No. of outputs		4
Connection		N
Coupling ratio	%	25/25/25/25



Coaxial patch cable with N-connector

Coaxial link to connect:

- Stacking LNB TWL 01 with optical transmitter TOU 232 SA
- Stacking LNB TWL 01 with active splitter TAS 04
- Splitter TAS 04 with optical transmitters TOU 232 SA

Pre-assembled cable with N connector

Type		TUC 001	TUC 002	TUC 003	TUC 005	TUC 010
Art. No.		307601	307602	307603	307604	307605
Assembled with				N-Connector		
Diameter cable	mm			10		
Cable length	m	0.5	2	3	5	10

Integrated Reception System

| TOE 02 Optical-to Electrical Repeater

Expanding the Fibre network by Opto-Repeater

The TOE 02 is designed to re-launch the fibre system when it is at a stage where the PON cannot be split any further.

The TOE 02 has the function to convert the optical signal from the Opto-LNB or IRS1 transmitter to electrical signals for feeding another optical transmitter TOU 232 SA

- Expands the optical split of a fibre line up to 2x32
- The splitt of the passive optical network (PON) before the repeater should not be more than 16
- Maximum of optical split in an IRS 1:
  2048 = (TOU 232=2x16) x (Repeater TOE 02+TOU 232SA=2x32)
- Additional expanding of split by factor 4 by use of active coaxial splitter TAS 04 for driving more IRS1 transmitters (TOU 232SA) up to 8192
- Power supply of the TOE 02 is carried over the coaxial patch cable TUC 02 from the TOU 232 SA.

Technical specification

Type		TOE 02
Art. No.		307694
Functionality		Optical-to-electrical converter
Optical Input		
Input Power	dBm	-12...-3
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 connnector		FC/PC
Output SAT		
Stacked SAT-IF signal	MHz	950...5450
Impedance, nominal	Ohm	50
Return loss (min.)	dB	9
Flatness across band	dB	4
Output Level SAT	dBµV	80
Outputs Terrestrial		
Terrestrial frequency range, DVB-T	MHz	470...854
Terrestrial frequency range, DAB	MHz	174...240
Terrestrial frequency range, DTT	MHz	87...108
Impedance, nominal	Ohm	75
Output Level DTT (DAB level -14dB respect to DTT)	dBµV	87
General Data		
Output connector SAT		N-female
Output connector TER		F-female
Input connector DC		F-female
Current consumption	mA	65 @ 20V
Input Voltage (fed from TOU 232SA or optional from PSU)	V	10...24
Operating temperature	°C	-10...+50
Weight	kg	0,45
Dimensions	mm	160 x 167x 30
Accessories		
Power supply (optional)		TPS 323 PSU (100-240 VAC +20VDC/1.2A), Art. No. 307657

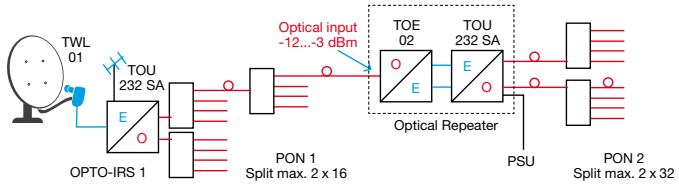
Integrated Reception System

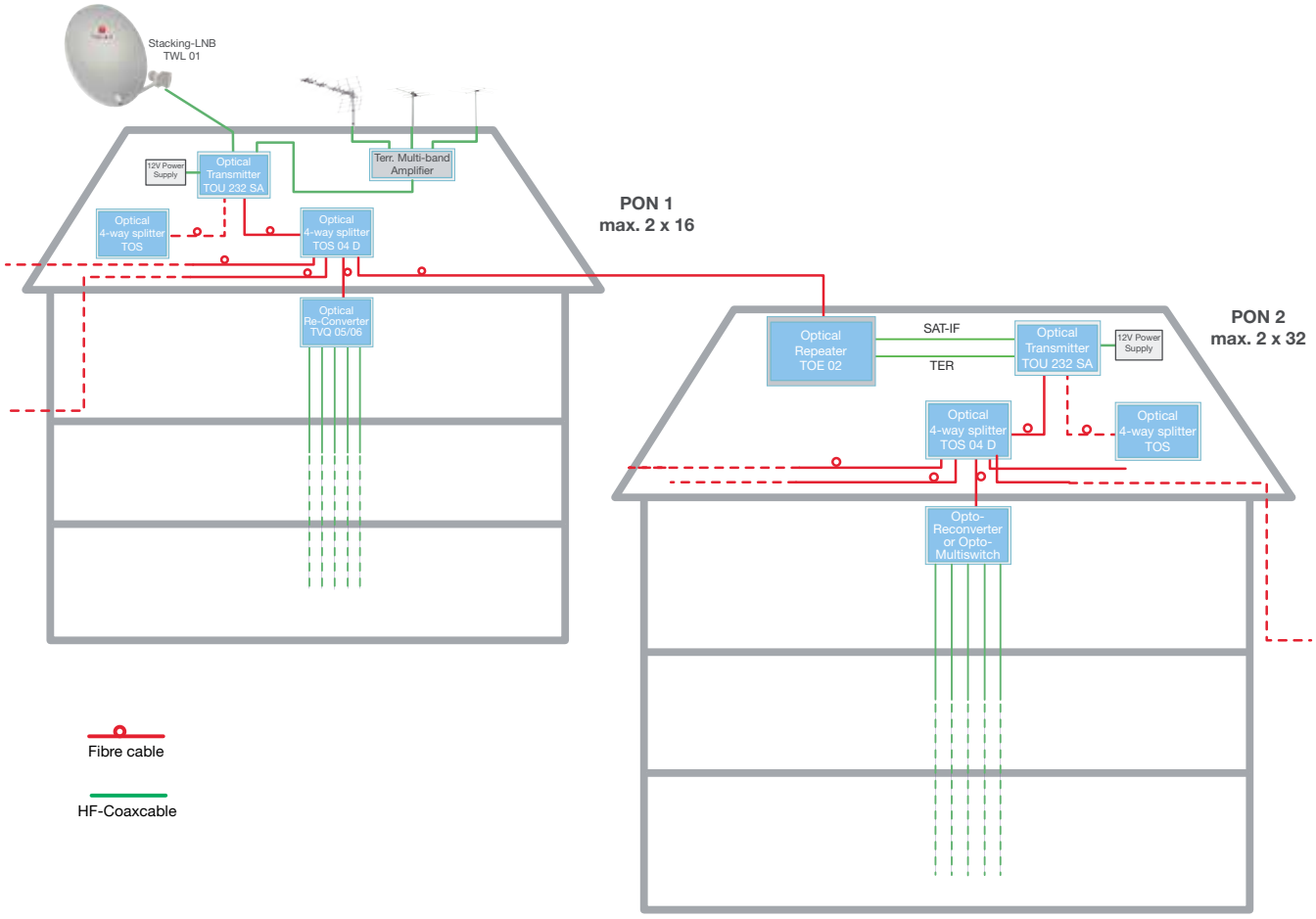
| Installation example with Opto Repeater TOE 02 + TOU 232 SA

Expanding the Fibre network by Opto-Repeater for 1xSAT + DTT/DAB/FM

Installation tips

- It is recommended that a selective multi-band cluster leveller like GNS or TMB is used to manage the terrestrial signals.
- The netwotk can be extended for a second SAT position by installation of an Opto-LNB with an additional fibre distribution network in parallel.





Opto-Reconverters

| TVC 05 Quad / TVQ 05 Quatro

Optical Re-Converters for Opto-LNB and IRS 1

The TVC 05 and TVQ 05 Virtual Optical Receiver Nodes are optical-to-coax converters which convert frequency stacked optical signals from an Opto-LNB TOL or a TOU 232-Kit (IRS 1) Sidecar unit into a legacy universal single coax signal.
The converters also provide a coax DTT/DAB/FM signal diplexed onto each output (TVC 05), or onto a separate output (TVQ 05) when it is inserted into the optical transmitter TOU 232 SA.

- Compatible with optical LNB TOL 32 /64 and optical transmitter TOU 232 /kit
- Built in AGC which allows a wide dynamic range of optical signals without impact to output level and quality.
- Two LED indicators display operation status.
- Easy mounting via a wall baseplate
- Power supply via RF output by SAT receiver (TVC 05) or by multiswitch (TVQ 05).
- Optional external power supply for continuous operation available: TPS 323 PSU
- Attention: Please insert an attenuator TFA (5/10/15 dB) if the optical attenuation of the passive optical network (PON) is less than10 dB

Technical specification

Type		TVC 05	TVQ 05
Art. No.		307627	307629
System		Quad + terrestrial	Quattro + terrestrial for use with multiswitches
Fibre Optical Input		FC/PC	
Input Power with TOL 32, TOU 232SA/TOL 64	dBm	-12…0 / -15…0	
Wavelength	nm	1310/1550	
Input frequency range, vertical	GHz	0.95 – 3.0	
Input 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, FM	MHz	87...108	
Input connnector		FC/PC	
Outputs SAT			
Horizontal High Band (4.4 to 5.45 GHz)	MHz	1100-2150, > 15,5 V 22 kHz	fix
Vertical High Band (1.95 to 3.0 GHz)	MHz	1100-2150, < 14,5 V 22 kHz	fix
Horizontal Low Band (3.4 to 4.4 GHz)	MHz	950-1950, > 15,5 V	fix
Vertical Low Band (0.95 to 1.95 GHz)	MHz	950-1950, < 14,5 V	fix
Impedance, nominal	Ohm	75	75
Return loss (min.)	dB	10	10
Automatic Gain Control (AGC)	dB	30	30
Output Level SAT	dBµV	approx. 70	approx. 75
Outputs Terrestrial			
Terrestrial frequency range, DVB-T	MHz	470...854	470...854
Terrestrial frequency range, DAB	MHz	174...240	174...240
Terrestrial frequency range, FM	MHz	87...108	87...108
Output Level	dBµV	approx. 68	approx. 68
Common Data			
Output connectors		4 x F (4 x SAT/terr.)	5 x F (4xSAT+1xterr.)
Current consumption	mA	<220 @ 10 V	<220 @ 10 V
Input Voltage	V	10...20 feed from Sat receiver	10...20 feed from multi-switch
Operating temperature	°C	0...+40	0...+40
Weight	kg	0,8	0,8
Dimensions	mm	110 x 136 x 50	110 x 136 x 50
Accessories			
Power supply unit (please order separately)		TPS 323 PSU (100-240 VAC +20VDC/1.2A), Art. No. 307657	

Opto-Reconverters

TVC 06 Quad mini, TVQ 06 Quatro mini

New Generation of Re-converters for Opto-LNB and IRS 1

The TVC 06 and TVQ 06 Virtual Optical Receiver Nodes are optical-to-coax converters, which convert frequency stacked optical signals from an Opto-LNB TOL or a TOU232-KIT (IRS 1) Sidecar unit into a legacy universal single coax signal.
The series TVC/TVQ 06 use a new chip technology which allows a smaller size of the devices, and a higher output level compare to the series 05 on the page before.

- Compatible with optical LNB TOL 32 /64 and optical transmitter TOU 232 /kit
- Built in AGC which allows a wide dynamic range of optical signals without impact to output level and quality.
- Two LED indicators display operation status.
- Power Supply via RF-output from SAT-receiver (TVC06) or from TVQ 06 and Multiswitch
- Optional external power supply for continuous operation available: TPS 323 PSU
- Attention: Please insert an attenuator TFA (5/10/15 dB) if the optical attenuation of the passive optical network (PON) is less than10 dB

Technical specification

Type		TVC 06	TVQ 06 *
Art. No.		**307641**	**307640**
Design		Quad + terrestrical	Quatro + terrestrical for the use with multi-switches
Optical Input			
Input Power with TOL 32, TOU 232SA/TOL 64	dBm	-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 connnector		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 (inpiut: 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	75
Return loss (min.)	dB	10	10
Automatic Gain Control (AGC)	dB	30	30
Output Level SAT	dBµV	ca. 75	ca. 79
Outputs Terrestrial			
Terrestrial frequency range, DVB-T	MHz	470...854	470...854
Terrestrial frequency range, DAB	MHz	174...240	174...240
Terrestrial frequency range, DTT	MHz	87...108	87...108
Output Level DTT	dBµV	ca. 65	ca. 79
Common Data			
Output connectors		4 x Ff (4 x SAT/TER)	5 x Ff (4xSAT+1xTER)
Current consumption	mA	125 @ 20V; 225 @ 10V	<400 @ 20V
Input Voltage	V	10...20 from receiver	10...20 from multiswitch
Operating temperature	°C	-15...+60	-15...+60
Weight	kg	0,8	0,8
Dimensions	mm	128 x 94 x 27	97 x 61 x 26
Accessories			
Power supply TPS 323 PSU (optional)		TPS 323 PSU (100-240 VAC +20VDC/1.2A), Art. No. 307657	

*) preliminary data

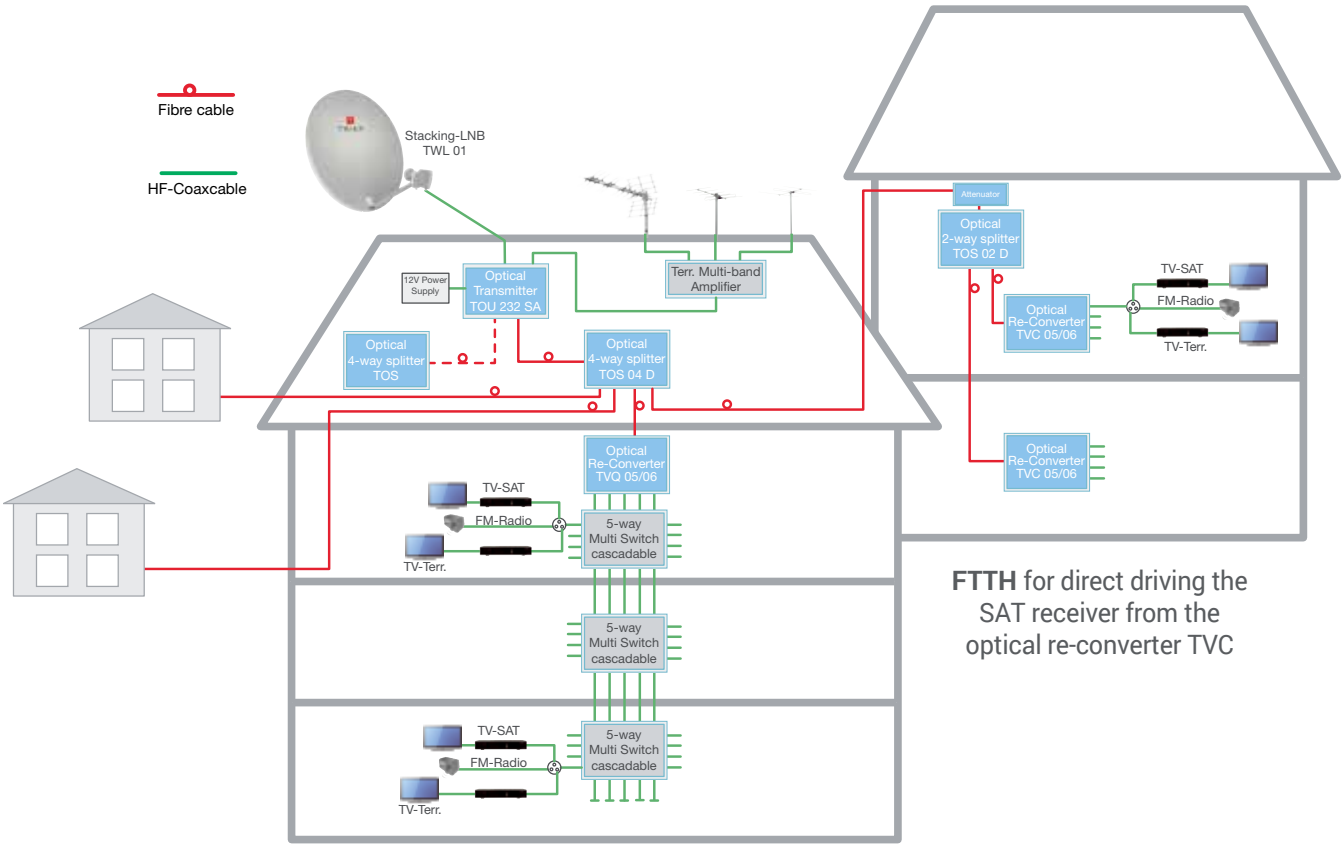
Opto-Reconverter

TVC/TVQ in application with IRS 1

Typical network structure for optical distribution of IRS1 (1xSAT + DTT/DAB/FM) by use of Opto-Transmitter TOU 232Kit and Re-converter TVC / TVQ

Installation tips

- The terrestrial reception should be implemented by a multi-band amplifier from the GNS or TMB series.
- The netwotk can be extended for a second SAT position by installation of an Opto-LNB with an additional fibre distribution network in parallel.



FTTH for direct driving the SAT receiver from the optical re-converter TVC

FTTB system with connected Multi-Switch distribution

Opto-Multiswitch

SwitchMaster TOM 08 M / 16 M + SwitchSlave TOM 08 S / 16 S

The TRIAX Opto-Multiswitch TOM combines the Optical Re-converter with an integrated Multiswitch.

The Opto Multiswitch features a built-in optical-to-coaxial Re-converter. All SAT-IF bands along with Terrestrial signals are available on every output.

The Opto Switch Master is the standalone base unit for reception of one SAT position and terrestrial broadcast signals. Two versions are available with 8 or 16 outputs.

Reception can be extended to 2, 3 or 4 satellites by plugging additional Opto Switch Slave units into the Opto Switch Master. Additional parallel fibre infrastructure required.

- Compatible with the Optical LNB TOL 32 / TOL 64 or Optical IRS 1 which includes TER (DTT, DAB, FM)
- Very compact form factor
- Ideal for SAT FTTH/FTTB networks because of easy and space-saving installation without any coaxial patch cables between re-convertrer and multi-switch
- Easy upgrade for reception of more than one satellite position.
- Desk top PSU for Master

SWITCH SLAVES ARE PLUGGED ON MASTER

1 SAT | 2 SAT | 3 SAT | 4 SAT

Opto-Multiswitch

SwitchMaster TOM 08 M / 16 M + SwitchSlave TOM 08 S / 16 S

Opto Switch Master

Opto Switch Slave

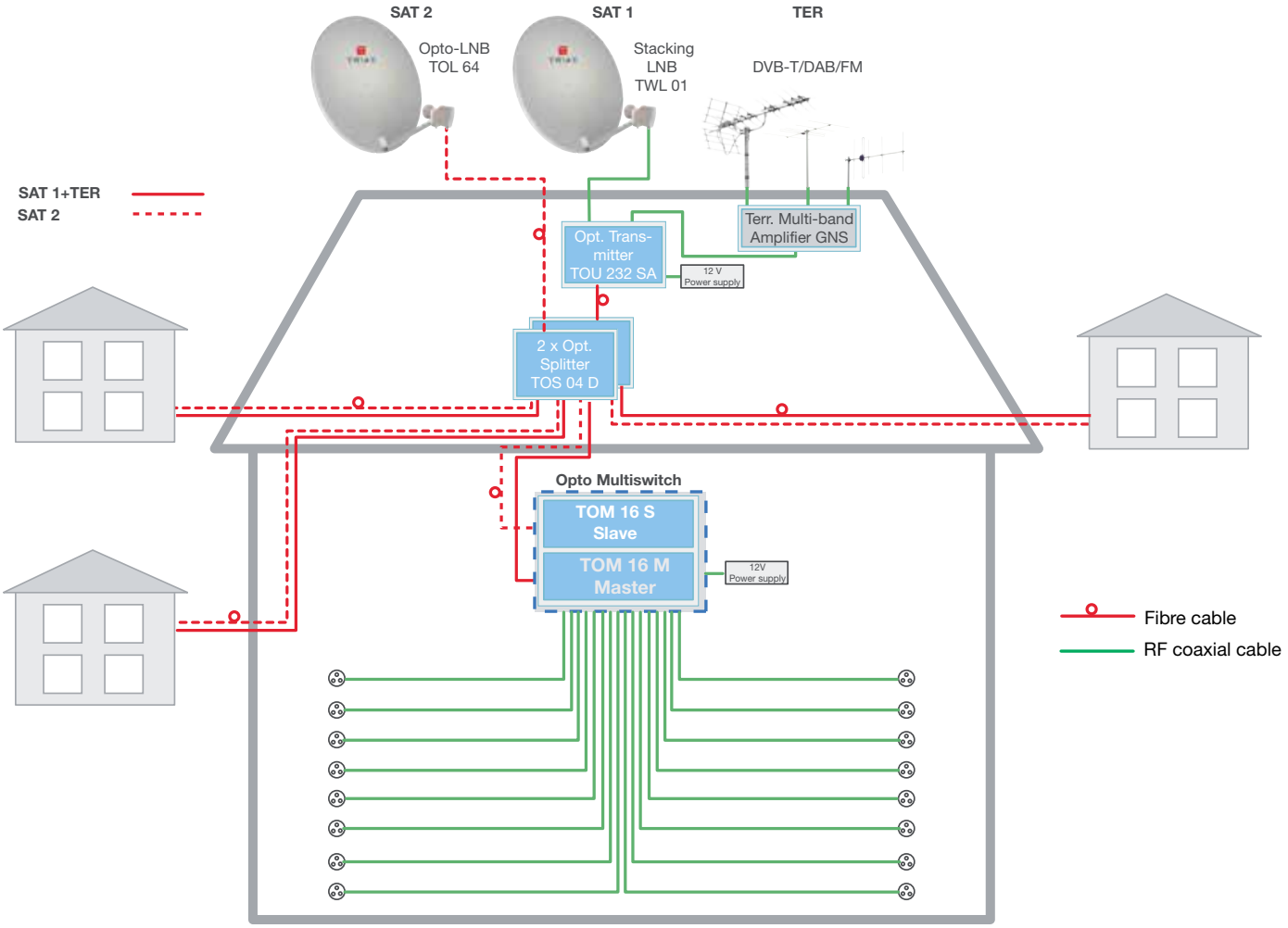
Technical specification

Type		TOM 16 M / TOM 08 M	TOM 16 S / TOM 08 S
Art. No.		307696 / 307697	307698 / 307699
Functionality		Master 16 way / 8 way	Slave 16 way / 8 way
Optical Input			
Input Power with TOL 32, TOU 232SA/TOL 64	dBm	-12...-3 /-14...-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 connnector		FC/PC	
Output SAT on ports		1...16 / 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 (inpiut: 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...16 / 1...8	
Terrestrial frequency range, DTT	MHz	470...854	
Terrestrial frequency range, DAB	MHz	174...240	
Terrestrial frequency range, FM	MHz	87...108	
Output Level DTT (6 multiplexes)	dBµV	ca. 69	
Common Data			
Output connectors		16 x F-f / 8 x F-f	
Current consumption (16 way based on 4 satellite configuration)	A	<1.2	
Supply voltage	V	11...20	from Master
Mains desk top adapter (PSU)	VAC	100...240 / +12V, 3,5A	
Interface for frequency morphing (GUI)		UART /WinXP, Win7, Linux, M-OS	
Operating temperature	°C	-20...+50	-20...+50
Weight	kg	1.65 (incl. PSU)	1.15
Dimensions of an unit	mm	227 x 138 x 67.5	227 x 95 x 67.5
Dimensions 2 satellites	mm	227 x 220 x 67.5	
Dimensions 3 satellites	mm	227 x 303 x 67.5	
Dimensions 4 satellites	mm	227 x 385 x 67,5	

Opto-Multiswitch

SwitchMaster TOM 08 M / 16 M + SwitchSlave TOM 08 S / 16 S

System application Opto-Multiswitch for optical distribution of 2xSAT + DTT/DVB/FM



Optical Splitters / Couplers

| Passive FC/PC splitter/coupler for optical Network

TOS Optical splitters/couplers

The TOS couplers are pre-assembled with optical connectors FC/PC in a metal case.

- For single mode fibre systems
- Excellent mechanical stability
- Low insertion loss
- TOS in metal housings - reliable solution as direct connection means little risk of damage to cables
- Coupler Technology
  FBT (Fused Biconical Tapered)
  PLC (Planar Lightwave Circuit)

FC/PC pre-terminated, balanced couplers

Type		TOS 02 D	TOS 03 D	TOS 04 F	TOS 08 F	TOS 16 F	TOS 32 F
Art. No.		307636	307637	307736	307737	307734	307735
No. of inputs		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				

FC/PC pre-terminated, unbalanced couplers

Type		TOS 02 D-1090	TOS 02 D-2080	TOS 02D-3070	TOS 02 D-4060
Art. No.		307730	307731	307732	307733
No. of inputs		1	1	1	1
No. of outputs		2	2	2	2
Connection		FC/PC	FC/PC	FC/PC	FC/PC
Technology		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

Optical Splitters / Couplers

Passive SC/APC splitter/coupler for optical Network

TOS Optical splitters/couplers

The TOS couplers are pre-assembled with optical connectors SC/APC in a metal case.

- For singlemode fibre systems
- Excellent mechanical stability
- Low insertion loss
- This assortment is for big plants where are fuse spliced SC/APC connectois are used
- TOS in metal housings - reliable solution as direct connection means little risk of damage to cables
- Coupler Technology
  FBT (Fused Biconical Tapered)
  PLC (Planar Lightwave Circuit)

SC/APC pre-terminated, balanced couplers

Type		TOS 02 S	TOS 04 S	TOS 08 S	TOS 16 S	TOS 32 S
Art. No.		307744	307738	307739	307747	307748
No. of inputs		1	1	1	1	1
No. of outputs		2	4	8	16	32
Connection		SC/APC	SC/APC	SC/APC	SC/APC	SC/APC
Technology		FBT	PLC	PLC	PLC	PLC
Coupling ratio	%	50-50	4x25	8x12,5	16x6,25	32x3,125
Through Loss	dB	3,5	7,2	10,2	13,6	16,7
Wavelength	nm	1310/1550	1260...1650	1260...1650	1260...1650	1260...1650
Wavelength band width	nm	± 40				

SC/APC pre-terminated, unbalanced couplers

Type		TOS 02 S-1090	TOS 02 S-2080	TOS 02S-3070	TOS 02 S-4060
Art. No.		307740	307741	307742	307743
No. of inputs		1	1	1	1
No. of outputs		2	2	2	2
Connection		SC/APC	SC/APC	SC/APC	SC/APC
Technology		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

Fibre Optic Accessories

| TFC Pre-assembled Terminated Fibre Cables

Fibre Cables, Pre-assembled

Pre-assembled with optical connectors on both sides for easy and reliable installation

- Low attenuation of 0.3 dB per km
- Single-mode fibre G 657A, 9/125 µm
- **TFC version**, suitable for indoor installation
  - Crush protection - flexible steel-reinforced intermediate coat protects against pressure loads
  - 4 aramid strands for strain relief when laying, max. tension on the cable: permanently 80 N, 100 N. briefly
- **TDB version** for burial installation.
  Extremely resistant PE sheath, UV-resistant
  - Aramid reinforced inserts allow high max. Tensile forces: 1500 N briefly permanently 600N
  - Gel insert to protect from moisture
  - Without steel reinforcement

Fibre - TFC

Fibre - TDB

Fibre cables, internal

Type		TFC 01	TFC 03	TFC 05	TFC 10	TFC 15	TFC 20
Art. No.		307661	307662	307663	307664	307665	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		TFC 30	TFC 40	TFC 50	TFC 75	TFC 100	TFC 200	TFC 500
Art. No.		307667	307668	307669	307670	307671	307672	307675
Assembled with		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	200	500

Fibre cables, external, direct burial

Type		TDB 050	TDB 100	TDB 200	TDB 500
Art. No.		307760	307761	307762	307763
Assembled with		FC/PC	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	500

Fibre Optic Accessories

Connectors, Attenuators and Terminators

Fibre Cables, connectors and attenuators

For making your own cable configuration we supply a professional range of connectors and tools

- Pigtails for fuse splicing to single mode fibre cables
- Adaptors to patch FC/PC or SC/PC connectors
- Fibre patch cords
- Optical attenuators for reducing the input level to the optical receivers

Products for assembling

Type		FC/PC - Pigtail	SC/APC - Pigtail
Art. No.		**307581**	**307584**
Description		Pigtail FC/PC	Pigtail SC/APC
Diameter cable	mm	3	3
Cable length	m	1	1

Optical patch cords

Type		SC/APC-SC/APC Opt. Patchkabel	FC/PC-SC/APC Opt. Patchkabel
Art. No.		**307580**	**307582**
Assembled with		SC/APC - SC/APC	FC/PC - SC/APC
Diameter cable	mm	3	3
Cable length	m	2	2

Optical adaptor / terminator

Type	TFB 001	TFB 002
Art. No.	**307684**	**307686**
Description	Adapter	Adapter
Assembled with	FC/PC-FC/PC	FC/PC-SC/APC

Optical attenuator

Type		TFA 05 FC/PC	TFA 10 FC/PC	TFA 15 FC/PC
Art. No.		**307688**	**307690**	**307692**
Description		Attenuator	Attenuator	Attenuator
Attenuation	dB	5	10	15

Fibre Optic Accessories

| Optical meter, tools and connectors

Optical level meter

Measurement of the optical signal level in fibre links

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

Type		TOM 011
Art. No.		307967
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

Optical - Accessories

Accessories for professional installation and service of optic products

Type	TSR 001	TKS 001	TST 001	TCT 002
Art. No.	307649	307650	307648	307647
Description	Steel remover	Fibre kevlar scissor tool	Fibre stripping tool	Fibre Cleaver Tool

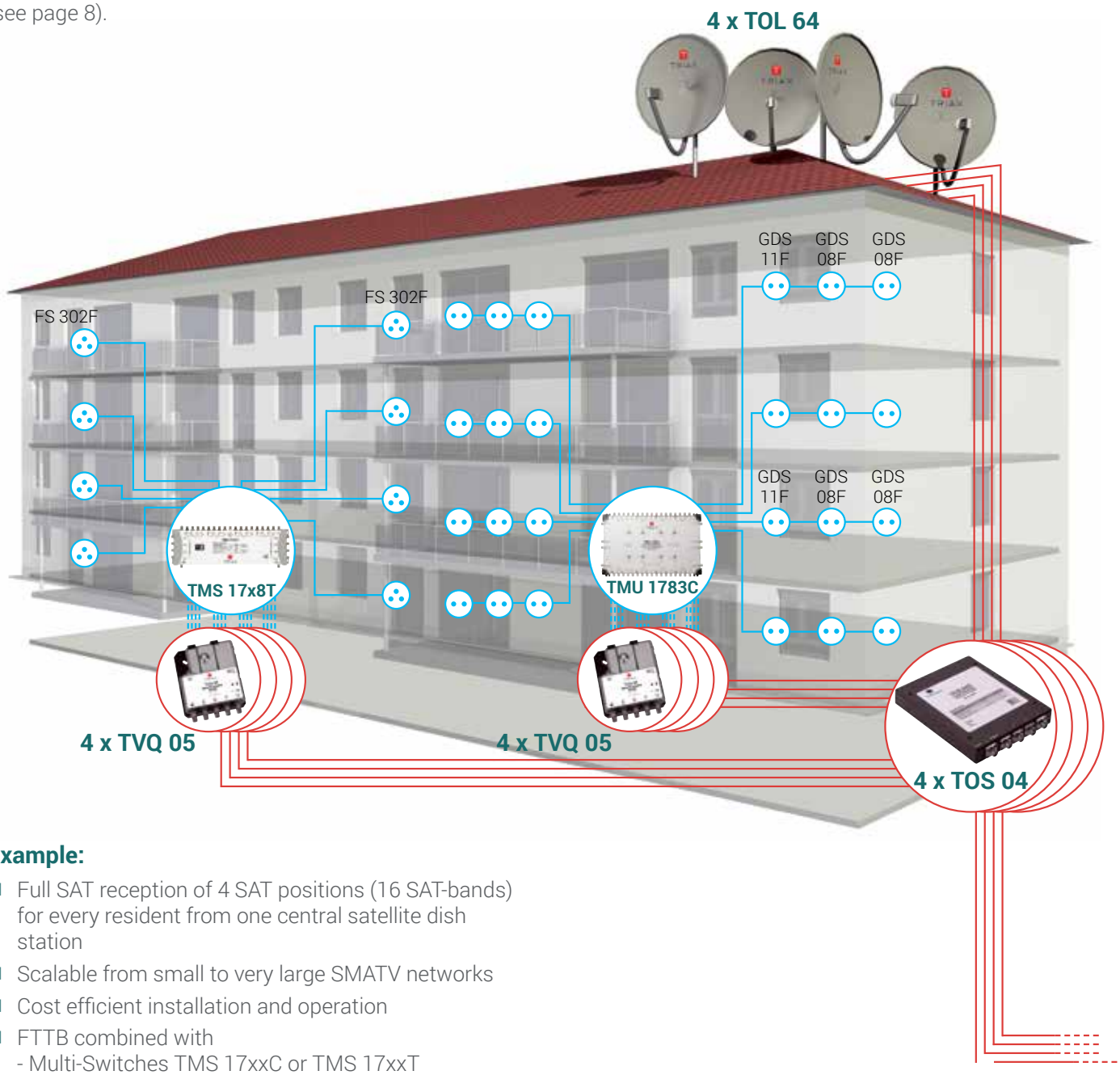
Type	TCC 001	TSP 001	TCS 001
Art. No.	307652	307654	307656
Description	Cleaning cloth for optical fibres	Fibre Optic Cleaning Pen	Glass fibre cleaning swab

Installation example

Fibre optical reception of 4 SAT positions

Each SAT position needs one Opto-LNB connected with a separate passive optical network (PON).

Terrestrial reception can be implemented by replacement of The Opto-LNB by a TOU 232 kit (IRS1) (see page 8).



Example:

- Full SAT reception of 4 SAT positions (16 SAT-bands) for every resident from one central satellite dish station
- Scalable from small to very large SMATV networks
- Cost efficient installation and operation
- FTTB combined with
  - Multi-Switches TMS 17xxC or TMS 17xxT
  - Multi-SCR Switches TMM 17x3C

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See triax.com for further info.

05-2016