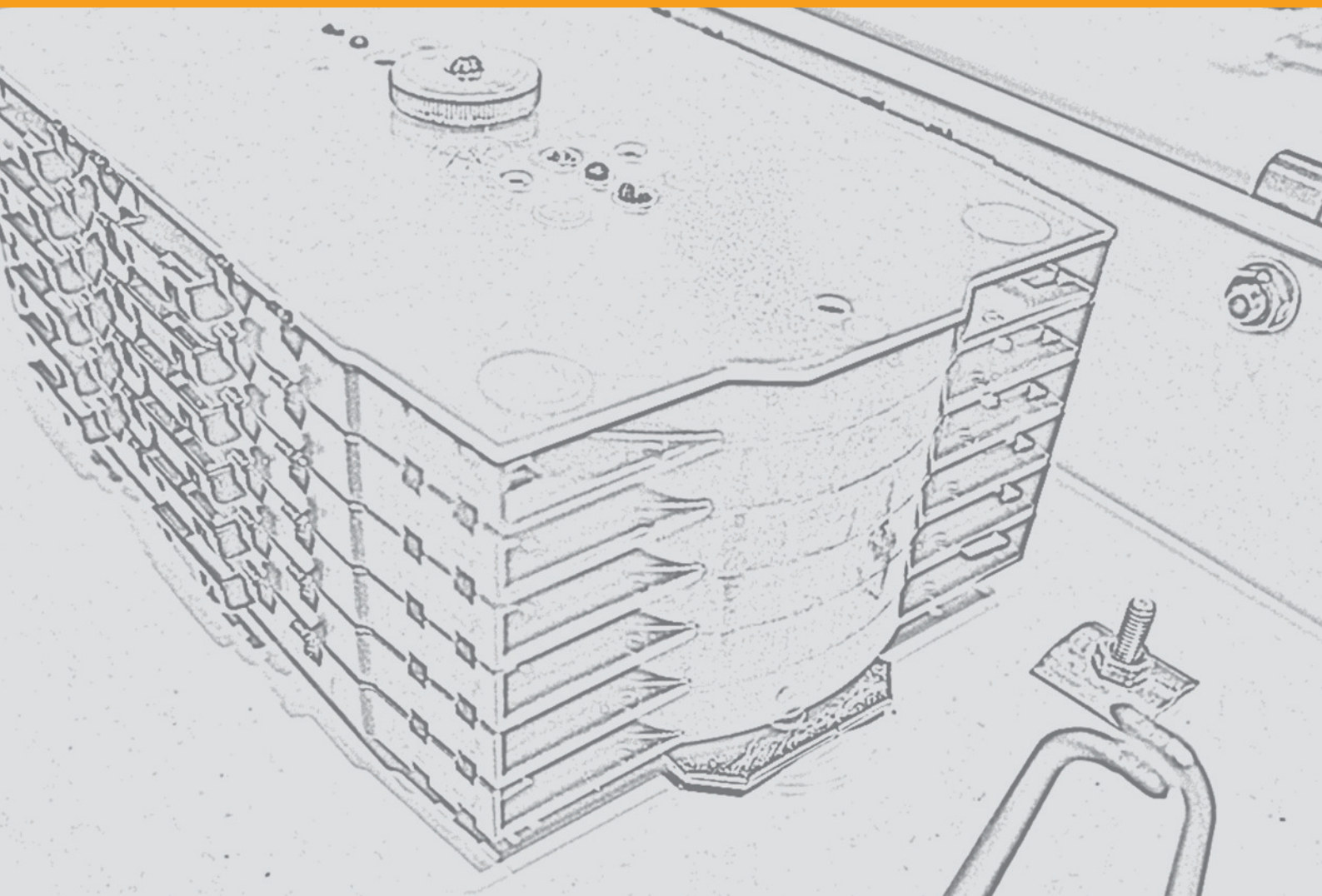


Televes®

FIBER OPTICS



A professional solution for large distribution networks



The use of **optical fiber** is the professional solution to solve the problem of the **distribution of the TV signal over wide areas**.

More and more often we find situations in which we need to distribute the TV signal in wider areas like, for example, shopping centres, stadiums or residential resources.

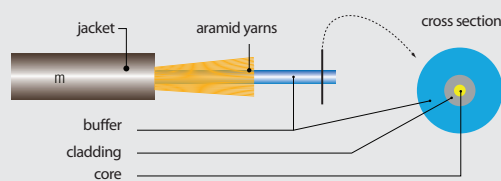
As distances covered by TV distribution networks increase, we start facing limitations due to the use of coaxial cable in long TV links: "higher attenuations that lead to the use of several cascaded amplification stages that will degrade the quality of the signal" (reduction of the C/N).

The problem is even worse when you must distribute other TV bands than the terrestrial like, for example, satellite signals. A possible solution to this situation comes from the use of optical fiber, which offers the following **advantages**:

- ▶ An attenuation about 0,3 dB/Km. Hence longer links can be realised without re-amplification.
- ▶ Immunity against noise and interferences.
- ▶ Transmissions are safe and reliable.
- ▶ Large bandwidth.
- ▶ Fully compatible with digital technologies
- ▶ Small dimensions and weight. Easy cabling through conduits.
- ▶ The raw material to manufacture optical fiber is one of the most abundant in the nature.

Against these advantages, optical fiber shows the following **disadvantages**:

- ▶ Only can subscribe persons living in those areas where the optical fiber network is already installed.
- ▶ Special care has to be taken along its installation: splicing, cleaning, safety,..., etc



Typical composition of an optical fiber

Televés, world leader in transmission and reception of digital signals, supplies a new and complete system of equipment in optical fiber to distribute TV signals.

FIBER OPTICS DISTRIBUTION

Depending on the services processed, the T.OX devices can be grouped within the following sections:

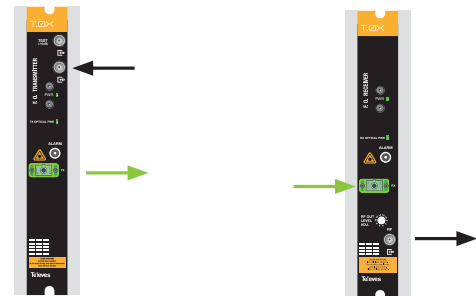
- ▶ **SMATV headends** (see T.OX section)
- ▶ **MATV headends** (see T.OX section)
- ▶ **Headend management and SW**(see T.OX section)
- ▶ **Optical fiber headends**



To configure headends, adapt signals and installation hardware, below is a list of Auxiliary equipment and Accessories:

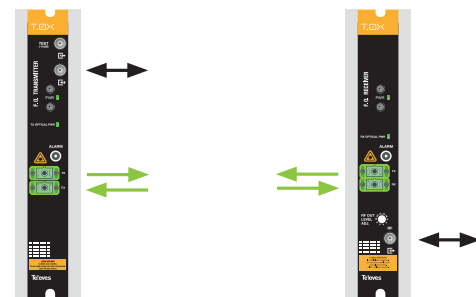
- ▶ CDC IP: ref. 5559.
- ▶ CDC IP/GSM: ref. 555901.
- ▶ TSuite control software: ref. 216801.
- ▶ Amplifier Push-Pull High Power: ref. 5575.
- ▶ Power Supply Unit: ref. 5629.
- ▶ Portable Programmer Unit PCT 5.0: ref. 7234.
- ▶ Adapter USB-COM: ref. 5838.
- ▶ Terminal load F 75 Ω DC-block: ref. 4061.
- ▶ Terminal load F 75 Ω: ref. 4058.
- ▶ Wall support 498mm (PSU+7 Modules T.OX): ref. 5071.
- ▶ Wall support 560mm (PSU+8 Modules T.OX): ref.5239.
- ▶ Rack frame 19"/5U (PSU+7 Modules T.OX): ref.5301.
- ▶ Wall mount lockable cabinet (PSU+7 Modules T.OX) with ventilation unit: ref. 507202.
- ▶ Rack 19" 15U: ref. 5333.
- ▶ Rack 19" 28U: ref. 5331.
- ▶ Rack 19" 37U: ref. 5332.
- ▶ Blank plate: ref. 5673.
- ▶ Control Bus Jumper (1m): ref.422603.

Televes also has available "USA version" products specially adapted for the U.S. market, which can be consulted in this catalogue.



Transmitter
2333 / 233310
234304 / 234310

Receiver
2335



Transmitter
with Return Channel
2334 / 233410

Receiver
with Return Channel
2336

F.O. T.OX SERIES. - QUICK REFERENCE GUIDE						
TYPE	OUTPUT		OPT →	OPT ↔	RF →	RF ↔
	INPUT					
TX	→RF		2333 233310 234304 234310	-	-	-
	↔RF		-	2334 233410	-	-
RX	→OPT		-	-	2335	-
	↔OPT		-	-	-	2336
OPTICAL SPLITTERS	2 →		2337			
	4 →		2339			
	8 →		234401			
	16 →		234501			
	32 →		234601			

T.OX HEADENDS

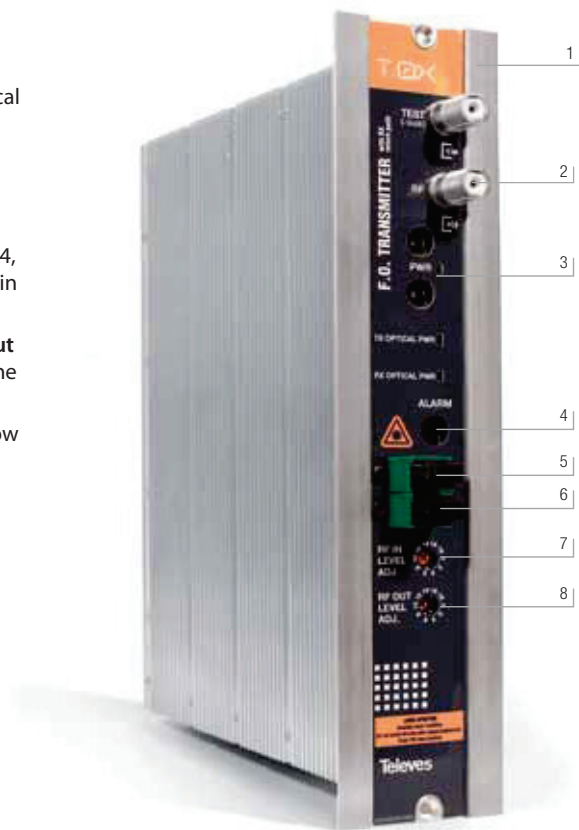
Optical Transmitters



QR-A00151

Are transmitters that generate an optical output of 1310 or 1550 nm, modulated by the incoming RF signal. In addition, Ref. 2334, 233411 and Ref. 233410 feature optical reception in the return channel.

- ▶ **SMATV compatible** RF input (87 - 2150 MHz).
- ▶ **Optical output power up to 10 dBm.**
- ▶ **Control of RF input** level for adjusting the quality parameters of optical transmission. In addition, Ref. 2334, 233411 and Ref. 233410 feature an output level control in the the return channel.
- ▶ Feature control signals for **monitoring the optical output** signal. Ref. 2334, 233411 and Ref. 233410 also monitor the optical signal in the return channel.
- ▶ Equipped with tension-free connections (relay) that allow implementing an **alarm** when the optical power falls.



▲ 2334

REF.	DESCRIPTION
2333	Optical Transmitter 1310nm "SC/APC" 6dBm w/o Return Ch.
233310	Optical Transmitter 1310nm "SC/APC" 10dBm w/o Return Ch.
2334	Optical Transmitter 1550nm "SC/APC" 4dBm w/o Return Ch.
233410	Optical Transmitter 1550nm "SC/APC" 10dBm w/o Return Ch.
234304	Optical Transmitter 1310nm "SC/APC" 6dBm with Return Ch. Optical Receiver 1200...1600nm
234310	Optical Transmitter 1310nm "SC/APC" 10dBm with Return Ch. Optical Receiver 1200...1600nm
USA version	
233306	Optical Transmitter 1310nm "SC/APC" 6dBm w/o Return Ch.
233311	Optical Transmitter 1310nm "SC/APC" 10dBm w/o Return Ch.
233411	Optical Transmitter 1550nm "SC/APC" 10dBm w/o Return Ch.
234305	Optical Transmitter 1310nm "SC/APC" 6dBm with Return Ch. Optical Receiver 1200...1600nm
234311	Optical Transmitter 1310nm "SC/APC" 10dBm with Return Ch. Optical Receiver 1200...1600nm

CONNECTIONS	
1	Test output (- 16 dB)
2	RF input
3	Power BUS
4	Alarms
5	Optical output (forward path)
6	Optical input (return path)
7	RF level adjustment (forward path)
8	RF level adjustment (return path)

T.OX HEADENDS

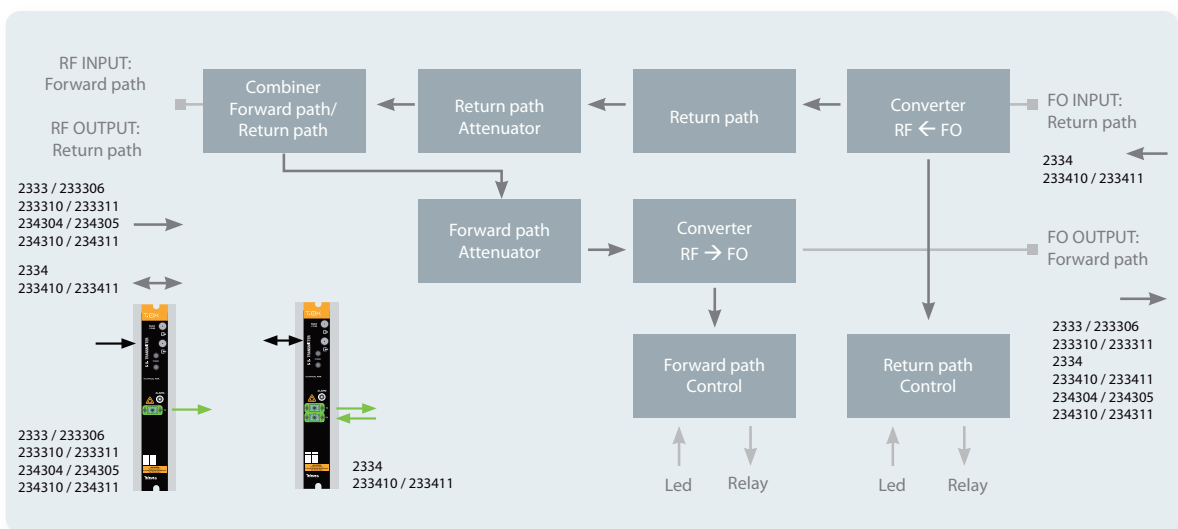


Reference				2333	233310	2334	233410	234304	234310		
				233306	23311		233411	234305	234311		
INPUT	RF	Frequency range		MHz		87...2150 54...2150 ⁽¹⁾					
		Max. input level for CSO & CTB >= 60dB ⁽²⁾	MATV	dBμV/dBmV		91 / 31	87 / 27	91 / 31	87 / 27	85 / 25	87 / 27
			SAT IF			80 / 20					
		Equivalent input noise figure @ 850MHz		dBm/Hz		- 150					
		Equivalent input noise figure @ 2GHz				- 146					
		Regulation margin		dB		0 - 18					
		Return losses				≥ 10					
		Impedance		Ω		75					
	F.O. Return path	Wavelength		nm		-	1200...1600		-		
		Detection bandwidth		MHz		-	1...3000		-		
		Optical power received (max)		dBm		-	2/3		-		
		Optical connector				-	SC/APC		-		
	OUTPUT	F.O. Forward path	Wavelength		nm		1310			1550	
			Optical power transmitted (max)		dBm		4/6	10/10	4/6	10/10	2,5/4
Optical connector					SC/APC						
RF Return path		Frequency range		MHz		-	1...65 5...42 ⁽¹⁾		-		
		Output level DIN45004B		dBμV/dBmV		-	112 / 52		-		
		Regulation margin		dB		-	0...18		-		
		Return losses				-	≥ 10		-		
		Impedance		Ω		-	75		-		
GENERAL		Powering voltage		Vdc		12 - 24					
		Consumption 24Vdc		mA		104	140	160	170	140	160
	Ingress protection		IP		20						
	Dimensions (WxHxD)		mm		50 x 216 x 175						

(1) Frequency range for USA references.

(2) Input: 41 TV CH CENELEC and 1 complete satellite transponder. The input attenuator in 0 dB position.

BLOCK DIAGRAM



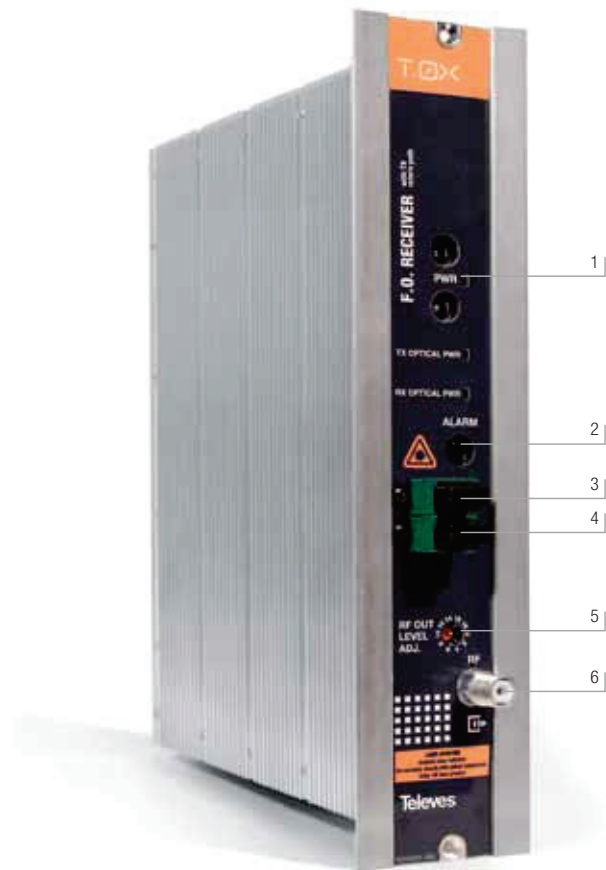
Optical receivers



QR-A00025

Are optical receivers that deliver the original RF signal that has previously been converted by a fiber optic transmitter.

- ▶ Ref. 2336 and 233601 features return path optical transmitter.
- ▶ Multi-window input (1200 ...1600 nm).
- ▶ Wide input dynamic range (-10 to 6 dBm).
- ▶ RF amplified output capable of delivering: 114dBμV in MATV, and 117dBμV in SAT IF.
- ▶ Control signals available for monitoring optical input signal. Ref.2336 and 233601 also monitors the optical output signal in the return path.
- ▶ Equipped with tension-free connections (relay) for use as an alarm when the received optical power falls.



▲ 2336

REF.	DESCRIPTION
2335	Optical Receiver 1200...1600nm "SC/APC" w/o Return Ch.
2336	Optical Receiver 1200...1600nm "SC/APC" with Return Ch. Optical Transmitter 1310nm 3dBm
USA version	
233501	Optical Receiver 1200...1600nm "SC/APC" w/o Return Ch.
233601	Optical Receiver 1200...1600nm "SC/APC" with Return Ch. Optical Transmitter 1310nm 6dBm

CONNECTIONS	
1	Power BUS
2	Alarms
3	Optical output (return path)
4	Optical input (forward path)
5	RF level adjustment (forward path)
6	RF output (forward path) / RF input (return path)

T.OX HEADENDS

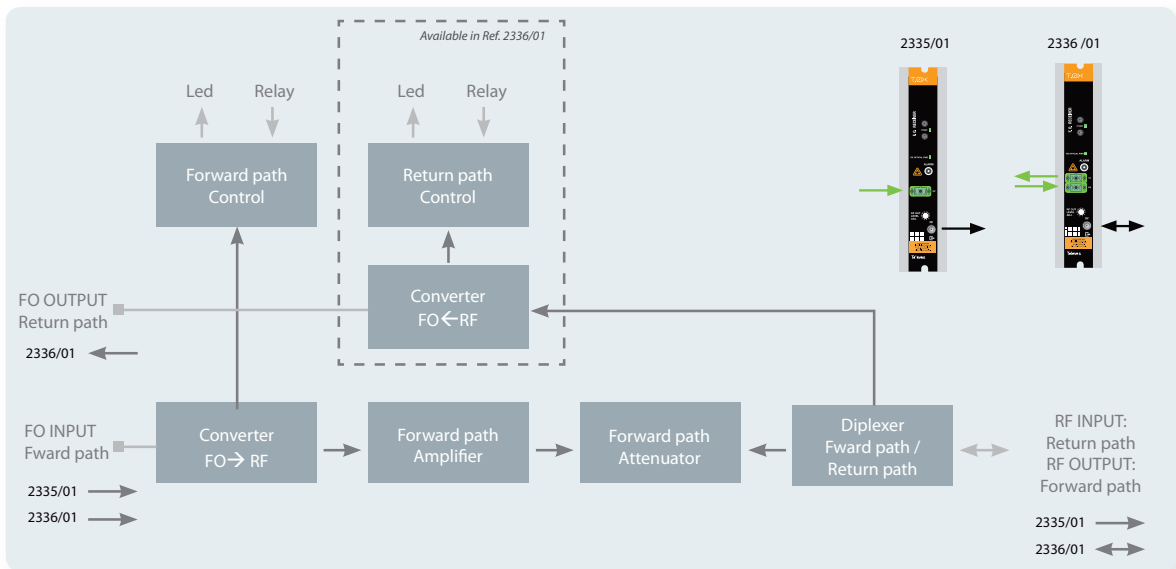


Reference				2335	2336	
USA version				233501	233601	
INPUT	F.O. Forward path	Wavelength	nm	1200...1600		
		Detection bandwidth	MHz	1...3000		
		Optical power received (max)	dBm	4/6		
		Optical connector		SC/APC		
	RF Return path	Frequency range	MHz	-	1...65 5...42 ⁽¹⁾	
		Return path input level DIN45004B	dBμV	-	95	
		Equivalent input noise figure @ 30 MHz	dbm/Hz	-152,5		
		Return losses	dB	-	≥ 11	
	Impedance	Ω	-	75		
OUTPUT	RF Forward path	Frequency range	MHz	87...2150 54...2150 ⁽¹⁾		
		Max. output level for CSO & CTB ≥ 60 dB ⁽²⁾	MATV	dBμV/dBmV		93 / 33
			SAT IF			90 / 30
		Regulation margin		dB	0 - 18	
		Return losses			≥ 11	
		Impedance		Ω	75	
	F.O. Return path	Wavelength	nm	-	1310	
		Optical power transmitted (max)	dBm	-	2/3 4/6 ⁽¹⁾	
		Optical connector		-	SC/APC	
GENERAL	Powering voltage	Vdc	12 - 24			
	Consumption 24Vdc	mA	155	175		
	Ingress protection	IP	20			
	Dimensions (WxHxD)	mm	50 x 216 x 175			

(1) Frequency range for USA references.

(2) Output: 42 TV CH CENELEC and 1 complete satellite transponder. The output attenuator in 0 dB position.

BLOCK DIAGRAM





Optical splitters



QR-A00153

Passive optical splitters: 2, 4, 8, 16 and 32 outputs, to be used in optical fibre star networks.

REF.	DESCRIPTION
2337	Optical Splitter 1310/1550nm "SC/APC" 2D 4dB
2339	Optical Splitter 1310/1550nm "SC/APC" 4D 7dB
234401	Optical Splitter 1310/1550nm "SC/APC" 8D 10dB
234501	Optical Splitter 1310/1550nm "SC/APC" 16D 14dB
234601	Optical Splitter 1310/1550nm "SC/APC" 32D 17dB



▲ 2339

BLOCK DIAGRAM



CONNECTIONS

- 1 Input
- 2 Outputs

Reference	2337	2339	234401	234501	234601	
No. of outputs	2	4	8	16	32	
INPUT / OUTPUT	Wavelength	nm				
	Optical connector	SC/APC				
	Insertion losses 1310/1550 nm	≤ 4,1	≤ 7,5	≤ 11	≤ 13,7	≤ 17,5
	Uniformity	≥ 55				
	Directivity	≥ 55				
Return losses	≤ 0,6	≤ 0,8	≤ 0,8	≤ 1,2	≤ 2	
GENERAL	Ingress protection level	IP				
	Dimensions (WxHxD)	mm		mm		
	50 x 216 x 175		73 x 216 x 175			



Optical Amplifier

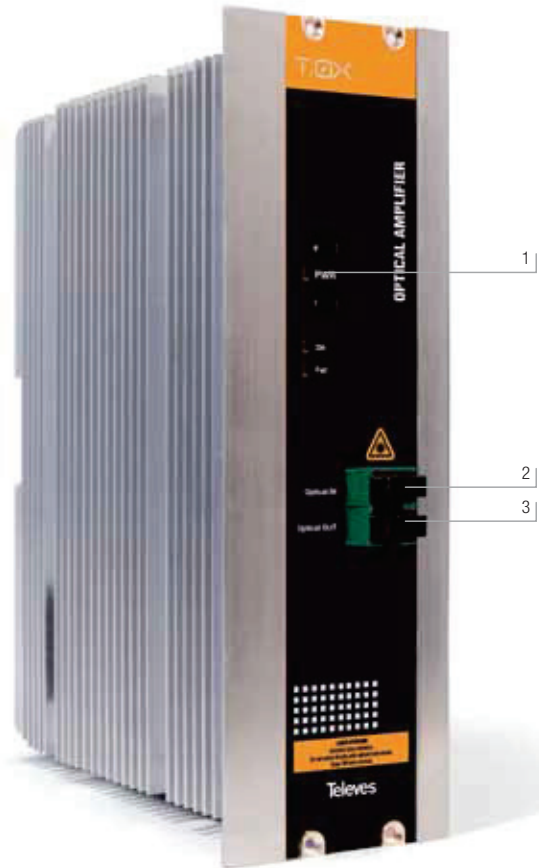


QR-A00152

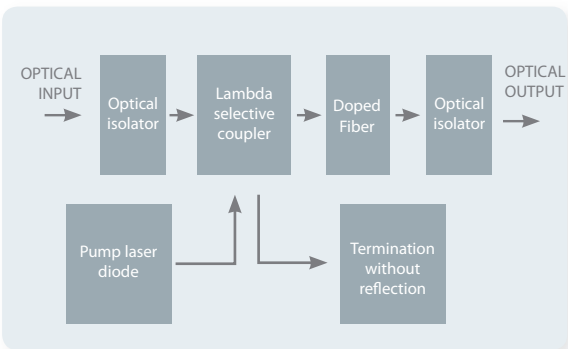
Optical amplifier (EDFA) intended to be attacked with the signal from an optical transmitter with a wavelength of 1550nm (ref. 234304).

- ▶ High output power.
- ▶ Low noise figure.
- ▶ High input range.

REF.	DESCRIPTION
234220	Optical Amplifier 1550nm "SC/APC" 20dBm



BLOCK DIAGRAM



CONNECTIONS	
1	Power
2	Optical input
3	Optical output

Reference			234220
OPTICAL INPUT	Input optical power range	dBm	-3 ~ +10
	Input connector	type	SC/APC
OPTICAL OUTPUT	Output optical power	dBm	20 ± 0,8
	Output connector	type	SC/APC
	Noise figure	dB	≤ 5 (for 0 dBm)
	Optical return losses	dB	≥ 50
GENERAL	Wavelength	nm	1550
	Powering	Vdc	24
	Consumption @ 24 Vdc	mA	410 max.
	Ingress protection level	IP	20
	Dimensions (WxHxD)	mm	75 x 216 x 175



RF Amplifier



QR-A00064

High power amplifier specially designed for T.OX series devices.

- ▶ **Low distortion** of second and third order allowing high output voltage (typical values of 120dBμV).
- ▶ Features two inputs, which allows mixing of channels processed from its own headend and channels from other sources.
- ▶ Equipped with test output.

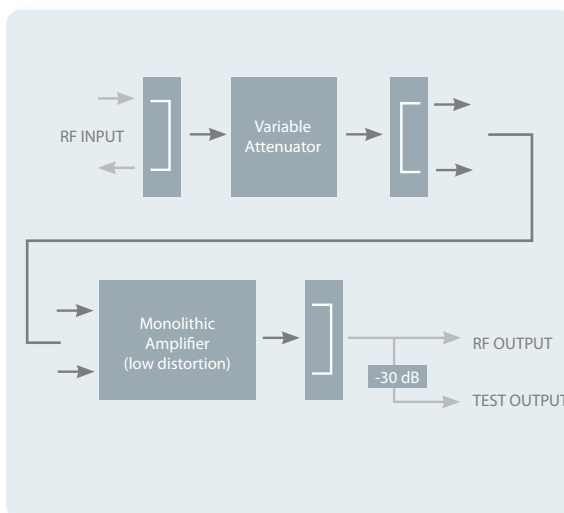


REF.	DESCRIPTION
5575	Amplifier Push-Pull (47... 862MHz)

CONNECTIONS
1 RF Output
2 Test Output (-30dB)
3 Power
4 Attenuator
5 RF Input
6 RF Input

Reference		5575		
RF INPUT	Frequency range	MHz	47...862	
	Noise figure	dB	< 11	
	Return losses	dB	> 10	
	Impedance	Ω	75	
RF OUTPUT	Frequency range	MHz	46...862	
	Gain	dB	44 ± 2,5	
	Output level	DIN45004B	dBμV	120
		42 CH Cenelec	dBμV	105
	Gain regulation	dB	0 - 20	
	Return losses	dB	> 8	
Impedance	Ω	75		
GENERAL	Powering voltage	Vdc	24	
	Consumption	mA	450 max.	
	Ingress protection level	IP	20	
	Dimensions (WxHxD)	mm	50 x 216 x 175	

BLOCK DIAGRAM





T.OX HEADENDS

Power Supply Unit

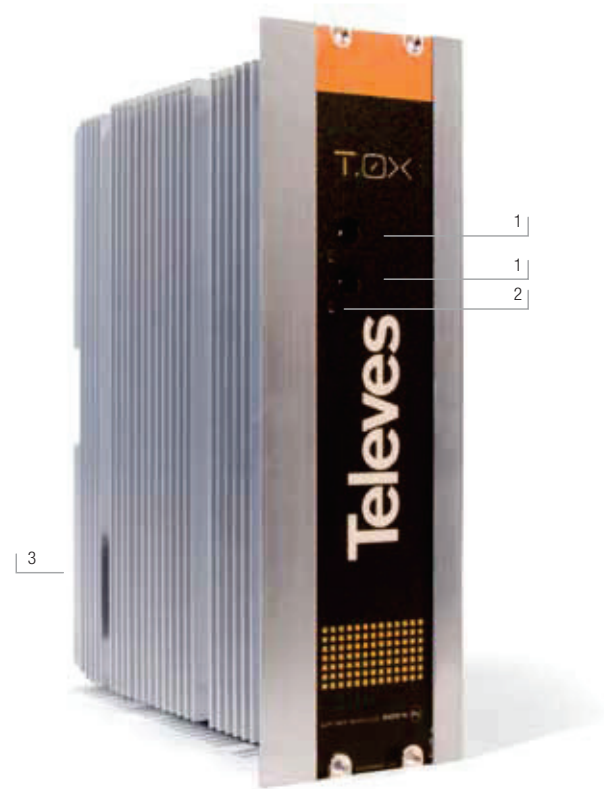


QR-A00065

High power switched-mode PSU, flyback type and high efficiency (> 85%).

Capable of delivering 5A at 24V (120W).

- ▶ Equipped with two outputs monitored by LEDs to indicate the status of the voltage delivered.
- ▶ Detects either overload or short-circuit.
- ▶ 4A maximum current per output.
- ▶ It offers protection against output voltage variation.

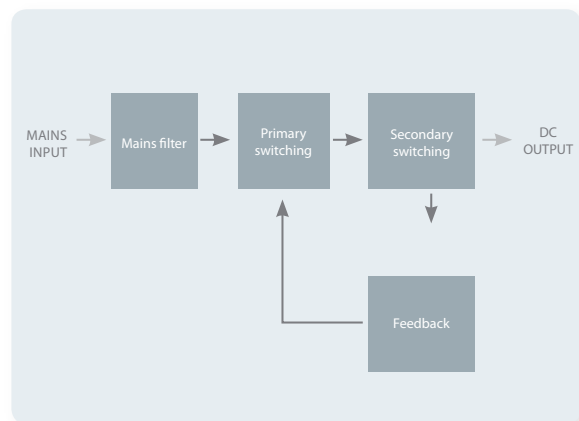


REF.	DESCRIPTION
5629	Switched-mode Power Supply Unit

CONNECTIONS
1 DC outputs
2 Status LED
3 Mains socket

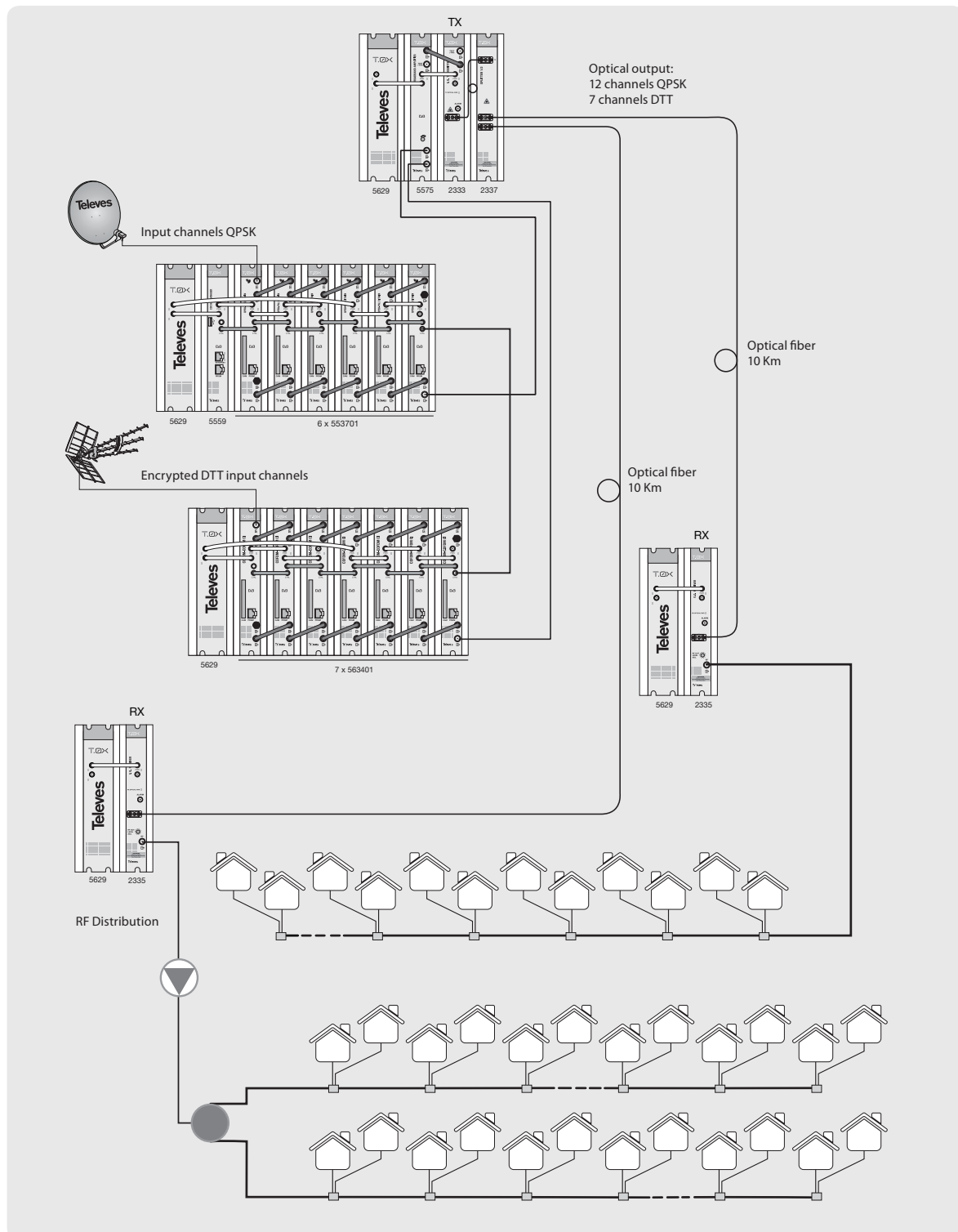
Reference				5629
MAINS	AC	Voltage	VAC	196...264
		Frequency	Hz	50, 60
OUTPUT	DC	Voltage	Vdc	24
		Max. current	A	5 (4 max. per output)
		Max. power	W	120
		Efficiency	%	> 85
GENERAL	Consumption	W	140 max.	
	Ingress protection	IP	20	
	Dimensions (WxHxD)	mm	75 x 216 x 175	

BLOCK DIAGRAM



Ref. 2333 / 2335 / 553701 / 563401

► 19 Channels





Optical Receivers



QR-A00021

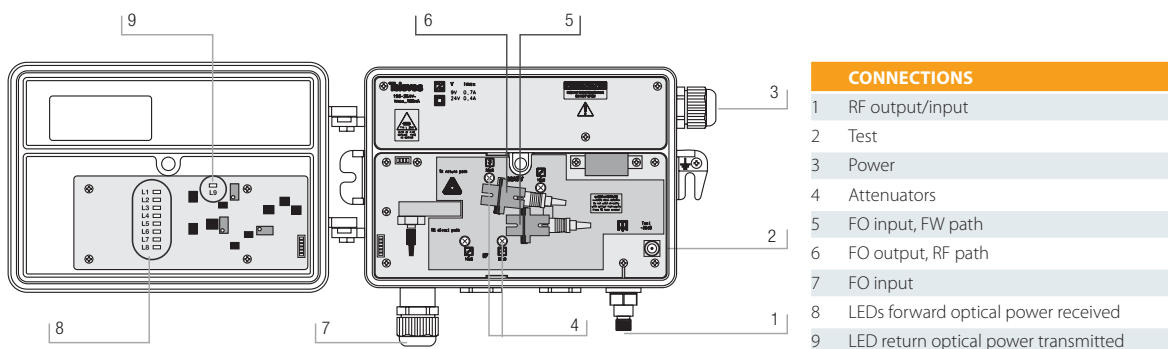
Outdoor optical receiver (Ref. 2310 includes return channel). This node is intended to be used as a launch amplifier in a final coaxial distribution network; it becomes the link between the end of the optical network trunk and the end users.

- ▶ High RF output power amplifier.
- ▶ It is equipped with separate stages of RF and IF, with controls for equalisation and attenuation.
- ▶ **Graphical scale (LEDs)** to inform about the optical input power.
- ▶ **LED OK/ NOT OK** indicates the correct optical output level of the return channel.
- ▶ Features a external test output to avoid cutting services to the user in maintenance operations.
- ▶ **Shielded enclosure IP61.**

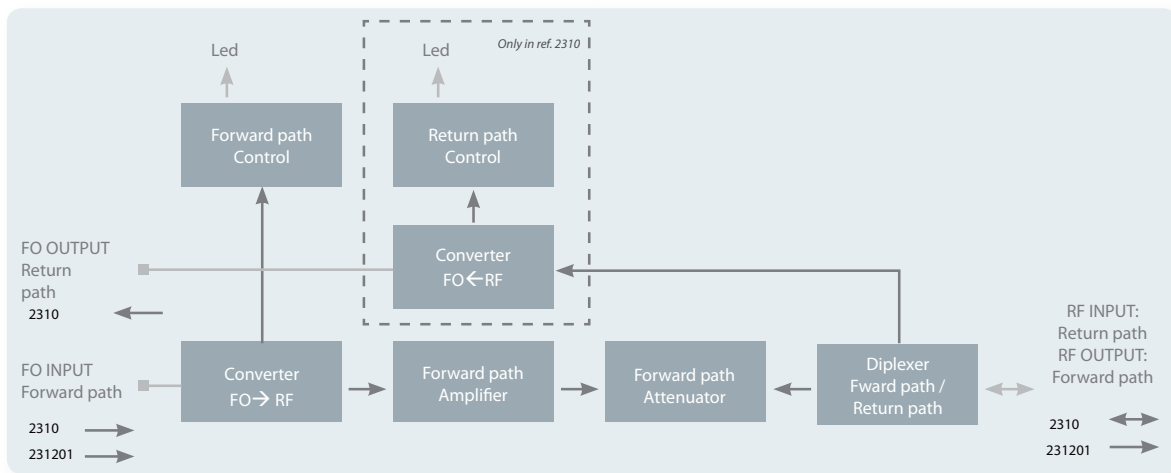


▲ 2310

REF.	DESCRIPTION
2310	Outdoor Optica Receiver 1200...1600nm "SC/APC" with Return Channel 1310nm + Amplifier (87...862/950...2150MHz)
231201	Outdoor Optica Receiver 1200...1600nm "SC/APC" w/o Return Ch. + Amplifier (87...862/950...2150MHz)



BLOCK DIAGRAM



OUTDOOR EQUIPMENT

Reference				2310	231201
ENTRADA	F.O. Forward channel	Wavelength	nm	1200...1600	
		Optical input range (recommended)	dBm	-5...+2	
		Max. permanent optical input level		+ 3	
		Optical connector	SC/APC		
	RF Return channel	Frequency range	MHz	5 - 65	-
		Max. input level ⁽²⁾	dBμV	90	-
		Flatness	dB	± 2	-
		Return losses		> 10	-
		Impedance	Ω	75	-

OUTPUTS	RF Forward channel	Output frequency	MHz	87...862	950...2150	87...862	950...2150	
		Max. MATV output level (42 CH CENELEC)	dBμV	104	-	104	-	
		Max. SAT IF output level (DIN VDE0885/12)		-	120	-	120	
		C/N for analogue channels ⁽¹⁾	dBc	> 45	-	> 45	-	
		Inter-stage attenuator	dB	0 - 20		0 - 20		
		Equaliser		0-15	0-10	0-15	0-10	
		Flatness		± 1,5	± 3	± 1,5	± 3	
		Return losses		> 10	> 7,5	> 10	> 7,5	
		Impedance		Ω	75		75	
		Connector		type	F-PG11		F-PG11	
		Internal test socket attenuation	dB	25 ± 1,5	27 ± 1,5	25 ± 1,5	27 ± 1,5	
		F.O. Return channel	Laser	type	Fabry-Perot (Clase 1M)		-	
	Wavelength		nm	1310		-		
	Max. optical power emitted		dBm	3		-		
	Optical connector		SC/APC			-		

GENERAL	Mains voltage	Vac	196~264	
	Current consumption	mA	180 (36 VA max.)	
	Power consumption	W	18	
	Operating temperature	°C	-5...+45	
	Weight	gr	1825	
	Housing material	Aluminium		
	Ingress protection level	IP	61	
	Dimensions (WxHxD)	mm	232 x 140 x 90	

1. Measures performed with 88dBμV at the optical transmitter input (device adjusted for delivering 104dBμV), followed by a 4 way splitter connected to one of the optical receiver output.

2. 2 carriers on 10 and 25 MHz and 90 dBμV level, for IM>50 dB at 35 MHz.

DOMESTIC EQUIPMENT

Optical receiver with automatic output level



QR-A00022

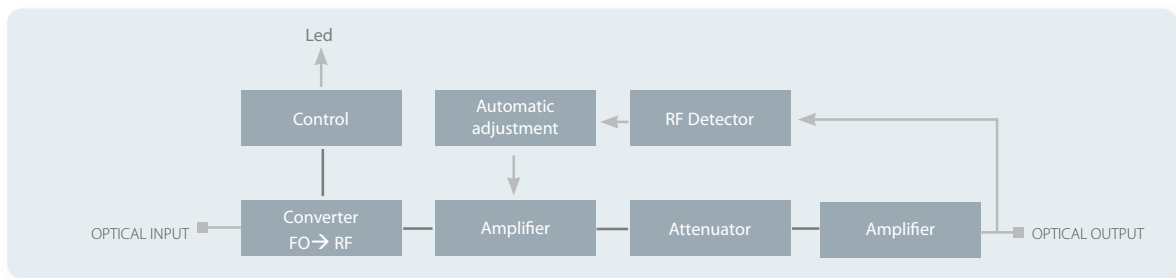
Designed for FTTH applications, provides a stable RF output signal level no matter of input signal variations.



REF.	DESCRIPTION
2311	Optical receiver with automatic output level

CONNECTIONS
1 RF output
2 SC/APC optical connector
3 Input optical power LED
4 Mains socket
5 ON/OFF power LED

BLOCK DIAGRAM



Reference	2311		
OPTICAL INPUT	Optical device	type	InGaAs pin photodiode
	Wavelength	nm	1200...1600
	Detection bandwidth	MHz	1...3000
	Optical input power range	dBm	-10 ~ +3
	Optical return losses	dB	> 60

RF OUTPUT	Frequency range	MHz	87... 860	950...2150	
	Impedance	ohm	75		
	Output return losses	dB	≥ 11		
	Optical AGC operating range	dB	0 ...18		
	Max. output level ⁽¹⁾ (2 tone, IMD ≥ 60 dB)	dBμV	110/tone	107/tone	
	Output level 42 CH CENELEC & 1 complete SAT Transponder ⁽²⁾	dBμV	93/channel	90/channel	

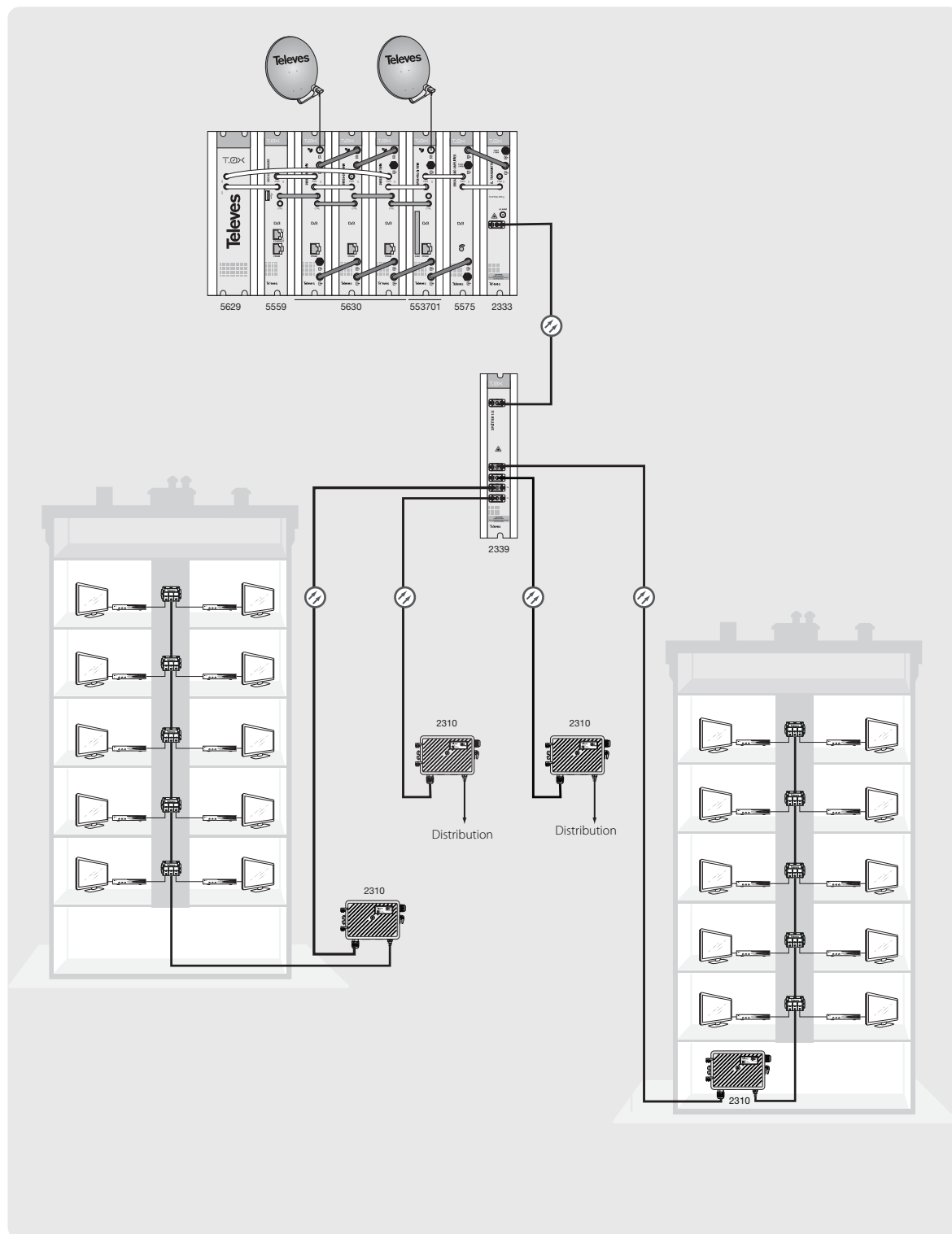
GENERAL	Mains voltage	Vac	230 ± 30%	
	Current consumption	mA	35 max.	
	Power consumption	W	3 max.	
	Conector de salida RF	type	F female	
	Conector de entrada óptica		SC/APC	
	Operating temperature	°C	0 ...45	
	Weight	gr	230	
	Ingress protection level	IP	20	
Dimensions (WxHxD)	mm	145 × 60 × 35		

1. Max. output level for CSO and CTB >= 60dB.

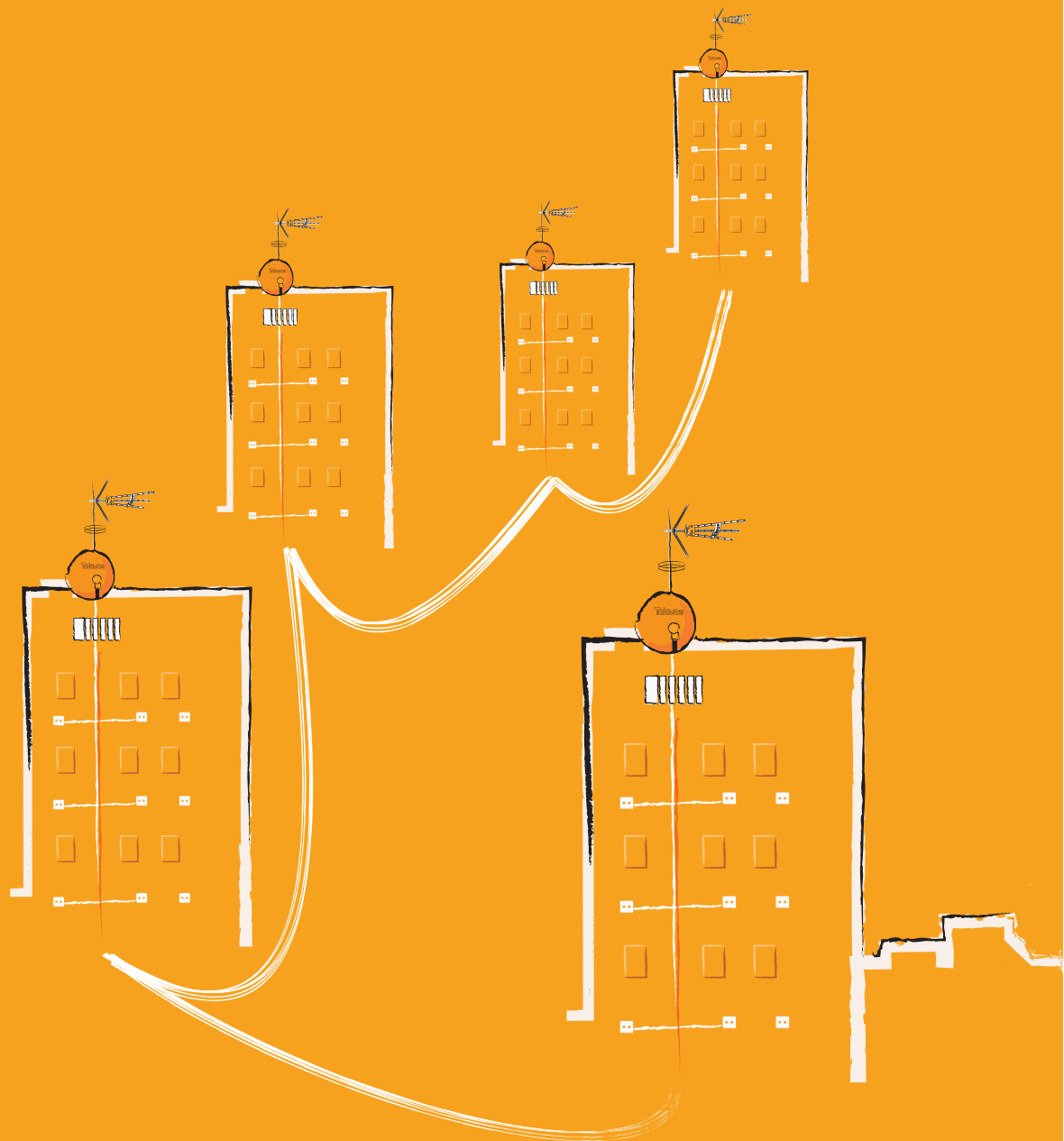
1. The LED indicator for received optical power, will glow red when the incident optical power exceeds the specified maximum value; it will glow green whenever the optical power is between -10 to +3 dBm; and will glow amber when the incident power is less than -10 dBm.

Refs. 2333 / 2310

- ▶ 8 Channels



FIBER OPTICS DISTRIBUTION



Main Terminal Enclosures



QR-A00184

- ▶ They allow the orderly deployment of optical cables and fibers, as well as stowing of splices.
- ▶ Provide reliable protection to secure, install, strip and laying of optical cables.
- ▶ Designed to protect the fibers of the distribution network into their corresponding trays and ensure minimum bend radius.
- ▶ Includes a variety of accessories that prevent unexpected damage to fibers.
- ▶ Painted with electrostatic spraying.

REF.	DESCRIPTION
233001	Indoor main terminal enclosure for optical fibers. Up to 48 SC/APC connectors (not included). Dimensions (W x H x D): 370 x 350 x 95 mm
233101	Outdoor main terminal enclosure for optical fibers. Up to 48 SC/APC connectors (not included). Dimensions (W x H x D): 370 x 350 x 95 mm



▲ 233001



▲ 233101

OPTICAL FIBER DISTRIBUTION

Splitting Terminal Enclosures



QR-A00185

- ▶ Designed for installation in the dividing of each plant, as per Spanish ICT-2 regulation.
- ▶ They may act as either a pass-through element or a terminal box.

REF.	DESCRIPTION
231301	Indoor splitting terminal enclosure for optical fibers. (Up to 8 output for fibers) Dimensions (W x H x D): 153 x 264 x 67 mm
231401	Outdoor splitting terminal enclosure for optical fibers. (Up to 4 output for fibers) Dimensions (W x H x D): 250 x 215 x 55 mm



▲ 231301



▲ 231401

User Access Point (UAP)



QR-A00186

- ▶ As per Spanish ICT-2 regulation, they make the link between the dispersion network, and user domestic network.
- ▶ They can be used as an end outlet for fiber optics.

REF.	DESCRIPTION
2315	Optical fiber UAP, with 2 SC-Female adapter (included) Dimensions (W x H x D): 80 x 80 x 25 mm
231501	Optical fiber UAP, up to 4 SC-Female adapter (2 included) Dimensions (W x H x D): 150 x 110 x 32 mm



▲ 2315



▲ 231501

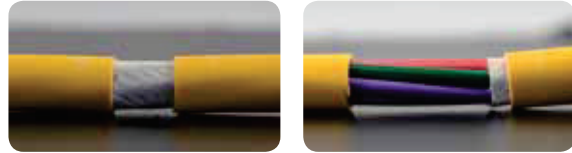
OPTICAL FIBER DISTRIBUTION

Optical Fiber Cables



QR-A00187

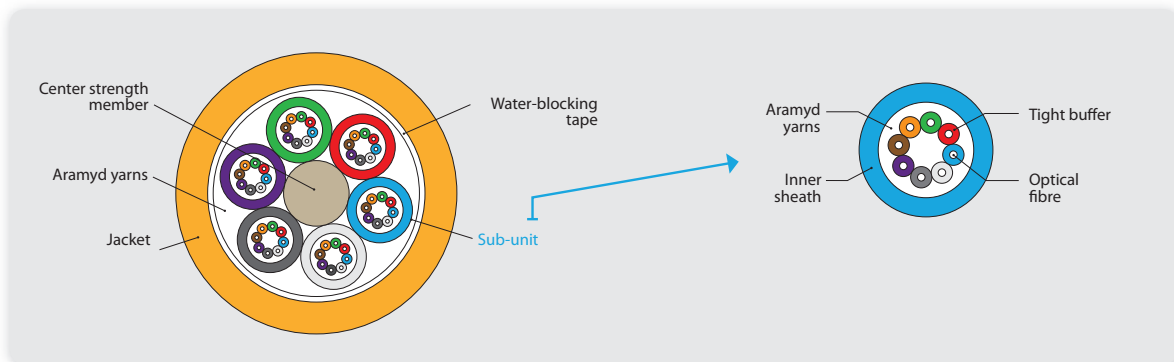
2, 24 or 48 multi-mode fibers; low bending sensitivity; in accordance with ITU-T G.657-A2 standard.



REF.	DESCRIPTION	pack
Multi-fiber cables (ITU-T-G657A2)		
231701	48 monomode fibers, LSFH	800 m
231702	48 monomode fibers, LSFH	sold in meters



▲ 231701/231702

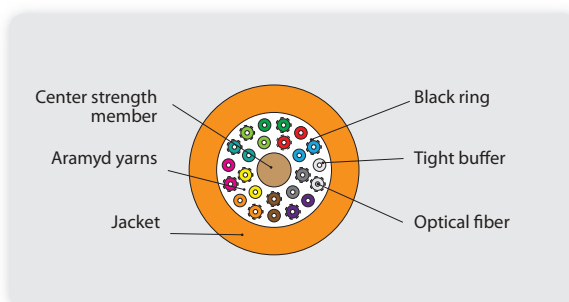


▲ 231701/231702



QR-A00188

REF.	DESCRIPTION	pack
Multi-fiber cables (ITU-T-G657A2)		
231601	24 monomode fibers, LSFH	2 Km
231603	24 monomode fibers, LSFH	sold in meters



▲ 231601/231603



▲ 231601/231603

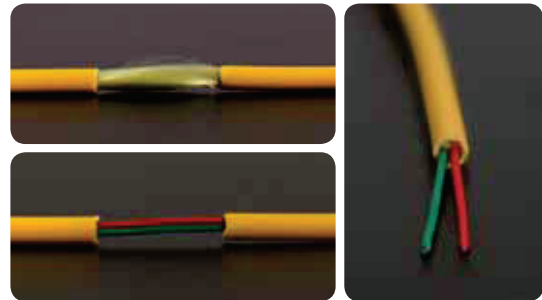
OPTICAL FIBER DISTRIBUTION

Optical fiber cables

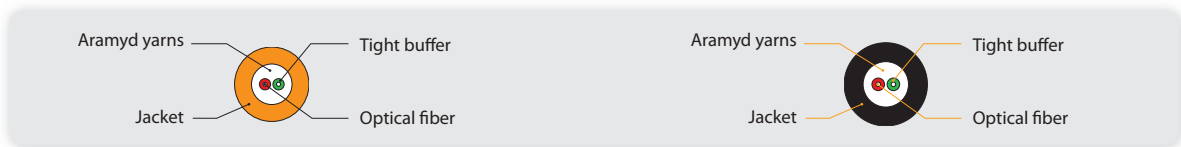


QR-A00189

REF.	DESCRIPTION	pack
Multi-fiber cable (ITU-T-G657A2)		
231901	2 monomode fiber, LSFH indoor	300 m
232001	2 monomode fiber, LSFH indoor	200 m



▲ 231901



▲ 231901

▲ 232001

Reference	231701	231702	231601	231603	231901	232001
No. of fibers	48		24		2	
Fiber type	9/125 (G657A2)					
Attenuation	dB/Km		≤ 0,4 (1310 nm); ≤ 0,3 (1550 nm)			
Fibre's tight buffer	mat'l		LSFH & flame retardant			
	Ø mm		0,9 ± 0,05			
Cable jacket	mat'l		LSFH & flame retardant			
	Ø mm		15,0 ± 0,2	8,0 ± 0,2	3,5 ± 0,2	4,8 ± 0,2
	color		orange			black
Bending radius	10 x Ø			5 x Ø	10 x Ø	
Short tension	N	1320		500	1200	
Short crash	N/100mm	1000		500	1000	
Oper. temperature	°C	-20...+70				
Pack	800 m	sold in meters	2 Km	sold in meters	300 m	200 m

Accessories



QR-A00190

REF.	DESCRIPTION
2327	Splicing protection sleeve. Splicer Ref. 2321
2328	Mechanical splice. Splicers Ref. 2322 & 2341
2329	SC/APC connectors (with mounting tool)
232601	Single-mode pigtail SC/APC(m)-SC/APC(m)
233202	Adapter SC/APC(f) – SC/APC(f)



▲ 232601



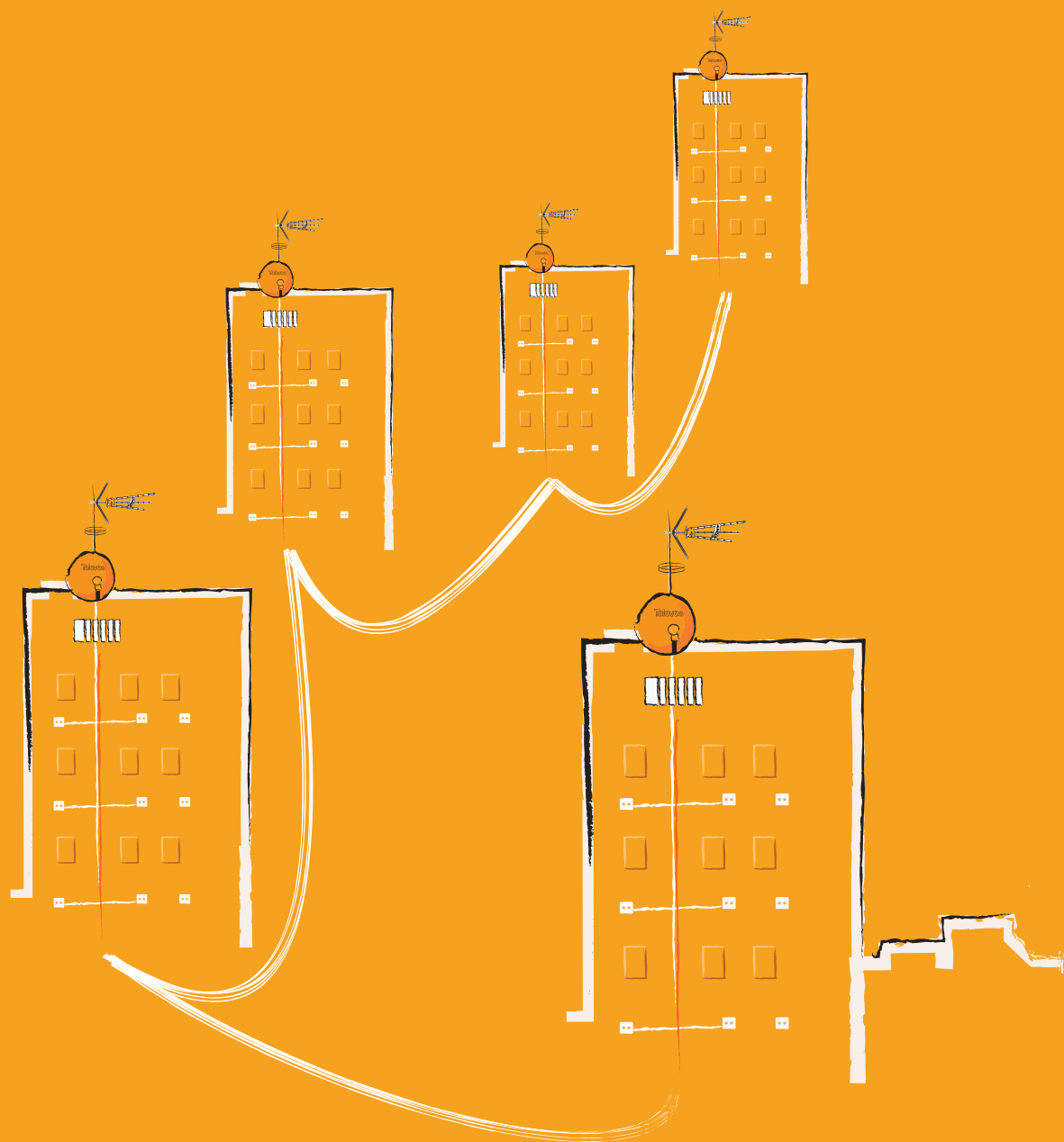
▲ 2327

▲ 2328

▲ 2329

▲ 233202

FIBER OPTICS DISTRIBUTION (OPTICAL LNB)



OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

Optical LNBs



QR-A00191

- ▶ Converts the 4 Universal IF bands to a single optical output: (HHi - HLo - VHi - VLo = Single Optical Output)
- ▶ Capable of supplying all converted signals up to 32 distribution points spread over a 10 Km radius.



▲ 2353



▲ 2363

REF.	DESCRIPTION
2353	Optical LNB 1310nm "FC/PC" G 72dB, Offset feedhorn
2363	Optical LNB 1310nm "FC/PC" G 72dB without feedhorn

Reference			2353	2363	
Description			Optical LNB (offset focus dish) Feedhorn Ø 40mm	Optical LNB (prime focus dish) flange C120	
Input frequency		GHz	10,7...12,75		
Output frequency			0,95...5,45		
Wavelength		nm	1310		
Local oscillators		GHz	9,75(Vertical) / 7,3 (Horizontal)		
Optical output power	from -30 to +60 °C		dBm		
Noise figure			7±2		
Gain	from -30 to +60 °C		dB		
Phase noise maximum limit	offset frequency (KHz)	1	dBc/Hz		
		10	-55		
		100	-80		
		1000	-100		
Local oscillator stability		MHz	-110		
Cross polar rejection		dB	±2		
Powering		Vdc	30 typ.		
Current consumption		mA	<250	<450	
Operating temperature		°C	12		
Connectors	DC input	tipo	F-female		
	Optical output		FC/PC		
Weight		gr	435	350	
Dimensions		mm	68 x 98 x 170	45 x 101 x 120	
Accessories					
FC/PC connector protection		units	1		
Female F to Female F connector		units	1		
Stand alone AC PSU	mains input	voltage	Vac	100-240	
		frequency	Hz	50/60	
	output	voltage	Vdc	12	
		current	mA	500	

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

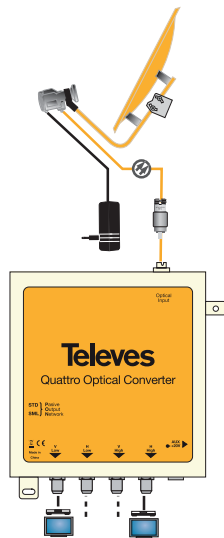
OPTICAL FIBER / RF CONVERTERS: SATELLITE



QR-A00192

Convert optical signal from optical LNBs to RF satellite signal in the IF band:

- ▶ As a QUAD device (4 polarities per output).
- ▶ As a QUATTRO device (polarity per output).
- ▶ FC/PC connector and monomode fiber.
- ▶ Local or remote powering.



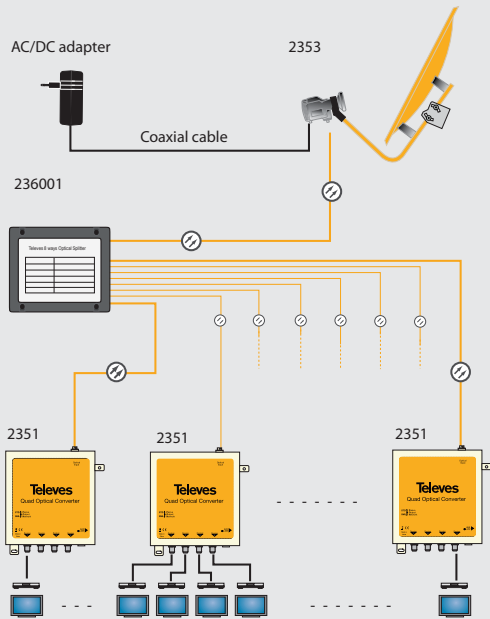
▲ 2350

REF.	DESCRIPTION
2350	Converter MDU 1310nm, FC/PC-F, Quattro IF + AC/DC adpdr
2351	Converter MDU 1310nm, FC/PC-F, Quad IF

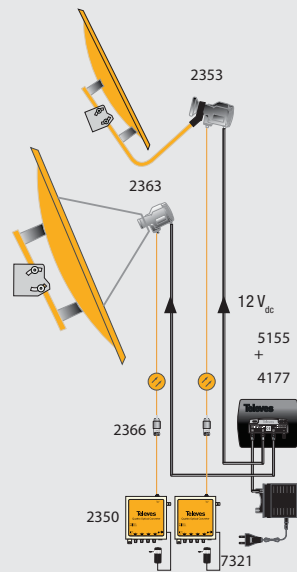
Reference				2350	2351	
Description				Quattro MDU	Quad MDU	
Input parameters						
Frequency range			GHz	0,950...5,45		
Optical return loss			dB	20		
Optical power	SML PON setting		dBm	-13 min / 0 max		
	STD PON setting			-18 min / -14 max		
SAT transponders			nº	120		
Optical input connector			tipo	FC/PC female		
Output parameters						
Frequency range	Low Band	V	950~1950	MHz	fixed output	< 14,5 Vdc
		H				> 15,5Vdc
	High Band	V	1100~2150			< 14,5Vdc 22KHz
		H				> 15,5Vdc 22KHz
Nominal output level/transponder			dBm	-65 min. / -25 max.		
Gain ripple across band			dB	5		
Return losses			dB	10		
Rejection between outputs			dB	30		
Noise figure			dB	4		
Nominal impedance			ohm	75		
Powering	voltage		Vdc	20	from receiver	
	consumption		mA	<300		
Connectors			tipo	F		
Operating temperature			°C	0-50		
Weight			gr	400		
Dimensions (WxHxD)			mm	160 x 185 x 30		

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

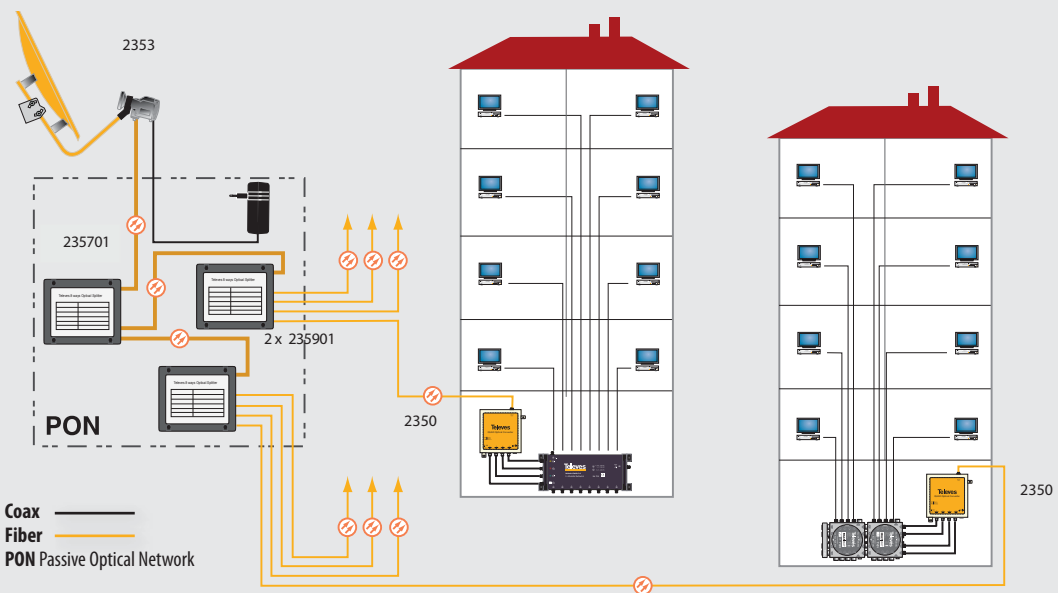
OPTICAL FIBER / RF CONVERTERS: SATELLITE



Example of signal distribution by means of a QUAD converters



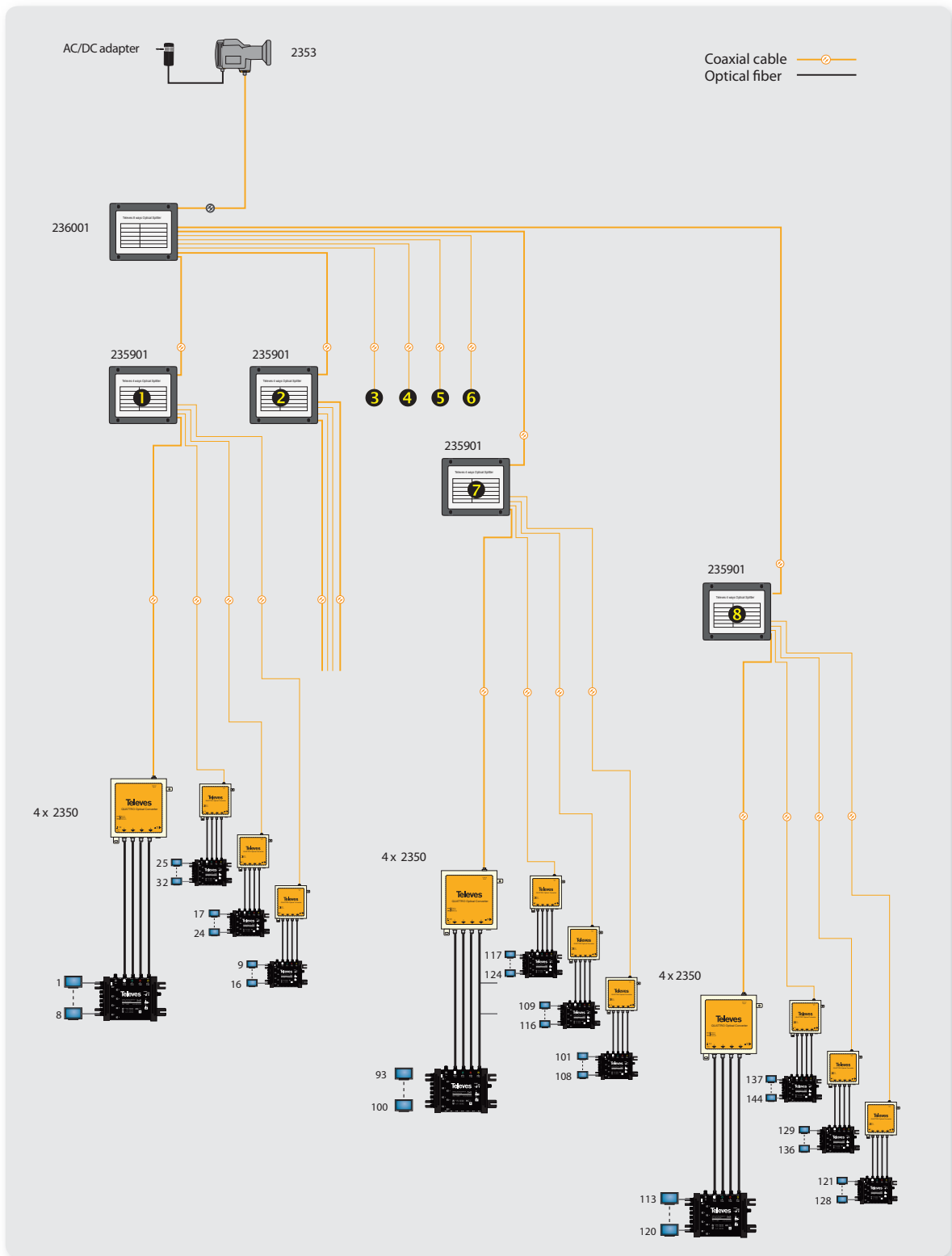
Example of two different LNBs powered by a single PSU



Application converter Quad/Quattro and multiswitches

APPLICATION

Converter Quattro and multiswitches



OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

OPTICAL FIBER / RF CONVERTERS: SATELLITE + TERRESTRIAL



QR-A00193

This kit allows converting the 4 universal SAT IF bands and the DTT terrestrial band into a single optical output.

- ▶ LNB with coaxial output. It stacks the 4 SAT IF polarities creating a single IF frequency ranging from 950 to 5450 MHz.
- ▶ ODU32 is a converter that combines the SAT IF signals coming from the LNB with the DAB/DTT terrestrial ones, transmitting them through 2 optical outputs.
- ▶ Optical power from 6 to 8 dBm.

Kit Ref. 236801 consists of:

- Optical LNB offset.
- Converter ODU32, RF to optical signal.
- AC/DC adapter unit.
- Low losses lead (2m/ 50Ω/ N connectors).
- Protective sleeve for the connector.
- Mast support for converter ODU 32.



▲ 236801



REF.	DESCRIPTION
236801	RF/Optical Converter ODU32 "F"- "N"- "FC"/ "PC": DAB/UHF-SAT + Offset LNB + AC/DC Adapter + Interconnection Accessories

Reference			236801		
OPTICAL	Wavelength	nm	1310		
	Optical power per output connector	dBm	6 a 8		
DAB / DVB-T	Input frequency	DAB / DVB-T	MHz	217...230 / 470...862	
	Impedance		Ohm	75	
	Input levels * (DAB must be 15 dB below DTT)	1 channel		dBμV	70 a 95 *
		4 channel			90
		8 channel			85
	Gain			15...45	
	DTT flatness	In-band		dB	4
		In-channel			0.5
	AGC range				25
	Noise figure at max gain				10
OIP3 ⁽¹⁾			dBμV	134	
Rejection (950-2150 MHz)			dB	20	
SAT	Input frequency	Vertical/Horizontal polarisations	MHz	950...3000 / 3400...5450	
	Impedance		Ohm	50	
	Input level		dBμV	96 a 111	
	In-band gain flatness	Vertical Polarisation			4
		Horizontal Polarisation			7 (3 dB slope)
	Gain flatness	per 30 MHz segment		dB	1
	AGC range (min)				15
	Noise figure at max gain				12
	OIP3 (min) ⁽¹⁾			dBμV	129
	Rejection (217-862 MHz) (min)			dB	20
ELECTRICAL	Powering voltage (through F connector)		Vdc	12	
	LNB powering voltage (through F connector)		Vdc	6,2	
	Current consumption (including optical LNB)		mA	500	
MECHANICAL	Connectors	Optical output		FC/PC	
		Satellite input		N female	
		DVB-T/DAB input		F female	
		Power input		F female	
	Operating temperature		°C	-30 to +60	
Weight		gr	545		
ODU Dimensions (W x H x D)		mm	168 x 160 x 30		

(1) The theoretical output level at which the third-order two-tone distortion products are equal in power to the desired signals.

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

OPTICAL FIBER / RF CONVERTERS: SATELLITE + TERRESTRIAL



QR-A00194

Devices that receive signals SAT(IF) and DAB/DTT via optical fiber and then are delivered via coaxial as SAT(IF) in QUAD format (4 polarities per output + terrestrial) or QUATTRO (1 polarity per output + terrestrial).

- ▶ FC/PC input connector and monomode fiber.
- ▶ **Local or remote powering** through any one of its outputs.
- ▶ The outputs of Ref. 237001 (QUATTRO), work in the same way that a standard **LNB QUATTRO**.
- ▶ The outputs of Ref. 236901 (QUATTRO), work in the same way that a standard **LNB QUAD**.



▲ 237001



▲ 236901

Recommendations to keep in mind for proper installation

The typical output optical power of the optical converter RF / FO ref. 236801 is 7 dBm. On the other hand, the dynamic range of converters FO/RF (References 236901 and 237001), ranges from -15 to 0 dBm:

- ▶ When there is no splitter in the optical fiber line, you must insert an optical attenuator Ref. 2366 (15 dB).
- ▶ Whenever are being used optical splitters, can be used attenuators of less losses (References 2365 and 2364).
- ▶ In the case that insertion losses are high enough to be within the dynamic range of the converter FO / RF, there will not be necessary to use attenuators.

REF.	DESCRIPTION
236901	Optical/RF Converter GTU "FC/PC"- "F" Quad DAB/UHF-SAT + AC/DC Adapter
237001	Optical/RF Converter GTU "FC/PC"- "F" Quattro DAB/UHF-SAT + AC/DC Adapter
236902	Optical/RF Converter, Quad FM/DAB/UHF-SAT
237002	Optical/RF Converter, Quattro FM/DAB/UHF-SAT

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

OPTICAL FIBER / RF CONVERTERS: SATELLITE + TERRESTRIAL

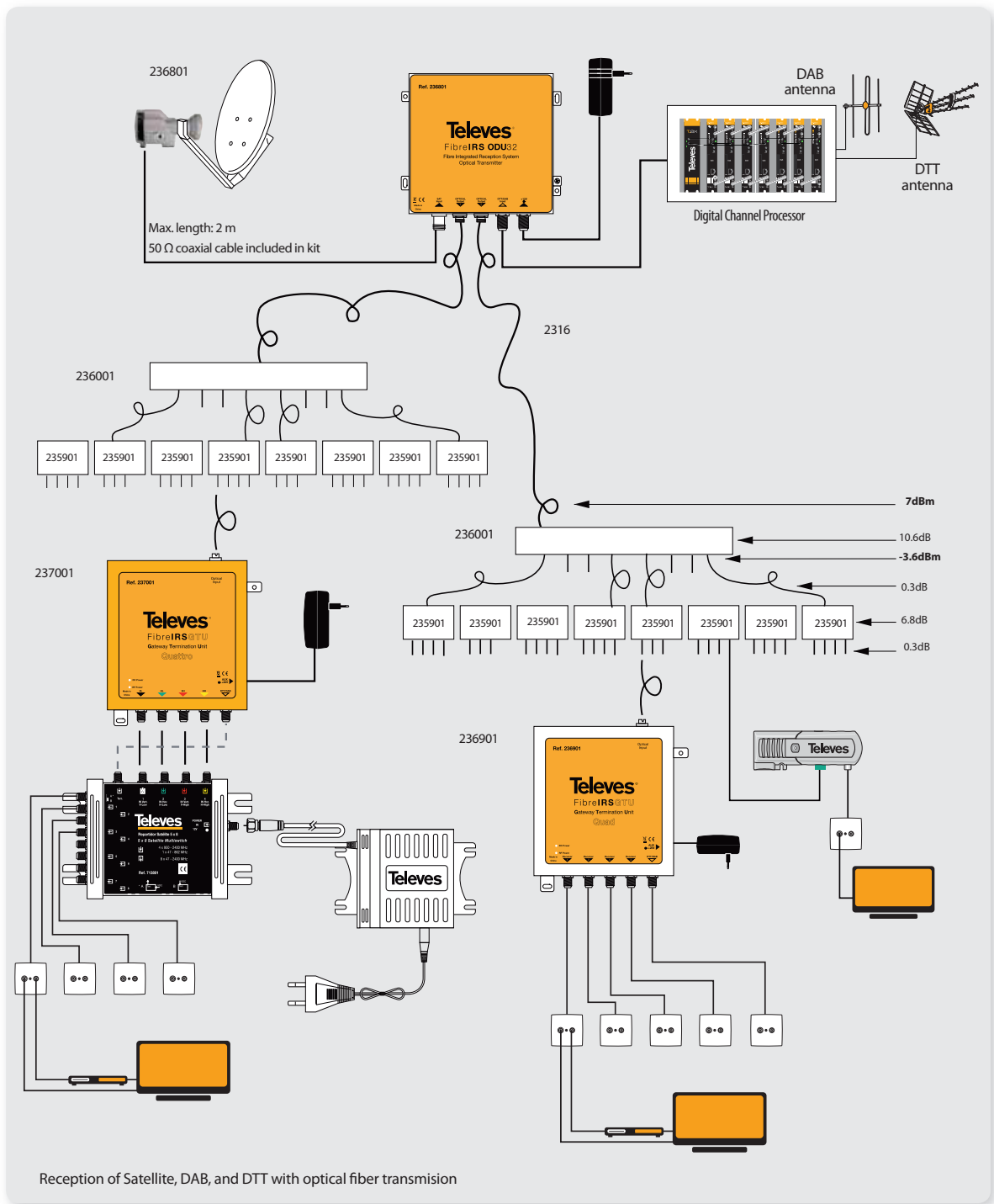
Reference			236901	237001		
OPTICAL	Wavelength		nm	1310	1310 /1550	
	Return losses		dB	45		
	Input power range			-15...0		
	Nominal levels	Satellite Xpdr		dBm	-72...-42	
DVB-T MUX		-65...-35				
DAB MUX		-79...-49				
DVB-T/DAB	Input frequency		DTT/DAB	MHz	47... 862	
	Impedance			ohm	75	
	Return losses (min)			dB	10	
	Nominal output levels	DVB-T		dB μ V	69	
		DAB			56	
	Gain	Max		dB	29	
		Min			6	
	DTT Gain flatness	In-band			6	
		In-channel			0,5	
	OIP3 ⁽¹⁾			dB μ V	100	
Rejection (950-2150 MHz)			dB	25		
SATELLITE	Nominal output level			dB μ V	-37 to 70	
	Output frequency bands	Vertical High		MHz	1100...2150	
		Vertical Low			950...1950	
		Horizontal High			1100...2150	
		Horizontal Low			950...1950	
	Selection of the satellite output frequency band	VHi (1100 - 2150 MHz)		Vdc/KHz	13/22	-
		VLo (950 - 1950 MHz)			13/-	-
		HHi (1099 - 2149 MHz)			18/22	-
		HLo (949 - 1949 MHz)			18/-	-
	Impedance			ohm	75	
	Return losses (min)			dB	10	
	Gain				39	
	AGC dynamic range				35	
Gain slope			dB	2		
Gain flatness	In-band			6		
	per 30 MHz segment			1		
OIP3 (min) ⁽¹⁾			dB μ V	112		
Rejection (min)			dB	30 (856 MHz)	30 (856 MHz)	
Noise figure			dB	7		
ELECTRICAL	Powering voltage		Vdc	20		
	Current consumption		mA	800		
MECHANICAL	Connectors	Optical output		FC/PC		
		DVB-T/DAB input		F female		
		Powering input		Jack female		
	Operating temperature		°C	-30 to +60		
	Weight		gr	595		
Dimensions		mm	168 x 180 x 30			

(1) The theoretical output level at which the third-order two-tone distortion products are equal in power to the desired signals.

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

OPTICAL FIBER / RF CONVERTERS: SATELLITE + TERRESTRIAL

- ▶ Ensure a good filtering of DAB and DTT signals, using channel processors.
- ▶ For a better C/N is necessary to use an attenuator. Total losses between the unit ODU32 Ref 236801 and optical converters FO/ RF should be about 15 dB.



OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

Optical splitters



QR-A00195

These devices are used when the optical signal is required for different active links and at the same time a non-intrusive element, like a test or monitoring equipment, has to be connected.

REF.	DESCRIPTION
235701	1310/1550nm, FC/PC, 2W 4dB
235801	1310/1550nm, FC/PC, 3W 5,5dB
235901	1310/1550nm, FC/PC, 4W 7dB
236001	1310/1550nm, FC/PC, 8W 10,1dB



▲ 235701

Reference	235701	235801	235901	236001
Outputs	2	3	4	8
Connectors	type FC/PC			
Wavelength	nm 1310 / 1550			
Insertion losses	dB 4	5,5	7	10,1
Fiber type	Monomode (SM)			
Dimensions (W x H x D)	mm 115 x 151 x 23			



▲ 236001

Optical attenuators



QR-A00196

Used to adjust the input levels to the dynamic range of devices.

REF.	DESCRIPTION
2364	1310/1550nm, FC/PC, 5dB
2365	1310/1550nm, FC/PC, 10dB
2366	1310/1550nm, FC/PC, 15dB



▲ 2364

Reference	2364	2365	2366
Attenuation	dB. 5	10	15
Connectors	type FC/PC		
Wavelength	nm 1310 / 1550		

OPTICAL FIBER DISTRIBUTION (OPTICAL LNB)

Pre-terminated patch cords single-mode



QR-A00219

Pre-connectorized patch cords, made of monomode G657A type fiber.

- ▶ High transmission speed and low attenuation.
- ▶ Low Smoke and Halogen Free (LSFH).
- ▶ Min. bending radius: 30 mm.
- ▶ Ø 3mm cable terminated with connectors FC/PC (9mm).
- ▶ **Flexible inner shielding** (1.3 mm diameter) consisting of a stainless steel fold and aramid yarns.



REF.	DESCRIPTION
2361	LSFH, FC/PC, 3m
236101	LSFH, FC/PC, 5m
236102	LSFH, FC/PC, 10m
236103	LSFH, FC/PC, 20m
236104	LSFH, FC/PC, 30m
236105	LSFH, FC/PC, 40m
236106	LSFH, FC/PC, 50m
236107	LSFH, FC/PC, 75m
236108	LSFH, FC/PC, 100m
236109	LSFH, FC/PC, 200m

Reference			2361	236101	236102	236103	236104	236105	236106	236107	236108	236109
Insertion losses	A1,A2	dB	≤ 0.2									
Return losses	A1,A2	dB	≥ 45									
Attenuation		dB/Km	0,3									
Connectors		type	FC/PC									
Fiber			Monomode (SM) G657A									
Outer sheath	material		LSFH PVC									
	Ø mm		3									
	color		gris									
Available jumper lengths	m		3	5	10	20	30	40	50	75	100	200

Optical accessories



QR-A00198

REF.	DESCRIPTION
2354	F.O. connector for 2 "FC-FC" pre-terminated patch cords interconnection.
2356	F.O. connector for a "FC-SC" connector change of 2 pre-terminated patch cords.



▲ 2354



▲ 2356

