SAT Fibre Optics

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

your ultimate connection

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 at SAT installations
- High reliability
- Significant cost 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
- No influence by external electric or magnetic fields
- Cost savings for thermal insulation and fire protection

Advantages for tenant and landlord

- Very short installation times
- Best possible quality
- Maximum flexibility
- High fire safety
- Future-proof
- Energy saving in comparison to multiswitch installations

When upgrading or new installation

- Receive all broadcast via satellites
- Supply several hundred apartments with only one Satellite dish station
- Increased user satisfaction
- Building aesthetics
- A fibre optic cable replaces four coaxial cables per satellite position
- 30 - 60% cost savings compared to alternative solutions *
- Troublefree media supply

* Calculation is based on the calculation of net service company

Television at the speed of light

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) allows to supply many households over larger distances, 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
- Provide hundreds of homes from only one LNB
- High cost savings already with 16 participants

- Optical fibre with galvanic isolation - resulting in increased lightning protection and no occurrence of ground and ground loops
- Quick and easy installation by using pre-assembled fibre optical cables

Overview of TRIAX products for optical satellite IF transmission technology

System	Opto-LNB	Opto-IRS 1
Transmission capabilities SAT Terrestrial	 1 SAT position with 4 polarities	 1 SAT position with 4 polarities 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 Optical transmitter Optical re-converter	 TOL 32, belong integrated optical transmitter TOL 64, belong integrated optical transmitter TVC 05/TVQ 05	 TWL 01 with N connector TOU 232 SA with 2 x opt. output TVC 05/TVQ 05
Components for extension		TAS 04 coaxial splitter to 4 opt. transmitters N-cables TUC xx TOU 232 SA
Optical budget (max.)	TOL 32: 19 TOL 64: 22 dB	2 x 19 dB
Max. optical splitting (=max. number of connectable re-converters TVx) with extension TAS 04	TOL 32: 32 TOL 64: 64 -	2x32 = 64 4 x (2x32) = 256 (4 x TOU 232SA)

Fibre Optics

| High quality, high performance universal Fibre LNBs

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

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

- Stacking LNB with optical output for splitting to max. 32 or 64 fibre links
- Optical wavelength 1310 nm
- Power supply via external power supply (included) via F connector
- Compatible with optical re-converter TVQ 05 (Quatro) and TVC 05 (Quad)

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	
Polarisation	Linear	horizontal and vertikal	
Characteristics			
Optical wavelengths	nm	1310	1310
Optical power, (nominal @ 25°C)	dBm	7.0	7.0
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/1A),	TPS 323 PSU (20 V/1,2A),
Spare part - Art.No.		307658	307657

Fibre Optics

| Optical Re-Converters 1 x SAT + DTT/DAB/FM

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

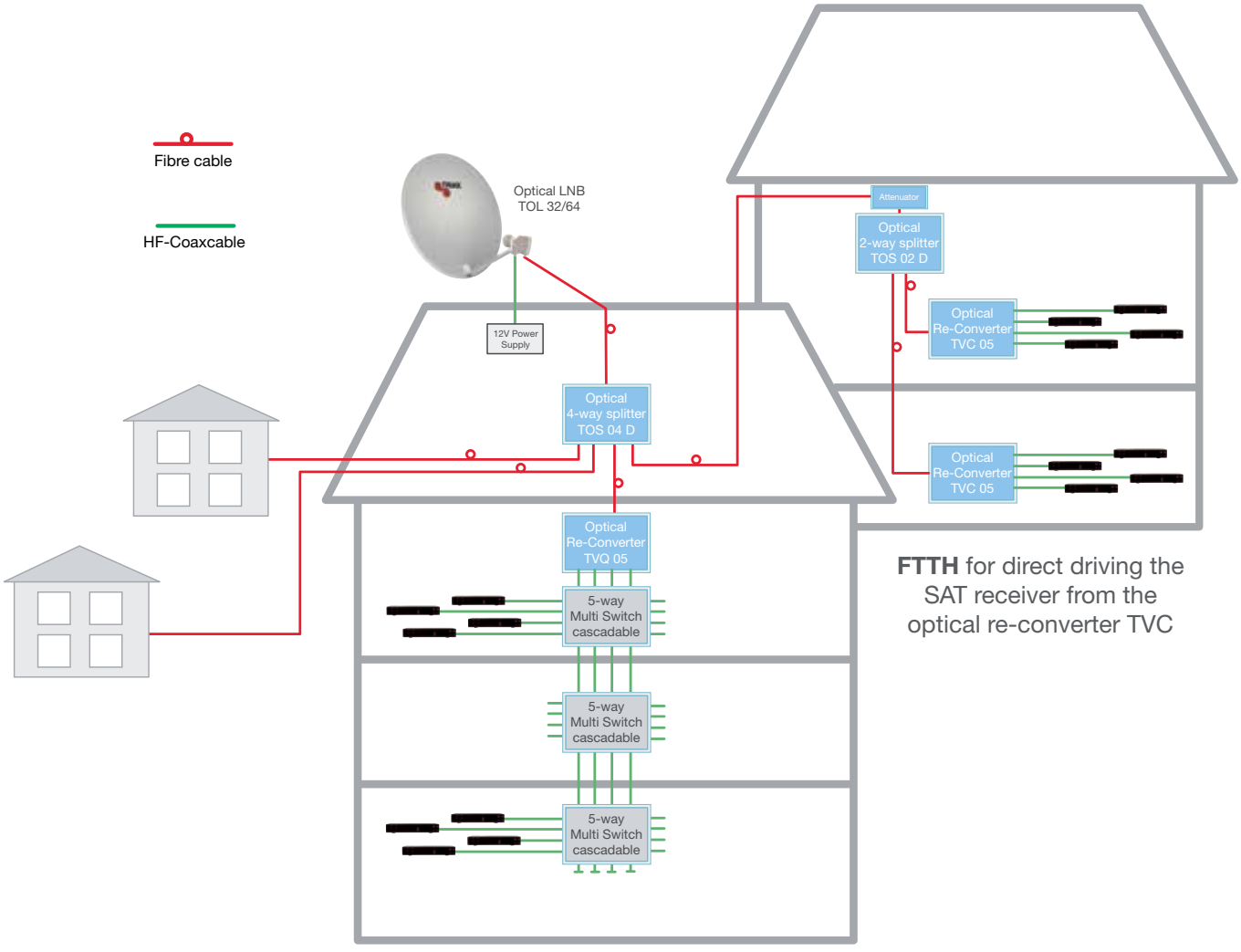
Type		TVC 05	TVQ 05
Art. No.		**307627**	**307629**
System		Quad + terrestrial	Quattro + terrestrial for use with multiswitches
Fibre Optical Input		FC/PC	
Input Power	dBm	0...-15	
Wavelength	nm	1310/1550	
Input frequency range, vertical	GHz	0.95 – 3.0	
Input frequency range, horizontal	GHz	3.4 – 5.45	
Terrestrial frequency range, DVB-T	MHz	470...854	
Terrestrial frequency range, DAB	MHz	174...241	
Terrestrial frequency range, FM	MHz	88...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. 70
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	-15...+60	-15...+60
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), Part No. 307657	

Typical network structure for reception and optical distribution of broadcast from 1 SAT position

Application sample with Optical LNB TOL 32 /TOL 64

Installation tips

- Insert optical attenuator TFA (see page 13) 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 building (FTTB).



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

FTTB system with connected Multi-Switch distribution

Integrated Reception System

| IRS 1 for 1 Sat-Position + Terrestrial

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 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 or TVQ 05 converter
- 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

- External PSU 20V (included)

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
Polarisation	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)	
Characteristics				
Optical wavelength	nm		1310	1310
Optical output level (nom. @25 °C)	dBm		2 x 3.5	2 x 3.5
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			-30 - +60	
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

Fibre Optics

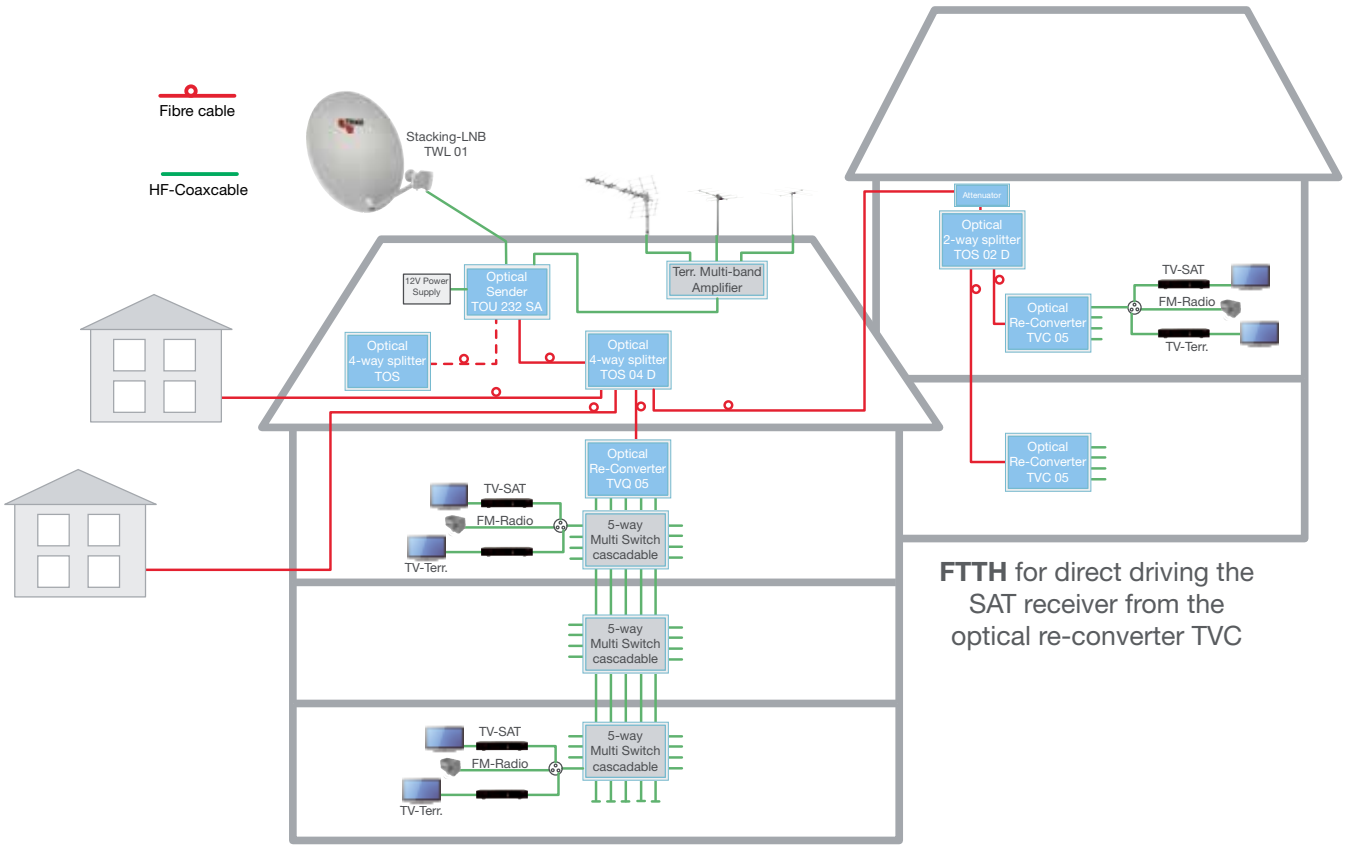
| Optical Reception - 1 x SAT + Terr.

Typical network structure for reception and optical distribution of TV signals from 1 SAT position and and terrestrial broadcast (DTT, FM, DAB)

Application sample of TOU 232 Kit

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 (see also page 16).



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

FTTB system with connected Multi-Switch distribution

Optical Splitters / Couplers

| Passive FC/PC splitter/coupler for your 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 02D...08D - balanced splitter/coupler with FC/PC connectors on inputs and outputs
- TOS 02D-1090...4060 - unbalanced couplers, with FC/PC connectors on inputs and outputs
- Wavelength 1310 and 1550 nm

TOS FC/PC balanced couplers (splitters)

Type		TOS 02 D	TOS 03 D	TOS 04 D	TOS 08 D
Art. No.		307636	307637	307635	307639
No. of inputs		1	1	1	1
No. of outputs		2	3	4	8
Connection		FC/PC	FC/PC	FC/PC	FC/PC
Coupling ratio	%	50/50	33/33/33	25/25/25/25	8x12,5
Through Loss	dB	4,0	5,5	7,0	10,1
Wavelength	nm	1310/1550	1310/1550	1310/1550	1310/1550
Wavelength band width	nm	± 40	± 40	± 40	± 40

TOS FC/PC unbalanced couplers (taps)

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
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 your 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
- TOS 02S...08s - balanced splitter/coupler with SC/APC connectors on inputs and outputs
- TOS 02S-1090...4060 - unbalanced couplers, with SC/APC connectors on inputs and outputs
- Wavelength 1310 and 1550 nm

TOS SC/APC balanced couplers (splitters)

Type		TOS 02 S-5050	TOS 04 S	TOS 08 S
Art. No.		307744	307745	307746
No. of inputs		1	1	1
No. of outputs		2	4	8
Connection		SC/APC	SC/APC	SC/APC
Coupling ratio	%	50/50	25/25/25/25	8x12,5
Through Loss	dB	3.6	6,9	10,2
Wavelength	nm	1310/1550	1310/1550	1310/1550
Wavelength band width	nm	± 40	± 40	± 40

TOS SC/APC unbalanced couplers (taps)

Type		TOS 02 S-1090	TOS 02 S-2080	TOS 02 S-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
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

| Pre-assembled 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
- Maximum bending radius: 5 mm.
- UV-resistant, suitable for outdoor use
- Steel-reinforced jacket for protection and tension
- LSZH jacket in grey colour (smoke retardant and halogen-free)
- Assembled with FC/PC connectors on both cable heads
- Single-mode fibre G 657A, 9/125 µm

Technical specification

Type		TFC 01	TFC 03	TFC 05	TFC 10	TFC 15
Art. No.		307661	307662	307663	307664	307665
Assembled with		FC/PC	FC/PC	FC/PC	FC/PC	FC/PC
Diameter cable	mm			3		
Diameter connector	mm			10		
Cable length	m	1	3	5	10	15

Type		TFC 20	TFC 30	TFC 40	TFC 50	TFC 75
Art. No.		307666	307667	307668	307669	307670
Assembled with		FC/PC	FC/PC	FC/PC	FC/PC	FC/PC
Diameter cable	mm			3		
Diameter connector	mm			10		
Cable length	m	20	30	40	50	75

Type		TFC 100	TFC 200	TFC 500
Art. No.		307671	307672	307675
Assembled with		FC/PC	FC/PC	FC/PC
Diameter cable	mm		3	
Diameter connector	mm		10	
Cable length	m	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 cable FC/PC	Pigtail cable SC/APC
Diameter cable	mm	3	3
Cable length	m	1	1

Optical patch cords

Type		SC/APC-SC/APC fibre patch cord	FC/PC-SC/APC fibre patch cord
Art. No.		**307580**	**307582**
Connector		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	TOT 02
Art. No.	**307684**	**307686**	**307644**
Description	Adaptor	Adaptor	Terminator
Connection	FC/PC-FC/PC	FC/PC-SC/APC	FC/PC

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

| Active Coax splitter and Cable with N-connectors

Active coaxial splitter with N connector

TAS 04 is an active coaxial splitter to drive up to 4 optical transmittesrs TOU 232 SA connected by the N-cable TUC 002 (please order separately)

- Active splitter without insertion loss
- The optical splitting of an IRS 1 system can be increased to 4 x (2x32) = 256 by using the TAS 04 connected to 4 x optical transmitter TOU 232 SA.
- Fit RF cable with N-connectors TUC 0xx

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

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

Technical specification

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 hours with 3 x 1.5V AA-batteries
Size (H X W X D)	mm	190 x 100 x 50
Weight	g	370

Accessories

Accessories for the installation and service of optic products

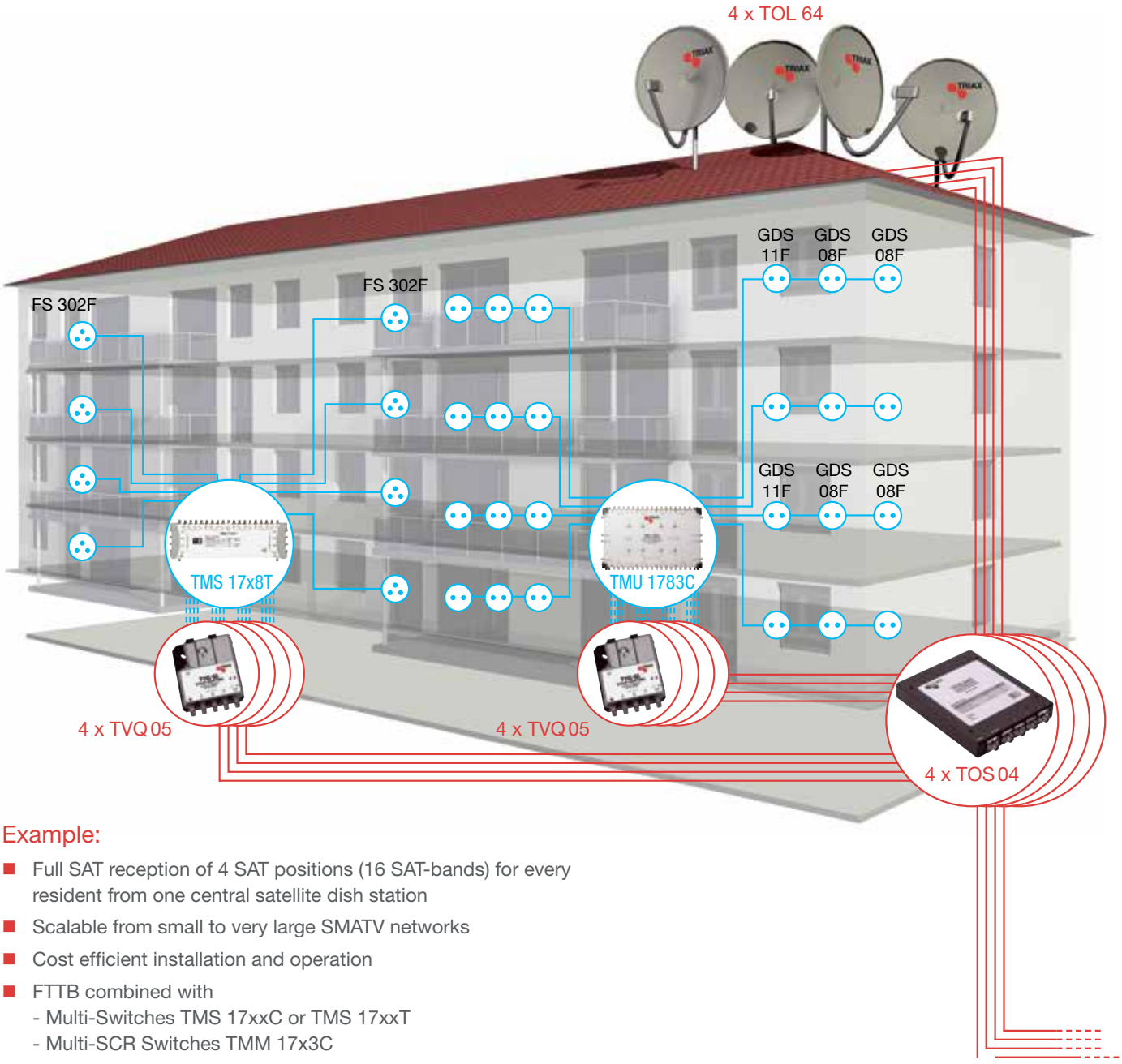
- TFT 001 - Optical Test-Tool
- TKS 001 - Fibre kevlar scissor tool. Fibre kevlar scissor for cutting strain members
- TCC 001 - Fibre cleaning cloth - portable, universal, fibre optic end-face cleaning system
- TSP 001 - Fibre solvent pen / optical cleaning pen
- TCS 001- Fibre swabs - 2.5 mm foam swabs. Designed for bulkhead cleaning when used with Fibre solvent pen. Designed for test and equipment maintenance.

Type	TFT 001	TKS 001	TCC 001	TSP 001	TCS 001
Art. No.	**307682**	**307650**	**307652**	**307654**	**307656**
Description	Light tester for optical cable	Fibre kevlar scissor tool	Cleaning cloth for optical fibres	Fibre Optic Cleaning Pen	Glass fibre cleaning swab

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 9).



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

Discover more at:

www.triax.com