



Going future today.



main catalogue

2009 / 2010



About Astro



The change from analogue to digital transmission technology is in full activity, and with it a wide array of multimedia possibilities. Communication links of the future will no longer be restricted by the means involved. ASTRO is active in shaping this transformation. As a specialist in innovative products for full-service networks and digital reception systems, we are the ideal partner for the diverse challenges brought by the new age of multimedia communication.

For the complex requirements in this future market ASTRO offers individual solutions on highest level. As a modern High-Tech-company with more than 60 years of experience we benefit from a successful alliance of tradition and innovation. With 180 highly qualified employees and a region-wide service network we are your professional partner.

Herbert Strobel
(Managing director)

Quality and reliability

- Our high-class products are subject to a demanding quality and security check. Your satisfaction is our benchmark
- ASTRO-products are EMC-certified.
- Functionality determines the design of ASTRO-products.



Flexibility and service

- Our region-wide service network we are able to react quickly and flexible to all your needs.
- ASTRO-experts speak your language.
- Our specialists support you locally and help to develop market-driven solutions.



Tradition and innovation

- Benefit from our long standing experience and the unusually long staff membership of our highly qualified employees.
- As a full-line distributor ASTRO offers one-stop solutions even for complex requirements.
- Your success is our success. We support you creatively and competent in partnership.



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Satellite- technology

External SAT-units

High-class and budget-priced aluminium offset parabolic antennas

Universal reception systems for reception of all common SAT-signals (analogue / digital) in the KU-band

Page 8



Multiswitches

Complete range of stand-alone and cascadable devices for all applications of SAT-IF-distribution

Page 11



For receivers and digital distribution systems
please mail your questions to: info@astro-kom.de



External SAT-units

ASTRO offers several satellite reception units for all applications at different quality levels. (See opposite page)

- SAT-series: premium-class offset parabolic-antennas for semiprofessional application and very quality-conscious consumers
- ASP-series: high-class offset parabolic-antennas with excellent price-performance ratio and very good test results; well adapted for use in high-class private SAT reception units
- AST-series: budget-priced offset parabolic-antennas for price-conscious consumers

The parabolic-antennas are supplemented by the well matched feed systems of the SBX- and ACX-series.



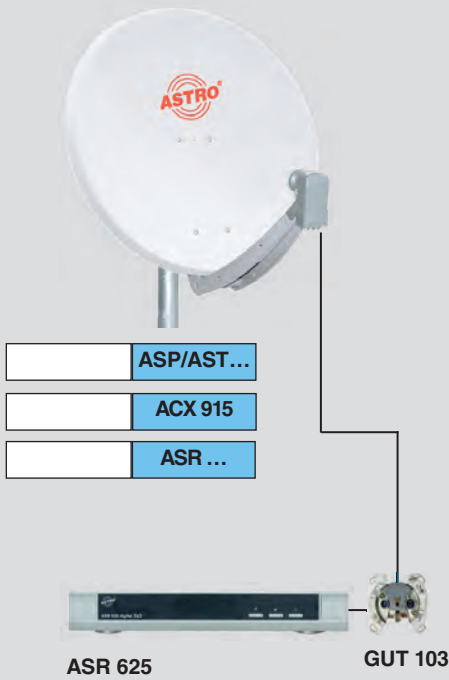
You can find further information on our website
HYPERLINK "<http://www.astro-kom.de>" www.astro-kom.de or
please mail your questions to: info@astro-kom.de.

Application examples

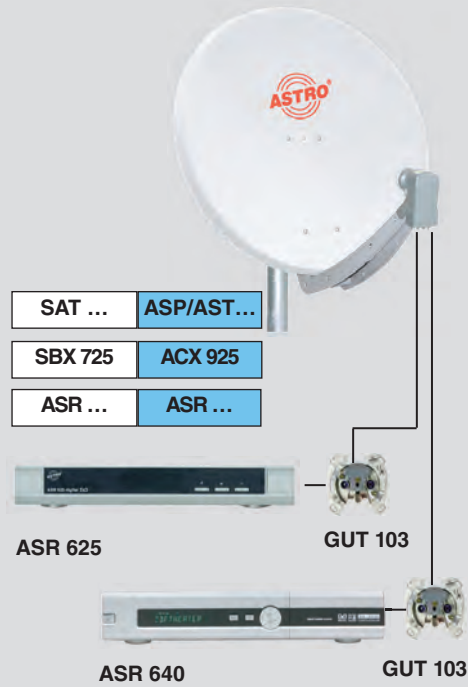
high-class budget-priced

i Multiswitches, see page 11
Wall outlets, see page 144

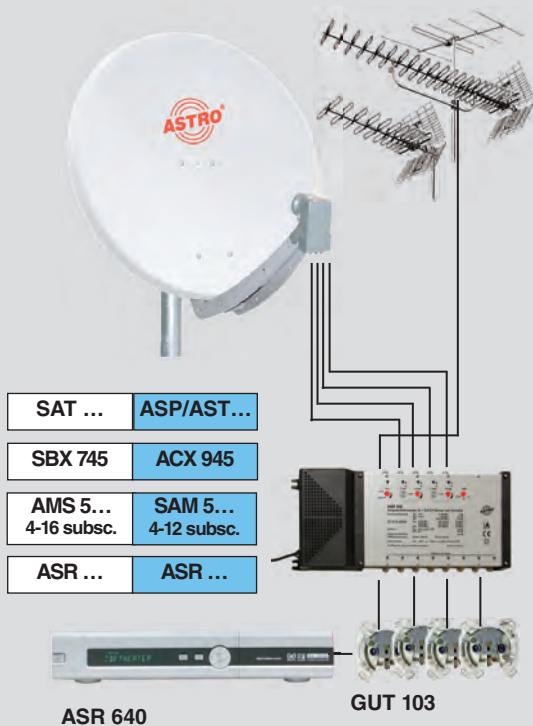
Single (analogue / digital)



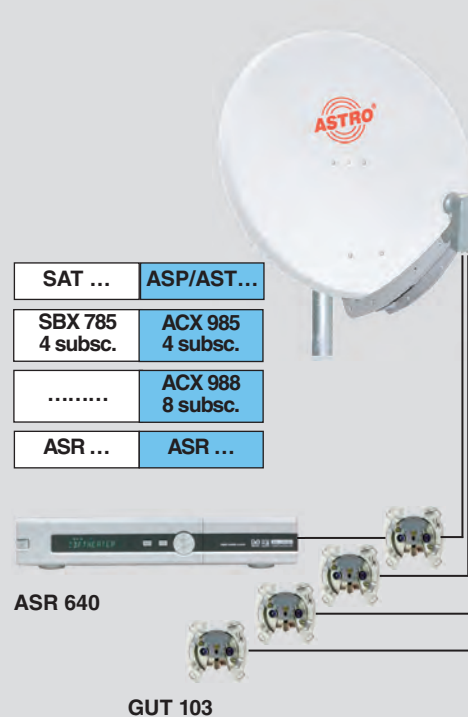
Twin (analogue / digital)



Quatro (analogue / digital)



Quatro-Switch (analogue / digital)



Applications for universal reception systems

analogue / digital

reception of all common SAT-signals in the KU-band, such as ASTRA ..., Eutelsat

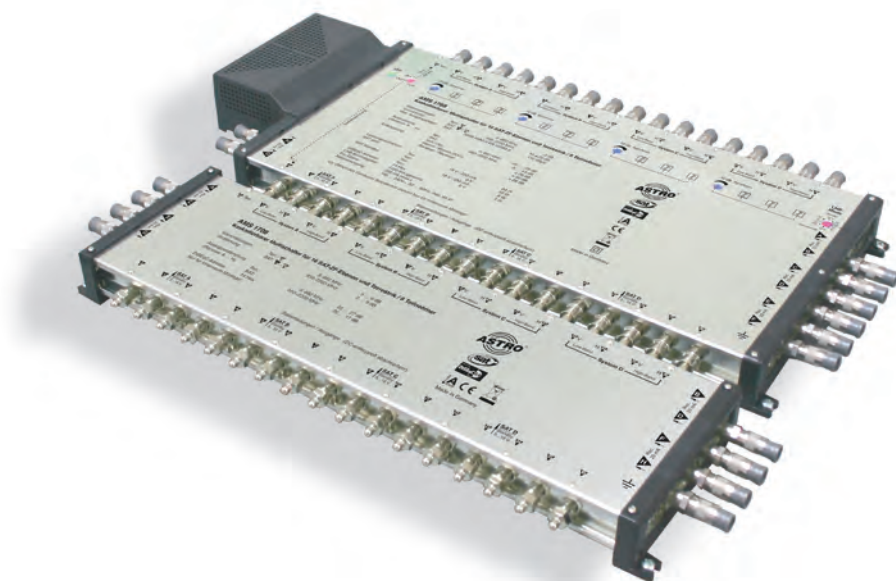
SBX... for offset parabolic-antennas SAT 60, 75, 90 and 1200

ACX... for offset parabolic-antennas AST 60, 850 and ASP 78, 85

Type	ACX 915	SBX 725 / ACX 925	SBX 745 / ACX 945
application	1 participator	2 participators	multiswitch device
	H/V High + Low	2 x H/V High + Low	V H V H * Low high High Low
			*only for illustration purposes techn. variation feasible
Type	SBX 785 / ACX 985	ACX 988	
application	4 participators, with integrated multiswitch	8 participators, with integrated multiswitch	
	4 x H/V High + Low	8 x H/V High + Low	

Recommended dish diameters:

Type	Ø cm	Single	Twin	Quatro	Quatro-Switch
SAT 60 AST 60	60 (65) 58 (64)	●			
SAT 75 ASP 78 ASP 85	75 (80) 74 (84) 85 (85)		●	●	●
SAT 90 AST 850	90 (99) 85 (55)		●	●	●
SAT 1200	123 (157)		●	●	●



Multiswitches

ASTRO offers a range of multiswitches for all demands from stand-alone devices to cascable systems.

- AMS Stand-alone: high-class compact-multiswitch with 4 SAT-inputs and terrestrial input, suitable for return path, integrated switching power supply with stand-by function
- SAM Ecoswitch: Multiswitches with outstanding price/performance ratio, 4 or 8 SAT-inputs plus terrestrial input and optionally 6, 8, 12 or 16 receiver-outputs; power supply with stand-by function
- AMS cascade: high-class cascable multiswitches with 4, 8, or 16 SAT-inputs plus terrestrial input and 4 to 16 receiver-outputs, level adjustment, selectable LNB-supply, integrated energy-saving switching power supply

Application example

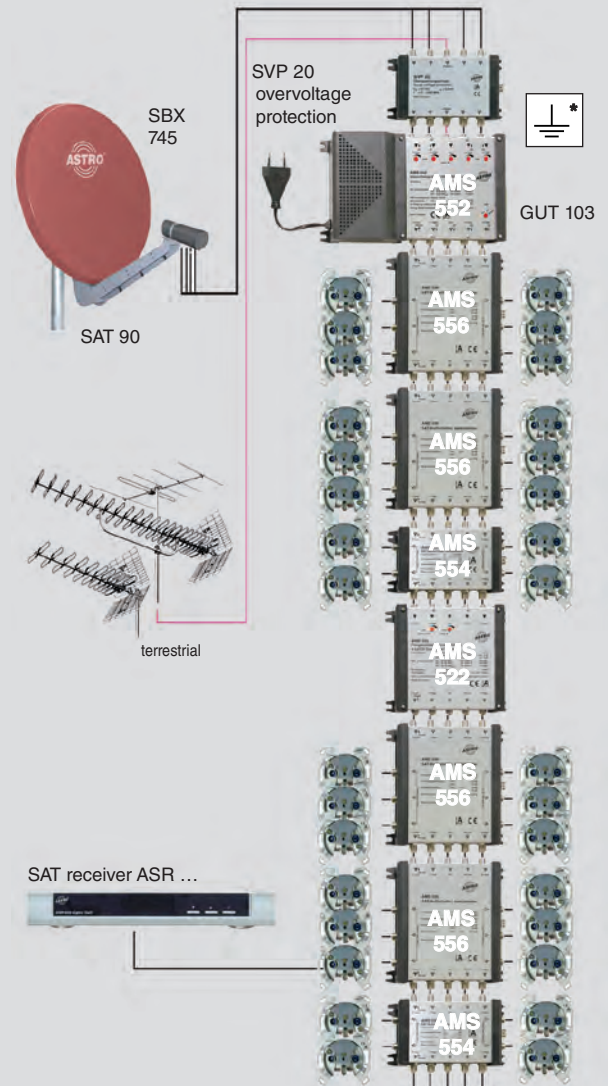
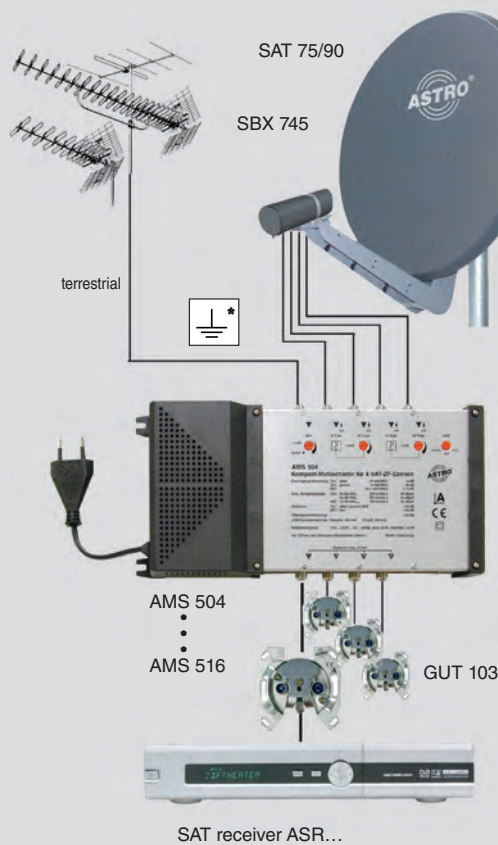
Stand-alone multiswitches
 Cascadable multiswitches
 5 inputs (4 SAT polarizations + terrestrial)

With SAT-IF distribution it is now possible to implement multiple-subscriber systems with more than 100 connections. In principle we differentiate between multiswitches in compact assembly (stand alone) for usual cable lengths and cascadable systems which can be expanded to IES-capable distribution systems.

Four polarization multiswitches plus terrestrial means 4 SAT inputs, analogue and digital (h and v) for one satellite position plus terrestrial input.

4-16 subscriber system with AMS 5 ... (stand-alone)

32 subscriber system with AMS 5 ... (cascadable)




Wall outlets, see page 144

AMS series: stand-alone 5 inputs

High-class Compact-multiswitches 4 SAT-inputs + terrestrial



- terrestrial input active 0 dB with 10 dB level attenuator, passive 20 dB
- for analogue und digitale signals
- suitable for return path / frequency range 5 - 862 MHz
- SAT-amplifier with 5 dB slope
- variable attenuator (10 dB) for SAT IF Bands
- LNB supply voltage selectable 12 VDC / 18 V DC / 22 kHz
- integrated energy-saving switching power supply with stand-by mode
- optionally: SVP 20 overvoltage protection  see page 166
- switchover 13 / 18V, 0 / 22 kHz



Common technical data AMS 504 to AMS 516

Frequency range		
Terrestrial passive / active	[MHz]	5 - 862 / 47 - 862
SAT-IF		950 - 2200
Noise figure Terrestrial / SAT	[dB]	<7 / <9
Terrestrial level adjuster range	[dB]	0...-10
Selection		
Terrestrial active / passive ... SAT	[dB]	> 30 / > 25
SAT / Terrestrial		> 50
Crosstalk attenuation	[dB]	> 26
Isolation		
Receiver / Receiver terrestrial	[dB]	> 30
SAT		> 26
Current consumption per receiver	[mA]	40
Total LNB current	[mA]	600
Single port LNB current		500
Power consumption		
Terrestrial active – SAT active /		
Terrestrial passive – SAT active	[W]	26 / 22,5
Terrestrial active – SAT standby /		
Terrestrial passive – SAT standby	[W]	6 / 2,5

Technical changes, changed design and errors excepted.

Type		AMS 504	AMS 506	AMS 508
Input connector plan				
Order number		360 040	360 060	360 080
Receiver outputs		4	6	8
Through loss				
Terrestrial passive	[dB]	-13...-18	-17...-20	-16...-19
Terrestrial active		+10...+5	+4	+4
SAT-IF		-5...+3	-6...+2	-6...+2
Maximum output level 60 dB / EN 50083-3				
47 - 862 MHz	IMA ₃ / IMA ₂ CTB / CSO	[dBμV] 94 / 90 87 / 84	92 / 88 83 / 78	90 / 86 85 / 80
950 - 2200 MHz	35 dB IMA ₂ / IMA ₃ EN 50083-3	[dBμV]	92	
Common data				
Dimensions (W x H x D)	[mm]	250 x 130 x 50	300 x 130 x 50	300 x 130 x 50

Technical changes, changed design and errors excepted.


Type		AMS 512	AMS 516
Input connector plan			
Order number		360 120	360 160
Receiver outputs		12	16
Through loss			
Terrestrial passive	[dB]	-18...-22	-20...-22
Terrestrial active		+5...+2	+3...0
SAT-IF		-6...+1	-6...0
Maximum output level 60 dB / EN 50083-3			
47 - 862 MHz	IMA ₃ / IMA ₂ CTB / CSO	[dBμV] 88 / 84 84 / 79	86 / 82 80 / 79
950 - 2200 MHz	35 dB IMA ₂ / IMA ₃ EN 50083-3	[dBμV]	90
Common data			
Dimensions (W x H x D)	[mm]	380 x 130 x 50	

Technical changes, changed design and errors excepted.

SAM series: Stand-alone 5 inputs

Price-competitive compact multiswitches 4 SAT-inputs + terrestrial



- Energy-saving concept with stand-by function
- flame-retardant plastics
- for analog und digital signals
- low tap loss
- optionally available: SVP 20 overvoltage protection  see page 166

SAM 56 Ecoswitch



4 SAT inputs / 1 terrestrial input
and 6 receiver outputs
with integrated energy-saving power supply

SAM 58 Ecoswitch



4 SAT inputs / 1 terrestrial input
and 8 receiver outputs
with integrated energy-saving power supply

SAM 512 Ecoswitch



4 SAT inputs / 1 terrestrial input
and 12 receiver outputs
with integrated energy-saving power supply

SAM 516 Ecoswitch



4 SAT inputs / 1 terrestrial input
and 16 receiver outputs
with integrated energy-saving power supply




Type		SAM 56 Ecoswitch	SAM 58 Ecoswitch	SAM 512 Ecoswitch	SAM 516 Ecoswitch
Input connector plan					
Order number		360 506	360 508	360 512	320 516
Receiver outputs		6	8	12	16
SAT range					
Frequency range	[MHz]	950 - 2150			
Gain	[dB]	-4		0 ... 3	
Output level	[dBμV]	typ. 100, acc. EN 500083-3			
Input isolation SAT / SAT	[dB]	typ. 25			
Output isolation					
SAT / SAT	[dB]	typ. 40			
SAT / Terrestrial	[dB]	typ. 40			
Receiver / Receiver	[dB]	typ. 35			
Return loss					
Input LNB	[dB]	typ. 8			
Output	[dB]	typ. 10			
Terrestrial range					
Frequency range	[MHz]	5 - 862			
Tap loss	[dB]	typ. 20	typ. 21	typ. 25	typ. 26
Maximum input level	[dBμV]	typ. 120, acc. EN 500083-2, limited by EMC			
Isolation					
Receiver / Receiver	[dB]	typ. 24			
Terrestrial / SAT	[dB]	typ. 35			
Return loss					
Input Terrestrial	[dB]	typ. 10			
Output	[dB]	typ. 10			
Power consumption					
All receivers off	[W / VA]	2 / 5,5		3 / 7	
Minimum 1 receiver on	[W / VA]	8,5 / 11		11,5 / 14	
LNB current	[mA]	300			
Common data					
Impedance	[Ω]	75			
Connectors		F-female			
LNB-supply voltage	[V]	15			
Maximum LNB-current	[mA]	300			
EMC		compliant with EN 500083-2			
Supply voltage	[V~/Hz]	230 / 50 ± 10 %			
Ambient temperature	[°C]	-15 ... +55			
Dimensions (W x H x D)	[mm]	217 x 124 x 57		312 x 124 x 57	

Technical changes, changed design and errors excepted.

AMS series: Cascadable 5 inputs

High quality cascadable multiswitches 4 SAT-inputs + terrestrial



- for SAT IF distribution systems with more than 16 subscribers
- terrestrial input active with attenuator, passive, suitable for return path, 5 - 862 MHz
- terrestrial amplifier section is using CATV (passive modus)
- SAT amplifier with slope
- variable attenuator for SAT IF polarizations
- LNB supply voltage selectable 12 V DC / 18 V DC / 22 kHz
- integrated energy-saving switching power supply with standby mode
- optionally: SVP 20 overvoltage protection  see page 166

system base unit AMS 5.. cascade



AMS 552 with integrated energy-saving switching power supply

extension modules AMS 5.. cascade



delivery with 4 (AMS 554), 6 (AMS 556) or 8 (AMS 558) receiver outputs

remote power amplifier



remote supply for AMS 522 by AMS 552 (15...20 V / 650 mA)



for connecting the cascadable multiswitches we recommend:



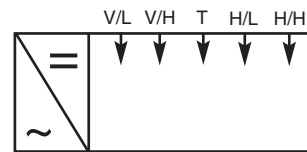
F-Quickplug FSS07Q
see page 169



System base unit

AMS 552

Input connector plan



Order number		360 520
Frequency ranges		
Terrestrial passive / active SAT-IF	[MHz]	5 - 862 / 47 - 862 950 - 2200
Gain		
Terrestrial passive / active SAT	[dB]	-4 / 22 19...23
Through loss		
Terrestrial passive	[dB]	-13...-18
Terrestrial active		+10...+5
SAT-IF		-5...+3
Maximum output level 60 dB / EN 50083-3		
47 - 862 MHz IMA ₃ / IMA ₂ CTB / CSO	[dBμV]	109 / 110 99 / 105
950 - 2200 MHz 35 dB IMA ₂ / IMA ₃ EN 50083-3	[dBμV]	110
Selection terrestrial ... SAT	[dB]	≥ 30 ... ≥ 35
Isolation trunk / trunk	[dB]	≥ 26
Noise figure terrestrial / SAT	[dB]	7 / 7,5...5
Max. current / output	[V][mA]	18 / 650
Single port / total current	[mA]	400 / 600
Power consumption		
Terr. active / passive / SAT active	[W]	36 / 32
Terr. active / passive / SAT standby		6 / 2,5
Common data		
Dimensions (W x H x D)	[mm]	220 x 153 x 38

Technical changes, changed design and errors excepted.



Extension modules		AMS 554	AMS 556	AMS 558
Input connector plan				
Order number		360 540	360 560	360 580
Receiver outputs		4	6	8
Through loss				
Terrestrial	[dB]	4	5	6
SAT-IF		1...2	2...4,5	2...4,5
Tap loss				
Terrestrial	[dB]	20	20...18	20...18
SAT-IF / SAT-IF		21...18	18...15	18...15
Common technical data				
Crosstalk attenuation	[dB]	26		
Frequency range				
Terrestrial	[MHz]	5 - 862 / 47 - 862		
SAT-IF		950 - 2200		
Isolation				
Trunk / Trunk	[dB]	30		
Receiver / Receiver		> 26		
Common data				
Current consumption per receiver	[mA]	40		
DC-through SAT 2...4 each	[A]	2		
Dimensions (W x H x D)	[mm]	140 x 90 x 38	140 x 153 x 38	140 x 153 x 38

Remote power amplifier AMS 522				
Order number		360 220		
Frequency ranges				
Terrestrial passive / active	[MHz]	5 - 862 / 47 - 862		
SAT-IF		950 - 2200		
Gain				
Terrestrial passive / active	[dB]	-4 / 22		
SAT		15...18		
Selection				
Terrestrial active / passive ... SAT	[dB]	≥ 20		
SAT / Terrestrial		≥ 30		
Isolation trunk / trunk	[dB]	≥ 26		
Maximum output level 60 dB / EN 50083-3				
Range	[MHz]	47 - 862		
IMA3 / IMA2	[dBμV]	109 / 110		
CTB / CSO		99 / 105		
Range	[MHz]	950 - 2200		
35 dB IMA2 / IMA3 EN 50083-3	[dBμV]	110		
Common data				
Noise figure Terrestrial / SAT	[dB]	7 / 7,5...5		
Dimensions (W x H x D)	[mm]	140 x 153 x 38		

Technical changes, changed design and errors excepted.

Application example

Stand-alone Multiswitches
 Cascadable Multiswitches
 9 Inputs (8 SAT polarizations + terrestrial)

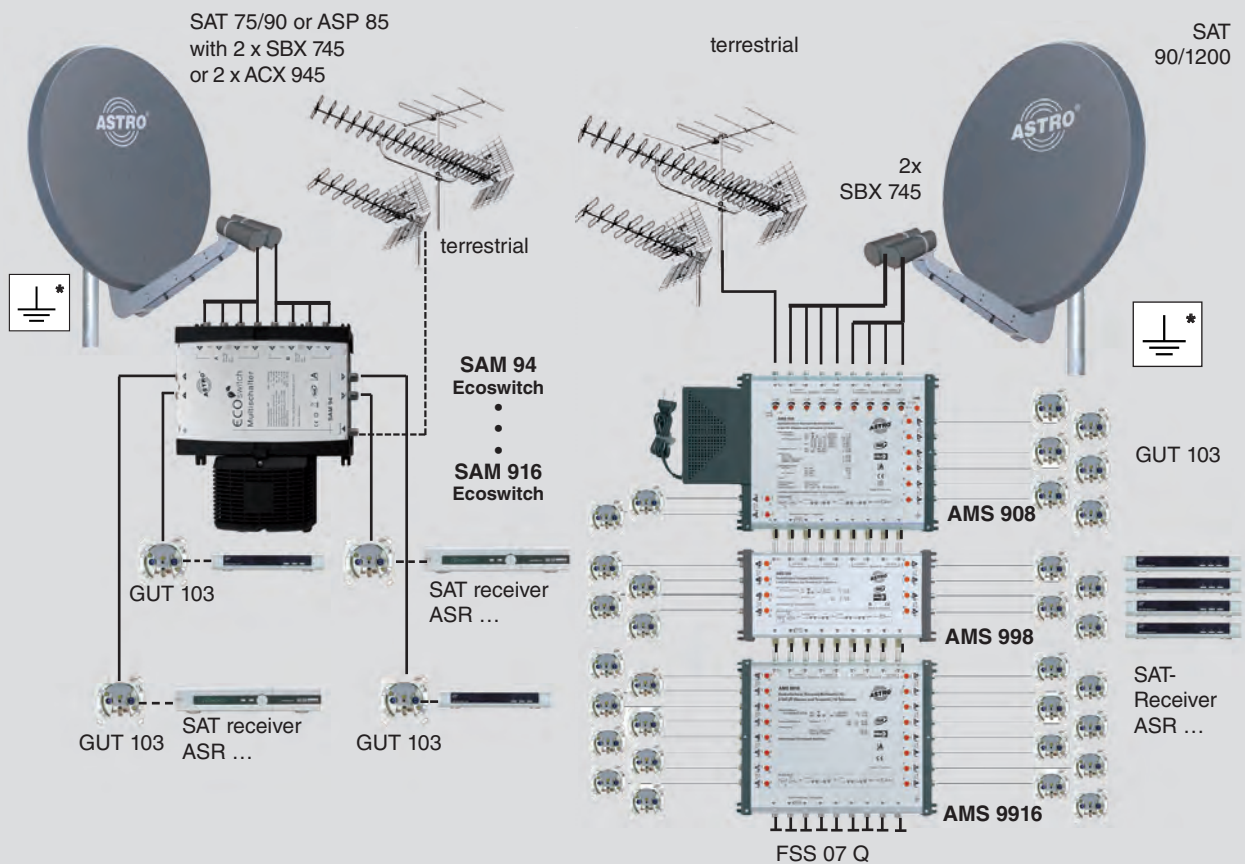


DiSEqC™ is a trademark of the European Telecommunications Satellite Organization (Eutelsat)

With SAT-IF distribution it is now possible to implement multiple-subscriber systems with more than 100 connections. In principle we differentiate between multiswitches in compact (stand-alone) assembly for usual cable lengths and cascadable systems which can be expanded to **IES**-Integrated distribution and receiving systems.

For multiswitches with 8 SAT inputs (8 SAT inputs, analogue and digital [h and v] for 2 satellite positions plus terrestrial) it was necessary to introduce the DiSEqC control technology. DiSEqC permits information to be exchanged digitally and bi-directionally via coaxial cables between the receivers and multiswitches by means of a digitally coded 22 kHz signal included in the supply voltage between the receiver and the LNB/multiswitch.

4-16 subscriber system with SAM 9... (stand-alone) subscriber system with AMS 9... (cascadable)




Wall outlets see page 144

SAM series: Stand-alone 9 inputs

Price-competitive compact multiswitches 8 SAT-inputs + terrestrial



- Energy-saving concept with stand-by function
- flame-retardant plastics
- low tap loss
- DiSEqC 2.0 (bi-directional communication between receiver and multiswitch)
- optionally available: SVP 20 overvoltage protection  see page 166

SAM 94 Ecoswitch



8 SAT inputs / 1 terrestrial input
and 4 receiver outputs
with integrated energy-saving power supply

SAM 96 Ecoswitch



8 SAT inputs / 1 terrestrial input
and 6 receiver outputs
with integrated energy-saving power supply

SAM 98 Ecoswitch



8 SAT inputs / 1 terrestrial input
and 8 receiver outputs
with integrated energy-saving power supply

SAM 912 Ecoswitch



8 SAT inputs / 1 terrestrial input
and 12 receiver outputs
with integrated energy-saving power supply

SAM 916 Ecoswitch



8 SAT inputs / 1 terrestrial input
and 16 receiver outputs
with integrated energy-saving power supply




Type		SAM 94 Ecoswitch	SAM 96 Ecoswitch	SAM 98 Ecoswitch	SAM 912 Ecoswitch	SAM 916 Ecoswitch
Input connector plan						
Order number		360 904	360 906	360 908	320 912	320 916
Receiver outputs		4	6	8	12	16
SAT range						
Frequency range	[MHz]	950 - 2150				
Gain	[dB]	0 ... 4				
Output level	[dBμV]	typ. 100, acc. EN 500083-3				
Input isolation SAT / SAT	[dB]	typ. 30				
Output isolation						
SAT / SAT	[dB]	typ. 40				
SAT / Terrestrial	[dB]	typ. 40				
Receiver / Receiver	[dB]	typ. 35				
Return loss						
Input LNB	[dB]	typ. 8				
Output	[dB]	typ. 10				
Terrestrial range						
Frequency range	[MHz]	5 - 862				
Tap loss	[dB]	19 ... 22	20 ... 23	21 ... 24	25 ... 27	26 ... 28
Maximum input level	[dBμV]	typ. 120, acc. EN 500083-2, limited by EMC				
Isolation						
Receiver / Receiver	[dB]	> 24				
Terrestrial / SAT	[dB]	> 35				
Return loss						
Input Terrestrial	[dB]	typ. 10				
Output	[dB]	typ. 10				
Power consumption						
All receivers off	[W / VA]	3,5 / 7,5				
1 LNB on	[W / VA]	10 / 12,5				
2 LNB on	[W / VA]	16 / 19				
LNB current	[mA]	each 300				
Common data						
Impedance	[Ω]	75				
Connectors		F-female				
LNB-supply voltage	[V]	15 (maximum LNB-current 600 mA)				
Maximum LNB-current	[mA]	600				
EMC		compliant with EN 500083-2				
Supply voltage	[V~/Hz]	230 / 50 ± 10 %				
Ambient temperature	[°C]	-15 ... +55				
Dimensions (W x H x D)	[mm]	217 x 214 x 57			289 x 214 x 57	

Technical changes, changed design and errors excepted.

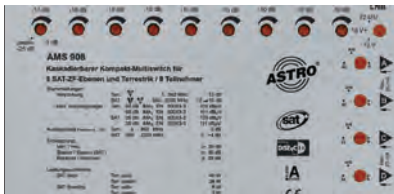
AMS series: Cascadable 9 inputs

High quality cascadable DiSEqC multiswitches 8 SAT-inputs + terrestrial



- Basic multiswitch usable as single switch for 8 subscribers, as amplifier or as cascade termination
- for cascading with AMS 998 / 9912 / 9916
- DVB-T-suitable, active terrestrial input with 15 dB attenuator
- attenuator (0...10 dB) for SAT-IF-inputs
- LNB supply voltage selectable 12V DC / 18 V DC / 22 kHz
- integrated energy-saving switching power supply
- optionally available: SVP 20 overvoltage protection  see page 166

system base unit AMS 9.. cascade



AMS 908 with integrated energy saving switching power supply, basic multiswitch usable as single switch for 8 subscribers, as amplifier or as cascade termination

extension modules AMS 9.. cascade



delivery with 8, 12 or 16 receiver outputs



for connecting the cascadable multiswitches we recommend:



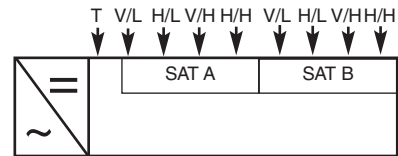
F-Quickplug FSS07Q
see page 169



System base unit

AMS 908

Input connector plan



Order number		360 901
Receiver outputs		8
Frequency range		
Terrestrial passive / active	[MHz]	5...862 / 47...862
SAT-IF	[MHz]	950...2200
Gain		
Terrestrial active	[dB]	15
SAT	[dB]	12...16
Selection		
Terrestrial active / SAT	[dB]	> 26
Terr. pass. / SAT / Terr. pass. / SAT	[dB]	> 30
SAT / Terrestrial	[dB]	> 32
Isolation		
Trunk / Trunk	[dB]	≥ 30
Receiver / Receiver	[dB]	≥ 28
Maximum output level 60 dB / EN 50083-3		
Range	[MHz]	47 - 862
IMA3	[dB]	105
IMA2	[dB]	101
CTB / CSO	[dB]	94 / 90
Range	[MHz]	950 - 2200
35 dB IMA3 / EN 50083-3	[dBμV]	109
35 dB IMA2 / EN 50083-3	[dBμV]	111
Noise figure		
Terrestrial / SAT	[dB]	< 7 / < 7
LNB remote current		
Total current	[mA]	800
Single port current	[mA]	400
Current consumption per receiver	[mA]	25
Power consumption		
Terrestrial active	[W]	40
Terrestrial passive	[W]	36
Stand-by / Terrestrial active	[W]	6
Stand-by / Terrestrial passive	[W]	3
Common data		
Dimensions (W x H x D)	[mm]	326 x 130 x 39

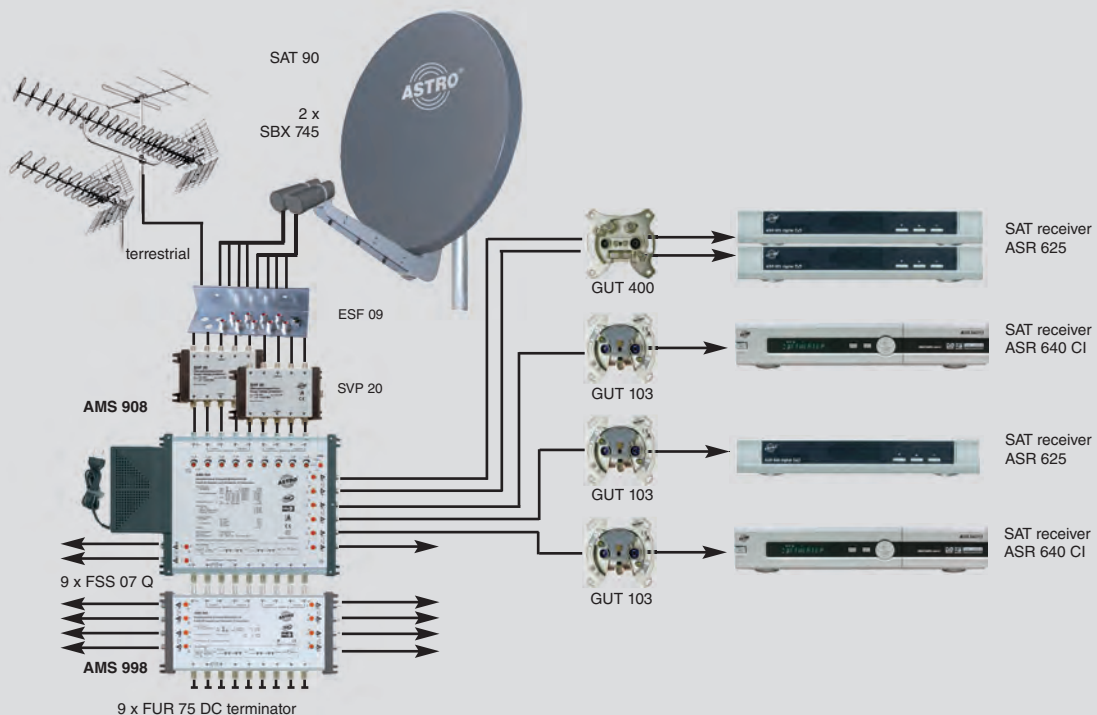
Technical changes, changed design and errors excepted.

Extension modules		AMS 998	AMS 9912	AMS 9916
Input connector plan				
Order number		360 911	360 931	360 921
Receiver outputs		8	12	16
Through loss				
Terrestrial	[dB]	3,5...4,5	3,5...5	3,5...5
SAT-IF	[dB]	2...4,5	4...8	4...8
Tap loss				
Terrestrial	[dB]	17...23	20...24	21...25
SAT-IF	[dB]	21...15	22...16	22...16
Frequency range				
Terrestrial	[MHz]		5 - 862	
SAT-IF	[MHz]		950...2200	
Crosstalk attenuation	[dB]		> 26	
Isolation				
Trunk / Trunk	[dB]	> 30	> 26	> 26
Receiver / Receiver	[dB]	> 30	> 26	> 26
Common data				
Current consumption per receiver	[mA]	max. 25	max. 25	max. 25
DC-pass (Trunk 0, 2...8)	[A]	max. 2	8,1	9,0
Dimensions (W x H x D)	[mm]	264 x 130 x 39	264 x 211 x 39	264 x 211 x 39

Technical changes, changed design and errors excepted.

Application example


AMS 9... cascade installation (2 satellites for 16 subscribers)



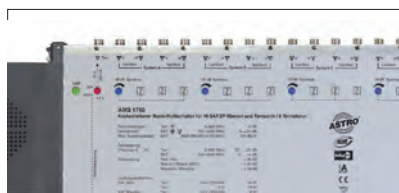
AMS series: Cascadable 17 inputs

High-class cascadable multiswitch, 16 SAT-inputs + terrestrial



- Basic multiswitch AMS 1788 usable as single switch for 8 subscribers, as amplifier or as cascade termination
- for cascading with AMS 1708 / 1712 / 1716
- DVB-T-suitable, active terrestrial input with 15 dB attenuator
- attenuator (0...10 dB) for SAT-IF-inputs
- LNB-supply selectable (12 V / 18 V / 22 kHz)
- integrated energy saving switching power supply
- optionally: SVP 20 overvoltage protection  see page 166

System base unit for AMS 17.. cascade



AMS 1788 with integrated energy saving switching power supply, basic multiswitch usable as single switch for 8 subscribers, as amplifier or as cascade termination

Extension modules for AMS 17.. cascade



available with 8, 12 or 16 receiver outputs



for connecting the cascadable multiswitches we recommend:



F-Quickplug FSS07Q
see page 169



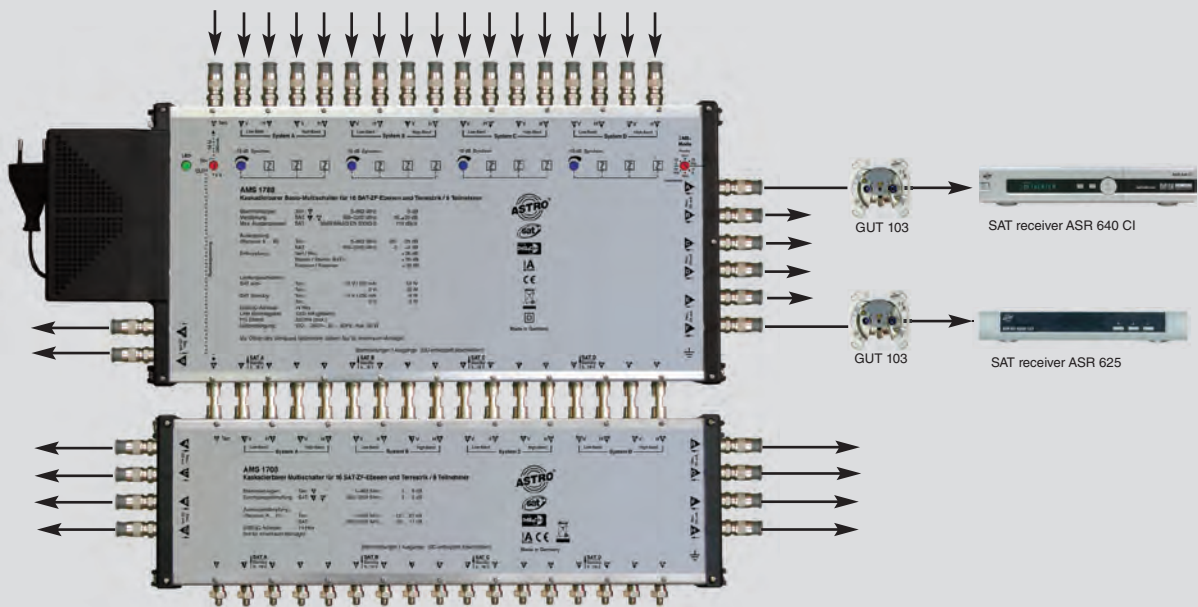
System base unit		AMS 1788
Input connector plan		
Order number		360 420
Receiver outputs		8
Frequency range		
Terrestrial passive / active	[MHz]	5...862 / 47...862
SAT-IF	[MHz]	950...2200
Gain		
Terrestrial active	[dB]	-5
SAT	[dB]	16...20
Selection		
Terrestrial active / SAT	[dB]	> 26
Terr. pass. / SAT / Terr. pass. / SAT	[dB]	> 30
SAT / Terrestrial	[dB]	> 32
Isolation		
Trunk / Trunk	[dB]	≥ 30
Receiver / Receiver	[dB]	≥ 28
Maximum output level 60 dB / EN 50083-3		
Range	[MHz]	47 - 862
IMA ₃	[dB]	105
IMA ₂	[dB]	101
CTB / CSO	[dB]	94 / 90
Range	[MHz]	950 - 2200
35 dB IMA ₃ / EN 50083-3	[dBμV]	110
35 dB IMA ₂ / EN 50083-3	[dBμV]	110
Noise figure		
SAT	[dB]	< 7
LNB remote current		
Total current	[mA]	1200
Single port current	[mA]	300
Current consumption per receiver	[mA]	25
Power consumption		
Terrestrial active	[W]	54 (Terrestrial 18 V / 250 mA)
Terrestrial passive	[W]	50
Stand-by / Terrestrial active	[W]	8 (Terrestrial 18 V / 250 mA)
Stand-by / Terrestrial passive	[W]	3
Common data		
Dimensions (W x H x D)	[mm]	326 x 130 x 39

Technical changes, changed design and errors excepted.

Extension modules		AMS 1708	AMS 1712	AMS 1716
Input connector plan				
Order number		360 440	360 460	360 480
Receiver outputs		8	12	16
Through loss				
Terrestrial	[dB]	5...6	3,5...5	3,5...5
SAT-IF	[dB]	2...4	4...8	4...8
Tap loss				
Terrestrial	[dB]	22...27	20...24	21...25
SAT-IF	[dB]	17...20	22...16	22...16
Frequency range				
Terrestrial	[MHz]		5 - 862	
SAT-IF	[MHz]		950...2200	
Crosstalk attenuation	[dB]		> 26	
Isolation				
Trunk / Trunk	[dB]		> 30	
Receiver / Receiver	[dB]		> 30	
Common data				
Current consumption per receiver	[mA]		max. 25	
Dimensions (W x H x D)	[mm]	426 x 132 x 39	426 x 211 x 39	426 x 211 x 39

Technical changes, changed design and errors excepted.

Installation advice



Installation advice:
The last module of a multiswitch-cascade must be terminated with terminating impedance.



FUR 75 DC terminator, see page 169



Head-end technology

Price-competitive SAT-processing

Z-series
Z 8 base unit with 8 slots
Plug-in cards of the Z-series

page 30



Universal compact SAT-processing

X-series
X-2, X-5, X-8 base units with 2 – 8 slots
Plug-in cards of the X-series

page 37



Professional SAT-processing

V-series
V 16 base units with 8 slots
Plug-in cards of the V-series
U-series
19-inch-versions of the professional SAT-processing and accessories

page 63



Head-end accessories

Combiners
Bus controllers
Programming software
V 16 accessories
Mounting accessories


page 86





Price-competitive SAT-processing

Price competitive SAT-processing, base unit

- 8 slots for different plug-in cards for conversion of digital TV programs from satellites and terrestrial signals
- by interconnection, a very extensive program offer can be converted
- configuration only via KC3 handheld programmer  see page 93
- Plug-in modules are secured by a locking device, which is integrated in the housing
- optionally available: SAT distribution ZSV
- operation only with Z series head-end modules

Type		Z-8 Basis
Order number		380 480
Voltage supply	[V~/Hz]	230 / 50
EMC		compliant EN 50083-2
Ambient temperature	[°C]	0 ... +50
Dimensions (W x H x D) with mounting brackets backside		340 x 491 x 290
Weight	[kg]	4,9
Power consumption	[VA] / [W]	maximum 95 / 80

Technical changes, changed design and errors excepted.

Z 61

DVB-S to PAL converter



- designed for procession of one digital satellite TV-program into one standard PAL-signal in the frequency range of 47 - 862 MHz
- Common Interface
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- level control for adjusting the modules on an equal output level
- operation only in Z-8 base unit

Type		Z 61
Order number		380 461
QPSK demodulator		
Input frequency range	[MHz]	950 - 2150
Input level	[dBμV]	40 - 80
SAT IF input	[Ω]	F-jack, 75
Return loss	[dB]	≥ 10
AFC-catch range		automatically adjustment
SAT IF bandwidth	[MHz]	36
Spectrum shape	[%]	35 cos-roll-off
Input data rate	[MBaud]	2 - 35, adjustable
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8, automatically / manually
Interfaces		Common Interface (CI)
RF modulator		
Connections	[Ω]	IEC jacks, 75
Output frequency	[MHz]	47 - 862
Output channels		C2 - C69
Output level	[dBμV]	90 - 100
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Spurious frequency distance	[dB]	typ. 60
TV standard		B, G (D/K on request)
Video-signal to noise ratio	[dB]	typ. 60
Common data		
Power consumption	[W]	9,0
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.



Z 62

DVB-S to PAL twin-converter



- designed for the processing of one digital satellite TV-program into two standard PAL-signals in the frequency range 47 - 862 MHz
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- level control for adjusting the modules on an equal output level
- operation only in Z-8 base unit

Type		Z 62
Order number		380 462
QPSK demodulator		
Input frequency range	[MHz]	950 - 2150
Input level	[dBμV]	40 - 80
SAT IF input	[Ω]	F jacks, 75
Return loss	[dB]	≥10
AFC-catch range		automatically adjustment
SAT IF bandwidth	[MHz]	36
Spectrum shape	[%]	35 cos-roll-off
Input data rate	[MBaud]	2 - 35, adjustable
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8, automatically / manually
Interfaces		—
RF modulator		
Connections	[Ω]	IEC jacks, 75
Output frequency	[MHz]	47 - 862
Output channels		C2 - C69
Output level	[dBμV]	90 - 100
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Spurious frequency distance	[dB]	typ. 60
TV standard		B, G (D/K on request)
Video-signal to noise ratio	[dB]	typ. 60
Common data		
Power consumption	[W]	9,0
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.

Z 71

DVB-T to PAL converter



- designed for the processing of a digital terrestrial TV-program into a standard PAL-signal in the frequency range 47 - 862 MHz
- Common Interface
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- level control for adjusting the modules on an equal output level
- operation only in Z-8 base unit

Type		Z 71
Order number		380 471
COFDM demodulator		
Input frequency range	[MHz]	47 - 862
Input level	[dBμV]	58 - 85
Input	[Ω]	IEC jack, 75
Return loss	[dB]	typ. 10
Level control	[dB]	35
Interfaces		Common Interface (CI)
RF modulator		
Connections	[Ω]	IEC jack, 75
Output frequency	[MHz]	47 - 862
Output channels		C2 - C69
Output level	[dBμV]	90 - 100
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Spurious frequency distance	[dB]	typ. 60
TV standard		B, G (D/K on request)
Video-signal to noise ratio	[dB]	typ. 60
Common data		
Power consumption	[W]	8,5
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.



Z 72

DVB-T to PAL twin-converter



- designed for the processing of a digital terrestrial TV-program into two standard PAL-signals in the frequency range 47 - 862 MHz
- Common Interface
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- level control for adjusting the modules on an equal output level
- operation only in Z-8 base unit

Type		Z 72
Order number		380 472
COFDM demodulator		
Input frequency range	[MHz]	47 - 862
Input level	[dB μ V]	58 - 85
Input	[Ω]	IEC jack, 75
Return loss	[dB]	typ. 10
Level control	[dB]	35
Interfaces		Common Interface (CI)
RF modulator		
Connections	[Ω]	IEC jack, 75
Output frequency	[MHz]	47 - 862
Output channels		C2 - C69
Output level	[dB μ V]	90 - 100
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Spurious frequency distance	[dB]	typ. 60
TV standard		B, G (D/K a.A.)
Video-signal to noise ratio	[dB]	typ. 60
Common data		
Power consumption	[W]	13
Ambient temperature	[$^{\circ}$ C]	0... +50

Technical changes, changed design and errors excepted.

Z 52

DVB-S to QAM twin-converter



- designed for procession and conversion of two QPSK modulated SAT-IF signals to QAM modulated adjacent channels in the frequency range 47 - 862 MHz
- The integrated stuffing unit creates a data rate adjustment in the output channel.
- The output channels can be switched on and off separately from one another.
- Each board has an electronic level control for level matching of the individual plug-in boards to the same output level.
- operation only in Z-8 base unit

Type		Z 52
Order number		380 452
QPSK demodulator		
Input frequency range	[MHz]	920 - 2150
Input level	[dBμV]	50 - 80
SAT IF input	[Ω]	F jack, 75
Spectrum shape	[%]	35 cos-roll-off
Input data rate	[MBaud]	10 - 30, adjustable
Viterbi-Decodierung		1/2; 2/3; 3/4; 5/6; 7/8, automatically / manually (according DVB standard))
QAM modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM (digitale Realisierung)
Signal processing		gemäß DVB-Standard
Spectrum shape	[%]	15 cos-roll-off
FEC		Reed-Solomon (204,188)-Code
Data rate adjust		✓
PCR correction		✓
Output symbol rate	[MBaud]	depends on input data rate
Bandwidth	[MHz]	depends on input data rate
Brutto data rate	[Mbits]	depends on input data rate
RF output		
Connections	[Ω]	IEC jack, 75
Frequency range	[MHz]	47 - 862 (C2 - C69) 1-MHz-steps adjustable
Output level	[dBμV]	80 ... 90, adjustable
MER (Equalizer, 64 QAM)	[dB]	≥ 40
Spurious frequency distance 40 - 862 MHz > 950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level
Common data		
Power consumption	[W]	9
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.



ZSV

SAT-distribution board for Z-8



- 1 x 1 in 7 splitter for distribution of SAT-IF signals
- Included in delivery: 2 splitters with mounting material and cable for wiring
- operation only in Z-8 base unit

Type	ZSV	
Order number		380 463
Input frequency range	[MHz]	950 - 2150
Minimum input level	[dBμV]	60
SAT IF inputs	[Ω]	F jacks, 75
Reflection loss	[dB]	≥ 10
Isolation of outputs	[dB]	> 25
Through loss	[dB]	13 ± 2
Remote control supply	[V]	12, each 250 mA

Technical changes, changed design and errors excepted.

Z-8

Complete units



Type	Z-8 DVB-S/PAL	Z-8 QPSK/QAM
Order number	380 500	380 498
Consisting of:		
Base unit Z 8	✓	✓
ZSV SAT-distribution board	2 x	2 x
Z... Twincards	8 x Z 62	8 x Z 52

Technical changes, changed design and errors excepted.

External programming unit KC 3 for Z-8



see page 93




Universal compact SAT-processing

The X-series is guaranteed future-proof thanks to a flexible modular concept. Its outstanding features are easy servicing and easy expansibility. A motherboard holds easily interchangeable plug-in modules allowing a mixed digital/analogue complement. The entire system is enclosed in a compact metal housing with 2, 5 or 8 plug-in slots.

The main field of application for the X-series are conversion or expansion of small to medium-sized community installations and design of new distribution networks.

Main features:

- for analogue, digital, twin and single plug-in cards
- suitable for adjacent channels to 862 MHz
- integrated input switching matrix and output combiner to simplify cabling
- low service and maintenance expenses
- fully compatible with cards of the X-series
- adjustment via the HE programming software (only X-5 / X-8 twin) or via programming unit KC 3

 see page 93 & 94



X-2 twin

Base unit with 2 slots



The X-2 twin system completes the ASTRO Head-end System with a compact housing with 2 slots for analogue and digital plug-in modules. The system is enclosed in a compact metal housing and offers an easy to maintain, convenient expansibility for your present TV-offering.

- 2 SAT-inputs, 2 external inputs, ready for 4 AV-inputs
- for analogue, digital, twin and single plug-in modules
- audio / video modulator plug-in cards pluggable (with X-A/V quad up to 8 channels)
- suitable for adjacent channels up to 862 MHz
- plug-in power supply included
- integrated output combiner to simplify cabling
- adjustment via KC 3 programming unit

 see page 93

Type		X-2 twin Basis
Order number		380 020
Voltage supply	[V~/Hz]	230 / 50
EMC		compliant EN 50083-2
Ambient temperature	[°C]	0 ... +50
Dimensions (W x H x D)	[mm]	240 x 115 x 235
Weight	[kg]	2,3
Power supply	[V]	12, 5 A, 60 W

Technical changes, changed design and errors excepted.

X-5 twin

Base unit with 5 slots



- Base unit with input splitter, power supply and motherboard
- ideal for supplement of existing CATV- or IF-distribution networks
- individual assembly and configuration
- adjustment via HE programming software or KC 3 programming unit



see page 93 & 94

Type		X-5 Basis			
Version		twin	twin/B	twin/AV	twin/BA
Order number		330 461	330 840	330 680	330 690
SAT inputs					
Switchable inputs		2			
External inputs		10			
Polarizations		up to 12			
AV-inputs		–	–	10	10
Busadapter BA 2		–	1	–	1
Common data					
Supply voltage	[V~/Hz]	230 / 50			
EMC		compliant EN 50083-2			
Ambient temperature	[°C]	0 ... +50			
Dimensions (W x H x D)	[mm]	218 x 360 x 277			
Weight	[kg]	3,6			
Power consumption	[VA] / [W]	maximum 95 / 80			

Technical changes, changed design and errors excepted.

X-5 twin

Complete units



Type	X-5 twin DVB-S/PAL	X-5 twin 3 digital
Order number	330 853	330 571
Consisting of:		
X-5 Basis twin	✓	✓
X-Plug-in cards	5 x X-DVB-S/PAL twin (10 channels)	5 x X-QAM twin 3 (10 transponders)

Technical changes, changed design and errors excepted.



X-8 twin

Base unit with 8 slots



- Base unit with input splitter, power supply and motherboard
- ideal for supplement of existing CATV- or IF-distribution networks
- individual assembly and configuration
- adjustment via HE programming software or KC 3 programming unit



see page 93 & 94

Type		X-8 Basis twin
Order number		380 010
SAT inputs		
Switchable inputs		—
External inputs		4
Polarizations		up to 8
AV-inputs (prepared)		up to 32
Busadapter		1
Common data		
Supply voltage	[V~/Hz]	230 / 50
EMC		compliant EN 50083-2
Ambient temperature	[°C]	0 ... +50
Dimensions (W x H x D) with mounting brackets backside	[mm]	340 x 426 x 277 (19" / 7 RU) 340 x 491 x 290
Weight	[kg]	6,8
Power consumption	[VA] / [W]	maximum 200 / 160

X-8 twin

Complete units



Type	X-8 twin DVB-S/PAL	X-8 twin DVB-S/PAL CI
Order number	380 013	380 011
Consisting of:		
X-8 Basis twin	✓	✓
X-Plug-in cards	8 x X-DVB-S/PAL twin (16 channels)	8 x X-DVB-S/PAL twin CI (16 channels)

Technical changes, changed design and errors excepted.

Plug-in cards for the X-series

By continuous advancement the approved head-end modules of the X-series have matured to a complete, rounded off concept for nearly every demand. The arrangement of the signal processing with the base units X-2 twin, X-5 twin and X-8 twin and the price-competitive digital twin-modules result in the systems high efficiency. Of course all modules of the X-series can be used in the V 16 base unit as well.

The plug-in cards of the X-series offer you approved technology and flexible mounting of the base units with plug-in modules. Digital (DVB-C / -S / -T) as well as analogue input signals can be processed and converted into cable-suitable DVB-C, PAL or FM signals.

The following head-end modules are available:

- terrestrial converters (DVB-T and analogue TV)
- DVB-S / PAL, DVB-T / PAL and DVB-C / PAL transcoders
- DVB-S / FM transcoders
- DVB-S(2) / QAM, DVB-T / QAM, DVB-C / QAM and DVB-S(2) / COFDM transmodulators
- A/V modulators and de-modulators
- terrestrial FM converters
- analogue SAT converters

The high-performance transmodulators are HDTV applicable and support all features required for processing cable signals according DVB-C standard. But also the transcoders for PAL and FM offer convincing features, of which operators as well as end-customers will benefit. Terrestrial converters, modulator-cards and analogue SAT-modules complement the X-series.

The very good price/performance ratio of the X-series makes it possible to use it even in small networks, but because of the good system parameters it can promptly be used in larger CATV-networks.

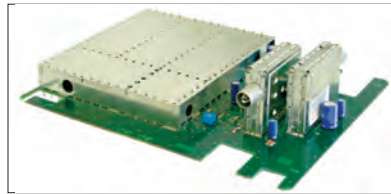


X-series plug-in modules – overview

Type	description	Usable in base unit		Catal. page
		X-5	X-8	
X-DTU	terrestrial converter (analogue or DVB-T)	✓	✓	43
X-DTU duo	terrestrial twin-converter (analogue or DVB-T), independent output channels	✓	✓	43
X-DVB-S/PAL CI	QPSK to PAL converter with CI	✓	✓	44
X-DVB-S/PAL duo	QPSK to PAL twin-converter, independent output channels	✓	✓	46
X-DVB-S/PAL duo CI	QPSK to PAL twin-converter with CI, independent output channels	✓	✓	46
X-DVB-S/PAL twin	QPSK to PAL twin-converter	✓	✓	44
X-DVB-S/PAL twin CI	QPSK to PAL twin-converter with CI		✓	44
X-DVB-S/Multinorm twin	QPSK to PAL, PAL B/G, PAL D/K NICAM, Direct Digital		✓	45
X-DVB-S/Multinorm twin CI	QPSK to PAL, PAL B/G, PAL D/K NICAM, Direct Digital, with CI		✓	45
X-DVB-T/PAL CI	COFDM (DVB-T) to PAL converter with CI	✓	✓	47
X-DVB-T/PAL twin	COFDM (DVB-T) to PAL twin-converter	✓	✓	47
X-DVB-T/PAL twin CI	COFDM (DVB-T) to PAL twin-converter with CI		✓	47
X-COFDM duo S2	DVB-S2 to COFDM (DVB-T) twin-converter, Direct Digital, independent output channels		✓	49
X-DVB-T/Multinorm twin	COFDM (DVB-T) to PAL, PAL B/G, PAL D/K NICAM twin-converter, Direct Digital		✓	48
X-DVB-T/Multinorm twin CI	COFDM (DVB-T) to PAL, PAL B/G, PAL D/K NICAM twin-converter, Direct Digital, with CI		✓	48
X-DVB-C/PAL CI	QAM to PAL converter with CI	✓	✓	50
X-DVB-C/PAL twin	QAM to PAL twin-converter	✓	✓	50
X-DVB-C/PAL twin CI	QAM to PAL twin-converter with CI		✓	50
X-DVB-C/Multinorm twin	QAM to PAL, PAL B/G, PAL D/K NICAM twin-converter, Direct Digital		✓	51
X-DVB-C/Multinorm twin CI	QAM to PAL, PAL B/G, PAL D/K NICAM twin-converter, Direct Digital, with CI		✓	51
X-860 twin analog S	SAT analogue twin-converter, video signal-to-noise-ratio 58 dB	✓	✓	52
X-A/V twin 860 S	A/V to PAL twin-modulator	✓	✓	53
X-A/V Multinorm twin	A/V to PAL twin-modulator, Direct Digital		✓	53
X-A/V quad	A/V to PAL quad-modulator		✓	53
X-Demod twin	PAL in A/V, Mono, twin-de-modulator	✓	✓	54
X-QAM twin 3	QPSK to QAM twin-converter, Direct Digital, MER typ. 40 dB	✓	✓	55
X-QAM twin 5	QPSK to QAM twin-converter, NIT-generating, Direct Digital, MER typ. 40 dB	✓	✓	55
X-QAM twin 6	QPSK to QAM twin-converter, data rate adaption, NIT/PID-processing, PID-remapping, PCR-correction, OP-ID, Direct Digital, MER typ. 45 dB	✓	✓	55
X-QAM 5 S2	DVB-S2 to QAM converter, Direct Digital, MER typ. 40 dB	✓	✓	56
X-QAM twin 5 S2	QPSK to QAM twin-converter, data rate adaption, NIT/PID-processing, PID-Remapping, PCR-Korrektur, Direct Digital, MER typ. 40 dB		✓	56
X-QAM twin 6 S2	DVB-S2 to QAM twin-converter, data rate adaption, NIT/PID-processing, PID-remapping, PCR-correction, Direct Digital, MER typ. 45 dB		✓	57
X-QAM duo 7 S2	DVB-S2 to QAM twin-converter, data rate adaption, NIT/PID-processing, servicefilter, OP-ID, PID-remapping, PCR-correction, Direct Digital, MER typ. 45 dB, independent output channels		✓	57
X-CQAM twin 6	QAM (DVB-C) in QAM twin-converter, data rate adaption, NIT/PID-processing, PID-remapping, PCR-correction, Direct Digital, MER typ. 45 dB	✓	✓	58
X-TQAM twin 6	COFDM (DVB-T) QAM twin-converter, data rate adaption, NIT/PID-processing, PID-remapping, PCR-correction, OP-ID, Direct Digital, MER typ. 45 dB	✓	✓	58
X-DVB-S/FM twin	QPSK to FM twin-transcoder with RDS, Direct Digital	✓	✓	59
X-DVB-S/FM octopus	QPSK to FM 8-time-transcoder with RDS, Direct Digital		✓	59
X-UKW twin	terrestrial FM to FM twin-converter	✓	✓	60
X-UKW Verstärker	terrestrial FM amplifier with 6 wave traps	✓	✓	61
X-FM twin S	audio to FM twin-modulator	✓	✓	62

X-DTU, X-DTU duo

digital / analogue terrestrial converters



- for conversion and input of terrestrial TV-programs in existing CATV- or SAT-IF distribution networks
- DVB-T → DVB-T or PAL → PAL possible
- automatic input level adjustment
- electronic level adjustment
- X-DTU duo offers 2 independent programmable output channels

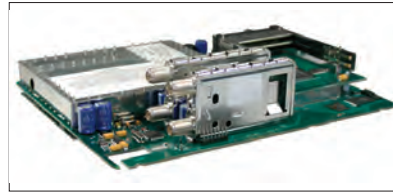
Type		X-DTU	X-DTU duo
Order number		330 598	330 597
Input			
Impedance	[Ω]	75	
Connections		IEC jacks	
Input frequency range	[MHz]	47 - 862	
Input level			
analogue / digital	[dBμV]	50 - 80 / 40 - 70	
Return loss	[dB]	typ. ≥10	typ. ≥ 8
TV standard		DVB-T	B/G, (D/K o.req.) / DVB-T 7/8 MHz
Control range for level control	[dB]	> 45	
Output (RF modulator)			
Output frequency	[MHz]	47 - 862 / C 2 - C 69	
Output level			
analog / digital	[dBμV]	90 - 100 / 80 - 90	90 - 100 / 85 - 95
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Common data			
Power consumption	[W]	7,5	11,5
Ambient temperature	[°C]	0 ... + 50	

Technical changes, changed design and errors excepted..



X-DVB-S/PAL, X-DVB-S/PAL twin

QPSK to PAL converters



- for processing of one or two digital SAT-TV-programs in one or two PAL-signals in the frequency range 47 - 862 MHz
- X-DVB-S/PAL twin: output channel A selectable, output channel B is automatically selected as the adjacent channel
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- electronic level adjustment (X-DVB-S/PAL CI manually)

Type		X-DVB-S/PAL CI	X-DVB-S/PAL twin	X-DVB-S/PAL twin CI
Order number		330 675	330 676	330 677
QPSK-Demodulator				
Input frequency range	[MHz]	950 - 2150		
Input level	[dBμV]	40 - 80		
SAT IF input	[Ω]	F jack, 75		
Return loss	[dB]	≥ 10		
AFC-catch range		automatic adjustment		
SAT IF bandwidth	[MHz]	36		
Spectrum shape cos-roll-off	[%]	35		
Input data rate	[mBaud]	2 – 35, adjustable		
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8 automatically / manually		
CI interfaces		✓	—	✓
RF modulator				
Connections	[Ω]	IEC jacks, 75		
Output frequency	[MHz]	47 - 862		
Output channels		C 2 - C 69		
Output level	[dBμV]	90 - 100		
Intermodulation distance	[dB]	typ. 60		
Return loss	[dB]	> 10		
Spurious frequency distance	[dB]	typ. 60		
TV standard		B, G (D/K on request)		
Video-signal to noise ratio	[dB]	typ. 60		
Common data				
Power consumption	[W]	9	13	16,5
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted

X-DVB-S Multinorm twin

QPSK to PAL twin-converter



- for processing of two digital SAT-TV-programs in two adjacent PAL-signals in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV standards
- electronic level adjustment

Type		X-DVB-S Multinorm twin	X-DVB-S Multinorm twin CI
Order number		330 667	330 666
QPSK demodulator			
Input frequency range	[MHz]	950 - 2150	
Input level	[dBμV]	40 - 80	
SAT IF input	[Ω]	F jack, 75	
Return loss	[dB]	≥ 10	
AFC-catch range		automatic adjustment	
SAT IF bandwidth	[MHz]	36	
Spectrum shape cos-roll-off	[%]	35	
Input data rate	[mBaud]	2 - 35, adjustable	
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8 automatically / manually	
CI interfaces		—	✓
RF modulator			
Connections	[Ω]	IEC jacks, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69)	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier, signal to noise ratio, weighted CCIR	[dB]	typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video-signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	12,5	14,5
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted



X-DVB-S/PAL duo

QPSK to PAL twin-converter



- for processing of two digital SAT-TV-programs in two independent PAL-output channels in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV standards
- electronic level adjustment

Type		X-DVB-S/PAL duo	X-DVB-S/PAL duo CI
Order number		330 686	330 687
QPSK demodulator			
Input frequency range	[MHz]	950 - 2150	
Input level	[dBμV]	40 - 80	
SAT IF input	[Ω]	F jack, 75	
Return loss	[dB]	≥ 10	
AFC-catch range		automatic adjustment	
SAT IF bandwidth	[MHz]	36	
Spectrum shape cos-roll-off	[%]	35	
Input data ratio	[mBaud]	2 - 35, adjustable	
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8 automatically / manually	
CI interfaces		—	✓
RF modulator			
Connections	[Ω]	IEC jacks, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69) independent adjustable	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier, signal to noise ratio, weighted CCIR	[dB]	typ. 58	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	14,5	16,5
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

X-DVB-T/PAL, X-DVB-T/PAL twin

COFDM to PAL converters



- for processing of one / two digital DVB-T TV-programs in one / two adjacent PAL-signals in the frequency range 47 - 862 MHz
- X-DVB-T/PAL twin (CI): output channel A selectable, output channel B automatically selected as the adjacent channel
- Data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- electronic level adjustment (X-DVB-T/PAL CI manually)

Type		X-DVB-T/PAL CI	X-DVB-T/PAL twin	X-DVB-T/PAL twin CI
Order number		330 590	330 594	330 597
COFDM demodulator				
Input frequency range	[MHz]	47 - 862		
Input level	[dBμV]	35 - 84		
Input	[Ω]	IEC jacks, 75		
Return loss	[dB]	typ. 8		
Level control	[dB]	65		
CI interfaces		✓	—	✓
RF modulator				
Connections	[Ω]	IEC jacks, 75		
Output frequency	[MHz]	47 - 862		
Output channels		C 2 - C 69		
Output level	[dBμV]	90 - 100		
Intermodulation distance	[dB]	typ. 60		
Return loss	[dB]	> 10		
Spurious frequency distance	[dB]	typ. 60		
TV standard		B, G (D/K on request)		
Video-signal to noise ratio	[dB]	typ. 60		
Common data				
Power consumption	[W]	7	14	16
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted.



X-DVB-T Multinorm twin

COFDM to PAL twin-converter



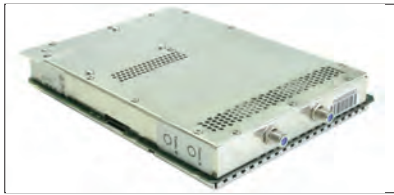
- for processing of two digital DVB-T TV-programs in two adjacent PAL-signals in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV standards
- electronic level adjustment

Type		X-DVB-T Multinorm twin	X-DVB-T Multinorm twin CI
Order number		330 599	330 600
COFDM-Demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	35 - 84	
Input	[Ω]	IEC jack, 75	
Return loss	[dB]	typ. 8	
Level control	[dB]	65	
CI interfaces		—	✓
RF modulator			
Connections	[Ω]	IEC jack, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69)	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier, signal to noise ratio, weighted CCIR	[dB]	typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	15	18
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

X-COFDM duo S2

DVB-S2 to COFDM (DVB-T) twin-converter



- for processing of DVB-S(2)-modulated SAT-IF-signals in two independent COFDM output channels
- selection of programs for transmodulation via pass- or drop-service filter

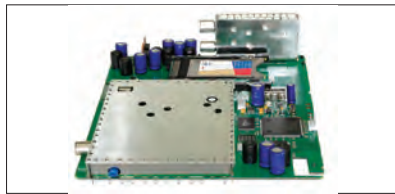
Type		X-COFDM duo S2
Order number		330 483
DVB-S(2) demodulator		
Input frequency range	[MHz]	950 - 2150
Input level	[dBμV]	50 - 80
SAT IF input	[Ω]	F jack, 75
Input symbol rate	[MS/s]	maximum 30,0
DVB-S viterbi		1/2; 2/3; 3/4; 5/6; 6/7; 7/8
DVB-S2 LDPC		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10
DVB-S2 roll-off-factors		0,20; 0,25; 0,35
DVB-S2 modulation		QPSK, 8PSK
COFDM modulator		
Signal processing		according DIN EN 300744
Transmission mode		2k (8k on request)
Modulation		QPSK; 16 QAM; 64 QAM
Bandwidth	[MHz]	7 or 8
Data rate adjust		✓
PCR correction		✓
PID filter		✓
Coding		1/2; 2/3; 3/4; 5/6; 6/7; 7/8
Guard-Intervals		1/4; 1/8; 1/16; 1/32
RF output		
Connections	[Ω]	IEC jack, 75
Frequency range	[MHz]	47 - 862
Output level	[dBμV]	80 ... 90
MER (Equalizer, 64 QAM)	[dB]	36
Spurious freq. distance 47 - 862 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences
Common data		
Power consumption	[W]	15
Ambient temperature	[°C]	0 ... +50

Technical changes, changed design and errors excepted.



X-DVB-C/PAL, X-DVB-C/PAL twin

QAM to PAL converters



- for processing of one / two digital DVB-C TV-programs in one / two PAL-signals in the frequency range 47 - 862 MHz
- X-DVB-C/PAL twin (CI): output channel A selectable, output channel B automatically selected as the adjacent channel
- data services like VPS or teletext can be switched on / off via software as well as the generation of test lines.
- electronic level adjustment (X-DVB-C/PAL CI manually)

Type		X-DVB-C/PAL CI	X-DVB-C/PAL twin	X-DVB-C/PAL twin CI
Order number		330 580	330 579	330 577
QAM demodulator				
Input frequency range	[MHz]	47 - 862		
Input level	[dBμV]	58 - 75	47 - 92	47 - 92
Input	[Ω]	IEC jacks, 75		
Return loss	[dB]	typ. 10		
Level control	[dB]	17		
CI interfaces		✓	—	✓
RF modulator				
Connections	[Ω]	IEC jacks, 75		
Output frequency	[MHz]	47 – 862		
Output channels		C 2 - C 69		
Output level	[dBμV]	90 - 100		
Intermodulation distance	[dB]	typ. 60		
Return loss	[dB]	> 10		
Spurious frequency distance	[dB]	typ. 60		
TV standard		B, G (D/K on request)		
Video signal to noise ratio	[dB]	typ. 60		
Common data				
Power consumption	[W]	9	14,6	15,5
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted.

X-DVB-C Multinorm twin

QAM to PAL twin-converter



- for processing of two digital DVB-C TV-programs in two adjacent PAL-signals in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV standards
- electronic level adjustment

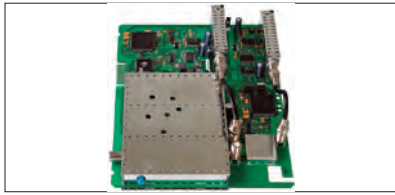
Type		X-DVB-C Multinorm twin	X-DVB-C Multinorm twin CI
Order number		330 646	330 647
QAM demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	58 - 75	
Input	[Ω]	IEC jacks, 75	
Return loss	[dB]	typ. 10	
Level control	[dB]	typ. 17	
CI interfaces		—	✓
RF modulator			
Connections	[Ω]	IEC jacks, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69)	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier, signal to noise ratio, weighted CCIR	[dB]	typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	14,5	16,5
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



X-860 twin analog S

SAT analogue PAL converter

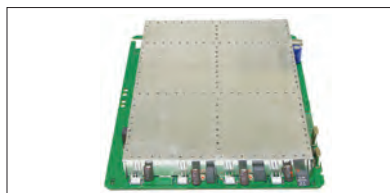
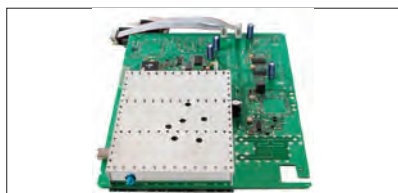


- for processing of two analogue TV-satellite-programs in standard TV-signals in the frequency range 47 - 862 MHz
- two optional SAT-channels into two VHF-/ UHF adjacent channels with equal channel spacing
- separated activation and deactivation of both output channels

Type		X-860 twin analog S
Order number		330 510
SAT IF		
Input frequency range	[MHz]	920 - 2150
Frequency tuning		1-MHz-steps adjustable
SAT IF input	[Ω]	F jack, 75
Input level	[dBμV]	47 - 80
Return loss	[dB]	typ. 10
AFC-catch range	[MHz]	± 8
IF-bandwidth	[MHz]	27
SAT video		
Video bandwidth	[MHz]	0,025 ... 4,8
Video polarity	[MHz]	negative, positive (on request)
Deemphasis		PAL
Videohub		automatic adjustment by level control
Video-signal to noise ratio	[dB]	typ. 58
Suppression blur of energy	[dB]	typ. 30
SAT audio		
Tone IF range	[MHz]	5,5 ... 9,0, adjustable
Frequency tuning		1-kHz-steps adjustable
Audio bandwidth	[kHz]	130 Wegener Panda comp. 280/500 kHz, 50μs, J17
RF modulator		
Output frequency	[MHz]	47 - 862 / C 2 - C 69
In steps of	[kHz]	100
Output level	[dBμV]	90 - 100, adjustable
Intermodulation distance	[dB]	> 60
Spurious frequency distance	[dB]	typ. 60 (on 40 - 862 MHz)
Group delay	[ns]	± 80
TV standard		B, G (D/K on request)
Return loss	[dB]	> 10
Common data		
Power consumption	[W]	13,5
Ambient temperature	[°C]	0 ... + 50

Technical changes, changed design and errors excepted.

X-A/V twin 860 S, X-A/V Multinorm twin, X-A/V quad Audio/Video to PAL modulators



- for modulation of audio / video signals in CATV- or SAT-IF distribution networks
- separated activation and deactivation of both output channels
- electronic level adjustment (X-A/V twin 860 S manually)
- X-A/V Multinorm twin: outstanding output parameters by Direct Digital technology
- X-A/V Multinorm twin: free configuration via software, support of all common TV standards

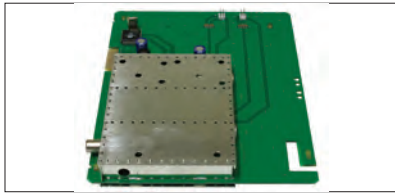
Type		X-A/V twin 860 S	X-A/V Multinorm twin	X-A/V quad
Order number		330 322	330 326	380 322
RF modulator				
Output frequency range	[MHz]	47 - 862		
Output channels		C 2 - C 69		
Output level	[dB μ V]	90 - 100		
Intermodulation distance	[dB]	typ. 60		
Return loss	[dB]	> 10		
Spurious frequency distance	[dB]	typ. 60		
TV standard		B, G (D/K on request)	PAL / SECAM B/G/D, Secam L, A2 / Nicam	B, G (D/K on request)
Video-signal to noise ratio	[dB]	typ. 58	typ. 60	typ. 60
Audio / Video				
Input		15-pin SUB-D-jack (per jack 2 A/V-input signals)		
Audio				
Input level	[V RMS]	0,5	0,5	0,5
Frequency range		40 Hz - 15 kHz		
Signal-to-noise ratio	[dB]	typ. 45		
Video				
Bandwidth		25 Hz - 4,8 MHz		
Input level		1 V _{ss} / 75 Ω		
Common data				
Power consumption	[W]	8	13	14,1
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted.



X-Demod twin

PAL to A/V demodulator



- for reception of two optional analogue RF-signals (47 - 862 MHz) and demodulation into A/V
- automatic input level adjustment

Type		X-Demod twin
Order number		330 323
RF demodulator		
Input frequency range	[MHz]	47 - 862
Input level	[dB μ V]	55 - 85
Input	[Ω]	IEC jack, 75
Return loss	[dB]	> 10
TV standard		B / G
Video-signal to noise ratio	[dB]	typ. 54
Audio-Video		
Output		15-pin SUB-D jack
Frequency range		40 Hz - 15 kHz
Output level	[VRMS]	0,5 / 10 k Ω
Video		
Output level		1 V _{ss} / 75 Ω
Common data		
Power consumption	[W]	2
Ambient temperature	[$^{\circ}$ C]	0 ... + 50

Technical changes, changed design and errors excepted.

X-QAM twin 3, X-QAM twin 5, X-QAM twin 6

QPSK to QAM twin-converters



- for processing of two QPSK-modulated SAT-IF-signals into two QAM-modulated adjacent channels in the frequency range of 47 - 862 MHz
- future-proof by integrated data rate adjustment, PCR-correction, PID-filter and NIT-generation (only X-QAM twin 5 & 6)

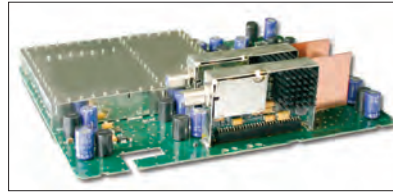
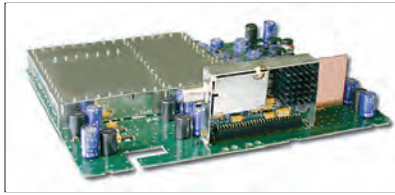
Type		X-QAM twin 3	X-QAM twin 5	X-QAM twin 6
Order number		330 581	330 584	380 585
QPSK demodulator				
Input frequency range	[MHz]	920 - 2150		
Input level	[dBμV]	50 - 80		
SAT IF input	[Ω]	F jack, 75		
Spectrum shape cos-roll-off	[%]	35		
Input data rate	[mBaud]	10,0 - 30,0	2,4 - 30,0	2,4 - 30,0
Viterbi decoding		1/2; 2/3; 3/4; 5/6; 7/8, automatically / manually (according DVB standard)		
QAM modulator				
Modulation		16-, 32-, 64-, 128-, 256-QAM (digital implementation)		
Shoulder attenuation	[dB]	typ. 50	typ. 50	typ. 58
Signal processing		according DVB-Standard		
Spectrum shape	[%]	15 cos-roll-off		
FEC		Reed-Solomon (204,188)-Code		
Data rate adjust			✓	
PCR correction			✓	
PID filter		—		✓
NIT handling		—		✓
Output symbol rate	[MBaud]	depends on input data rate	3,45 - 6,9	
Bandwidth	[MHz]	depends on input data rate	4 - 8, depending on symbol rate	
Brutto data rate	[MBit/s]	depends on input data rate	ca. 13,8 ... 55,2	
RF Output				
Connections	[Ω]	IEC jack, 75		
Frequency range	[MHz]	47 - 862 (C 2 - C 69)		
Output level	[dBμV]	80 ... 90, adjustable		
MER (Equalizer, 64 QAM)	[dB]	typ. 40	typ. 40	typ. 45
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level		
Common data				
Power consumption	[W]	9,5	9,5	10
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted.



X-QAM 5 S2, X-QAM twin 5 S2

DVB-S(2) to QAM converters



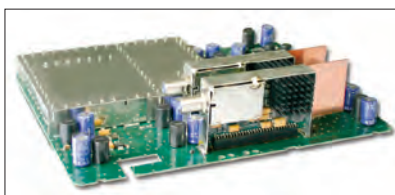
- for processing of one / two DVB-S(2)-modulated SAT-IF-signals into QAM-modulated adjacent channels in the frequency range of 47 - 862 MHz
- integrated data rate adjustment, PCR-correction, PID-filter and NIT-generation

Type		X-QAM 5 S2	X-QAM twin 5 S2
Order number		330 578	330 476
DVB-S(2) demodulator			
Input frequency range	[MHz]	950 - 2150	
Input level	[dBμV]	50 - 80	
SAT IF input	[Ω]	F jack, 75	
Input symbol rate	[MS/s]	maximum 30,0	
DVB-S viterbi		1/2; 2/3; 3/4; 5/6; 6/7; 7/8	
DVB-S2 LDPC		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10	
DVB-S2 roll-off-factors		0,20; 0,25; 0,35	
DVB-S2 modulation		QPSK, 8PSK	
QAM modulator			
Modulation		16-, 32-, 64-, 128-, 256-QAM	
Signal processing		according DVB standard	
Spectrum shape cos-roll-off	[%]	15	
FEC		Reed-Solomon (204,188)-Code	
Data rate adjust		✓	
PCR correction		✓	
NIT handling		✓	
PID filter		✓	
Output symbol rate	[MSym]	3,45 - 6,9	
Bandwidth	[MHz]	4 - 8 depending on symbol rate	
Brutto data rate	[MBit/s]	maximum 55,2	
RF output			
Connections	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 2 - C 69) 1-MHz-steps adjustable	
Output level	[dBμV]	80 ... 90, adjustable	
MER (Equalizer, 64 QAM)	[dB]	typ. 40	
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level	
Common data			
Power consumption	[W]	10	15,5
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

X-QAM twin 6 S2, X-QAM duo 7 S2

DVB-S(2) to QAM twin-converters with NIT-processing



- for processing of DVB-S(2)-modulated SAT-IF-signals into QAM-modulated adjacent channels (X-QAM duo 7 S2: independent adjustable output channels)
- integrated data rate adjustment, PCR-correction, PID-filter (X-QAM twin 6 S2: drop PID / X-QAM duo 7 S2: pass or drop service filter) and NIT-generation

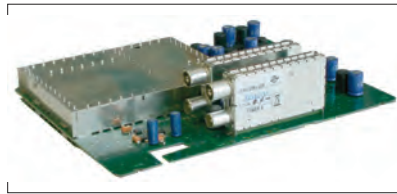
Type		X-QAM twin 6 S2	X-QAM duo 7 S2
Order number		330 478	330 479
DVB-S(2) demodulator			
Input frequency range	[MHz]	920 - 2150	
Input level	[dBμV]	50 - 80	
SAT IF input	[Ω]	F jack, 75	
Input symbol rate	[MS/s]	maximum 30,0	
DVB-S viterbi		1/2; 2/3; 3/4; 5/6; 6/7; 7/8	
DVB-S2 LDPC		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10	
DVB-S2 roll-off-factors		0,20; 0,25; 0,35	
DVB-S2 modulation		QPSK, 8PSK	
QAM modulator			
Modulation		16-, 32-, 64-, 128-, 256-QAM	
Signal processing		according DVB standard	
Spectrum shape cos-roll-off	[%]	15	
FEC		Reed-Solomon (204,188)-Code	
Data rate adjust		✓	
PCR correction		✓	
NIT handling		✓	
PID filter		Drop PID	Pass or Drop Service Filter
Output symbol rate	[MSym]	depends on input data rate, 3,45 - 6,9	
Bandwidth	[MHz]	depends on input data rate, 4 - 8	
Brutto data rate	[MBit/s]	maximum 55,2	
RF output			
Connections	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 2 - C 69) in 1-MHz-steps adjustable	
Output level	[dBμV]	80 ... 90, adjustable	
MER (Equalizer, 64 QAM)	[dB]	typ. 45	
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level	
Common data			
Power consumption	[W]	15,5	17,1
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



X-TQAM twin 6, X-CQAM twin 6

DVB-T / DVB-C to QAM twin-converters with NIT-processing



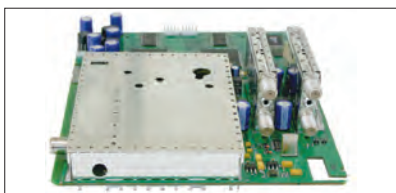
- for processing of two DVB-T / DVB-C input channels into two QAM adjacent channels
- outstanding output parameters by Direct Digital technology, integrated data rate adjustment, PCR-correction, PID-filter, NIT-generation

Type		X-TQAM twin 6	X-CQAM twin 6
Order number		330 700	330 701
Demodulator			
Demodulator type		COFDM	QAM
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	35 - 84	47 - 92
Input	[Ω]	IEC jack, 75	
Input symbol rate	[Mbaud]	—	0,5 - 7,0 adjustable
Channel bandwidth	[MHz]	6; 7; 8	—
Modulation types (according DVB standard)			QPSK, QAM16, QAM32, QAM64, QAM128, QAM256
AFC-catch range		—	automatically adjustment
Return loss	[dB]	typ. 8	
Level control	[dB]	—	typ. 45
QAM modulator			
Modulation		16-, 32-, 64-, 128-, 256-QAM	
Signal processing		according DVB standard	
Spectrum shape	[%]	15	
FEC		Reed-Solomon (204,188)-Code	
Data rate adjust		✓	
PCR correction / PID filtering		✓	
NIT handling		✓	
Output symbol rate	[MSym]	adjustable, 3,45 - 6,9	
Bandwidth	[MHz]	depends on input data rate, 4 - 8	
Brutto data rate	[Mbits]	maximum 55,2	
RF Output			
Connections	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 2 - C 69) in 1-MHz-steps adjustable	
Output level	[dBμV]	80 ... 90, adjustable	
MER (Equalizer, 64 QAM)	[dB]	typ. 45	
Shoulder attenuation	[dB]	typ. 58	
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level	
Common data			
Power consumption	[W]	9,5	10
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

X-DVB-S/FM twin

QPSK to FM converters



- for processing of digital SAT-radio-programs into standard FM-signals in the frequency range 87,5 - 108 MHz
- outstanding audio parameters (IMA, distortion factor, etc.) by Direct Digital technology

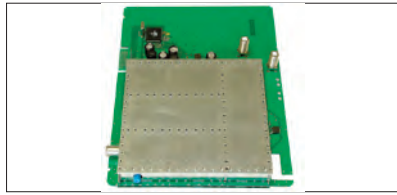
Type		X-DVB-S/FM twin	X-DVB-S/FM octopus
Order number		330 643	330 645
QPSK demodulator			
Input frequency range	[MHz]	950 - 2150	
Input level	[dBμV]	40 - 80	
SAT IF input	[Ω]	F jack, 75	
Return loss	[dB]	≥ 10	
SAT IF bandwidth	[MHz]	36	
Spectrum shape	[%]	35 (cos-roll-off)	
Input symbol rate	[mBaud]	2 - 35, adjustable	
AFC-catch range		automatically adjustment	
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8 automatically / manually	
FM modulatoren			
Output frequency Step by step selection	[MHz] [kHz]	87,5 - 108 MHz, 10	
RDS data Static Dynamic		PS 2 x 8 signs radiotext / PTY / PS	
Output level	[dBμV]	maximum 98	
Intermodulation distance	[dB]	> 70	
Return loss	[dB]	> 14	
Signal to noise ratio	[dB]	> 66	
Unweighted signal to noise ratio	[dB]	> 72	
Preemphasis	[μs]	50	
Stereo cross talk	[dB]	typ. 60	
Distortion factor	[%]	< 0,05	
Frequency response	[dB]	< 1	
Common data			
Power consumption	[W]	10	6,5
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



X-UKW twin

Terrestrial FM to FM twin-converter



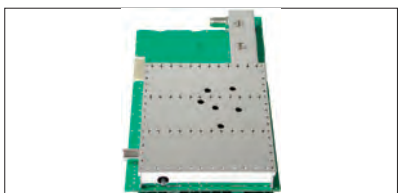
- for processing of two FM radio-programs into standard FM-signals in the frequency range 87,5 - 108 MHz
- input of terrestrial FM programs by shifting of the original
- processing of two independent stereo FM programs
- integrated shiftable input distributor for use of one input signal in both tuners

Type		X-UKW twin
Order number		330 740
FM input		
Impedance	[Ω]	75 / F jack
Frequency range	[MHz]	87.5 - 108
Step by step selection	[kHz]	10
Input level	[dB μ V]	40 - 80
Return loss	[dB]	typ. 10
IF		
IF range	[MHz]	10,7
IF bandwidth	[kHz]	typ. 250
FM output		
Impedance	[Ω]	75
Frequency range	[MHz]	87.5 - 108
Output level	[dB μ V]	maximum 98
Step by step selection	[kHz]	10
Distortion factor	[%]	< 1
Frequency response	[dB]	± 2
Cross-talk attenuation	[dB]	typ. 30
Return loss	[dB]	> 10
Common data		
Power consumption	[W]	12
Ambient temperature	[$^{\circ}$ C]	0 ... + 40

Technical changes, changed design and errors excepted.

X-UKW Verstärker

Terrestrial broadband FM amplifier



- for input of the terrestrial FM range into a channel processing
- overall level adjustment matches the complete FM range to the rest of the head-end
- 6 additional separately adjustable wave traps allow for attenuation of locally received FM programs

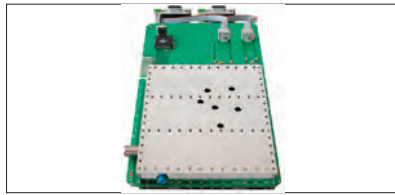
Type		X-UKW Verstärker	
Order number		330 661	
Input			
Frequency range	[MHz]	87,5 - 108	
Impedance	[Ω]	75	
Return loss	[dB]	> 10	
Output			
Frequency range	[MHz]	87,5 - 108	
Impedance	[Ω]	75	
Return loss	[dB]	> 10	
Output level	[dBμV]	maximum 100	
Level control	[dB]	20	
Gain	[dB]	typ. 45 ±1	
Noise figure	[dB]	typ. 6	
Filter selection	[dB]	> 30 @ ± 20 MHz, > 60 @ ± 40 MHz	
Blocking circuits for channel lowering			
Count		6	
Rejection	[dB]	typ. 12	
Adjustment range	[MHz]	80 - 120	
Common data			
Power consumption	[W]	3	
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



X-FM twin S

Audio in FM twin-converter



- for processing of audio-signals into standard FM signals in the frequency range of 87,5 - 108 MHz
- for use in head-ends, where - beyond TV and terrestrial radio programs – additional FM programs must be generated
- simultaneous processing of two independent audio signals into FM channels

Type		X-FM twin S
Order number		330 642
FM modulatoren		
Output frequency	[MHz]	87,5 - 108, steps 10 kHz
Output range	[dB μ V]	max. 98
Signal to noise ratio	[dB]	> 55
Unweighted signal-to-noise ratio	[dB]	> 60
Distortion factor	[%]	< 1
Cross-talk attenuation	[dB]	typ. 40
Frequency response	[dB]	< 1
Return loss	[dB]	> 10
Audio		
Input		15-pole SUB-D jack
Input range	[VRMS]	0,5 / 10 k Ω
Frequency range		40 Hz - 15 kHz
Common data		
Power consumption	[W]	3
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.



Professional SAT-processing

Distribution networks, that are built-up with the ASTRO V 16 system, are future-proof by their modular structure, because they are expandable, updateable and therefore adaptable to each reception situation at any time.

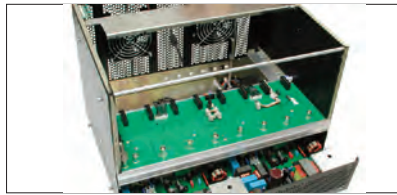
- 8 slots for connection of different plug-in cards
- fully downward-compatible to all modules of the proven X-series
- by interconnection a very extensive program offer can be converted
- optional satellite distribution field with six switchable inputs and 16 outputs
- optional delivery with redundant power supply possible
- power supply unit can easily be exchanged – without disassembling the plug-in modules
- power supply for up to four LNBS
- integrated temperature-controlled fans
- integrated bus adapter
- the entire head-end can be maintained and programmed remotely
- plug-in modules are secured by a locking device, which is integrated in the housing
- operation and error display for each plug-in module
- case cover is lockable (can be opened fast and easily without use of tools)
- 19-inch-cabinet and wall assembly
- due to the modular design up to 4 base units can be put into a standard 19-inch cabinet
- configuration via HE programming software (laptop)

 see page 94



V16 Base unit without plug-in cards

Base unit with power supply and mainboard



individual mounting with plug-in cards,
individually configurable

configuration via HE programming
software or via programming unit KC 3

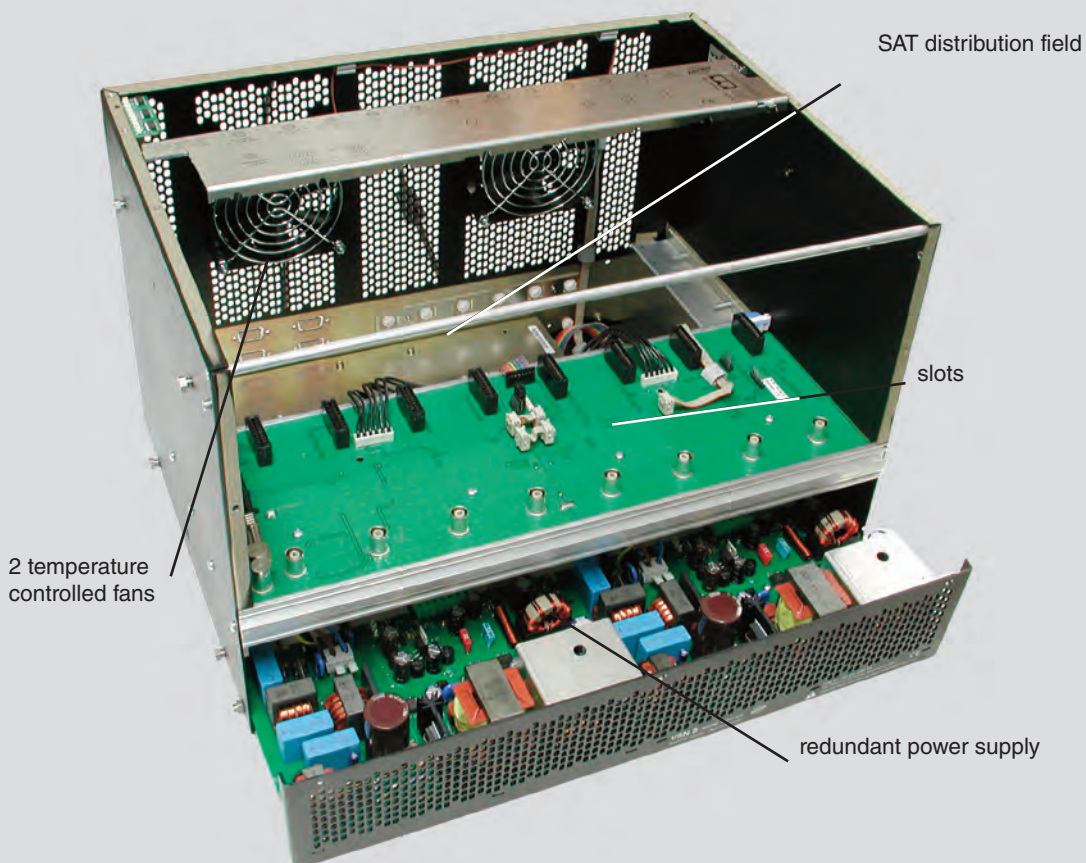
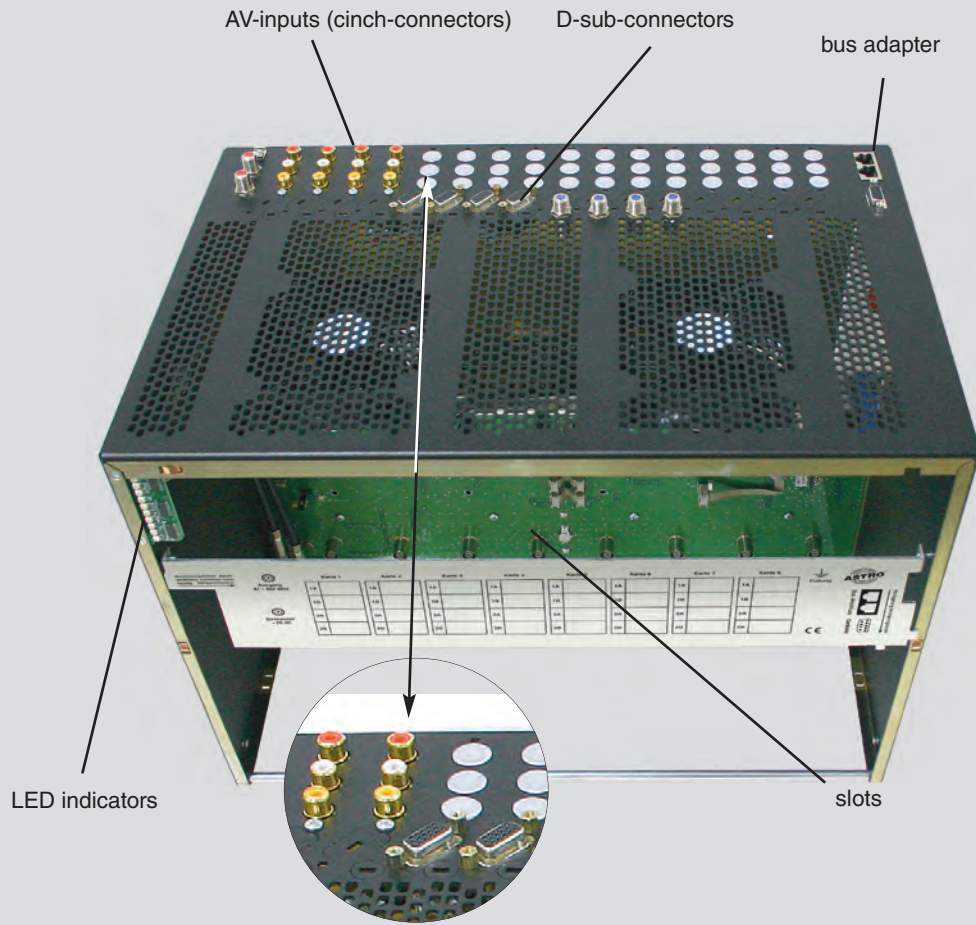


see page 93 & 94

Type base unit		V16.13	V16.1	V16.2	V16.23	V16.3	V16.4
Order number		380 070	380 077	380 071	380 076	380 080	380 090
Configuration components							
8 plug in slots		✓	✓	✓	✓	✓	✓
Bus adapter		✓	✓	✓	✓	✓	✓
2 temperature-controlled cooling fans		✓	✓	✓	✓	✓	✓
Power supply VSN 1		✓	✓	—	—	✓	—
Power supply VSN 2 (redundant)		—	—	✓	✓	—	✓
prepared for 16 AV- or 32 D-Sub inputs		✓	—	—	—	—	—
SAT-distribution board VMS 616		—	—	—	—	✓	✓
prepared for BNC connectors for applications with ASI-modules		—	—	—	✓	—	—
Common data							
Supply voltage	[V~/Hz]	230 / 50					
EMC		compliant EN 50083 T2 / A1					
Ambient temperature	[°C]	0 ... +50					
Dimensions (W x H x D) with mounting brackets frontside with mounting brackets backside	[mm]	340 x 426 x 277 (19" / 7 HE base) 340 x 491 x 277 340 x 491 x 290 + 3 HE for Air Flow units VAF					
Weight	[kg]	9,6					
Power consumption	[W]	maximal 200					

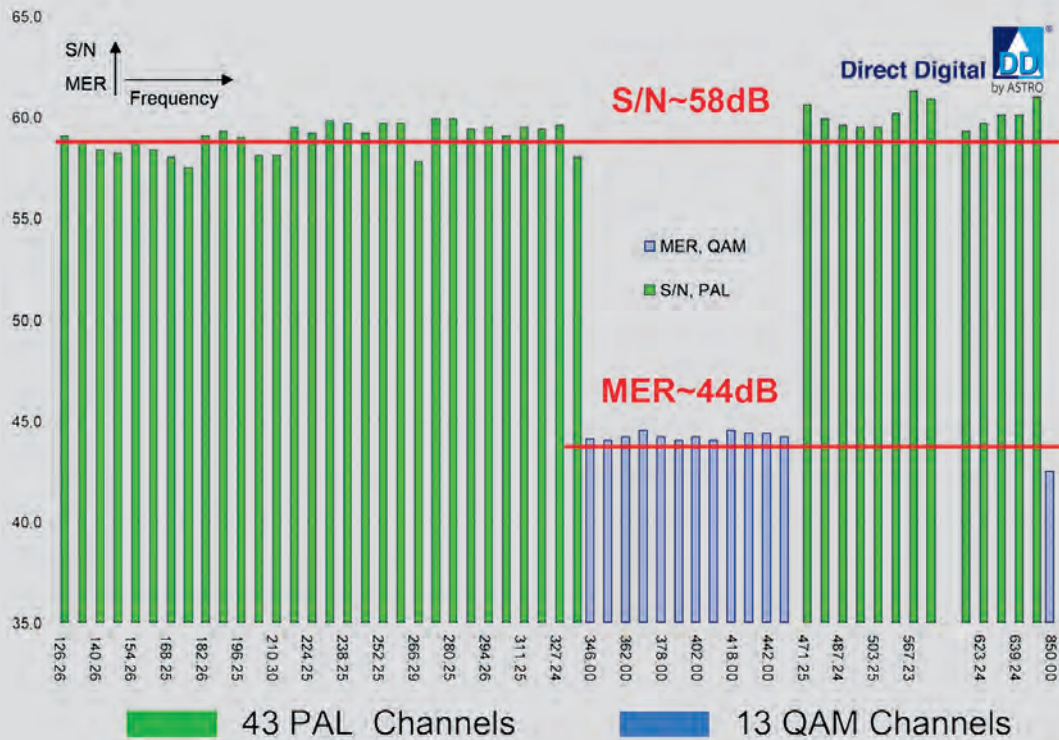
Technical changes, changed design and errors excepted.

V 16 configuration components



Plug-in cards of the V-series

The plug-in modules of the V-series were developed especially for professional channel processing in combination with the V 16 base unit. These modules feature excellent output parameters after the combining – thanks to the optional output channel filter – and are applicable in biggest networks. The impressive advantages of the V-series are displayed in the measurement protocol below.



Direct Digital by ASTRO

Using the Direct Digital technology, for the first time it is possible to reach system parameters, which seemed to be impossible in the head-end compact class. Besides a MER of more than 45 dB, offering additional system resources as well as high-end audio parameters, new benchmarks have been created regarding the flexibility of configuration.

Kanal	Bildtr. Freq. [MHz]	Programm	Bildtr. Pegel [dBuV]	TT 1 [dB]	TT 2 [dB]	Res. Carr [%]	C/L Delay [ns]	S/N Weight [dB]
K2	48,258	TM3	76,4	-12,5	-19,7	11,4	-13,1	59,5
K3	56,258	SUPERRTL	77,1	-12,3	-19,7	11,4	-4,1	59,3
K4	62,256	HESSEN 3	76,3	-12,6	-19,9	11,3	-17,7	59,3
S4	126,254	KIKA	76,9	-12,9	-20,4	11,4	-12,5	58,0
S5	133,256	ohne Info	76,2	-12,6	-20,0	11,4	4,2	58,4
S6	140,255	N-TV	75,4	-12,6	-19,9	11,3	-15,3	58,5
S7	147,255	KABELKAN	76,9	-12,6	-20,2	11,3	-2,7	59,7
S8	154,257	ohne Info	76,2	-12,9	-20,4	11,4	-22,8	59,3
S9	161,257	PRO 7	76,0	-12,4	-19,8	11,3	-1,1	59,6
S10	168,255	BR-3	75,8	-13,4	-20,8	11,3	-23,0	58,6
K5	175,255	ARD	75,2	-11,9	-19,3	11,3	5,4	58,3
K6	182,255	ZDF	75,5	-12,6	-20,0	11,4	-14,8	59,1
K7	189,256	SW3 BW	75,6	-12,5	-20,0	11,4	0,2	59,5
K8	196,252	RTL PLUS	75,2	-12,8	-20,1	11,3	-12,8	59,0
K9	203,252	SAT 1	75,5	-12,8	-20,4	11,3	-3,7	58,7
K10	210,257	ARTE	75,3	-12,7	-20,2	11,3	-23,3	59,8
K11	217,253	WDR-3	76,6	-12,3	-19,8	11,3	8,6	60,0

Kanal	Bildtr. Freq. [MHz]	Programm	Bildtr. Pegel [dBuV]	TT 1 [dB]	TT 2 [dB]	Res. Carr [%]	C/L Delay [ns]	S/N Weight [dB]
K12	224,254	ohne Info	75,4	-12,7	-20,0	11,3	-13,4	58,6
S11	231,254	DSF	75,9	-12,6	-20,2	11,3	2,5	59,9
S12	238,248	3SAT	75,2	-13,4	-20,7	11,4	-16,4	59,3
S13	245,248	ohne Info	74,9	-12,6	-20,1	11,4	-1,7	59,4
S14	252,25	RTL2	75,6	-13,1	-20,3	11,3	-19,9	59,8
S15	259,25	ohne Info	75,6	-12,4	-19,9	11,3	-4,7	59,5
S16	266,257	ohne Info	76,0	-12,3	-19,7	11,3	-8,0	59,0
S17	273,257	ohne Info	76,9	-13,3	-20,6	11,3	0,7	59,6
S18	280,25	VOX	75,3	-12,7	-20,1	11,3	-11,0	58,4
S19	287,25	HOT	75,3	-12,9	-20,4	11,4	-7,1	59,1
S20	294,251	ohne Info	74,3	-12,7	-20,2	11,4	-22,7	58,6
S21	303,251	ohne Info	75,0	-13,4	-20,9	11,3	-12,2	58,6
S22	311,252	ohne Info	74,4	-12,6	-20,3	11,3	11,6	58,9
S23	319,253	PHOENIX	74,2	-12,8	-20,3	11,3	10,1	58,9
S24	327,25	ohne Info	74,6	-12,9	-20,4	11,3	-16,1	58,2
S25	335,25	MDR-3	74,7	-12,6	-20,0	11,4	13,4	58,7
S35	415,249	ohne Info	74,8	-12,4	-19,7	11,3	-17,8	58,5

Measurement protocol of a DV-S/PAL channel processing – after combining – with V 612 and activated output channel filter

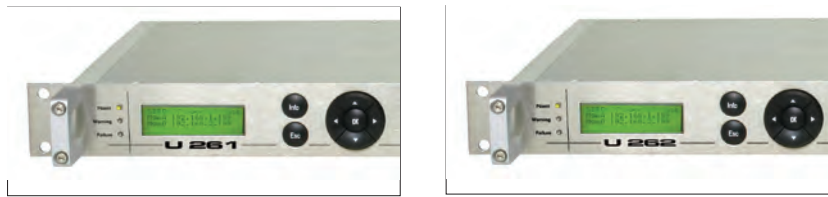
V 16-series plug-in cards - overview

Type	description	catalogue-page
V 112	A/V to PAL twin-converter with output channel filter option, Direct Digital	85
V 202	ASI to QAM twin-converter with output channel filter option, Direct Digital	70
V 212	ASI to PAL twin-converter with output channel filter option, Direct Digital	41
V 222	ASI to FM twin-converter, Direct Digital	72
V 228	ASI to FM 8-time-converter, Direct Digital	72
V 231	QAM to ASI converter, 2 x QAM routed in up to 6 ASI outputs, Direct Digital	73
V 241	COFDM to ASI converter, 2 x COFDM routed in up to 6 ASI outputs, Direct Digital	74
V 251	QPSK to ASI converter, 2 x QPSK routed in up to 6 ASI outputs, Direct Digital	75
V 252	DVB-S2 to ASI converter, 2 x Q(8)PSK routed in up to 6 ASI outputs, Direct Digital	75
V 311	terrestrial twin-converter with output channel filter option (also DVB-T in DVB-T), independent output channels	77
V 502	DVB-S2 to QAM twin-converter with output channel filter option, Direct Digital, operator-ID	78
V 503	COFDM to QAM twin-converter with output channel filter option, Direct Digital, operator-ID	79
V 504	QAM to QAM twin-converter with output channel filter option, Direct Digital, operator-ID	79
V 512	DVB-S2 to QAM twin-converter with output channel filter option, Direct Digital, operator-ID, pass-service-filter	78
V 532	Transport stream router 2 x DVB-S2 and 2 x ASI in QAM and 2 x ASI, Direct Digital	80
V 612	QPSK to PAL twin converter with output channel filter option, Direct Digital	81
V 712	COFDM to PAL twin converter with output channel filter option, Direct Digital	82
V 812	QAM to PAL twin converter with output channel filter option, Direct Digital	83
V 912	DVB-S2 to COFDM twin converter with output channel filter option, Direct Digital, independent output channels	84



U 261, U 262

IP/ASI-Gateway, ASI/IP-Gateway



- U 261: Processing of up to 16 multicast-groups of one Gigabit-Ethernet-Stream into up to 16 DVB ASI outputs (one reception & broadcast license included)
- U 262: Processing of up to 16 DVB ASI inputs into up to 16 multicast-groups of one Gigabit-Ethernet-Stream (one broadcast & reception license included)
- RTP & FEC implemented
- TS analyzer optionally available
- for installation of master and regional head-ends
- Postprocessing of output signals possible

Type		U 261	U 261 i	U 262	U 262 i
Order number		380 261	380 262	380 263	380 264
Transport stream interfaces					
DVB ASI		16			
Connectors		BNC-Female			
Bitrate	[Mbit/s]	213, maximum			
Network interfaces					
Interface type		1000 Base-T Ethernet			
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNMP, IGMP			
Connector		2 x RJ 45			
Total bit rate	[Mbit/s]	700, maximum			
Ethernet MTU length	[bytes]	1500, maximum			
Stream processing					
TS Encapsulation Stream processing		UDP, UDP+RTP, 1-7 packets, FEC transparent (188 or 204 packets)			
Control and management					
Type		10/100 Base-T Ethernet			
Features		Element control through HTTP/WEB			
Protocol		HTTP, SNMP (error messages)			
Connectors		2 x RJ 45			
Common data					
Input voltage	[VDC]	230 V	-48 V	230 V	-48 V
Power consumption	[W]	22	17	22	17
Dimensions		1 HE / 19"			
Ambient temperature	[°C]	0... +50			

Technical changes, changed design and errors excepted.

U 262 / U 262 – the video over IP – solution

The ASTRO video over IP gateways offer the possibility to distribute up to 16 MPEG-transport streams with audio & video data over an IP-backbone. The configuration of the gateways takes place user friendly via a webbrowser interface.

ASTRO TS over IP Gateway U261
Main Settings
 SW: Jan 21 2009 FW: 1.5 HW: 2, Up: 0d 00h 33m 39s, Time (UTC): Thu Jan 01 00:33:38 1970
 Location: Headend in Cablecity, Contact: John Doe, admin@example.com

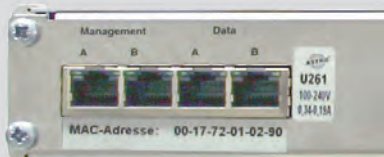
IP Interface Settings

Property	Management A (eth0)	Management B (eth1)	Data A (eth2)	Data B (eth3)
MAC	00:17:72:01:02:0c	00:17:72:01:02:0d	00:17:72:00:02:0c	00:17:72:00:02:0d
Active	<input checked="" type="radio"/> on <input type="radio"/> off	<input checked="" type="radio"/> on <input type="radio"/> off	<input checked="" type="radio"/> on <input type="radio"/> off	<input checked="" type="radio"/> on <input type="radio"/> off
Mode	10 Mbit/s, full duplex	10 Mbit/s, full duplex	1 Gbit/s, full duplex	1 Gbit/s, full duplex
Address	192 168 1 133	192 168 2 133	192 168 3 133	192 168 4 133
Subnet	255 255 255 0	255 255 255 0	255 255 255 0	255 255 255 0
Broadcast	192 168 1 255	192 168 2 255	192 168 3 255	192 168 4 255
Gateway	192 168 1 100	192 168 2 100	192 168 3 100	192 168 4 100

Note: Please use different IP address settings for each interface. Use 0.0.0.0 for unused or unknown gateway, DNS, SNMP or SNTP addresses.

Thanks to a licensing of the transport streams and further optional features (for example transport stream analyzer) the distribution of investment costs can be tailored to the market's needs. Forward Error Correction (FEC) according to ProMPEG CoP and encapsulation of Ethernet frames with RTP are already integrated.

The display on the front shows the management IP addresses of the device, which allows for fast access via webbrowser. Warnings that eventually must be indicated are displayed as well.



To achieve maximum reliability, the management as well as the data ports on the back of the device are implemented redundant.

The power supply of the IP gateways is implemented redundant as well. Optionally the devices are equipped with two 230 V power supplies or two -48 V power supplies.



U 261 TSL, U 262 TSL, TS-Analyzer

Licenses for complement of the U 261 / U 262 functionality

Type	Order number	Features
U 261 TSL	380 266	additional reception license for U 261 & U 261i
U 262 TSL	380 265	additional reception license for U 262 & U 262i
TS-Analyzer	380 267	License for clearing of the transport stream analyzer for checking of MPEG-TS on PID-level



V 202

ASI to QAM twin-converter



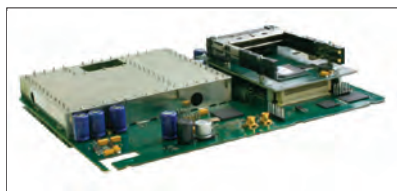
- for processing of two independent ASI input streams into two QAM adjacent channels in the frequency range of 47 - 862 MHz
- outstanding output parameters by Direct Digital technology: MER typ. 45 dB, shoulder attenuation typ. 58 dB


Type		V 202
Order number		380 202
ASI - Inputs		
Inputs		2 x DVB ASI
Connector	[Ω]	F-jack / BNC at the chassis, 75
Bitrate	[Mbit/s]	Burst 270 / constant 75
Transmission mode		Packet burst / continuous
Packet length		188, 204
Reed-Solomon Decoding		DVB at Packet length 204
QAM modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM
Signal processing		according DVB standard
Spectrum shape	[%]	15 (cos-roll-off)
FEC		Reed-Solomon (204,188)-Code
Data rate adjustment (stuffing unit)		✓
PCR correction		✓
PID filter		✓
NIT handling		✓
Output symbol rate	[Mbaud]	3,45 - 6,9
Bandwidth	[MHz]	4 - 8, dependent on symbol rate
Brutto data rate	[Mbits]	ca. 13,8 ... 55,2
RF output		
Connectors	[Ω]	IEC jack, 75
Frequency range	[MHz]	47 - 862 (C 02 - C 69) in 1 MHz-steps adjustable
Output level	[dBμV]	80 ... 90 adjustable
Shoulder attenuation	[dB]	typ. 58
MER (Equalizer, 64 QAM)	[dB]	typ. 45
Spurious frequency distance 40 - 862 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences
Common data		
Power consumption	[W]	7,6
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.

V 212

ASI to PAL twin-converter



- for processing of two TV-programs from two independent ASI-input streams into two PAL adjacent channels
- outstanding output parameters by Direct Digital technology: Video-S/N typ. 60 dB, residual carrier accuracy of 1 %
- adjustment of the output level electronically via HE programming software  see page 94

Type		V 212	V 212 CI
Order number		380 203	380 201
ASI - Inputs			
Inputs		2 x DVB ASI	
Connector	[Ω]	F-jack / BNC at the chassis, 75	
Bitrate	[Mbit/s]	Burst 270 / constant 75	
Transmission mode		Packet burst / continuous	
Packet length		188, 204	
Reed-Solomon Decoding		optional in 204	
CI interfaces		—	✓
RF modulator			
Connectors	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 02 - C 69)	
Output level	[dBμV]	90 ... 100 adjustable	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
Intercarrier, signal to noise ratio, weighted CCIR	[dB]	typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
TV standard		PAL/SECAM, B/G/D, SECAML, A2/NICAM	
Video-SNR	[dB]	typ. 60	
Common data			
Power consumption	[W]	11	12,8
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

V 222, V 228

ASI to FM twin-converter (V 222) / ASI in FM 8 x converter (V 228)



Direct Digital 
by ASTRO

- for processing of two / eight radio-programs of two independent ASI-input streams in two / eight radio (FM) programs in the frequency range of 87,5 - 108 MHz
- outstanding output parameters by Direct Digital technology: stereo cross talk attenuation > 60 dB, distortion factor < 0,05 %
- adjustment of the output level electronically via HE programming software

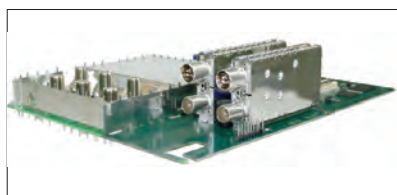
 see page 94

Type		V 222	V 228
Order number		380 204	380 209
ASI inputs			
Inputs		2 x DVB ASI	
Connector	[Ω]	F jack / BNC at the chassis, 75	
Bitrate	[Mbit/s]	Burst 270 / constant 75	
Transmission mode		Packet burst / continuous	
Packet length		188, 204	
Reed-Solomon decoding		optional in 204	
FM modulator			
Output frequency	[MHz]	87,5 - 108 MHz,	
Step-by-step selection	[kHz]	10	
RDS-data		PS 2x8 signs	
Static		radiotext / PTY / PS / CT	
Dynamic			
Output level	[dBμV]	max. 98	
Intermodulation distance	[dB]	> 70	
Return loss	[dB]	> 14	
Signal-to-noise ratio	[dB]	> 66	
Unweighted signal-to-noise ratio	[dB]	> 72	
Preemphasis	[μs]	50	
Stereo cross talk attenuation	[dB]	60	
Distortion factor	[%]	< 0,05	
Frequency range	[dB]	< 1	
Common data			
Power consumption	[W]	4,5	
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

V 231

QAM to ASI converters, 2 x QAM routed into 6 ASI-outputs



- for processing of two independent QAM input signals into ASI data streams
- routing on up to 6 outputs via software
- postprocessing of the streams with the ASTRO IP gateway U 262 or with any other ASI-transport stream compatible equipment (for example multiplexer)
- outstanding output parameters by Direct Digital technology

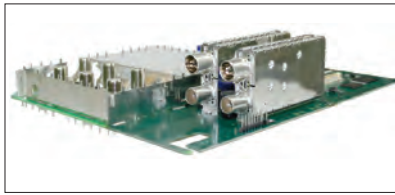
Type		V 231	V 231 CI
Order number		380 206	380 210
QAM demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	58 - 75	
SAT IF input	[Ω]	IEC jack, 75	
Return loss	[dB]	typ. 10	
Level range	[dB]	17	
CI interfaces		—	✓
ASI output			
Outputs		6 x DVB ASI	
Connectors	[Ω]	F jack / BNC at the chassis, 75	
Bitrate	[Mbit/s]	Burst 270 / constant 75	
Transmission mode	[dBμV]	Packet burst / continuous	
Packet length	[dB]	188, 204	
Reed-Solomon coding		DVB at packet length 204	
Common data			
Power consumption	[W]	5,5	7,3
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



V 241

COFDM to ASI converters, 2 x COFDM routed into 6 ASI-outputs



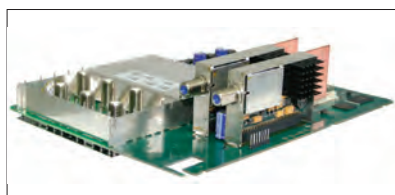
- for processing of two independent COFDM input signals into ASI data streams
- routing on up to 6 outputs via software
- postprocessing of the streams with the ASTRO IP gateway U 262 or with any other ASI-transport stream compatible equipment (for example multiplexer)
- outstanding output parameters by Direct Digital technology

Type		V 241	V 241 CI
Order number		380 208	380 211
COFDM demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	58 - 85	
Input	[Ω]	IEC jack, 75	
Return loss	[dB]	typ. 10	
Level range	[dB]	35	
CI interface		—	✓
ASI outputs			
Outputs		6 x DVB ASI	
Connectors	[Ω]	F jack / BNC at the chassis, 75	
Bitrate	[Mbit/s]	Burst 270 / constant 75	
Transmission mode	[dBμV]	Packet burst / continuous	
Packet length	[dB]	188, 204	
Reed-Solomon coding		DVB by Packet length 204	
Common data			
Power consumption	[W]	5,8	7,6
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

V 251, V 252

DVB-S (V 251) or DVB-S2 (V 252) to ASI



- for processing of two independent QPSK or 8PSK input signals into ASI data streams
- routing on up to 6 outputs via software
- postprocessing of the streams with the ASTRO IP gateway U 262 or with any other ASI-transport stream compatible equipment (for example multiplexer)
- outstanding output parameters by Direct Digital technology

Type		V 251	V 251 CI	V 252
Order number		380 205	380 207	380 217
Demodulator type		QPSK		DVB-S(2)
Input frequency range	[MHz]	950 - 2150		
Input level	[dBμV]	40 - 80		
SAT IF input	[Ω]	F jack, 75		
AFC range		adjusted automatically		
Input data rate	[MBaud]	2 - 35, adjusted		
Return loss	[dB]	≥ 10		
Input symbol rate	[MS/s]	maximum 30,0		max. 30,0 / 27,5@8PSK
DVB-S Viterbi		1/2, 2/3, 3/4, 5/6, 7/8, auto		—
DVB-S2 LDPC		—		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10
DVB-S2 roll-off-factors		—		0,20; 0,25; 0,35
DVB-S2 modulation		—		QPSK, 8PSK
Spectrum shape		0,35		0,20; 0,25; 0,35
CI interfaces		—	✓	—
ASI outputs				
Outputs		6 x DVB ASI		
Connectors	[Ω]	F jack / BNC at the chassis, 75		
Bitrate	[Mbit/s]	Burst 270 / constant 75		
Transmission mode	[dBμV]	Packet burst / continuous		
Packet length	[dB]	188, 204		
Reed-Solomon coding		DVB at Packet length 204		
Common data				
Power consumption	[W]	5,8	8,6	8,6
Ambient temperature	[°C]	0... +50		

Technical changes, changed design and errors excepted.



U 911 bis U 946

Active SAT-distribution fields, 19-inch rack-version



- for distribution of two SAT-inputs to 8 outputs at a time, or one SAT-input to 16 outputs
- attenuation and slope adjustable via HE programming software, completely remote maintenance, transmission of system-error indications

Type		U 911	U 912	U 913	U 914	U 915	U 916
Order number		380 192	380 212	380 213	380 214	380 215	380 216
Connectors	[Ω]	Inputs-outputs: F jack, 75					

Type		U 921	U 922	U 923	U 924	U 925	U 926
Order number		380 221	380 222	380 223	380 224	380 225	380 226
Connectors	[Ω]	Inputs-outputs: SMA-connectors, 50					

Type		U 931	U 932	U 933	U 934	U 935	U 936
Order number		380 231	380 232	380 233	380 234	380 235	380 236
Connectors	[Ω]	Inputs: SMA-connectors, 50 & outputs: F jack, 75					

Type		U 941	U 942	U 943	U 944	U 945	U 946
Order number		380 241	380 242	380 243	380 244	380 245	380 246
Connectors	[Ω]	Inputs: F jack, 75 & outputs: SMA-connectors, 50					

Common data							
Inputs-outputs		2 x 1 in 8			1 x 1 in 16		
Number power suppl. 230V / 28VA		2	1	0	2	1	0
Remote current	[mA]	350	350	1500*	350	350	1500*
LNB voltage	[V]	16	16	13 - 18*	16	16	13 - 18*
Input frequency range	[MHz]	950 - 2150					
Input level value	[dBμV]	85					
Through loss	[dB]	0 ± 2					
Isolation	[dB]	> 40					
Level control (0,5 dB steps)	[dB]	0... -15					
Equalizer	[dB]	0 / 7 ± 1					
Frequency range insertion loss at 36 MHz band width	[dBss]	< 1					
Nominal frequency range	[dBss]	< 2					
Return loss Inputs / outputs	[dB]	≥ 12 / ≥ 14					
Output isolation	[dB]	> 20					
Testpoints (1 per polarization)							
Value output isolation	[dB]	10					
Return loss	[dB]	12					

* max. 1,5 A, depending on power supply and internal securing

Technical changes, changed design and errors excepted.

V 311

Digital / analogue terrestrial TV twin-converter



- for processing and input of terrestrial TV-programs in CATV- or SAT-IF distribution networks
- both output channels freely selectable
- also DVB-T → DVB-T
- automatic input level adjustment
- electronic level adjustment
- outstanding output parameters by channel selective output filters (optional)

 see page 90

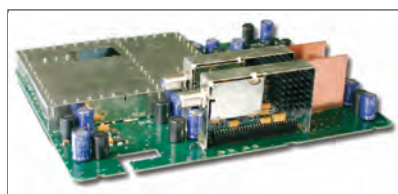
Type		V 311
Order number		380 311
Input		
Impedance	[Ω]	75
Connector		IEC jack
Input frequency range	[MHz]	47 - 862
Input level		
Analogue / digital	[dBμV]	50 - 80 / 40 - 70
Return loss	[dB]	typ. ≥ 8
TV standard		B/G, (D/K on request) / DVB-T 7/8 MHz
Control range for level control	[dB]	> 45
Output (RF modulators)		
Output frequency	[MHz]	47 - 862 / C 2 - C 69
Output level		
Analogue / digital	[dBμV]	90 - 100 / 85 - 95
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Common data		
Power consumption	[W]	11
Ambient temperature	[°C]	0 ... + 50

Technical changes, changed design and errors excepted.



V 502, V 512

DVB-S2 to QAM converter



- for processing DVB-S(2)-modulated SAT-IF-signals into QAM adjacent channels (V 512: independent output channels)
- outstanding output parameters by Direct Digital technology: MER typ. 45 dB
- integrated data rate adjustment, PCR-correction, PID-filter (V 502: drop PID / V 512: pass and drop service filter) and NIT-generation

Type		V 502	V 512
Order number		380 504	380 506
DVB-S(2) demodulator			
Input frequency range	[MHz]	920 - 2150	
Input level	[dBμV]	50 - 80	
SAT IF input	[Ω]	F-jack, 75	
Input symbol rate	[MS/s]	maximum 30,0	
DVB-S viterbi		1/2; 2/3; 3/4; 5/6; 6/7; 7/8	
DVB-S2 LDPC		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10	
DVB-S2 roll-off-factors		0,20; 0,25; 0,35	
DVB-S2 modulation		QPSK, 8PSK	
QAM modulator			
Modulation		16-, 32-, 64-, 128-, 256-QAM	
Signal processing		according DVB standard	
Spectrum shape cos-roll-off	[%]	15	
FEC		Reed-Solomon (204,188)-Code	
Data rate adjustment		✓	
PCR correction / NIT handling		✓	
PID filter		Drop PID	Pass or Drop Service Filter
Output symbol rate	[MSym]	depends on input data rate, 3,45 - 6,9	
Bandwidth	[MHz]	depends on input data rate, 4 - 8	
Brutto data rate	[MBit/s]	maximum 55,2	
RF output			
Connectors	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 2 - C 69) in 1-MHz-steps adjustable	
Output level	[dBμV]	80 ... 90, adjustable	
MER (Equalizer, 64 QAM)	[dB]	typ. 45	
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level	
Common data			
Power consumption	[W]	15,5	13,1
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

V 503, V 504

DVB-T DVB-C to QAM twin-converter



- for processing of two DVB-T / DVB-C input channels into two QAM adjacent channels
- outstanding output parameters by Direct Digital technology, integrated data rate adjustment, PCR-correction, PID-filter, NIT-generation

Type		V 503	V 504
Order number		380 507	330 508
Demodulator			
Demodulator type		COFDM	QAM
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	35 - 84	47 - 92
Input	[Ω]	IEC jack, 75	
Input data rate	[Mbaud]	—	0,5 - 7, adjustable
Channel bandwidth	[MHz]	6; 7; 8	—
Modulation types (according DVB standard)		—	QPSK, QAM16, QAM32, QAM64, QAM128, QAM256
AFC-catch range		—	adjusted automatically
Return loss	[dB]	typ. 8	
Level control	[dB]	—	typ. 45
QAM modulator			
Modulation		16-, 32-, 64-, 128-, 256-QAM	
Signal processing		according DVB standard	
Spectrum shape	[%]	15	
FEC		Reed-Solomon (204,188)-Code	
Data rate adjustment		✓	
PCR correction / PID filter		✓	
NIT handling		✓	
Output symbol rate	[MSym]	adjustable, 3,45 - 6,9	
Bandwidth	[MHz]	depends on input data rate, 4 - 8	
Brutto data rate	[Mbits]	maximum 55,2	
RF output			
Connectors	[Ω]	IEC jack, 75	
Frequency range	[MHz]	47 - 862 (C 2 - C 69) in 1-MHz-steps adjustable	
Output level	[dBμV]	80 ... 90, adjustable	
MER (Equalizer, 64 QAM)	[dB]	typ. 45	
Shoulder attenuation	[dB]	typ. 58	
Spurious freq. distance 40 - 862 MHz >950 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences > 20 relating to 100 dBμV system level and 90 dBμV operating level	
Common data			
Power consumption	[W]	10	9
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



V 532

Transport stream router



- for processing of two independent DVB-S(2) and two ASI-inputs into two independent & DVB-standard QAM-output channels and two ASI-outputs
- EPG of the whole QAM-network by exchange and multiplexing of the EIT possible

Type		V 532
Order number		380 505
QPSK demodulator		
Input frequency range	[MHz]	950 - 2150
Input level	[dBμV]	40 - 80
SAT IF input	[Ω]	F jack, 75
Return loss	[dB]	≥ 10
AFC-catch range		adjusted automatically
SAT IF bandwidth	[MHz]	36
Spectrum shape	[%]	35 (cos-roll-off)
Input data rate	[Mbaud]	2 - 35, adjustable
Viterbi decoding acc. DVB		1/2, 2/3, 3/4, 5/6, 7/8, auto
ASI input		
Inputs		2 x DVB ASI
Connector	[Ω]	BNC at the chassis, 75
Bitrate	[Mbit/s]	Burst 270 / constant 75
Transmission mode		Packet burst / continuous
Packet length		188, 204
Reed-Solomon decoding		DVB at Packet length 204
QAM modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM
Signal processing		according DVB standard
Spectrum shape	[%]	15 (cos-roll-off)
FEC		Reed-Solomon (204,188)-Code
Data rate adjust		✓
PCR correction / PID filtering		✓
NIT handling		✓
Output symbol rate	[Mbaud]	3,45 - 6,9
Bandwidth	[MHz]	4 - 8, depends on input data rate
Brutto data rate	[Mbits]	app. 13,8 ... 55,2
RF output		
Connectors	[Ω]	IEC jack , 75
Frequency range	[MHz]	47 - 862 (C 02 - C 69)
Output level	[dBμV]	80 ... 90 adjustable
Shoulder attenuation	[dB]	typ. 58
MER (Equalizer, 64 QAM)	[dB]	typ. 45
Spurious freq. distance 40 - 862 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences
Common data		
Power consumption	[W]	14,5

Technical changes, changed design and errors excepted.

V 612

QPSK to PAL twin-converter



- for processing of two digital SAT-TV-programs into two standard PAL adjacent channels in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV-standards
- outstanding signal quality by channel selective output filters (optional)

Type		V 612	V 612 CI
Order number		380 603	380 613
QPSK demodulator			
Input frequency range	[MHz]	950 - 2150	
Input level	[dBμV]	40 - 80	
SAT IF input	[Ω]	F jack, 75	
Return loss	[dB]	≥ 10	
AFC-catch range		adjusted automatically	
SAT IF bandwidth	[MHz]	36	
Spectrum shape cos-roll-off	[%]	35	
Input data rate	[mBaud]	2 - 35, adjustable	
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8 automatically / manually	
CI interfaces		—	✓
RF modulator			
Connectors	[Ω]	IEC jack, 75	
Output frequency	[MHz]	47 - 862 (C 02 - C 69)	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier signal to noise ratio, weighted CCIR	[dB]	typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video-signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	11,5	13,3
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



V 712

COFDM to PAL twin-converter



DVB-T
TERRESTRIAL

Direct Digital **DD**
by ASTRO

- for processing of two digital terrestrial TV-programs into two standard PAL adjacent channels in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV-standards
- outstanding signal quality by channel selective output filters (optional)
- electronic level adjustment

Type		V 712	V 712 CI
Order number		380 714	380 713
COFDM demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dB μ V]	35 - 84	
Input	[Ω]	IEC jack, 75	
Return loss	[dB]	typ. 8	
Level range	[dB]	65	
CI interfaces		—	✓
RF modulator			
Connectors	[Ω]	IEC jack, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69)	
Output level	[dB μ V]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier signal to noise ratio, weighted CCIR		typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video-signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	13,5	14,3
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.

V 812

QAM to PAL twin-converter



- for processing of two digital DVB-C TV-programs into two standard PAL adjacent channels in the frequency range 47 - 862 MHz
- Direct Digital technology
- free configuration via software, support of all common TV-standards
- outstanding signal quality by channel selective output filters (optional)
- electronic level adjustment

Type		V 812	V 812 CI
Order number		380 813	380 814
QPSK demodulator			
Input frequency range	[MHz]	47 - 862	
Input level	[dBμV]	47 - 92	
SAT IF input	[Ω]	F jack, 75	
Return loss	[dB]	≥ 8	
AFC-catch range		adjusted automatically	
Level range	[dB]	typ. 45	
Input data rate	[mBaud]	0,5 - 7, adjustable	
CI interfaces		—	✓
RF modulator			
Connectors	[Ω]	IEC jack, 75	
Output frequency	[MHz]	47 - 862 (C 2 - C 69)	
Output level	[dBμV]	90 - 100	
Intermodulation distance	[dB]	typ. 60	
Return loss	[dB]	> 10	
Spurious frequency distance	[dB]	typ. 60	
TV standard		PAL/SECAM, B/G/D, SECAM L, A2/NICAM	
Intercarrier signal to noise ratio, weighted CCIR		typ. 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
Video-signal to noise ratio	[dB]	typ. 60	
Common data			
Power consumption	[W]	13	14,8
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



V 912

DVB-S2 to COFDM twin-converter



DVB S2
SATELLITE

Direct Digital **DD**
by ASTRO

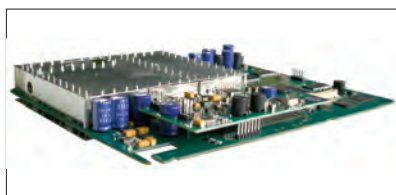
- for processing of DVB-S(2)-modulated SAT-IF-signals into two independent COFDM output channels
- selection of programs for transmutation via pass- or drop-service filter

Type		V 912
Order number		380 922
DVB-S(2) demodulator		
Input frequency range	[MHz]	950 - 2150
Input level	[dBμV]	50 - 80
SAT IF input	[Ω]	F jack, 75
Input symbol rate	[MS/s]	maximum 30,0
DVB-S Viterbi		1/2; 2/3; 3/4; 5/6; 6/7; 7/8
DVB-S2 LDPC		1/4; 1/3; 2/5; 1/2; 3/5; 2/3; 3/4; 4/5; 5/6; 8/9; 9/10
DVB-S2 roll-off-factors		0,20; 0,25; 0,35
DVB-S2 modulation		QPSK, 8PSK
COFDM modulator		
Signal processing		according DIN EN 300744
Transmission mode		2k (8k on request)
Modulation mode		QPSK; 16 QAM; 64 QAM
Bandwidth	[MHz]	7 oder 8
Data rate adjustment		✓
PCR correction		✓
PID filter		✓
Coding rate		1/2; 2/3; 3/4; 5/6; 6/7; 7/8
Guard-Intervals		1/4; 1/8; 1/16; 1/32
RF output		
Connectors	[Ω]	IEC jack, 75
Frequency range	[MHz]	47 - 862
Output level	[dBμV]	80 ... 90
MER (Equalizer, 64 QAM)	[dB]	36
Spurious freq. distance 47 - 862 MHz	[dB]	> 60 discrete interferences / > 57 noise interferences
Common data		
Power consumption	[W]	15
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.

V 112

Audio / Video to PAL twin-modulator



Direct Digital 
by ASTRO

- for processing of two analogue audio / video signals into two standard PAL adjacent channels in the frequency range 47 - 862 MHz
- outstanding output parameters by Direct Digital technology
- free configuration via software, support of all common TV-standards
- outstanding signal quality by channel selective output filters (optional)

Type		V 112
Order number		380 321
RF modulator		
Output frequency range	[MHz]	47 - 862
Output channels		C 2 - C 69
Output level	[dB μ V]	90 - 100
Intermodulation distance	[dB]	typ. 60
Return loss	[dB]	> 10
Spurious frequency distance	[dB]	typ. 60
TV standard		PAL / SECAM B/G/D, Secam L, A2 / Nicam
Video-signal to noise ratio	[dB]	typ. 60
Audio / Video		
Input		15-pin SUB-D- jack (per jack 2 A/V-input signals)
Audio		
Input level	[V RMS]	0,5 / 600 Ω
Frequency range	[Hz]	40 - 15000
Signal to noise ratio	[dB]	typ. 45
Video		
Bandwidth		25 Hz - 4,8 MHz
Input level	[V _{ss}]	1 / 75 Ω
Common data		
Power consumption	[W]	11,5
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.



Head-end accessories


The versatile accessories for the ASTRO head-end offers the integration of base units and processing modules as well as the professional mounting of these components. Further more a range of different components for the management of the head-end are available. The following accessories are provided:

- material for active and passive distribution and combining
- hard- and software for management
- mounting cabinets and accessories
- jumper- and adapter-cables
- channel selective input and output filters
- power supplies for V16 base units

U 901, VZN 8

Active combining network, 19-inch rack & trims installation version



- for extremely low-noise and low-distortion combining of up to 8 base units
- gain matching can be effected individually either for each input or all inputs by means of fixed attenuation pads
-  Pads, short see page 113
- preemphasis adjustable
- testpoint (-20 dB, directional coupler) for measuring purposes
- U 901 and VZN 8 can receive the operating voltage either directly via the RF inputs (remote feeding via V16) or via an external power supply

Type		U 901	VZN 8
Order number		380 190	380 191
Impedance	[Ω]	75	
Frequency range	[MHz]	47 - 862	
Attenuation distortion	[dB]	≤ 1, full range ≤ 0,2 (8 MHz channel)	
Gain	[dB]	0 - 7, pluggable in 0,5 steps by attenuation pads (short)	
Preemphasis	[dB]	0 - 15	
Intermodulation distance EN 50083-3 @ 81 dBpW (100 dBμV)	[dB]	3.0. ≥ 92	
	[dB]	2.0. ≥ 79	
Reflection loss In-outputs	[dB]	≥ 16	
Isolation inputs	[dB]	typ. ≥ 20, min 18	
Testpoint	[dB]	-20 ± 1 directional coupler	
Remote powering	[V~]	12 - 19 via output 1 and 8 or external connector	
Power consumption	[W]	12	
Ambient temperature	[°C]	0... +50	

Technical changes, changed design and errors excepted.



U 960

Passive interconnection network, 19-inch rack version



- for distribution of input signals in the frequency range 5 - 1000 MHz
- individual mounting subject to customer request

Type		U 960
Order number		380 195
Impedance	[Ω]	75
Frequency range	[MHz]	5 - 1000
Screening	[dB]	> 100
Connectors	[dB]	F jacks
can be assembled with:		
2-way splitter		
Through loss	[dB]	3,8 ± 0,5
Isolation	[dB]	> 24
Return loss	[dB]	> 21
3-way splitter		
Through loss	[dB]	6,5 ± 0,5
Isolation	[dB]	> 24
Return loss	[dB]	> 22
4-way splitter		
Through loss	[dB]	7,5 ± 0,5
Isolation	[dB]	> 23
Return loss	[dB]	> 23
8-way splitter		
Through loss	[dB]	11,2 ± 0,5
Isolation	[dB]	> 29
Return loss	[dB]	> 21
Common data		
Ambient temperature	[°C]	0... +50

Technical changes, changed design and errors excepted.

U 953, X-BC 4

Head-end management system, 19-inch rack & trims installation version



- time-controlled update
- transmission of SNMP traps
- permanent testing of HE operating parameters
- automatic programming of exchanged head-end modules
- programming of up to 10 time-shared channels
- 2 programmable alarm contacts for the connection of alarm detectors (fire detector, water detector...)
- also available as U 953 19-inch version with redundant power supply 2 x 230 V AC or 2 x -48 V DC
- configuration via HE programming software and webbrowser



see page 94

Type		U 953	U 953 i	X-BC 4
Order number		380 405	380 406	380 404
Power supply	[V]	2 x 230 AC	2 x -48 DC	12 DC
Power consumption	[A]		0,19 - 0,34	
Ambient temperature	[°C]		0... +45	

Technical changes, changed design and errors excepted.



X-BC 2, X-BC 3

Bus controllers



- for common programming of all bus-compatible head-end units via PC, remote access to the head-end via modem
- remote programming via GSM-modem, alarm indication via SMS (alarm message at up to 3 call numbers)
- 10 time-shared RF-channels definable (per each time-shared RF-channel 6 switching events possible)
- X-BC 3: multifunctional NIT-processing (creation of the cable-NIT out of any PID or dynamic NIT generation of the cable-NIT including Service List Descriptors)
- operation only via HE programming software

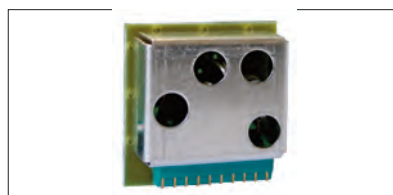
See page 94

Type		X-BC 2	X-BC 3
Order number		330 400	330 403
Power supply	[DC]	6 V via plug-in power supply (230V~/50Hz)	
Power consumption	[mA]	35	
Ambient temperature	[°C]	0 ... +50	

Technical changes, changed design and errors excepted.

X-KF, V-KF

Channel selective input and output filters



- for compliance of European specifications (EN 50 083-2) the channel selective input filter X-KF is required
- the V-KF... is used for maintaining the outstanding output parameters even after interconnection

Type	X-KFV K...	X-KFU K...	X-KFBI K...
Order number	340 030	340 040	340 050
Channel range in MHz	5 ... 12	21 ... 68	2 ... 4

Please order with input channel

Type	V-KF ...
Order number	380 ...
Channel range in MHz	111 ... 862

Please order with output channel and V-Card type

VMS 616

SAT-distribution field with 6 switchable inputs and 16 outputs



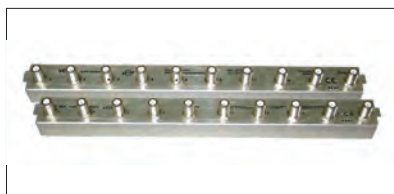
Type		VMS 616
Order number		380 260
Input frequency range	[MHz]	950 - 2150
Inputs / outputs		6 / 16
Optimal input level	[dBμV]	72 - 78
Through loss	[dB]	12
Isolation input / input	[dB]	25
Remote supply powering	[mA]	4 outputs, each 12 V, 250
Current consumption @ 5V	[mA]	80
Ambient temperature	[°C]	0 ... +50

Technical changes, changed design and errors excepted.

VSF 8, VSF 42

SAT-distribution field 1 x 1 in 8 and 1 loop-through output (VSF 8)

SAT-distribution field 2 x 1 in 4 and 2 loop-through outputs (VSF 42)



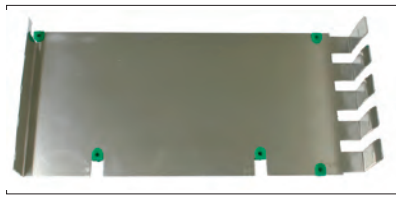
Type		VSF 8	VSF 42
Order number		380 280	380 281
Input frequency range	[MHz]	950 - 2150	
Optimal input level	[dBμV]	68 - 74	
Ripple	[dB]	> 1	
Tilt	[dB]	2 ± 1	
Reflection loss Input / output	[dB]	> 10	
Isolation of outputs	[dB]	> 30	
Through loss Loop-through output Output 1 - 8	[dB]	0 ± 1 8 ± 1	
Input / output	[Ω]	75, F jack	
Current consumption @ 5V	[mA]	80	
Ambient temperature	[°C]	0 ... +50	

Technical changes, changed design and errors excepted.



VH 5

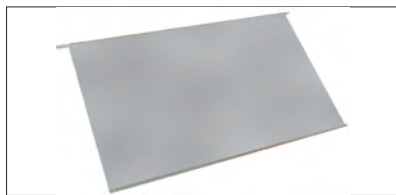
Adapter plate for mounting of up to 5 x VSF



Type	VH 5
Order number	380 250

VAF

Air flow unit for optimum heat leading when mounting the V 16 into 19-inch racks



Type	VAF
Order number	380 980
	3 RU afforded

VSN 1, VSN 2

V 16 single power supply (VSN 1)

V 16 twin power supply (VSN 2), redundant



Type		VSN 1	VSN 2
Order number		350 210	350 220
Nominal voltage	[V~]	230, (+6 / -10%) 50 / 60 Hz	
Power consumption	[VA] [W]	196 / 190	208 / 200
Output lines		5 V / 13,5 A, 12 V / 6,5 A, 28 V / 200 mA	
Fuse		T 1,25 A "L", IEC60127-2/3	
Ambient temperature	[°C]	0 ... +50	

Technical changes, changed design and errors excepted.

KC 3

External programming unit*



- easy and intuitive operation
- practical, attractive design, illuminated display and large keyboard
- protection against unauthorized programming by easy removal of the control unit
- display of operating parameters in a 4-line, 16-character LC display

* not for transmodulator modules with NIT-processing and digital FM-converters

Type		KC 3
Order number		330 350

VCP 15-2

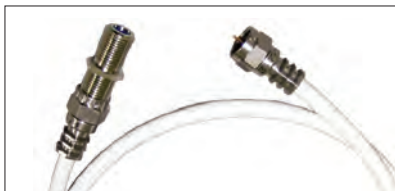
Adapter cable for connection to X... AV-modules and V 112



Type		VCP-15-2
Order number		350 151
Length	[mm]	1400
Connectors		15-pin Sub-D-plug & Cinch / RCA

XF-450, XF-700

Internal jumper cable



Type		XF-450	XF-700
Order number		790 450	790 700
Length	[mm]	450	700
Screening	[dB]	90	
Connectors	[Ω]	75, F connector	

Technical changes, changed design and errors excepted.



HE programming software

clearly arranged programming of X-5, X-8, V16 head-end systems via PC or Laptop



All head-end parameters can be edited - in the office – via PC or Laptop before initial operation and saved for programming on location.

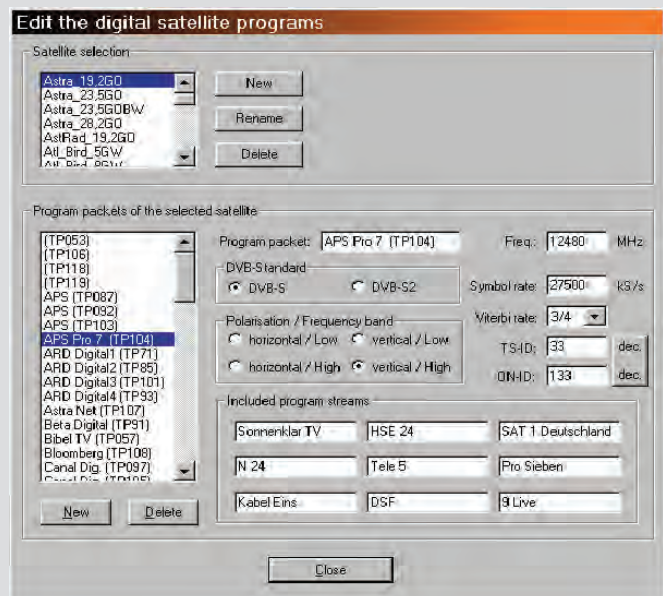
Adjustable head-end parameters:

- received satellite / SAT-programs / output channel
- video- and audio parameters of analogue output channels
- symbol rate and modulation mode for digital output channels
- input frequencies for terrestrial converters and output frequencies

Type		HE Programming software	
Order number		330 360	

Configuration

With the HE programming software, up to 20 bus-compatible X-5 / X-8 / V16 base units can be saved in a configuration file. From the menu item “Display unit” the user has the option of accessing the program parameters of an already existing head-end and easily edit and modify them. Current program satellite assignments are stored in their own “SAT program files”. These files can be updated and changed by the user. ASTRO offers updating of program assignments of the most common satellites via the internet.



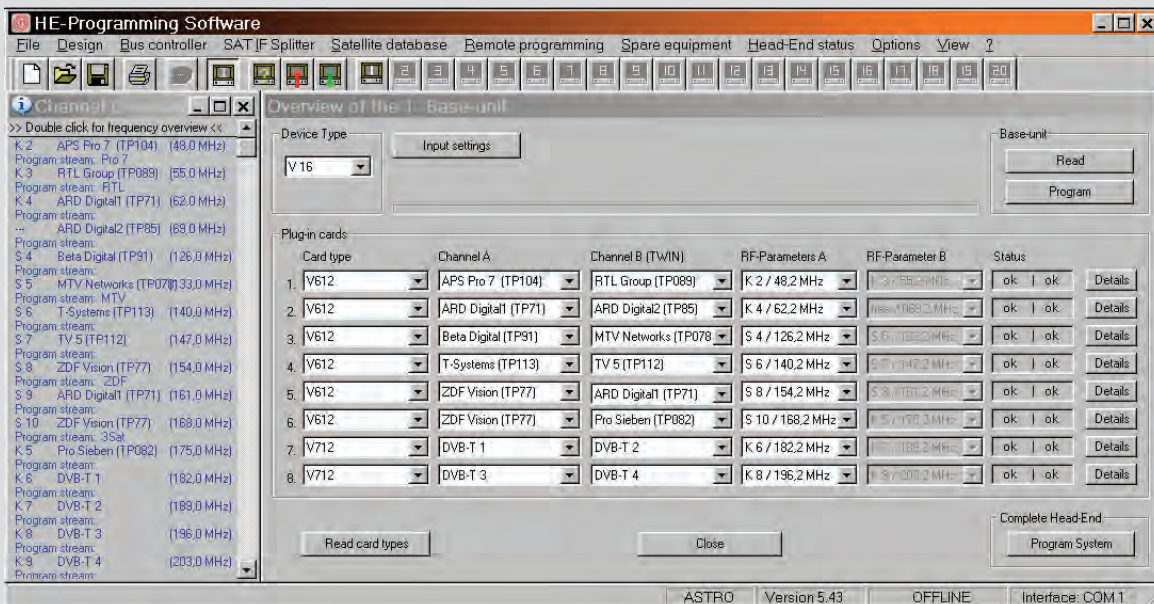
Programming the head-end

Remote maintenance

The user has the option of remotely programming and maintaining head-end devices. Depending on the use of bus controllers different possibilities are offered: analogue modem, GSM-modem or connection via IP. These added features save the network operator service costs, e. g. when changes occur in transponder assignments. They imply rapid response in the event of processing card failure by replacement signal switching. In order to activate the backup signal circuit, the network operator merely has to select the failed module and the backup module redundancy. A renewed manual configuration of the operating parameters for the redundancy module is not necessary.

The following processes are carried out in an automated manner:

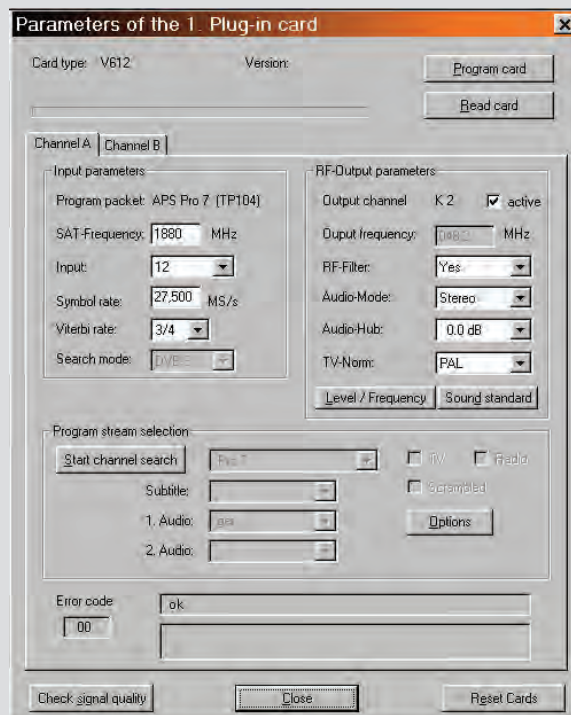
- switch-off (RF) of the failed module
- copying of the operating parameters of the faulty module to the redundancy module
- switch-off (RF) of the redundancy module



Detail adjustments

Via a menu for detail adjustments all relevant parameters of signal processing can be configured for every head-end module. The options are clearly arranged and assorted according to input and output parameters. Input parameters can – depending on the module – be entered manually or carried over from the satellite data base in a user friendly manner. Output parameters can be adjusted as needed. Depending on the module the level adjustment occurs electronically and different options for the output signal can be activated or deactivated.

If error messages should occur, these are displayed in the detail menu as well.



LGH mouting cabinet / protective housing

specially designed for assembling distribution systems and broadband cable systems



- protective housing made of 1,2 mm sheet steel with PURAL-coating 7032; open rear side with distance- and mounting-frame
- eight pre-punches that can be tweaked out if required for cable feed
- ventilation grills for good ventilation
- uniform locking safety lock
- delivered with particle board for mounting

Type	LGH 2030	LGH 3040	LGH 4060
Order number	189 230	189 340	189 460
Dimensions (W x H x D)	225 x 325 x 150 mm 1 door	300 x 400 x 150 mm 1 door	400 x 600 x 190 mm 2 doors

Type	LGH 8060	LGH 8080	LGH 80120
Order number	189 700	189 800	189 900
Dimensions (W x H x D)	600 x 800 x 250 mm 1 door	800 x 800 x 260 mm 1 door	1200 x 800 x 290 mm 2 doors

LGH mounting cabinet

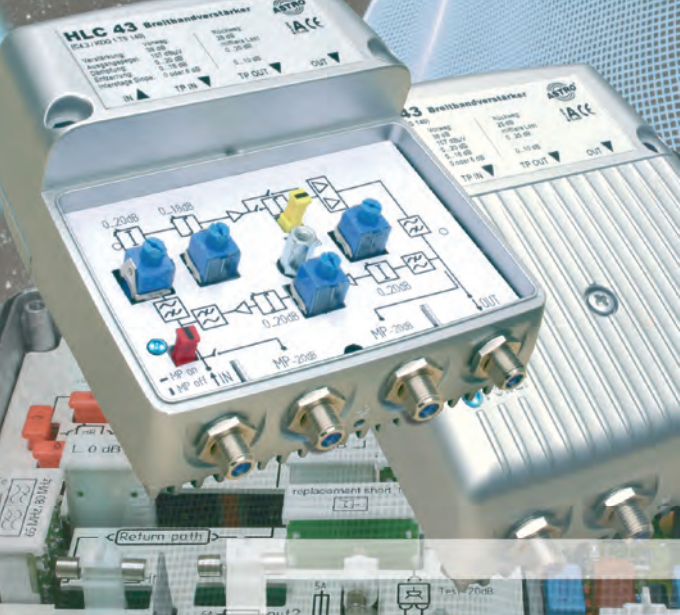
specially designed for assembling distribution systems and broadband cable systems



- protective housing made of 1,2 mm sheet steel with PURAL-coating 7032
- 2 fans, 2 temperature controllers and a socket panel
- ventilated socket, comfortable grips at the front, turning handles at the rear side doors
- uniform locking safety lock
- delivered with particle board for mounting (LGH 1000 B)

Type	LGH 1000 B	LGH 1800	LGH 2000
Order number	189 902	189 921	189 931
Dimensions (W x H x D)	1000 x 1000 x 325 2 doors	600 x 1800 x 600 2 doors / 38 RU	600 x 2000 x 600 2 doors / 42 RU

Technical changes, changed design and errors excepted.



Broadband-amplifiers

AL-series

amplifiers for in-house distribution networks

page 98



HL-series

universal broadband amplifiers for bidirectional in-house distribution and broadband communication systems

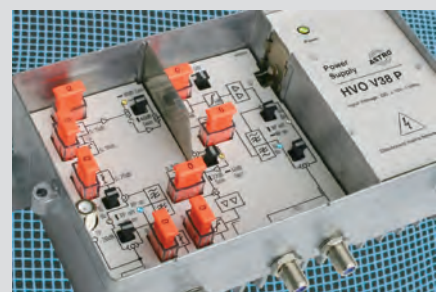
page 106



HV-series

universal broadband amplifiers for in-house distribution and broadband communication systems (CATV)

page 109



VARIO-series

Universal broadband amplifiers with pluggable modules for CATV systems

page 114





■ KLASSE
A
 ■ CLASS

AL-series

amplifiers for in-house distribution networks that can be used in future-proof, bidirectional distribution systems in family homes and apartment buildings

- aluminium die-cast housing with high screening and cooling
- according to (EN 50083-2/A1)
- safe against spurious radiation thanks to a housing screening factor ≥ 90 dB
- tuneable gain and slope adjustment
- versions with active and passive 65 MHz return path available
- excellent price/performance ratio

AL 108, AL 308E

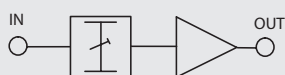
price-competitive amplifiers for in-house distribution
without return path



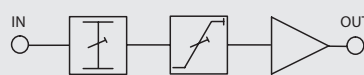
KLASSE
A
CLASS

- for in-house distribution in cable TV networks
- high output level and high operating level for multichannel use
- level controller for exact level adjustment

AL 108



AL 308E



Type		AL 108	AL 308E
Order number		214 180	214 380
Frequency range	[MHz]	45 - 862	
Gain	[dB]	20	30
Maximum output level			
EN 50083-3, 42 channels @ 60 dB CSO, CTB	[dBμV]	96	
Common data			
Noise figure	[dB]	6,5	
Attenuator	[dB]	0 - 10	
Slope correction	[dB]	–	0 - 10
Power consumption	[VA] / [W]	3 / 2,5	4,5 / 3,5
Return loss RF inputs / outputs		EN 50083-3, categorie C	
Power supply	[V~/Hz]	230 / 50	
EMC		compliant EN 50083-2	
Connectors	[Ω]	F jacks 75 Ω	
Ambient temperature	[°C]	-15 ... +55	
Dimensions (W x H x D)	[mm]	120 x 160 x 60	
Weight	[kg]	0,6	
Protection		DIN 45 050-IP 20	

Technical changes, changed design and errors excepted.

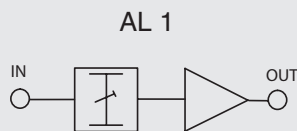
AL 1, AL 3E

amplifiers for in-house distribution without return path



KLASSE
A
CLASS

- for in-house distribution in cable TV networks
- high output and level high operating level for multichannel use
- level controller for exact level adjustment



Type		AL 1	AL 3E
Order number		214 010	214 040
Frequency range	[MHz]	47 - 862	
Gain	[dB]	20 ±1	30 ±1
Interstage Slope		—	3 typ.
Maximum output level			
EN 50083-3, 42 channls @ 60 dB CSO, CTB	[dBμV]	97	98
Common data			
Noise figure	[dB]	5,5	4
Attenuator	[dB]	0 – 10	0 – 20
Interstage slope	[dB]	–	0 - 18
Power consumption	[VA] / [W]	3 / 2,5	6,5 / 5,5
Common data			
Return loss RF inputs / outputs		EN 50083-3, categorie C	
Power supply	[V~/Hz]	230 / 50	
EMC		compliant EN 50083-2	
Connectors	[Ω]	F jack 75 Ω	
Ambient temperature	[°C]	-15 ... +55	
Dimensions (W x H x D)	[mm]	117 x 132 x 50	
Weight	[kg]	0,8	
Protection		DIN 45 050-IP 20	

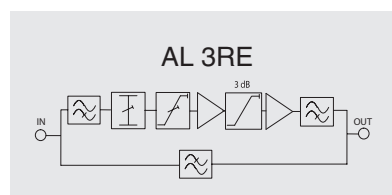
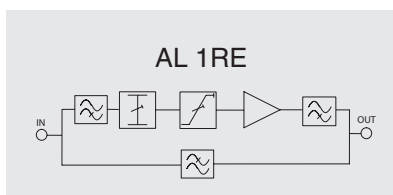
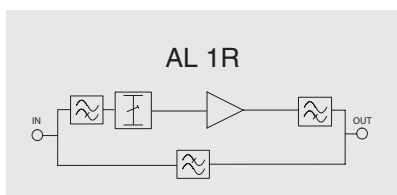
Technical changes, changed design and errors excepted.

AL 1R, AL 1RE, AL 3RE

amplifiers for in-house distribution with passive 30 MHz return path


KLASSE
A
CLASS

- for in-house distribution in cable TV networks
- high output level and high operating level for multichannel use



Type		AL 1R	AL 1RE	AL 3RE
Order number		214 020	214 060	214 050
Frequency range	[MHz]	47 - 862		
Gain	[dB]	20 ±1	20 ±1	30 ±1
Interstage Slope	[dB]	—	—	3 typ.
Maximum output level				
EN 50083-3, 42 channels @ 60 dB CSO, CTB	[dBμV]	97	97	98
Common data				
Noise figure	[dB]	6	6	5
Attenuator	[dB]	0 - 10	0 - 10	0 - 20
Interstage slope	[dB]	—	0 - 18	0 - 18
Power consumption	[VA] / [W]	3 / 2,5	3 / 2,5	6,5 / 5,5
Return path				
Frequency range	[MHz]	5 - 30	5 - 30	5 - 33
Gain	[dB]	> -2	> -2	> -2
Common data				
Return loss RF inputs / outputs		EN 50083-3, categorie C		
Power supply	[V~]/Hz]	230 / 50		
EMC		compliant EN 50083-2		
Connectors	[Ω]	F jack 75 Ω		
Ambient temperature	[°C]	-15 ... +55		
Dimensions (W x H x D)	[mm]	117 x 132 x 50		
Weight	[kg]	0,8		
Protection		DIN 45 050-IP 20		

Technical changes, changed design and errors excepted.

AL 020

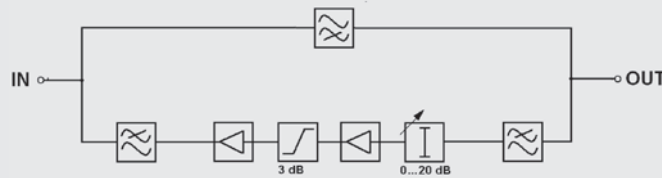
Return path booster 5 - 65 MHz



KLASSE
A
CLASS

for boosting the return path level if network attenuation is too high or return path gain of the house connection amplifier is too low

- integrated diplex filter, integrated pre-emphasis in the return path
- attenuation controller for level adjustment at the input of the return path
- high output level at the return path for more reliability at multichannel load



Type		AL 020
Order number		214 020
Forward path		
Frequency range	[MHz]	80 - 862
Gain	[dB]	-1 ... -0,9
Return path		
Frequency range	[MHz]	5 - 65
Gain	[dB]	20 ± 0,5
Common data		
Noise figure	[dB]	6
Attenuator	[dB]	0 - 10
Power consumption	[VA] / [W]	2 / 2,5
Power supply	[V~/Hz]	230 / 50
Return loss		EN 50083-3, categorie C
EMC		compliant EN 50083-2
Connectors	[Ω]	F jack 75 Ω
Ambient temperature	[°C]	-15 ... +55
Dimensions (W x H x D)	[mm]	117 x 132 x 50
Weight	[kg]	0,8
Protection		DIN 45 050-IP 20

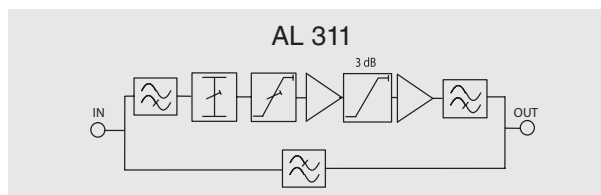
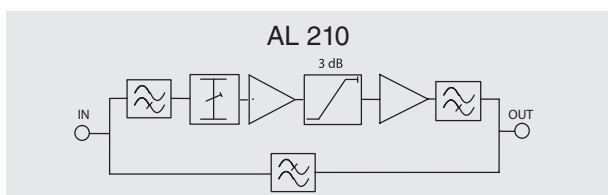
Technical changes, changed design and errors excepted.

AL 210, AL 311

In-house amplifiers with passive 65 MHz return path


KLASSE A
CLASS

- for in-house distribution in cable TV networks
- high output level and high operating level for multichannel use



Type		AL 210	AL 311
Order number		214 060	214 110
Forward path			
Frequency range	[MHz]	80 - 862	
Gain	[dB]	20 ±1	30 ±1
Attenuator	[dB]	0 - 20	
Slope equalization Interstage slope variable in the input	[dB]	3 typ. —	3 typ. 0 - 18
Maximum output level			
EN 50083-3, 42 channels @ 60 dB CSO, CTB	[dBμV]	98	98
Return path			
Frequency range	[MHz]	5 - 65	
Gain	[dB]	> -2	
Common data			
Power consumption	[VA] / [W]	4,5 / 2,5	5,5 / 5,5
Noise figure	[dB]	5	
Return loss		EN 50083-3, categorie C	
Power supply	[V~/Hz]	230 / 50	
EMC		compliant EN 50083-2	
Connectors	[Ω]	F jack 75 Ω	
Ambient temperature	[°C]	-15 ... +55	
Dimensions (W x H x D)	[mm]	117 x 132 x 50	
Weight	[kg]	0,8	
Protection		DIN 45 050-IP 20	

Technical changes, changed design and errors excepted.

AL 223, AL 325, AL 331, AL 431

In-house amplifiers with active 65 MHz return path

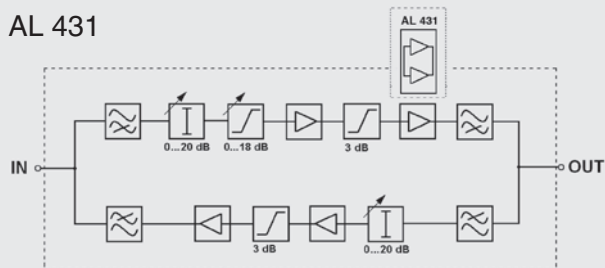


KLASSE **A**
CLASS

GaAs-technology for future-proof, bidirectional distribution systems in family homes and apartment buildings

- different forward path gains available
- integrated return path amplifiers and diplex filters
- attenuator for level adjustment at the input of forward and return path
- integrated slope at the input of the forward path
- high upstream output level for reliable operation even at multichannel operation
- integrated pre-emphasis in forward and return path

AL 223, AL 325, AL 431



Common data

Frequency range		
Forward path / return path	[MHz]	45 - 862 / 5 - 65
Ripple	[Ω]	75
Return loss		
RF inputs / outputs		EN 50083-3, categorie C
Connectors	[Ω]	F jack, 75 Ω
EMC		compliant EN 50083 -2
Power supply	[V~/Hz]	230 / 50
Ambient temperature	[°C]	-15 ... +55
Dimensions (W x H x D)	[mm]	117 x 132 x 50
Weight	[kg]	0,8
Protection		DIN 45 050-IP 20

Technical changes, changed design and errors excepted.

Type		AL 223	AL 325	AL 331	AL 431
Order number		214 223	214 325	214 331	214 431
Forward path					
Frequency range	[MHz]	80 - 862			
Gain	[dB]	24 ± 1	30 ± 1	32 ± 1	36 ± 1
Interstage slope (fixed), typical	[dB]	3			
Noise figure	[dB]	6	5	6	5
Equalizer in the input	[dB]	0 - 18			
Attenuation in the input	[dB]	0 - 20			
Maximum output level					
42 channels 60 dB CSO, CTB linear control	[dBμV]	98	98	98	103
Return path					
Frequency range	[MHz]	5 - 65			
Gain	[dB]	22 ± 1	23 ± 1	27 ± 1	27 ± 1
Interstage slope (fixed), typical	[dB]	3			
Noise figure	[dB]	7	6	6	5
Attenuator	[dB]	0 - 20			
Maximum output level					
2 carriers, linear @ 60 dB IMA2 (EN 50083-3)	[dBμV]	105			
3 carriers, @ 60 dB KMA (DIN 45004B)	[dBμV]	114			
Common data					
Power consumption	[VA] / [W]	7,5 / 6,5	8 / 7	8 / 7	9,5 / 8

Technical changes, changed design and errors excepted.





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CLASS

HL-series

Broadband amplifiers for bidirectional in-house distribution and broadband communication systems

- forward path gain from 24 dB to 38 dB available
- integrated return path amplifiers and diplex filters
- fixed or pluggable (HLB.. / HLC..) interstage slope in forward path
- attenuator for level adjustment at the input of forward and return path
- integrated slope at the input of the forward path
- compact aluminium die-cast housing for best screening and cooling
- excellent price-performance ratio

Common data

Frequency range		
Forward path / return path	[MHz]	80 - 862 / 5 - 65
Wave impedance	[Ω]	75
Return loss	[dB]	≥ 18 and at 40 MHz -1,5 / octave (at least 10)
Connectors	[Ω]	F jacks, 75 Ω
EMC		compliant EN 50083 -2
Power supply	[V~/Hz]	230 / 50
Ambient temperature	[°C]	-15 ... +55
Dimensions (W x H x D)	[mm]	122 x 148 x 55
Weight	[kg]	0,8
Protection		DIN 45 050-IP 20
Main fuse		T1A L250V IEC 60127-3/4

Technical changes, changed design and errors excepted.

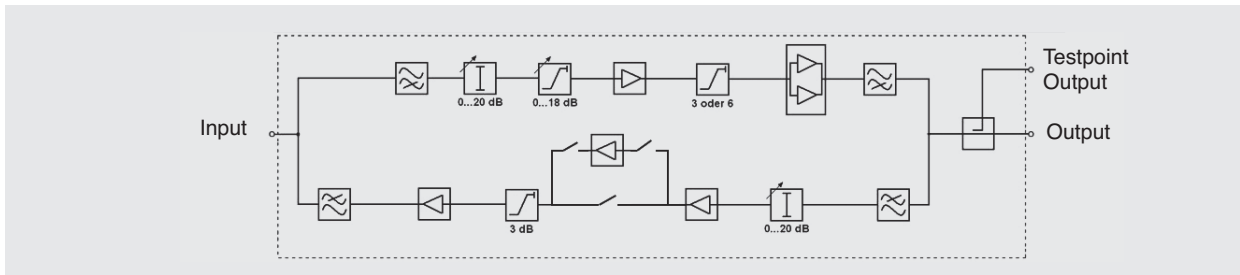
HLB 43

Broadband amplifier with active 65 MHz return path



KLASSE
A
CLASS

- Broadband amplifier with active 65 MHz return path
- high upstream output level for reliable operation even at multichannel operation, excellent price-performance ratio



Type		HLB 43
Order number		214 435
Forward path		
Frequency range	[MHz]	80 - 862
Gain	[dB]	38 ± 1
Interstage slope (fixed), typical	[dB]	3
Noise figure	[dB]	typ. 5
Equalizer in the input	[dB]	0 - 18
Attenuation in the input	[dB]	0 - 20
Testpoint	[dB]	20 ± 1
Maximum output level		
42 channels 60 dB CSO, CTB linear control	[dBμV]	107 (at 3 or 6 dB Slope)
Return path		
Frequency range	[MHz]	5 - 65
Gain	[dB]	30 / 20 ± 1
Interstage slope (fixed), typical	[dB]	3
Noise figure	[dB]	typ. 6
Attenuation in the input	[dB]	0 - 20
Maximum output level		
2 carriers, linear @ 60 dB IMA2 (EN 50083-3)	[dBμV]	105
3 carriers, @ 60 dB KMA (DIN 45004B)	[dBμV]	115
according KDG 1TS140		medium sytem load
Common data		
Power consumption	[VA] / [W]	17 / 8,5

Technical changes, changed design and errors excepted.

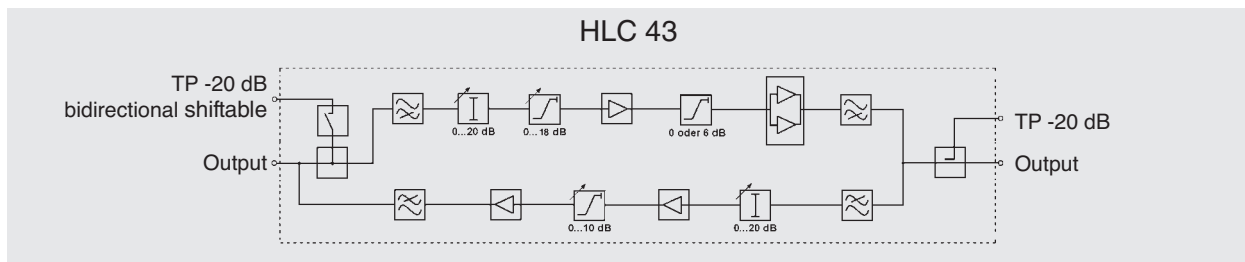
HLC 12, HLC 32, HLC 43

Broadband amplifiers with active 65 MHz return path



KLASSE
A
CLASS

- high upstream output level for reliable operation even at multichannel operation
- testpoints at input and output



Type		HLC 12	HLC 32	HLC 43
Order number		217 012	217 338	217 388
Forward path				
Frequency range	[MHz]		80 - 862	
Gain	[dB]	22 ± 1	32 ± 1	38 ± 1
Interstage slope, typical	[dB]	0 / 6 pluggable	5 fixed	5 fixed
Noise figure	[dB]	typ. 5	typ. 6	typ. 5
Equalizer in the input	[dB]		0 - 18	
Attenuation in the input	[dB]		0 - 20	
Testpoint input	[dB]		20 ± 2,5 shiftable	
Testpoint output	[dB]		20 ± 1	
Maximum output level				
41 channels 60 dB CSO, CTB linear control	[dBμV]	100 (103 with 6 dB Slope)	101 (103 with 6 dB Slope)	107 (109 with 6 dB Slope)
Return path				
Frequency range	[MHz]		5 - 65	
Gain	[dB]	20 ± 1	27 ± 1	28 ± 1
Interstage slope (fixed), typical	[dB]		0 - 10 adjustable	
Noise figure	[dB]		typ. 6	
Attenuation in the input	[dB]		0 - 20	
Testpoint shiftable	[dB]	input 20 ± 1,5	output 20 ± 1	output 20 ± 1
Maximum output level				
2 carriers, linear @ 60 dB IMA2 (EN 50083-3)	[dBμV]	105	105	105
3 carriers, @ 60 dB KMA (DIN 45004B)	[dBμV]	115	114	114
according KDG 1TS140		medium system load		
Common data				
Power consumption	[VA] / [W]	10,5 / 5,5	14 / 7,3	17 / 8,5

Technical changes, changed design and errors excepted.



KLASSE
A
CLASS

HV-series

Universal broadband amplifiers for in-house distribution and broadband communication systems

- high output level and gain by GaAs-technology
- diplex filter and return path gain in one pluggable module
- attenuator and slope for level adjustment
- testpoints at input and output
- interstage slope and interstage attenuation selectable
- low power consumption by switching power supply (V38)
- locally and remote powered (V38) versions

see page 120

Common data

Frequency range		
Forward path / return path	[MHz]	80 - 862 / 5 - 65
Ripple	[Ω]	75
Return loss	[dB]	≥ 18 and from 40 MHz -1,5 / Octave (at least 10)
Connectors	[Ω]	F jack, 75 Ω
EMC		compliant EN 50083 -2
Power supply	[V~/Hz]	230 / 50
Ambient temperature	[°C]	-15 ... +55
Dimensions (W x H x D)	[mm]	210 x 120 x 66
Weight	[kg]	1,6
Protection		IP 50 according EN 60529

Technical changes, changed design and errors excepted.



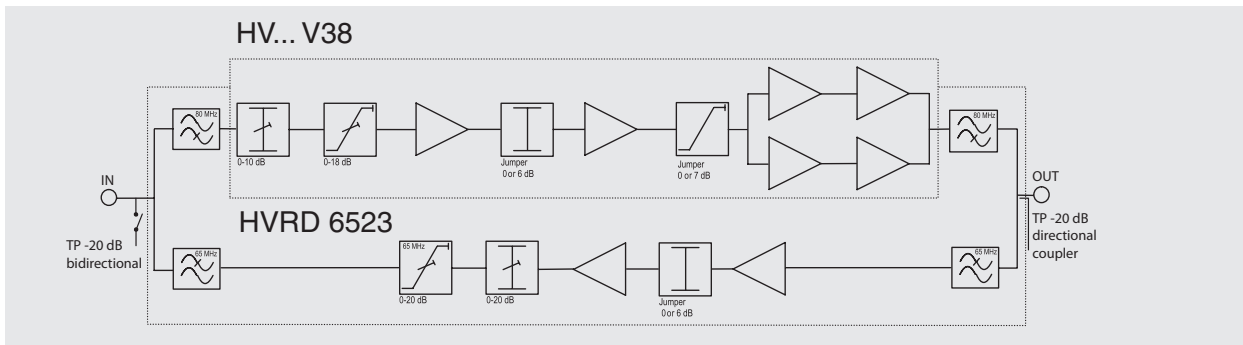
HVO/F V38, HVO/F V38S, HV 331

Broadband amplifiers for in-house distribution and CATV



KLASSE **A**
CLASS

- high upstream output level for reliable operation even at multichannel operation
- outstanding price-performance ratio

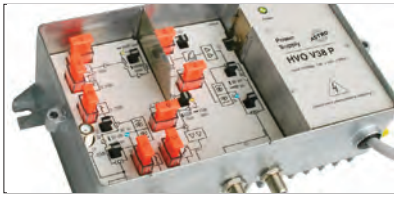


Type		HVO/F V38	HVO/F V38S	HV 331
Order number	local powering	217 381	217 371	217 331
	remote powering	217 391	217 421	—
Frequency range	[MHz]	47 - 862		
Gain	[dB]	38/32 ± 1	38/32 ± 1	30/24 ± 1
Ripple	[dB]	± 1	max ± 0,8	± 1
Interstage slope, typical	[dB]	0 / 7 pluggable	5 fixed	5 fixed
Attenuation at the input	[dB]	0 – 10 variable	0 – 10 Pads	0 – 10 variable
Input equalizer	[dB]	0 – 18 variable	0 – 18 Pads	0 – 18 variable
Noise figure	[dB]	6 – 7 (+1,4 dB at 6 dB interstage attenuation)		
Base of equalizer	[MHz]	862, fixed		
Interstage (ffixed)	[dB]	0 or 6, pluggable		
Interstage slope (fixed)	[dB]	0 or 7, pluggable		
Return loss (at 40 MHz, -1,5 dB/octave)	[dB]	cat. B acc. EN 50083-2	cat. B acc. EN 50083-2	cat. C acc. EN 50083-2
In-Output testpoint & at 40 MHz -1,5 dB/oct	[dB]	18	18	14
Maximum output level				
42 channels, EN 50083-3 for CTBA/CSOA ≥ 60 dB with 7 dB interstage slope	[dBμV]	107	107	100
	[dBμV]	109	109	—
Common data				
Testpoint	Input	[dB]	20 ± 1,5 bidirectional	
	Output	[dB]	20 ± 1 directional coupler	
Power consumption	local powering	[W / VA]	11 / 21	9 / 9,5
	remote powering	[W]	11	10,5

Data without return path module. Technical changes, changed design and errors excepted.


HVO V38 P

Universal broadband amplifier with integrated return path

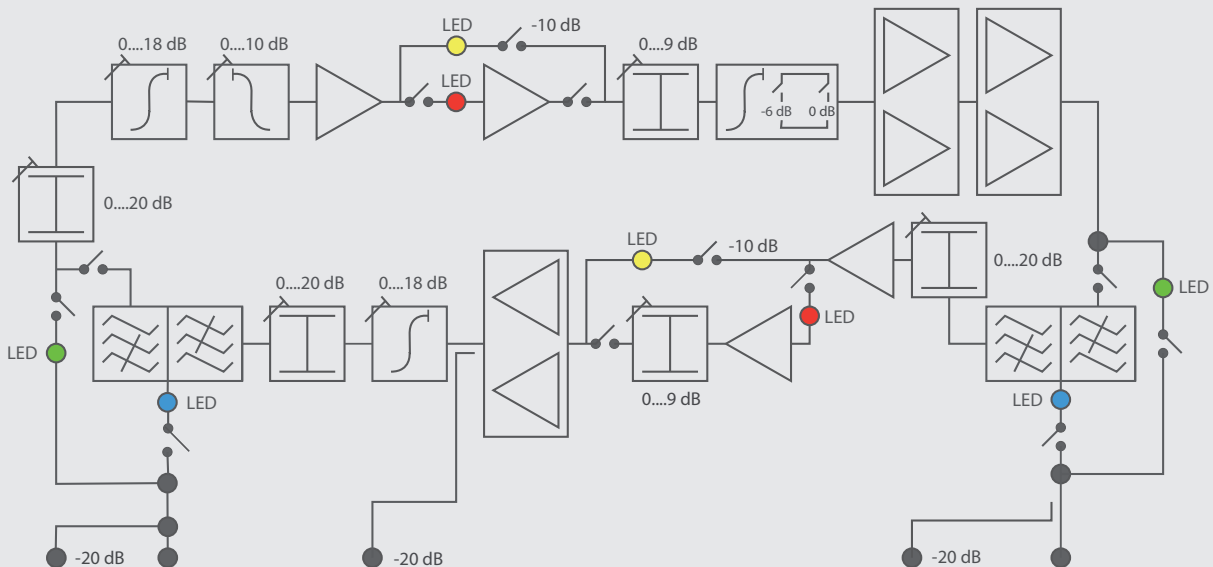


KLASSE
A
CLASS

The HVO V38 P rounds off the HV-series with a fully integrated concept. The complete configuration is carried out via jumpers and pads. For better survey the plugged signal paths are indicated by different LED.

- high output level at high C/N by GaAs-MMIC
- duplex filters and return path amplifier on-board
- 40 / 30 dB gain in forward path
- 32 / 22 dB gain in return path
- configuration via jumpers and pads, long  see page 113
- plugged signal paths indicated via LED
- testpoints in input and output

HVO V38 P



Forwarth path:
 ● gain 30 dB
 ● gain 40 dB

Return path:
 ● return path activated
 ● return path deactivated

Return path:
 ● gain 22 dB
 ● gain 32 dB

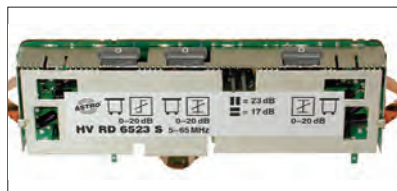


Type		HVO V38 P
Order number		217 390
Forward path		
Frequency range	[MHz]	47 - 862 respectively 5 - 65 / 80 - 862 switchable
Gain	[dB]	40 / 30 pluggable
Amplitude ripple	[dB]	±1
Output level	[dBμV]	109 at 40 dB respectively 107 at 30 dB CENELEC 42
Noise figure	[dB]	typical 6 at 40 dB, respectively typical 7 at 30 dB
Return loss	[dB]	categorie B, 18 and at 40 MHz-1,5 dB/octave
Cable simulation in the input	[dB]	0 bis 10, pad, deemphase
Attenuation in the input	[dB]	0 - 20, pad
Interstage attenuation	[dB]	0 to 9 at 40 dB, respectively 0 to 6 by 30 dB, pad
Input equalizer	[dB]	0-18, pad, preemphase
Interstage slope	[dB]	0 or 6, jumper, preemphase
Testpoints In- Output	[dB]	Bi, 20 ± 2,5 / RK, 20 ± 1
Return path		
Frequency range	[MHz]	5 - 65, activated with jumper
Gain	[dB]	32 / 22 jumper
Output level	[dBμV]	KDG: medium load; Kabel BW: standard load
Noise figure	[dB]	typical 5,5 bei 32 dB, resp. typical 5 at 22 dB
Attenuation	[dB]	0-20, pad, (in- and output)
Interstage attenuation	[dB]	0 to 8, pad, only by gain 32 dB
Output equalizer	[dB]	0-18, pad, preemphase
Testpoints	[dB]	RK, 20 ± 1 (before and behind positioning elements)
Common data		
Power consumption	[W / VA]	12,5 / 24

Data without return path module. Technical changes, changed design and errors excepted.

HV RD...

Return path modules



For configuration of the return path different modules with diplex filter and return path amplifier are available. Attenuation and slope of the modules are variable. Modules with attenuation pads are additionally equipped with an adjustable attenuation at the input of the return path amplifier.

Type		HVRD	6523	6523S	6527	6527S	6532	6532S
Order number			216 261	216 271	216 350	216 340	216 351	216 352
Frequency range return path	[MHz]		5 - 65	5 - 65	5 - 65	5 - 65	5 - 65	5 - 65
forward path			80 - 862	80 - 862	80 - 862	80 - 862	80 - 862	80 - 862
Gain (pluggable)	[dB]		23 / 17	23 / 17	27 / 21	27 / 21	32 / 25	32 / 25
Attenuation / equalizer			actuator	pad	actuator	pad	actuator	pad

PAD lang

Attenuation pads long for HV- and VARIO amplifiers



Type Value	Order no:	Type Value	Order no:	Type Value	Order no:	Type Value	Order no:
Pad 0 dB long	521 403	Pad 6 dB long	521 463	Pad 12 dB long	521 523	Pad 18 dB long	521 583
Pad 0,5 dB long	521 404	Pad 6,5 dB long	521 464	Pad 12,5 dB long	521 524	Pad 18,5 dB long	521 584
Pad 1 dB long	521 413	Pad 7 dB long	521 473	Pad 13 dB long	521 533	Pad 19 dB long	521 593
Pad 1,5 dB long	521 414	Pad 7,5 dB long	521 474	Pad 13,5 dB long	521 534	Pad 19,5 dB long	521 594
Pad 2 dB long	521 423	Pad 8 dB long	521 483	Pad 14 dB long	521 543	Pad 20 dB lang	521 603
Pad 2,5 dB long	521 424	Pad 8,5 dB long	521 484	Pad 14,5 dB long	521 544	Pad 20,5 dB long	521 604
Pad 3 dB long	521 433	Pad 9 dB long	521 493	Pad 15 dB long	521 553	Pad 21 dB long	521 613
Pad 3,5 dB long	521 434	Pad 9,5 dB long	521 494	Pad 15,5 dB long	521 554	Pad 22 dB long	521 623
Pad 4 dB long	521 443	Pad 10 dB long	521 503	Pad 16 dB long	521 563	Pad 23 dB long	521 633
Pad 4,5 dB long	521 444	Pad 10,5 dB long	521 504	Pad 16,5 dB long	521 564	Pad 24 dB long	521 643
Pad 5 dB long	521 453	Pad 11 dB long	521 513	Pad 17 dB long	521 573	Pad 25 dB long	521 653
Pad 5,5 dB long	521 454	Pad 11,5 dB long	521 514	Pad 17,5 dB long	521 574	Pad 26 dB long	521 663

PAD kurz

Attenuation pads short, pluggable for HVRD...S, HVAR...S, HV...V38S, U 901 and VZN 8



Type Value	Order no:	Type Value	Order no:	Type Value	Order no:	Type Value	Order no:
Pad 0 dB	521 401	Pad 5 dB	521 451	Pad 10 dB	521 501	Pad 15 dB	521 551
Pad 0,5 dB	521 402	Pad 5,5 dB	521 452	Pad 10,5 dB	521 502	Pad 15,5 dB	521 552
Pad 1 dB	521 411	Pad 6 dB	521 461	Pad 11 dB	521 511	Pad 16 dB	521 561
Pad 1,5 dB	521 412	Pad 6,5 dB	521 462	Pad 11,5 dB	521 512	Pad 16,5 dB	521 562
Pad 2 dB	521 421	Pad 7 dB	521 471	Pad 12 dB	521 521	Pad 17 dB	521 571
Pad 2,5 dB	521 422	Pad 7,5 dB	521 472	Pad 12,5 dB	521 522	Pad 17,5 dB	521 572
Pad 3 dB	521 431	Pad 8 dB	521 481	Pad 13 dB	521 531	Pad 18 dB	521 581
Pad 3,5 dB	521 432	Pad 8,5 dB	521 482	Pad 13,5 dB	521 532	Pad 18,5 dB	521 582
Pad 4 dB	521 441	Pad 9 dB	521 491	Pad 14 dB	521 541	Pad 19 dB	521 591
Pad 4,5 dB	521 442	Pad 9,5 dB	521 492	Pad 14,5 dB	521 542	Pad 19,5 dB	521 592

PAD SET lang, PAD SET kurz

Attenuation pads long, attenuation pads short



attenuation pads long 1 - 10 dB pluggable,
10 x 10 pieces per dB (100 pieces) in hardcover box
with separated partitions
attenuation pads short 1 - 10 dB pluggable,
10 x 10 pieces per dB (100 pieces) in hardcover box
with separated partitions

Type	PAD Set lang	PAD Set kurz
Order number	521 400	521 399






VARIO-series

Future-proof, adaptable amplifier concept for multimedia networks

The locally or remote powered VARIO amplifiers offer – thanks to the GaAs-technology – a high dynamic range with a low current consumption. Each type is temperature-compensated and equipped with pluggable interstage attenuation and slope. The incoming and outgoing cable attenuation can be compensated at the input. This is why the maximum output level can be increased.

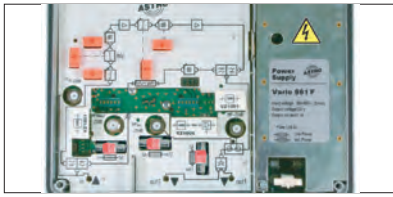
- flexible configuration thanks to pluggable modules  see page 120
- all return path amplifiers interruption-free
- passive return path with zero-module VZ 1001 realizable (included)
- additional testpoints for easy configuration and service

Common data Vario-series		Vario xxx F	Vario xxx O
		remote powering	local powering
Return path			
Frequency range	[MHz]	5 - 65 / 5 - 33	
Gain	[dB]	depends on return path module	
Diplexfilter	[MHz]	5 - 33 / 47 - 862 (VD 33) 5 - 65 / 80 - 862 (VD 65)	
Common data			
Connectors	[Ω]	IEC jacks or PG11	F jacks 75 Ω
Feed-through current	[A]	5	—
Power supply	[V~ / Hz]	24 - 65	230 / 50
Ambient temperature	[°C]	-15 ... +55	
Dimensions (W x H x D)	[mm]	240 x 73 x 150	
Weight	[kg]	2,7	
Return loss	[dB]	≥ 18 (> 40 MHz -1,5 dB/octave) in-outputs & testpoints	
EMC		compliant EN 50083 -2	
Protection		IP 50 acc. EN 60529	

Technical changes, changed design and errors excepted.

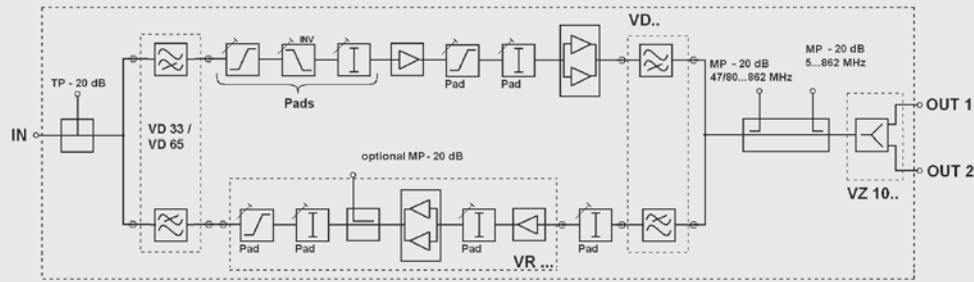
VARIO 371, VARIO 561, VARIO 661, VARIO 662

Universal broadband amplifiers



- configuration via pads
- 4 testpoints

KLASSE **A**
CLASS



Type		Vario 371 O / F	Vario 561 O / F
Order number local powering		217 370	217 570
remote powering		217 372	217 571
Forward path			
Gain	[dB]	37 ± 0,8	36,5 ± 0,8
Maximum output level			
42 channels / linear	[dBμV]	107 (CTBA & CSOA ≥ 60 dB)	110 (CTBA & CSOA ≥ 60 dB)
42 channels / 7 dB slope	[dBμV]	109	112

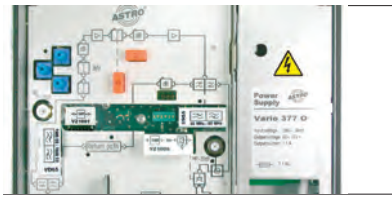
Type		Vario 661 O / F	Vario 662 O / F
Order number local powering		217 650	217 660
remote powering		217 651	217 662
Forward path			
Gain	[dB]	36 ± 1	35,5 ± 0,8
Maximum output level			
42 channels / linear	[dBμV]	112 (CTBA & CSOA ≥ 60 dB)	112 (CTBA & CSOA ≥ 60 dB)
42 channels / 7 dB slope	[dBμV]	115	114

Common data			
Frequency range	[MHz]	47 - 862	
Ripple	[dB]	± 1 including temperature drift	
Noise figure	[dB]	typ. 5 (± 0,5) / > 800 MHz: + 0,5 dB	
Attenuation in the input	[dB]	0 - 20 (0,5 dB - steps)	
Attenuation interstage	[dB]	0 - 10 (0,5 dB - steps)	0 - 7 (0,5 dB - steps)
Equalizer in the input	[dB]	0 - 20 (0,5 dB - steps)	
Equalizer interstage	[dB]	0 - 10 / 0 - 12 @ Vario 661 (0,5 dB - steps)	
Base of equalizer	[MHz]	862	
Inverted equalizer input	[dB]	0 - 10 (0,5 dB - steps)	
Base of inverted equalizer	[MHz]	47	
Input testpoint	[dB]	return path 20 ± 1 / forward path 20 ± 2	
Output testpoint	[dB]	20 ± 1 (directional coupler) 5 - 862 MHz	
Power consumption with / without return path	[W]	Vario 371: 11,5 / 9 resp. 24 / 18 VA (O) Vario 661: 18 / 15,5 resp. 33 / 29 VA (O)	Vario 561: 14,5 / 12 resp. 28 / 24 VA (O) Vario 662: 15,5 / 13 resp. 29 / 24 VA (O)
Testpoints		4	

Technical changes, changed design and errors excepted.

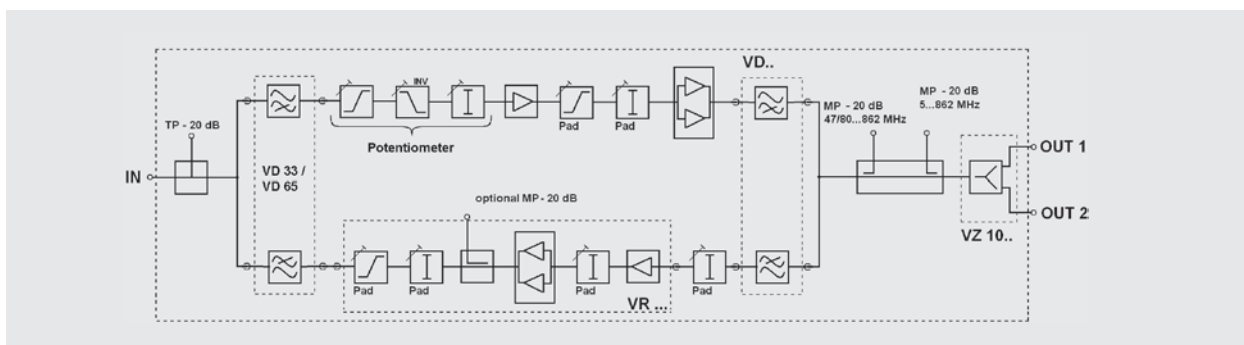
VARIO 377, VARIO 567

Universal broadband amplifiers



KLASSE A
CLASS

- configuration via potentiometers at the input
- 2 testpoints

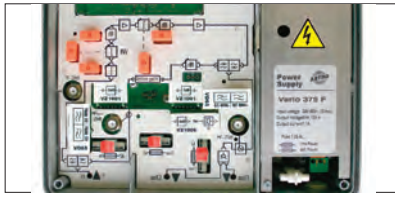


Type		Vario 377 O / F	Vario 567 O / F
Order number local powering		217 376	217 567
remote powering		217 377	217 577
Forward path			
Gain	[dB]	36 ± 1	35,5 ± 1
Maximum output level			
42 channels / linear	[dBµV]	107 (CTBA & CSOA ≥ 60 dB)	110 (CTBA & CSOA ≥ 60 dB)
42 channels / 7 dB Slope	[dBµV]	109	112
Common data			
Frequency range	[MHz]	47 - 862	
Ripple	[dB]	± 1 including temperature drift	
Noise figure	[dB]	typ. 5 / > 800 MHz: + 0,5	
Attenuation in the input	[dB]	0 - 20 (continuous)	
Attenuation interstage	[dB]	0 - 10 (0,5 dB - steps)	0 - 7 (0,5 dB - steps)
Equalizer in the input	[dB]	0 - 20 (continuous)	
Equalizer interstage	[dB]	0 - 10 (0,5 dB - steps)	
Base of equalizer	[MHz]	862	
Inverted equalizer input	[dB]	0 - 10 (continuous)	0 - 7 (continuous)
Base of inverted equalizer	[MHz]	47	
Input testpoint	[dB]	return path 20 ± 1 / forward path 20 ± 2	
Output testpoint	[dB]	20 ± 1 (directional coupler) 5 - 862 MHz	
Power consumption with / without return path	[W]	Vario 377 F: 11,5 / 9 Vario 377 O: 11 / 9 bzw. 24 / 18 VA	Vario 567 F: 14,5 / 12 Vario 567 O: 14 / 12 bzw. 28 / 24 VA
Testpoints		2	

Technical changes, changed design and errors excepted.

VARIO 375, VARIO 565, VARIO 666

Universal broadband amplifiers

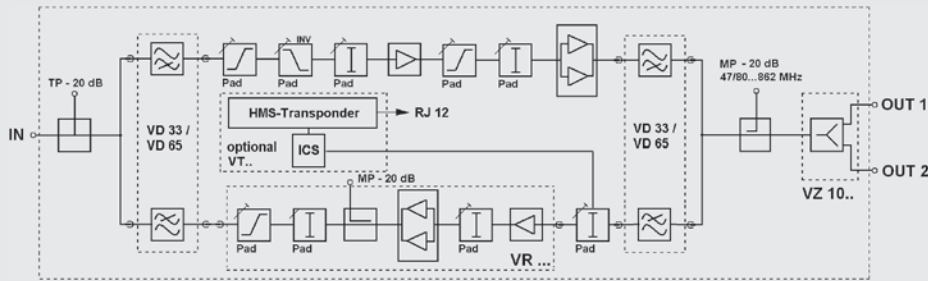


KLASSE **A**
CLASS

- configuration via pads
- 3 testpoints
- HMS transponder option



see page 120



Type		Vario 375 O / F	Vario 565 O / F	Vario 666 O / F
Order number local powering		217 375	217 574	217 668
remote powering		217 378	217 575	217 669
Forward path				
Gain	[dB]	37 ± 0,8	36 ± 0,8	34,5 ± 0,8
Maximum output level				
42 channels / linear (CTBA & CSOA ≥ 60 dB)	[dBμV]	107	110	112
42 channels / 7 dB Slope	[dBμV]	109	112	114
Common data				
Frequency range	[MHz]	47 - 862		
Ripple	[dB]	± 0,8 including temperature drift		
Noise figure	[dB]	typ. 4,5 / > 800 MHz: 5		
Attenuation in the input	[dB]	0 - 20 (0,5 dB - steps)		
Attenuation interstage	[dB]	0 - 10 (0,5 dB - steps)	0 - 7 (0,5 dB - steps)	
Equalizer in the input	[dB]	0 - 20 (0,5 dB - steps)		
Equalizer interstage	[dB]	0 - 10 (0,5 dB - steps)		
Base of equalizer	[MHz]	862		
Inverted equalizer input	[dB]	0 - 10 (0,5 dB - steps)		
Base of inverted equalizer	[MHz]	47		
Input testpoint	[dB]	return path 20 ± 1 / forward path 20 ± 2		
Output testpoint	[dB]	20 ± 1 (directional coupler) 5 - 862 MHz		
Power consumption with / without return path	[W]	11,4 / 9,3; 22 / 18 VA (O)	13 / 12; 28 / 25 VA (O)	17 / 15; 32 / 29 VA (O)
with HMS-Transponder		12,5; 24 VA (O)	15,8 / 30 VA (O)	18,5; 34 VA (O)
Testpoints		3		

Technical changes, changed design and errors excepted.

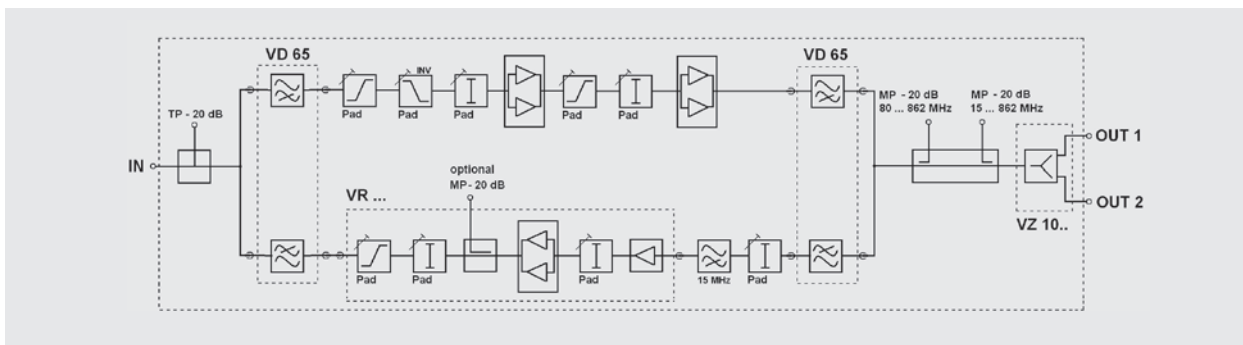
VARIO 683, VARIO 681

Universal broadband amplifiers



KLASSE
A
CLASS

- configuration via pads
- VARIO 681: 15 MHz high-pass at the return path
- 4 testpoints

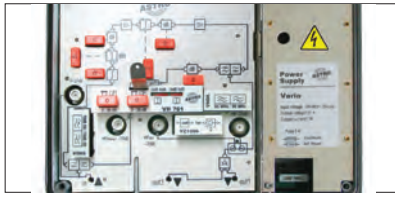


Type		Vario 683 O / F	Vario 681 O / F
Order number local powering		217 685	217 681
remote powering		217 684	217 680
Forward path			
Gain	[dB]	40 ± 0,8	
Maximum output level			
42 channels / linear	[dBμV]	113 (CTBA & CSOA ≥ 60 dB)	
42 channels / 7 dB Slope	[dBμV]	115	
Common data			
Frequency range	[MHz]	47 - 862	
Ripple	[dB]	± 0,8 including temperature drift	
Noise figure	[dB]	typ. 5,5	
Attenuation in the input	[dB]	0 - 20 (0,5 dB - steps)	
Attenuation interstage	[dB]	0 - 7 (0,5 dB - steps)	
Equalizer in the input	[dB]	0 - 20 (0,5 dB - steps)	
Equalizer interstage	[dB]	0 - 7 (0,5 dB - steps)	
Base of equalizer	[MHz]	862	
Inverted equalizer input	[dB]	0 - 10 (0,5 dB - steps)	
Base of inverted equalizer	[MHz]	47	
Input testpoint	[dB]	return path 20 ± 1 / forward path 20 ± 2	
Output testpoint	[dB]	20 ± 1 (directional coupler) 5 - 862 MHz	
Power consumption with / without return path	[W]	18 / 16 18 / 16; 34 / 32 VA (O)	
Testpoints		4	

Technical changes, changed design and errors excepted.

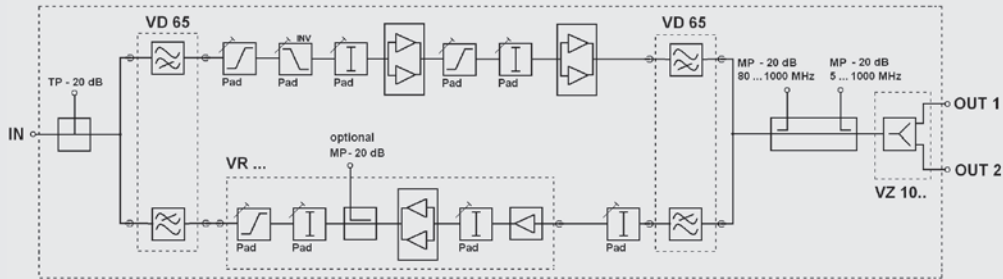
VARIO 684, VARIO 682

Universal broadband amplifiers



KLASSE
A
CLASS

- 1 GHz version
- configuration via pads
- VARIO 682: 15 MHz high-pass at the return path
- 4 testpoints



Type	Vario 684 O / F		Vario 682 O / F	
Order number local powering		217 687		217 683
remote powering		217 686		217 682
Forward path				
Gain	[dB]	40 ± 0,8		
Maximum output level				
42 channels / linear	[dBμV]	113 (CTBA & CSOA ≥ 60 dB)		
42 channels / 7 dB Slope	[dBμV]	115		
Common data				
Frequency range	[MHz]	47 - 1000		
Ripple	[dB]	± 1 including temperature drift		
Noise figure	[dB]	typ. 5,7 / > 800 MHz: typ. 6,2		
Attenuation in the input	[dB]	0 - 20 (0,5 dB - steps)		
Attenuation interstage	[dB]	0 - 7 (0,5 dB - steps)		
Equalizer in the input	[dB]	0 - 20 (0,5 dB - steps)		
Equalizer interstage	[dB]	0 - 10 (0,5 dB - steps)		
Base of equalizer	[MHz]	1000		
Inverted equalizer input	[dB]	0 - 10 (0,5 dB - steps)		
Base of inverted equalizer	[MHz]	47		
Input testpoint	[dB]	return path 20 ± 1 / forward path 20 ± 2 20 ± 1 (directional coupler) 5 - 862 MHz		
Output testpoint	[dB]			
Power consumption with / without return path	[W]	18 / 16 18 / 16; 34 / 32 VA (O)		
Testpoints		4		

Technical changes, changed design and errors excepted.



VT L, VT M, VT H

HMS transponder

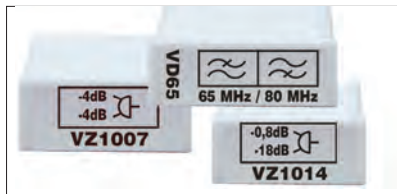


Internal current consumption, internal power supply, Ingress Control Switch (ICS) for attenuation and switching-off the return path

Type	VT L	VT M	VT H
Order number	416 012	416 013	416 014
Frequency range	5 - 8 MHz	8 - 13 MHz	13 - 19 MHz

VZ..., VD...

Plug-in modules, diplex filters



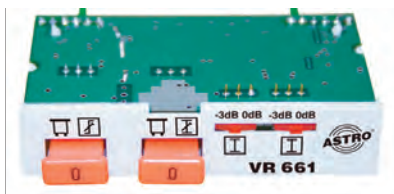
The following plug-in modules serve the expansion and adjustment of VARIO amplifiers.

Type	VZ 1021	VZ 1012	VZ 1013	VZ 1014
Order number	416 030	416 006	416 007	416 008
Function	taps	taps	taps	taps
Attenuation	- 7 dB	- 10 dB	- 15 dB	- 18 dB

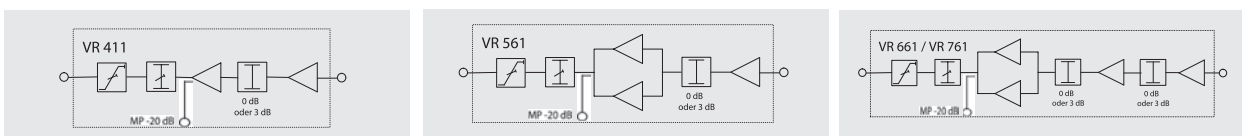
Type	VZ 1001	VZ 1006	VZ 1007	VD 33	VD 65
Order number	216 278	416 001	416 002	216 653	216 652
Function	zero card passive-return path	zero card 1 output	splitter 2-way	diplexfilter	diplexfilter
Frequency range	—	—	5 - 862 MHz	5 - 33 MHz	5 - 65 MHz

VR...

Low-noise return path amplifiers



All modules are interruption-free, attenuation and equalizing at the output are variable. Furthermore the gain can be configured interstage using the included switches.



Type	VR 411	VR 561	VR 661	VR 761
Order number	216 411	216 561	216 661	216 761
Frequency range	[MHz]	5 - 65		
Gain	[dB]	14 / 11	22 / 17	27 / 24 / 21
Output level 60dB IMA2 / KMA	[dBμV]	105 / 116	117 / 116	117 / 116
Noise figure	[dB]	4,5		



Optical transmission

Optical head-end platform

Base units, power supplies, controllers
Forward path transmitters, return path receivers

page **122**



Optical nodes

Fibre Deep Nodes
Optical receivers and transmitters
Optical amplifier

page **130**



Optical passives

LFT-series

page **140**





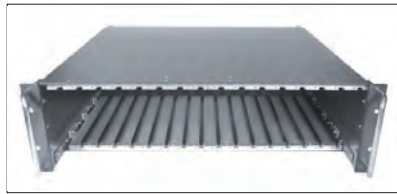
Optical head-end platform

The LWZ series is a new developed high density modular optical head-end platform. It is designed for 19-inch standard rack (3 RU height) and the 16 slots can be equipped with a variety of combinations of plug-in modules and power supplies.

- 1 GHz platform
- plug & play
- changing of modules without special tools
- 6 cooling fans to avoid over-heating
- hot swappable

LWZ B

Base unit



1 GHz platform, plug & play, changing of modules without special tools, 6 cooling fans, hot swappable

Type		LWZ B
Order number		212 500
Common parameters		
Cooling fans		6
Number of slots		16
Interfaces		RS 485, LAN
Ambient temperature	[°C]	0 ... 50
Dimensions (H x W x D)	[mm]	133 x 485 x 485

LWZ C

Control unit



used for local monitoring and configuration of LWZ plug-in modules, LCD panel and control, hot swappable, local monitor post RS 232, remote monitoring by HMS or SNMP remote management (ethernet), up to 192 modules controlled by one LWZ C

Type		LWZ C
Order number		212 501

LWZ P

Power supply



power supply module for LWZ platform, redundancy provided if two LWZ P are used in one LWZ B base unit, 2 cooling fans, 1 power supply for up to 12 LWZ modules

Type		LWZ P
Order number		212 502

LWZ SL

Slot cover



cover for unused slots of the LWZ B

Type		LWZ SL
Order number		212 512

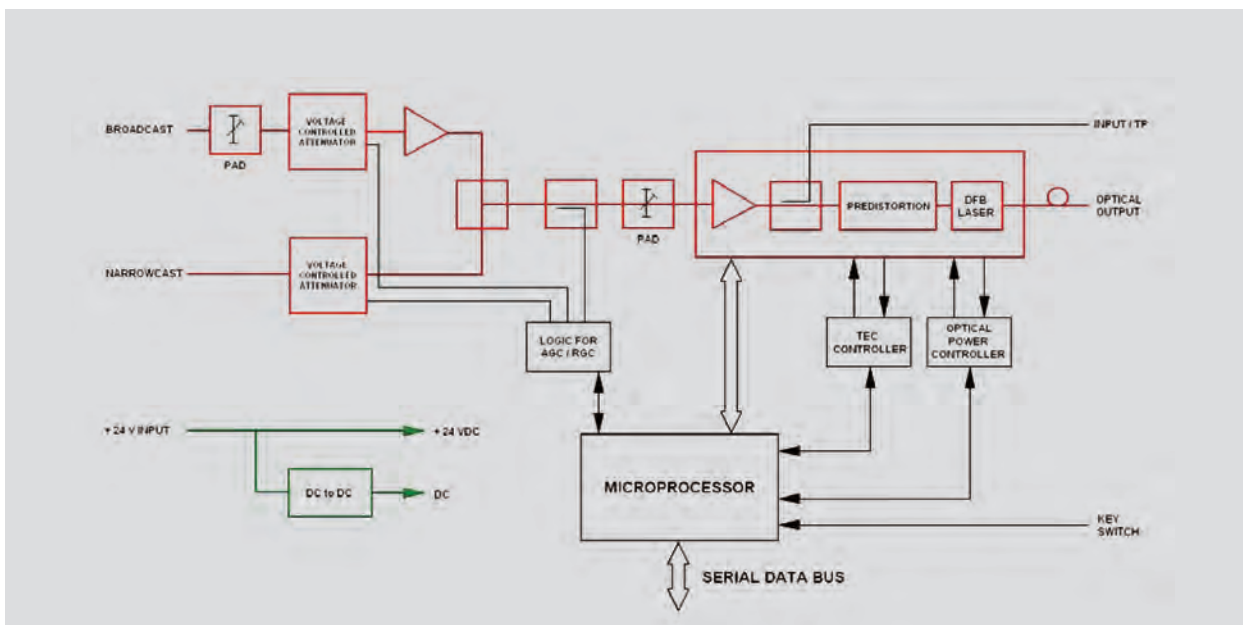


LWZ ...D131

Forward path transmitters



- 1310 nm optical wavelength
- up to 1 GHz transmission bandwidth
- up to 12 modules can be used in the LWZ B base unit
- plug-in JXP attenuator pads for RF gain control
- hot swappable
- remote monitor and control function by HMS or SNMP
- RF front panel testpoint
- SC / APC or E 2000 optional connector types



LWZ 13D131

Forward path transmitters



- 1310 nm optical wavelength
- optical power 13 dBm
- SC / APC or E 2000 optional connector types

Type		LWZ 13D131 SC/APC	LWZ 13D131 E2000
Order number		212 510	212 511
Optical specifications			
Laser type		Cooled DFB with isolator	
Optical wavelength	[nm]	1310 +/- 10	
Optical power	[dBm]	13	
Connector type		SC / APC	E2000
RF parameters			
Operating bandwidth	[MHz]	50 ... 1000	
Broadcast RF input level	[dBμV]	74 ... 82 (AGC mode) / 78 (MGC mode)	
Narrowcast RF input level	[dBμV]	89 ... 97 (AGC mode) / 93 (MGC mode)	
Remote gain control range	[dB]	-4 ... +4	
Flatness	[dB]	+/- 0,5 (50 - 1000 MHz)	
Test point	[dB]	0 +/- 0,5	
Port-to-port isolation	[dB]	> 16 (Broadcast to Narrowcast) > 50 (Narrowcast to Broadcast)	
CSO / CTB			
CSO / CTB / Cross-Modulation	[dB]	> 65 / > 70 / > 65	
Common parameter			
RF connector type		F-female	
Module width		1 slot	
Dimensions (D x H x W)	[mm]	410 x 127 x 26	
Operating temperature	[°C]	0 ... 50	
Power consumption	[W]	15,6	

Technical changes, changed design and errors excepted.



LWZ 10D131

Forward path transmitters



- 1310 nm optical wavelength
- optical power 10 dBm
- SC / APC or E 2000 optional connector types

Type		LWZ 10D131 SC/APC	LWZ 10D131 E2000
Order number		212 503	212 506
Optical specifications			
Laser type		Cooled DFB with isolator	
Optical wavelength	[nm]	1310 +/- 10	
Optical power	[dBm]	10	
Connector type		SC / APC	E2000
RF parameters			
Operating bandwidth	[MHz]	50 ... 1000	
Broadcast RF input level	[dBμV]	71 ... 78 (AGC mode) / 75 (MGC mode)	
Narrowcast RF input level	[dBμV]	86 ... 94 (AGC mode) / 90 (MGC mode)	
Remote gain control range	[dB]	-4 ... +4	
Flatness	[dB]	+/- 0,5 (50 - 1000 MHz)	
Test point	[dB]	0 +/- 0,5	
Port-to-port isolation	[dB]	> 16 (Broadcast zu / to Narrowcast) > 50 (Narrowcast zu / to Broadcast)	
CSO / CTB			
CSO / CTB / Cross-Modulation	[dB]	> 65 / > 70 / > 65	
Common parameters			
RF connector type		F-female	
Module width		1 slot	
Dimensions (D x H x W)	[mm]	410 x 127 x 26	
Operating temperature	[°C]	0 ... 50	
Power consumption	[W]	15,6	

Technical changes, changed design and errors excepted.

LWZ 6D131

Forward path transmitters



- 1310 nm optical wavelength
- optical power 6 dBm
- SC / APC or E 2000 optional connector types

Type		LWZ 6D131 SC/APC	LWZ 6D131 E2000
Order number		212 514	212 515
Optical specifications			
Laser type		Cooled DFB with isolator	
Optical wavelength	[nm]	1310 +/- 10	
Optical power	[dBm]	6	
Connector type		SC / APC	E2000
RF parameters			
Operating bandwidth	[MHz]	50 ... 1000	
Broadcast RF input level	[dBμV]	71 ... 78 (AGC mode) / 75 (MGC mode)	
Narrowcast RF input level	[dBμV]	86 ... 94 (AGC mode) / 90 (MGC mode)	
Remote gain control range	[dB]	-4 ... +4	
Flatness	[dB]	+/- 0,5 (50 - 1000 MHz)	
Test point	[dB]	0 +/- 0,5	
Port-to-port isolation	[dB]	> 16 (Broadcast to Narrowcast) > 50 (Narrowcast to Broadcast)	
CSO / CTB			
CSO / CTB / Cross-Modulation	[dB]	> 65 / > 70 / > 65	
Common parameters			
RF connector type		F-female	
Module width		1 slot	
Dimensions (D x H x W)	[mm]	410 x 127 x 26	
Operating temperature	[°C]	0 ... 50	
Power consumption	[W]	15,6	

Technical changes, changed design and errors excepted.



LWZ 4D131

Forward path transmitters



- 1310 nm optical wavelength
- optical power 4 dBm
- SC / APC or E2000 optional connector types

Type		LWZ 4D131 SC/APC	LWZ 4D131 E2000
Order number		212 508	212 509
Optical specifications			
Laser type		Cooled DFB with isolator	
Optical wavelength	[nm]	1310 +/- 10	
Optical power	[dBm]	4	
Connector type		SC / APC	E2000
RF parameters			
Operating bandwidth	[MHz]	50 ... 1000	
Broadcast RF input level	[dBμV]	71 ... 78 (AGC mode) / 75 (MGC mode)	
Narrowcast RF input level	[dBμV]	86 ... 94 (AGC mode) / 90 (MGC mode)	
Remote gain control range	[dB]	-4 ... +4	
Flatness	[dB]	+/- 0,5 (50 - 1000 MHz)	
Test point	[dB]	0 +/- 0,5	
Port-to-port isolation	[dB]	> 16 (Broadcast to Narrowcast) > 50 (Narrowcast to Broadcast)	
CSO / CTB			
CSO / CTB / Cross-Modulation	[dB]	> 65 / > 70 / > 65	
Common parameters			
RF connector type		F-female	
Module width		1 slot	
Dimensions (D x H x W)	[mm]	410 x 127 x 26	
Operating temperature	[°C]	0 ... 50	
Power consumption	[W]	15,6	

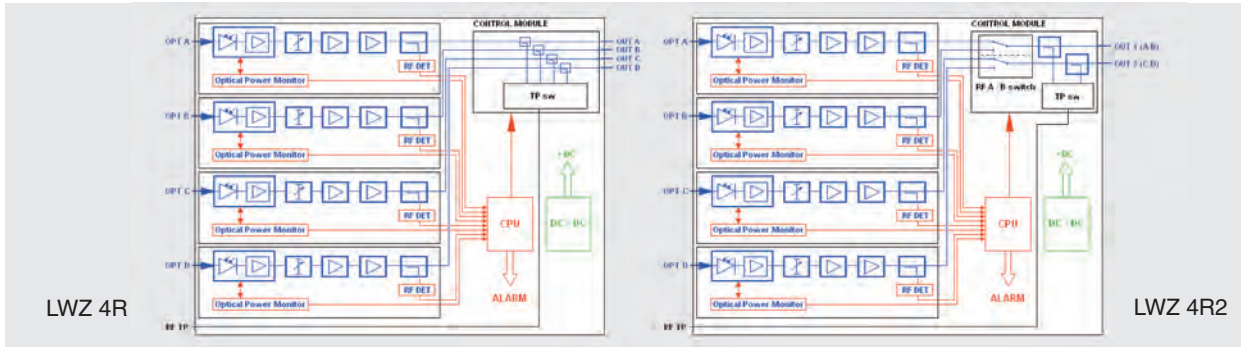
Technical changes, changed design and errors excepted.

LWZ 4R / 4R 2

Quad return path receivers



max. 48 return paths per chassis,
wide optical input range,
optical front inputs and RF rear outputs,
optical wavelength 1200...1600 nm,
remote monitor and control function by HMS or SNMP,
hot swappable



Type	LWZ 4R SC/APC	LWZ 4R E2000
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Order number	212 504	212 507
--------------	---------	---------

Type	LWZ 4R2 SC/APC	LWZ 4R2 E2000
------	----------------	---------------

Order number:	212 505	212 513
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Optical specifications

Optical wavelength	[nm]	1200 ... 1600
Optical input power	[dBm]	-17 ... 0
Connector type		SC / APC E2000

RF specifications

Impedance	[Ω]	75
Return loss	[dB]	min.17 @ 5 - 7 MHz / min.18 @ 7 - 200 MHz
Output level	[dBμV]	102 *
RF gain adjustment	[dB]	0 ... 20
Operating bandwidth	[MHz]	5 ... 200
Flatness	[dB]	+/- 0,5
Slope	[dB]	+0,75 ... - 0,5
Test point	[dB]	-20 +/- 0,5
RF gain	[dB]	54
Isolation	[dB]	> 70 (Receiver to Receiver)
Equivalent noise input	[pA/Hz ^{0.5}]	7
Second order distortion	[dB]	> 60
Third order distortion	[dB]	> 53

Common parameters

Module width		1 slot
Dimensions (D x H x W)	[mm]	410 x 127 x 26
Operating temperature	[°C]	0 ... 50
Power consumption	[W]	17,6

* @ max. gain / -10 dBm opt. Input & 10% OMI from return transmitter Technical changes, changed design and errors excepted.






Optical nodes

The manageable Fibre Deep Nodes perform the opto-electrical conversion of broadband forward signals by a very low-noise optical front end. Optionally, a pluggable return path transmitter module converts RF return path signals to optical 1310 nm or 1550 nm wavelength signals.

- ultra low noise front end
- high RF output power driven by GaAs push-pull hybride
- pluggable diplex filter
- output test port
- E 2000 (LWO 31x) or SC / APC (LWO 30x)
- optionally remote powered (LWF ...)
- optional AGC in the input
- plus control module (VZ 1018 + VZ 1020)

 see page 134

LWO 301 / 311

Optical Fibre Deep Node




- ultra low-noise front end
- high RF output power driven by GaAs push-pull hybride
- pluggable diplex filter
- output test port
- E 2000 (LWO 311) or SC / APC (LWO 301)
- optionally remote powered (LWF...)
- optional AGC in the input plus control module (VZ 1018 + VZ 1020)

Type		LWO 301	LWO 311
Order number		212 301	212 305
Optical receiver			
Wavelength	[nm]	1290 ... 1600	
Input power	[dBm]	0 ... - 8	
Optical return loss	[dB]	> 40	
Equivalent input noise (EIN)	[pA/√Hz]	typ. 3,8 / max 4,5	
Maximum RF output level at 4,1% OMI according GENELEC 42; ≥ 60dB CSO CTB	[dBμV]	min. 106, typ. 107 *	
Input attenuation (pad)	[dB]	0 ... 16	
Interstage attenuation (pad)	[dB]	0 ... 8	
Interstage slope (pad)	[dB]	0 ... 8	
Frequency range depending on diplex filter	[MHz]	40 / 85 ... 862	
Frequency flatness	[dB]	± 1,5	
Responsivity	[dBA/W]	57@1310nm without AGC / 55,5@1310nm with AGC	
RF Impedance	[Ω]	75	
RF Return loss	[dB]	18 @40 MHz – 1,5 dB / oct.	
Test point attenuation	[dB]	20	
AGC		optional	
Connector type		SC / APC	E2000
Common parameters			
EMC		DIN EN 50083-2	
Operating temperature	[°C]	- 15 ... + 55	
Dimensions (W x H x D)	[mm]	215 x 145 x 85	
Weight	[kg]	app. 2,5	

* incl. AGC-Module min. 105, typ. 106 @P_{opt} = 0...-2dBm Technical changes, changed design and errors excepted.



LWO 303 / 313

Optical Fibre Deep Node



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- ultra low-noise front end
- high RF output power driven by GaAs push-pull hybride
- pluggable duplex filter
- output test port
- E 2000 (LWO 311) or SC / APC (LWO 301)
- optionally remote powered (LWF...)
- including AGC in the input plus control module (VZ 1018 + VZ 1020)

Type		LWO 303	LWO 313
Order number		212 306	212 313
Optical receiver			
Wavelength	[nm]	1290 ... 1600	
Input power	[dBm]	0 ... - 8	
Optical return loss	[dB]	> 40	
Equivalent input noise (EIN)	[pA/√Hz]	typ. 3,8 / max 4,5	
Maximum RF output level at 4,1% OMI according CENELEC 42; ≥ 60dB CSO CTB	[dBμV]	min.106, typ. 107 *	
Input attenuation (pad)	[dB]	0 ... 16	
Interstage attenuation (pad)	[dB]	0 ... 8	
Interstage slope (pad)	[dB]	0 ... 8	
Frequency range depending on duplex filter	[MHz]	40 / 85 ... 862	
Frequency flatness	[dB]	± 1,5	
Responsivity	[dBA/W]	57@1310nm without AGC / 55,5@1310nm with AGC	
RF Impedance	[Ω]	75	
RF Return loss	[dB]	18 @40 MHz – 1,5 dB / oct.	
Test point attenuation	[dB]	20	
AGC		intergrated	
Connector type		SC / APC	E2000
Common parameters			
EMC		DIN EN 50083-2	
Operating temperature	[°C]	- 15 ... + 55	
Dimensions (W x H x D)	[mm]	215 x 145 x 85	
Weight	[kg]	app. 2,5	

* incl. AGC-Module min. 105, typ. 106 @ P_{opt} = 0...-2dBm Technical changes, changed design and errors excepted.

LWO 304 / 314

Optical Fibre Deep Node



KLASSE
A
CLASS

- ultra low-noise front end
- high RF output power driven by GaAs push-pull hybride
- pluggable diplex filter
- output test port
- E 2000 (LWO 311) or SC / APC (LWO 301)
- optionally remote powered (LWF...)
- including AGC in the input (control module VZ 1020 or LWR... required)

Type		LWO 304	LWO 314
Order number		212 307	212 314
Optical receiver			
Wavelength	[nm]	1290 ... 1600	
Input power	[dBm]	0 ... - 8	
Optical return loss	[dB]	> 40	
Equivalent input noise (EIN)	[pA/√Hz]	typ. 3,8 / max 4,5	
Maximum RF output level at 4,1% OMI according CENELEC 42; ≥ 60dB CSO CTB	[dBμV]	min.106, typ. 107 *	
Input attenuation (pad)	[dB]	0 ... 16	
Interstage attenuation (pad)	[dB]	0 ... 8	
Interstage slope (pad)	[dB]	0 ... 8	
Frequency range depending on diplex filter	[MHz]	40 / 85 ... 862	
Frequency flatness	[dB]	± 1,5	
Responsivity	[dBA/W]	57@1310nm without AGC / 55,5@1310nm with AGC	
RF Impedance	[Ω]	75	
RF Return loss	[dB]	18 @40 MHz – 1,5 dB / oct.	
Test point attenuation	[dB]	20	
AGC		intergrated	
Connector type		SC / APC	E2000
Common parameters			
EMC		DIN EN 50083-2	
Operating temperature	[°C]	- 15 ... + 55	
Dimensions (W x H x D)	[mm]	215 x 145 x 85	
Weight	[kg]	app. 2,5	

* incl. AGC-Module min. 105, typ. 106 @P_{opt}= 0...-2dBm Technical changes, changed design and errors excepted.

LWR ...

Optical DFB return path transmitter

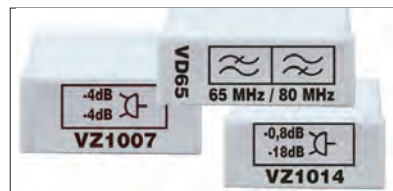


Type	LWR xxx	
Order number		212 xxx
RF Input frequency range	[MHz]	5 - 200
RF input level @OMI 15%	[dBμV]	typ. 70 (PAD for OMI setting)
RF Impedance	[Ω]	75
RF Return loss	[dB]	min. 18 / min 15@ >65 MHz
Wavelength / Optical output power	[nm] / [dBm]	see below
Optical return loss	[dB]	minimum 30
Relative Intensity Noise (RIN)	[dB/Hz]	typ. - 155, maximum 140
Test point attenuation	[dB]	0

Type	Order number	Optical output power	DWDM	CWDM	Wavelength
LWR 0D131	212 031	0 dBm	●		1310 nm
LWR 3D131	212 310	3 dBm	●		1310 nm
LWR 3D155	212 311	3 dBm	●		1550 nm
LWR 6D147	212 600	6 dBm		●	1470 nm
LWR 6D149	212 601	6 dBm		●	1490 nm
LWR 6D151	212 602	6 dBm		●	1510 nm
LWR 6D153	212 603	6 dBm		●	1530 nm
LWR 6D155	212 604	6 dBm		●	1550 nm
LWR 6D157	212 605	6 dBm		●	1570 nm
LWR 6D159	212 606	6 dBm		●	1590 nm
LWR 6D161	212 607	6 dBm		●	1610 nm

VZ .../ VD ...

Accessories for optical nodes



Type	Order number	Function
VZ 1007	416 002	output splitter 2-way
VD 33	216 653	diplexfilter 5 - 33 MHz
VD 65	216 652	diplexfilter 5 - 65 MHz
VZ 1018	212 319	AGC card
VZ 1020	212 312	control card for AGC only necessary if LWO is operated with AGC but without LWR...
VZ 1021	416 030	output tap -7 dB
VZ 1012	416 006	output tap -10 dB
VZ 1013	416 007	output tap -15 dB
VZ 1014	416 008	output tap -18 dB

LWO 201

Optical receiver for broadband TV- and radio signals in FTTH upgrade areas



KLASSE
A
CLASS

The FTTH (fibre to the home) node LWO 201 performs the opto-/electrical conversion of broadband TV- and radio signals in fibre to the home upgrade areas. Thanks to an extreme low-noise optical front end and a wide input power range a variable field of applications can be covered.

- variable operation thanks to wide input power range
- extreme low-noise optical receiver, best S/N values are reached
- output voltage optimized for the use in single and multifamily residences
- compact, space saving design
- high efficiency by an outstanding price-performance ratio

Type		LWO 201	LWO 211
Order number		212 211	212 212
Optical receiver			
Optical wavelength	[nm]	1290 ... 1600	
Optical input power	[dBm]	-12 ... 0	
Optical return loss	[dB]	45	
Equivalent input noise	[pA/√Hz]	typ. 3,8, max. 4,5	
Optical input		SC/APC	E2000
RF output			
Frequency range	[MHz]	40 ... 862	
Output voltage at 0 dBm input power	[dBμV]	min. 93, typ. 94 4% OMI, CENELEC 42 channels CTB/CSO ≥ 60dB	
Impedance	[Ω]	75	
Return loss	[dB]	≥ 18 @ 40 MHz, -1,5 / octave	
Connectors		F-female (RF output)	
Common parameters			
EMC		according EN 50083 T2 / A1	
Voltage supply	[V~]	230, 50 Hz	
Operating temperature	[°C]	- 15 ... + 55	
Dimensions (W x H x D)	[mm]	116,5 x 132 x 50	
Weight	[kg]	0,8	
Protection class		IP 20	

Technical changes, changed design and errors excepted.

LWE 21

Dual optical return path receiver



KLASSE
A
CLASS

- two independent, separately switchable optical receivers
- two single outputs or one combined output in the frequency range 5 - 65 MHz
- measurement function for the optical input power
- 19" housing (one RU)

Type		LWE 21
Order number		212 200
Optical receiver		
Optical input power	[dBm]	-11 ... +2 (max +4)
Optical wavelength	[nm]	1280 ... 1580 typ. 1310 / 1550
Optical return loss	[dB]	typ. 45 dB
Responsivity	[A/W]	0,8 ... 1
Optical connector		E2000
RF Parameters		
RF-bandwidth	[MHz]	5 ... 65
Impedance	[W]	75
Ripple	[dB]	+/- 0,75
Output level	[dBµV]	80 / 86
Output level testing point	[dBµV]	60 / 66
C/N	[dB]	49,5
Return loss on RF terminals	[dB]	19
Frequency of ALC pilot tone	[MHz]	590 ... 630
RF-connectors		IEC-female
Common Data		
Voltage supply	[V~]	100 ... 240
Operating temperature	[°C]	0 ... 40

LWM 11

Management system for LWS... and LWE 21



translation of RS 485 data to SNMP,
Ethernet & webbrowser, Ethernet protocol

Type		LWM 11
Order number		212 202

Technical changes, changed design and errors excepted.

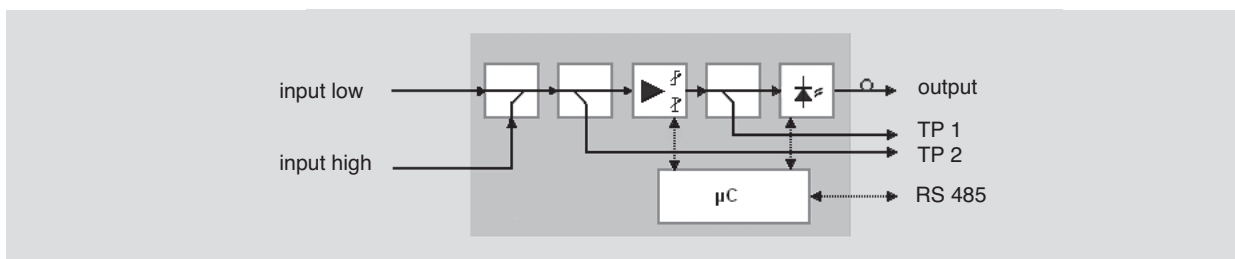
LWS 61

Optical transmitter



KLASSE
A
CLASS

- for conversion of electrical CATV input signals, as QAM, FM or AM-VSB, two optical output signals in the second optical window (1310 nm)
- low-noise DFB-laser-diode (output power 6 dBm)
- two inputs for different input levels
- slope, gain and output power can be adjusted electronically
- further types 1310 nm per request



Type		LWS 61
Order number		212 201
RF input parameters		
Frequency range	[MHz]	5 ... 1000
Input level Inputs single / coupled	[dBµV]	79 / 93
Gain adjustment	[dB]	0 ... 24
Slope adjustment	[dB]	-2 ... 16
Impedance	[W]	75
Return loss	[dB]	> 20 (bei / at 47 MHz); - 1,5 dB / oct.; min. 15
Testing point 1 attenuation	[dB]	20
Testing point 2 AC voltage for optical output power indication	[dBµV] [V/mW]	80 + 2Δ P _{opt} ± 2,0 dB @ OMI = 5% (AC) 0,1 +/- 0,02 (DC)"
Optical output parameters		
Optical output power / λ	[dBm]	6 / 1310 nm
Attenuation optical output power	[dB]	0 ... -3
Optical return loss	[dB]	> 45
C/N	[dB]	≥ 51 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
CSO	[dBc]	≥ 60 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
CTB	[dBc]	≥ 62 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
Common Data		
Voltage supply	[V~]	100 ... 240
Power consumption	[W]	≤ 11,5
Operating temperature	[°C]	0 ... 40

Technical changes, changed design and errors excepted.



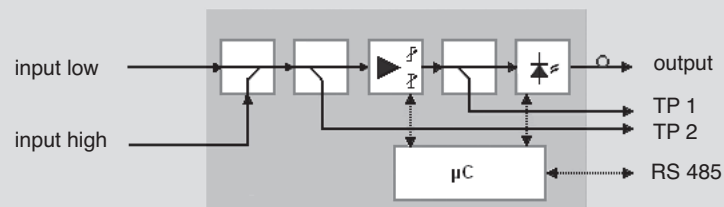
LWS 151

Optical transmitter



KLASSE
A
CLASS

- for conversion of electrical CATV input signals, as QAM, FM or AM-VSB, two optical output signals in the third optical window (1550 nm)
- low-noise DFB-laser-diode (output power 15 dBm)
- two inputs for different input levels
- slope, gain and output power can be adjusted electronically
- further types 1550 nm per request



Type		LWS 151
Order number		212 151
RF input parameters		
Frequency range	[MHz]	5 ... 1000
Input level Inputs single / coupled	[dBµV]	79 / 93
Gain adjustment	[dB]	0 ... 24
Slope adjustment	[dB]	-2 ... 16
Impedance	[W]	75
Return loss	[dB]	> 20 (bei / at 47 MHz); - 1,5 dB / oct.; min. 15
Testing point 1 attenuation	[dB]	20
Testing point 2 AC voltage for optical output power indication	[dBµV] [V/mW]	80 + 2Δ P _{opt} ± 2,0 dB @ OMI = 5% (AC) 0,1 +/- 0,02 (DC)"
Optical output parameters		
Optical output power / λ	[dBm]	15 / 1550 nm
Attenuation optical output power	[dB]	0 ... -3
Optical return loss	[dB]	> 45
C/N	[dB]	≥ 51 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
CSO	[dBc]	≥ 60 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
CTB	[dBc]	≥ 62 (Cenelec 42 channels; OMI = 4%; 20 km opt. fiber; P _{opt, in} = 0 dBm)
Common Data		
Voltage supply	[V~]	100 ... 240
Power consumption	[W]	≤ 11,5
Operating temperature	[°C]	0 ... 40

Technical changes, changed design and errors excepted.

LWV 171

Optical amplifier / EDFA



KLASSE
A
CLASS

- for amplification of optical input signals on single mode fibres, can be used in HFC- (Hybrid Fibre Coax) networks
- optical power output 17 dBm at 1550 nm
- optical input power, output power and pump laser current are supervised internally
- automatically switched-off in case of insufficient optical input power to prevent the optical PIN diode receiver from damage
- 19" housing (1 RU)



Type		LWV 171
Order number		212 171
Optical input parameters		
Optical wavelength	[nm]	1550 ± 10
Wavelength pump laser	[nm]	980 / 1480 (typ.)
Optical return loss	[dB]	> 40
Minimum optical input power	[dBm]	- 3
Maximum optical input power	[dBm]	+ 6
Optical connector		E2000
Optical output parameters		
Optical wavelength	[nm]	1550 ± 10
Optical output power	[dBm]	17
CSO with CENELEC 42	[dBc]	- 80
CTB with CENELEC 42	[dBc]	- 90
Optical connector		E2000
Common Data		
Interface		RS 485 (adapted to LVM 11)
Voltage supply	[V~]	100 ... 240
Power consumption	[W]	12
Operating temperature	[°C]	0 ... 40

Technical changes, changed design and errors excepted.



Optical passives

As an extension of the optical head end platform LWS and LWZ, ASTRO now added passive optical components to the product range for the first time. As first step, passive 8-way (LFT 8), 16-way (LFT 16) and 32-way (LFT 32) splitters will be offered. Those components are equipped with the proven SC/APC connectors and are available in a 19" version with one rack unit height.

- 19" rack mounting
- 1 rack unit
- including measurement protocol for each port
- SC / APC connectors

LFT 8

Optical splitter with 8 outputs



KLASSE
A
CLASS

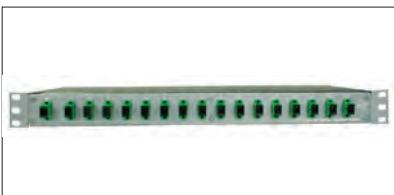
- 19" rack mounting
- 1 rack unit
- including measurement protocol for each port
- SC / APC connectors

Type		LFT 8
Order number		212 700
Optical parameters		
Optical wavelength	[nm]	1260 - 1620
Tap loss	[dB]	6 ± 0,5
Connector In-Outputs		SC/APC
Operating temperature	[°C]	-40 ... 85

Technical changes, changed design and errors excepted.

LFT 16

Optical splitter with 16 outputs



KLASSE
A
CLASS

- 19" rack mounting
- 1 rack unit
- including measurement protocol for each port
- SC / APC connectors

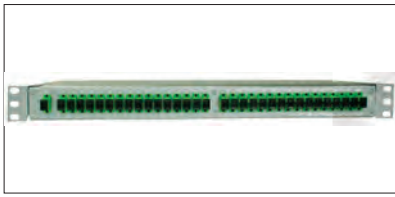
Type		LFT 16
Order number		212 701
Optical parameters		
Optical wavelength	[nm]	1260 - 1620
Tap loss	[dB]	13 ± 0,5
Connector In-Outputs		SC/APC
Operating temperature	[°C]	-40 ... 85

Technical changes, changed design and errors excepted.



LFT 32

Optical distributor with 32 outputs

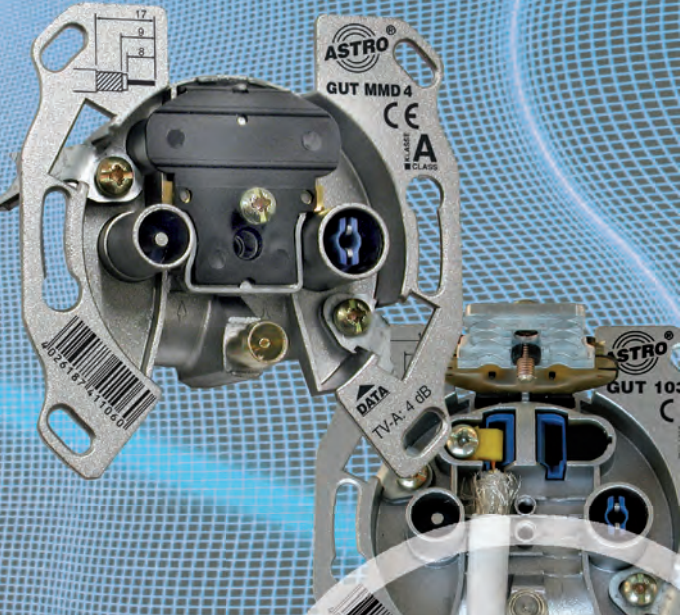


KLASSE
A
CLASS

- 19" rack mounting
- 1 rack unit
- including measurement protocol for each port
- SC / APC connectors

Type		LFT 32
Order number		212 702
Optical parameters		
Optical wavelength	[nm]	1260 - 1620
Tap loss	[dB]	16 ± 0,7
Connector In-Outputs		SC/APC
Operating temperature	[°C]	-40 ... 85

Technical changes, changed design and errors excepted.

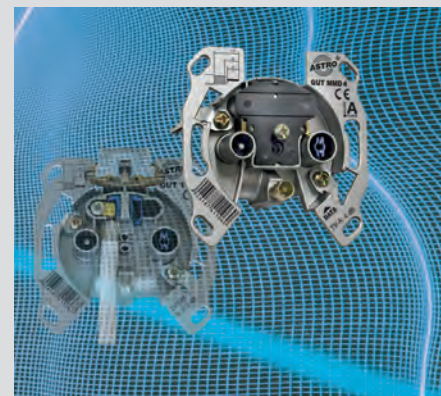


Passives

Wall outlets

High quality wall outlets for use in multimedia broadband systems and SAT-IF installations

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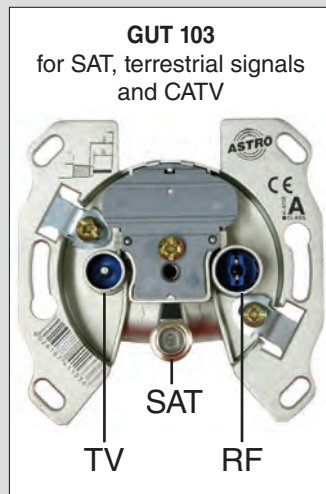
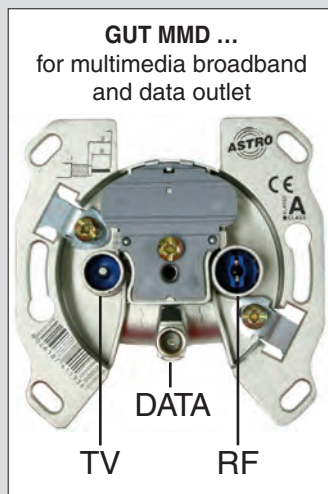
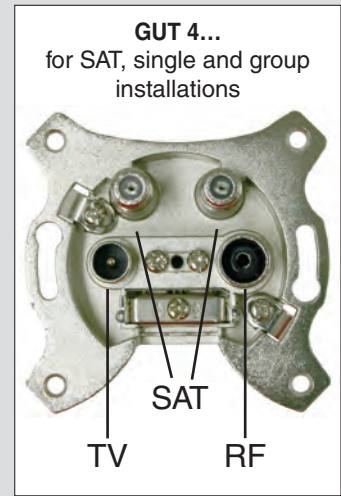
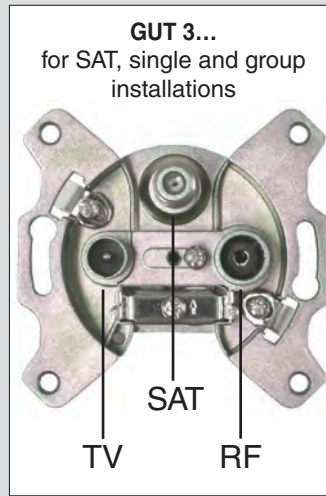
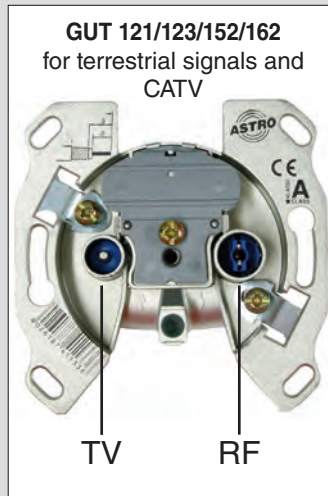
Splitters and taps

Materials for distribution in broadband systems and SAT-IF installations

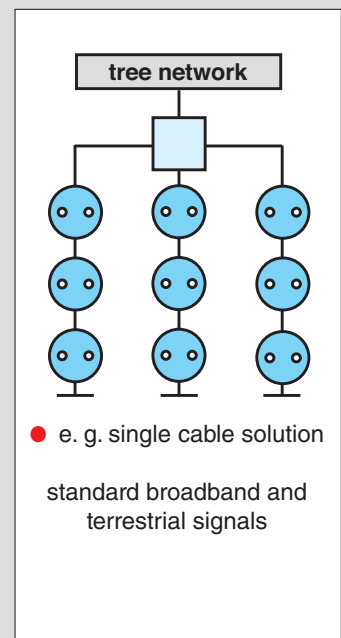
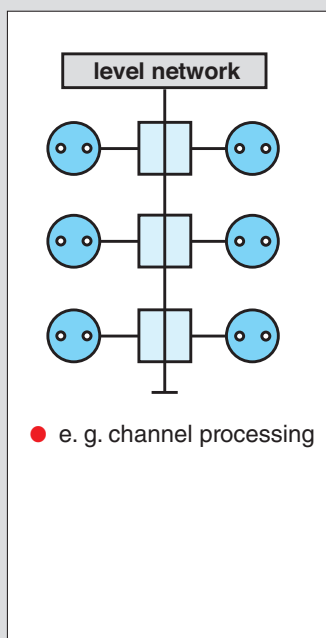
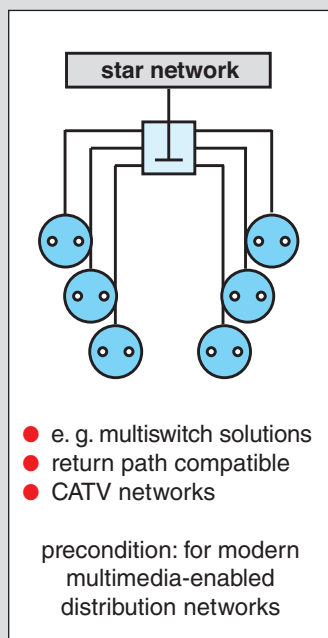
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GUT... wall outlet types



Net structures



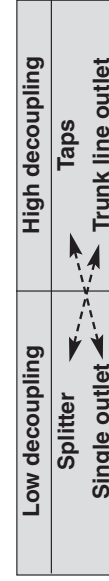
Which wall outlet for what purpose?

Type	Short description	Sort		Allocation of connectors				Application in broadband networks			Application in SAT networks		
		Stubline outlet	Trunk line outlet	IEC connector	IEC coupling	F-/Wfolic connector	with splitter	Single or with taps	Single and multitswitch	SEV 300/500	Twin-receiver = 2 cables		
GUT 103	3-jacks SAT single outlet	✓		TV	FM	SAT/DC							
GUT 121	Broadband single outlet	✓		TV	FM			•					
GUT 123	Broadband trunk line outlet		✓	TV	FM		•	•					
GUT 152	Broadband trunk line outlet		✓	TV	FM		•	•					
GUT 162	Broadband trunk line outlet		✓	TV	FM		•	•					
GUT 300	3-jacks SAT single outlet	✓		TV	FM	SAT/DC			•				
GUT 311	3-jacks SAT trunk line outlet		✓	TV	FM	SAT/DC-Block				•			
GUT 312	3-jacks SAT trunk line outlet		✓	TV	FM	SAT/DC-0.5A				•			
GUT 400	4-jacks SAT (TWIN)	✓		TV	FM	2x SAT/DC				•		•	
GUT MMD 4	Modem stubline outlet	✓		TV	FM	Modem		•					
GUT MMD 10	Modem end outlet		✓	TV	FM	Modem	•	•					
GUT MMD 13	Modem trunk line outlet		✓	TV	FM	Modem	•	•					
GUT MMD 15	Modem trunk line outlet		✓	TV	FM	Modem	•	•					
GUT MMD 17	Modem trunk line outlet		✓	TV	FM	Modem	•	•					
GUT MMD 19	Modem trunk line outlet		✓	TV	FM	Modem	•	•					
GUT MMD 22	Modem trunk line outlet		✓	TV	FM	Modem	•	•					

DC = direct voltage pass for receivers 14 and 18 Volt

- Broadband single outlets can only be applied at taps in the tap path, or if only one outlet is installed!
- End outlets are trunk line outlets with a 75 Ω termination resistor (= GUR 75/750)
- An end outlet must always be the last outlet in a trunk line or the only outlet.
- There must be adequate decoupling at every connector to avoid residual images or other distortion.

* If splitters are used, installed outlets may never be manipulated.



GUT 103

Stubline wall outlet (MATV / CATV / SAT)



KLASSE
A
CLASS

3-jacks wall outlet for reception of terrestrial, SAT-, radio- and TV-programs up to 2400 MHz

- cable channel compatibility, return path capability
- easy, fast and secure connection, even with different internal conductor diameters
- for standard and mini-coax cable
- with screw- and claw-fixing, mounting with 55 Ø wall boxes



adequate wall boxes,
see page 170

Type		GUT 103 Stubline outlet				
Order number		540 831				
Frequency range	[MHz]	5 - 2400				
	[MHz]	5 - 68	87,5 - 108	125 - 862	950 - 2400	
Tap loss						
Jack RF	[dB]	–	2 ±1,5	–	–	
Plug TV		1 ±1,5	–	2 ±1,5	–	
F jack SAT		–	–	–	2 ±1,5	
Return loss						
Input	[dB]	> 10	> 9	> 5	> 5	
Jack RF		–	> 8	–	–	
Plug TV		> 10	–	> 5	–	
F jack SAT		–	–	–	> 5	
Isolation						
RF – TV	[dB]	> 30	> 17	> 20	–	
TV – SAT		> 4 to 20 MHz > 10 at 20 MHz	–	> 10	> 9	
FM – SAT		–	> 25	–	> 30	

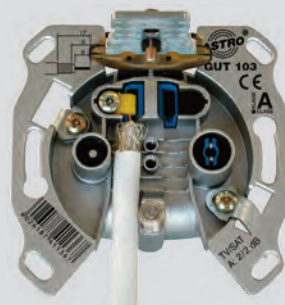
maximum 500 mA LNB current via F jack. Technical changes, changed design and errors excepted.

Screening

Frequency range	[MHz]	5 - 30	30 - 300	300 - 470	470 - 950	950 - 2400
Screening	[dB]	> 85	> 85	> 80	> 75	> 55

Advantages in relation to standard 3-jacks wall outlets

- easy cable mounting
- long F-plugs for easy fixing of F-connectors
- Made in Germany
- sophisticated mechanics for compliance of minimum bending radius
- EVERY outlet is checked and selected according to compliance with requested data.



GUT 300

Stubline wall outlet (MATV / CATV / SAT)



for reception of terr., SAT-, radio and TV-programs up to 2400 MHz, 3 outputs, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Type		GUT 300 Stubline outlet				
Order number		540 301				
Frequency range	[MHz]	40 - 2400				
	[MHz]	40 - 70	87,5 - 108	174 - 862	950 - 2150	2150 - 2400
Tap loss						
FM	[dB]	-	2 ± 1,5	-	-	-
TV		1 ± 1,5	-	2 ± 1,5	-	-
SAT		-	-	-	2 ± 1,5	3 ± 2
Return loss						
Input	[dB]	> 5	> 5	> 5	> 5	> 5
FM		-	> 8	-	-	-
TV		> 5	-	> 8	-	-
SAT		-	-	-	> 5	> 5
Isolation						
FM-TV / TV-SAT / FM-SAT	[dB]	> 20 / > 6 / > 30				

GUT 311

Trunk line wall outlet with DC Block (MATV / CATV / SAT)



for reception of terr., SAT-, radio and TV-programs up to 2400 MHz, 3 outputs, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Type		GUT 311 Trunk line outlet				
Order number		541 311				
Frequency range	[MHz]	40 - 2400				
	[MHz]	40 - 70	87,5 - 108	174 - 862	950 - 2150	2150 - 2400
Through loss						
	[dB]	2 ± 1	2 ± 1	2 ± 1	2,5 ± 1,5	3,5 ± 2,5
Tap loss						
FM	[dB]	-	11 ± 2	-	-	-
TV		11 ± 1,5	-	12,5 ± 1,5	-	-
SAT		-	-	-	12 ± 2	12,5 ± 2,5
Return loss						
Input output	[dB]	> 5	> 5	> 5	> 5	> 5
FM		-	> 8	-	-	-
TV		> 5	-	> 5	-	-
SAT		-	-	-	> 5	> 5
Isolation						
FM-TV / TV-SAT / FM-SAT	[dB]	> 20 / > 6 / > 30				

Technical changes, changed design and errors excepted.



GUT 312

Trunk line wall outlet with DC pass (MATV / CATV / SAT)



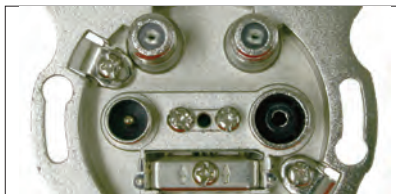
for reception of terrestrial, SAT-, radio and TV-programs up to 2400 MHz, 3 outputs, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Type		GUT 312 Trunk line outlet					
Order number		541 312					
Frequency range	[MHz]	40 - 2400					
	[MHz]	40 - 70	87,5 - 108	174 - 862	862 - 1750	1750 - 2400	
Through loss		[dB]	2 ± 1	2 ± 1	2 ± 1	3,5 ± 1,5	4 ± 2,5
Tap loss		[dB]					
FM			11 ± 2				
TV		11 ± 1,5		12,5 ± 1,5			
SAT					12 ± 2	12,5 ± 2,5	
Return loss		[dB]					
Input output		> 5	> 5	> 5	> 5	> 5	
FM			> 8				
TV		> 5		> 5			
SAT					> 5	> 5	
Isolation		[dB]	> 20 / > 6 / > 30				
FM-TV / TV-SAT / FM-SAT							

GUT 400

Stubline wall outlet with DC pass (MATV / CATV / SAT)



for reception of terrestrial, SAT-, radio and TV-programs up to 2400 MHz, 4 outputs, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Type		GUT 400 Stubline outlet					
Order number		540 400					
Frequency range	[MHz]	40 - 2400					
	[MHz]	40 - 70	87,5 - 108	174 - 862	950 - 2150	2150 - 2400	
Through loss		[dB]	2 ± 1	2 ± 1	2 ± 1	3,5 ± 1,5	4 ± 2,5
Attenuation		[dB]					
FM			1,5 ± 1				
TV		1,5 ± 1	typ.20	1,5 ± 1	typ.10		
SAT1		typ.10	10	typ.10	2,6 ± 1,5	typ.8	
SAT2		1 ± 0,5	1 ± 0,5	1 ± 0,5	1,5 ± 1	5 ± 2	
Return loss		[dB]					
Input SAT 1 / 2		> 6	> 6	> 6	> 4	> 4	
FM			> 6				
TV		> 6		> 5			
SAT 1 / SAT 2		- / > 10	- / > 10	- / > 10	> 4 / > 4	- / > 4	
Isolation		[dB]	typ. 20 / typ. 25				
Input SAT 1 / SAT 2							

GUT 121

Stubline wall outlet (MATV / CATV)

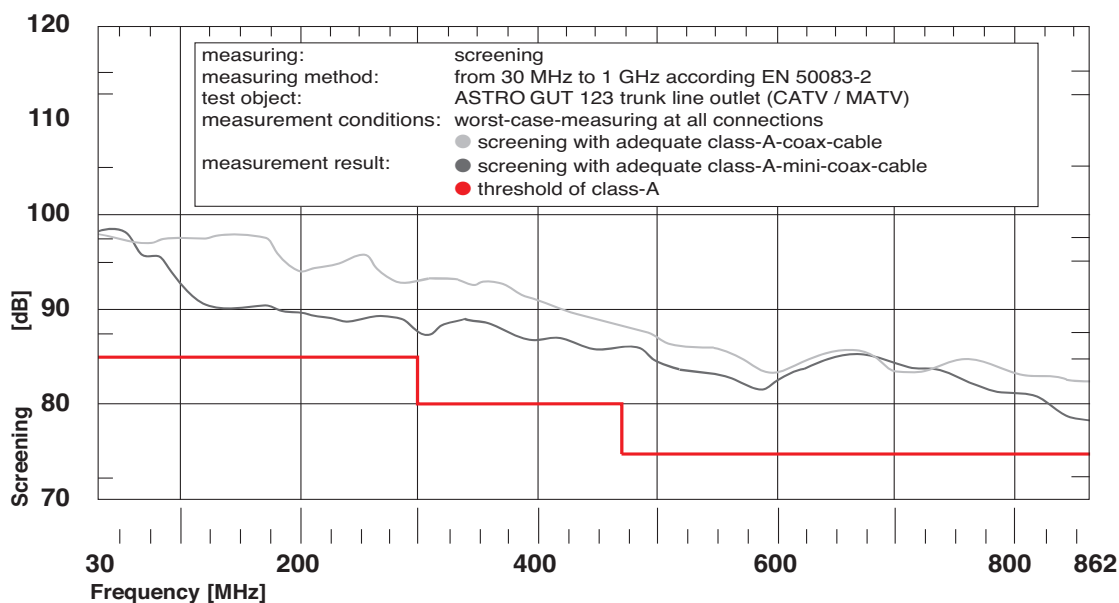


KLASSE **A**
CLASS

2 jacks wall outlet for reception of terrestrial radio and TV-programs

- stubline and trunk line outlets, frequency range 5 - 862 MHz
- suitable for special channels and return path
- easy, fast and secure connection even with different internal conductor diameters
- for standard coax- and minicoax-cable, improved reconnection technology
- outstanding electric parameters
- with screw- and claw-fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170



Type						GUT 121 Stubline outlet					
Order number				540 811							
Frequency range		[MHz]		5 - 862							
		[MHz]		5 - 65	87,5 - 108	47 - 470	470 - 862				
Tap loss											
Jack RF		[dB]		6 ± 0,5	5,5 ± 0,5	–	–				
Plug TV				2,4 ± 0,3	2,4 ± 0,3	2,4 ± 0,5	2,2 ± 0,3				
Return loss											
Input		[dB]		> 14	> 14	> 10	> 12				
Jack RF				–	> 14	–	–				
Plug TV				>14	> 14	> 14	> 14				
Isolation											
RF – TV		[dB]		> 22	> 25	> 25	> 50				

Technical changes, changed design and errors excepted.

GUT 123

Trunk line wall outlet (MATV / CATV)



for reception of terr., radio and TV-programs up to 862 MHz, 2 outputs and return path, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Typ		GUT 123 Trunk line outlet			
Order number		540 231			
Frequency range	[MHz]	5 - 862			
	[MHz]	5 - 65	87,5 - 108	47 - 470	470 - 862
Tap loss					
Jack RF	[dB]	–	12,5 ± 0,5	–	–
Plug TV		9 ± 0,5	9 ± 0,5	8,5 ± 1	8,5 ± 1
Through loss					
	[dB]	2,5 ± 0,2	2,5 ± 0,2	2,6 ± 0,2	2,8 ± 0,2
Return loss					
Trunk line input – output*	[dB]	> 18	> 18	> 14	> 14
Jack RF		–	> 14	–	–
Plug TV		> 14	> 14	> 12	> 12
Isolation					
Trunk line output – connectors	[dB]	> 30	> 35	> 30	> 28
RF – TV		> 22	> 25	> 25	> 50

* >12 dB over the complete range, if subscriber connector is not terminated

GUT 152

Trunk line wall outlet (MATV / CATV)



for reception of terr., radio and TV-programs up to 862 MHz, 2 outputs and return path, with screw and claw fixing, mounting with 55 Ø wall boxes

adequate wall boxes, see page 170

Typ		GUT 152 Trunk line outlet			
Order number		540 851			
Frequency range	[MHz]	5 - 862			
	[MHz]	5 - 65	87,5 - 108	47 - 470	470 - 862
Tap loss					
Jack RF	[dB]	–	15,5 ± 0,5	–	–
Stecker TV		12,2 ± 0,5	12,2 ± 0,5	12 ± 1	12,2 ± 1
Through loss					
	[dB]	0,8 ± 0,2	0,8 ± 0,2	0,9 ± 0,2	1,1 ± 0,2
Return loss					
Trunk line input – output	[dB]	> 18	> 18	> 18	> 15
Jack RF		–	> 14	–	–
Plug TV		> 14	> 14	> 12	> 12
Isolation					
Trunk line output – connectors	[dB]	> 30	> 35	> 30	> 28
RF – TV		> 22	> 25	> 25	> 50

Technical changes, changed design and errors excepted.

GUT 162

Trunk line wall outlet (MATV / CATV)



for reception of terr., radio and TV-programs up to 862 MHz, 2 outputs and return path, with screw and claw fixing, mounting with 55 Ø wall boxes



adequate wall boxes, see page 170

Typ		GUT 162 Trunk line outlet			
Order number		541 861			
Frequency range	[MHz]	5 - 862			
	[MHz]	5 - 65	87,5 - 108	47 - 470	470 - 862
Tap loss					
Jack RF Stecker TV	[dB]	- 14,3 ± 0,5	17,5 ± 0,5 14,3 ± 0,5	- 14 ± 1	- 14 ± 1
Through loss					
	[dB]	0,6 ± 0,2	0,6 ± 0,2	0,7 ± 0,2	0,9 ± 0,2
Return loss					
Trunk line input – output	[dB]	> 18	> 18	> 18	> 15
Jack RF		-	> 14	-	-
Plug TV		> 14	> 14	> 12	> 12
Isolation					
Trunk line output – connectors	[dB]	> 30	> 35	> 30	> 28
RF – TV		> 22	> 25	> 25	> 50

GUT 182

Trunk line wall outlet (MATV / CATV)



for reception of terr., radio and TV-programs up to 862 MHz, 2 outputs and return path, with screw and claw fixing, mounting with 55 Ø wall boxes



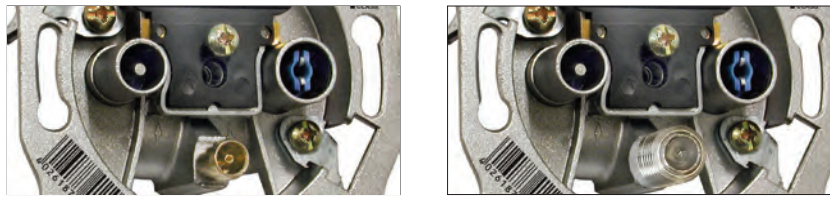
adequate wall boxes, see page 170

Typ		GUT 182 Trunk line outlet			
Order number		540 880			
Frequency range	[MHz]	5 - 862			
	[MHz]	5 - 65	87,5 - 108	47 - 470	470 - 862
Tap loss					
Jack RF Plug TV	[dB]	- 14,3 ± 0,5	21 ± 0,5 18 ± 0,5	- 18 ± 1	- 18 ± 1
Through loss					
	[dB]	0,6 ± 0,2	0,6 ± 0,2	0,7 ± 0,2	0,9 ± 0,2
Return loss					
Trunk line input – output	[dB]	> 18	> 18	> 18	> 15
Jack RF		-	> 14	-	-
Plug TV		> 14	> 14	> 12	> 12
Isolation					
Trunk line output – connectors	[dB]	> 30	> 35	> 30	> 28
RF – TV		> 22	> 25	> 25	> 50

Technical changes, changed design and errors excepted.

GUT MMD x, GUT MMD xF

Multimedia broadband and data outlets



KLASSE
A
CLASS

- very high isolation between data connection and TV/RF connection prevents disturbances in TV and radio reception by means of the cable modem
- WICLIC or F-connector jacks for cable modem prevent unwanted ingress caused by connecting a "second television"
- high beam strength via the radio jack by means of VHF band pass filter
- easy, fast and secure connection even with different internal conductor cross sections
- cable bend protection by chamfered housing
- solid die-cast housing

adequate wall boxes, see page 170

Common data		GUT MMD ...	
Isolation			
Modem to TV	(5 - 45 MHz)	[dB]	≥ 80
Modem to TV	(45 - 65 MHz)	[dB]	≥ 70
Modem to TV	(5 - 65 MHz)	[dB]	≥ 40
Common data			
Directivity		[dB]	≥ 30
Screening			class A acc. EN 50083-2
Intermodulation resistance			acc. EN 60728-4

Type	GUT MMD 4 / MMD 4F		GUT MMD 10 / MMD 10F	
Order number	540 140 / 540 141		541 110 / 541 111	
	Modem stubline outlet		Modem endpoint outlet	
Tap loss				
TV	(109 ¹⁾ - 1.000 MHz)	[dB]	maximum 4,3 ± 1	maximum 10 ± 1
Modem	(5 - 1.000 MHz) ²⁾	[dB]	maximum 4,3 ± 1	maximum 10 ± 1
FM	(87,5 ³⁾ - 108 ³⁾ MHz)	[dB]	maximum 8 ± 2	maximum 13,5 ± 2
Return loss				
Input	(5 - 862 MHz)	[dB]	≥ 16 ⁴⁾	≥ 16

¹⁾ additional attenuation max. 2 dB ²⁾ 87,5 - 108 MHz: + 2 dB ³⁾ additional attenuation max. 0,5 dB ⁴⁾ 87,5 - 125 MHz: according to EN 60728-4
 Technical changes, changed design and errors excepted.

Type		GUT MMD 13 / MMD 13F		GUT MMD 15 / MMD 15F	
Order number		540 130 / 540 131		541 115 / 541 151	
		Modem trunk line outlet			
Tap loss					
TV	(109 ¹⁾ - 1.000 MHz)	[dB]	maximum . 12,8 ± 1	maximum 15,3 ± 1	
Modem	(5 - 1.000 MHz) ²⁾	[dB]	maximum 12,8 ± 1	maximum 15 ± 1	
FM	(87,5 ³⁾ - 108 ³⁾ MHz)	[dB]	maximum 16,5 ± 2	maximum 18,5 ± 2	
Trunk via net loss					
		(5 - 1.000 MHz)	[dB]	maximum 1,8 ± 0,3	maximum 1,3 ± 0,3
Return loss					
		[dB]			
Input	(5 - 862 MHz)	[dB]	≥ 16		
Output	(5 - 862 MHz)	[dB]	≥ 16		

¹⁾ additional attenuation max. 2 dB ²⁾ 87,5 - 108 MHz: + 2 dB ³⁾ additional attenuation max. 0,5 dB

Type		GUT MMD 17 / MMD 17F		GUT MMD 19 / MMD 19F	
Order number		540 170 / 540 171		541 190 / 541 191	
		Modem trunk line outlet			
Tap loss					
TV	(109 ¹⁾ - 1.000 MHz)	[dB]	maximum 12,8 ± 1	maximum 15,3 ± 1	
Modem	(5 - 1.000 MHz) ²⁾	[dB]	maximum 12,8 ± 1	maximum 15 ± 1	
FM	(87,5 ³⁾ - 108 ³⁾ MHz)	[dB]	maximum 16,5 ± 2	maximum 18,5 ± 2	
Trunk via net loss					
		(5 - 1.000 MHz)	[dB]	maximum 1,8 ± 0,3	maximum 1,3 ± 0,3
Return loss					
		[dB]			
Input	(5 - 862 MHz)	[dB]	≥ 16		
Output	(5 - 862 MHz)	[dB]	≥ 16		

¹⁾ additional attenuation max. 2 dB ²⁾ 87,5 - 108 MHz: + 2 dB ³⁾ additional attenuation max. 0,5 dB

Type		GUT MMD 22 / MMD 22F			
Order number		540 220 / 540 221			
		Modem trunk line outlet			
Tap loss					
TV	(109 ¹⁾ - 1.000 MHz)	[dB]	maximum 22,2 ± 1		
Modem	(5 - 1.000 MHz) ²⁾	[dB]	maximum 22,2 ± 1		
FM	(87,5 ³⁾ - 108 ³⁾ MHz)	[dB]	maximum 26 ± 2		
Trunk via net loss					
		(5 - 1.000 MHz)	[dB]	maximum 0,9 ± 0,3	
Return loss					
		[dB]			
Input	(5 - 862 MHz)	[dB]	≥ 16		
Output	(5 - 862 MHz)	[dB]	≥ 16		

¹⁾ additional attenuation max. 2 dB ²⁾ 87,5 - 108 MHz: + 2 dB ³⁾ additional attenuation max. 0,5 dB

Technical changes, changed design and errors excepted.



HFT ...

Splitters and taps



KLASSE
A
CLASS

- top-quality distribution material for terrestrial frequencies up to 1000 MHz
- blocking capacitor at in- and outputs
- screening: class A

Common data		HFT ...
Screening		
30 - 300 MHz	[dB]	> 85
300 - 470 MHz	[dB]	> 80
470 - 862 MHz	[dB]	> 75
Common data		
Connectors	[dB]	standard F jack (F-female)
Screening		class A acc. EN 50083-2
Impedance	[Ω]	75

Type		HFT 2	HFT 3	HFT 4	HFT 6	HFT 8	
Order number		408 020	408 030	408 040	408 060	408 080	
		splitter					
Frequency range	[MHz]	5 ... 1000					
Through loss							
	5 - 20 MHz	[dB]	3,5 ± 0,5	5,3 ± 0,6	7,8 ± 0,8	9,2 ± 0,8	11,0 ± 0,8
	20 - 40 MHz	[dB]	3,5 ± 0,5	5,3 ± 0,6	7,8 ± 0,8	9,2 ± 0,8	11,0 ± 0,8
	40 - 300 MHz	[dB]	3,5 ± 0,5	5,3 ± 0,8	7,8 ± 0,8	9,2 ± 0,8	11,5 ± 0,2
	300 - 862 MHz	[dB]	3,5 ± 0,5	6,0 ± 1	7,8 ± 1	9,5 ± 1	12,0 ± 0,5
Return loss							
Input	5 - 20 MHz	[dB]	18	16	18	18	18
Output	5 - 20 MHz	[dB]	16	14	18	14	18
	20 - 40 MHz	[dB]	20	20	20	14	20
	40 - 300 MHz	[dB]	20*	24*	20*	20*	20*
	300 - 862 MHz	[dB]	20*	22*	20*	20*	20*

* at 40 MHz, -1,5 dB/Oct. Technical changes, changed design and errors excepted.

HFT ...
1-way taps



KLASSE
A
CLASS

- top-quality distribution material for terrestrial frequencies up to 1000 MHz
- blocking capacitor at in- and outputs
- screening: class A

Type			HFT 106	HFT 108	HFT 111	HFT 116	HFT 120
Order number			408 160	408 100	408 110	408 120	408 130
			1-way taps				
Frequency range	[MHz]		5 ... 1000				
Tab value							
Input-stub	5 - 862 MHz	[dB]	6,5 ± 1,5	8,5 ± 1,5	12,5 ± 1,5	16 ± 1,5	20 ± 1,5
Through loss							
In-output	5 - 862 MHz	[dB]	6,5 ± 1,5	8,5 ± 1,5	12,5 ± 1,5	16 ± 1,5	20 ± 1,5
Isolation							
Stub-output	5 - 40 MHz	[dB]	20	28	35	35	40
	40 - 470 MHz	[dB]	25	25	30	33	35
	470 - 862 MHz	[dB]	25	20	25	28	30
Return loss							
Input	5 - 20 MHz	[dB]	18	16	18	18	18
Output	5 - 20 MHz	[dB]	16	14	18	14	18
	20 - 40 MHz	[dB]	20	20	20	14	20
	40 - 300 MHz	[dB]	20*	24*	20*	20*	20*
	300 - 862 MHz	[dB]	20*	22*	20*	20*	20*

* at 40 MHz, -1,5 dB/Oct. Technical changes, changed design and errors excepted.



HFT ...
2-way taps



KLASSE
A
CLASS

- top-quality distribution material for terrestrial frequencies up to 1000 MHz
- blocking capacitor at in- and outputs
- screening: class A

Type			HFT 208	HFT 212	HFT 216	HFT 220
Order number			408 200	408 210	408 220	408 230
			2-way tap			
Frequency range	[MHz]		5 ... 1000			
Tap value						
Input-stub	5 - 862 MHz	[dB]	8,5 ± 1,5	12,5 ± 1,5	16 ± 1,5	20 ± 1,5
Through loss						
In-output	5 - 470 MHz	[dB]	3 ± 1	1,4 ± 0,8	1,2 ± 0,6	1,2 ± 0,6
In-output	470 - 862 MHz	[dB]	3,8 ± 1	2 ± 1	2 ± 0,8	1,8 ± 0,8
Isolation						
Stub-output	5 - 470 MHz	[dB]	20	25	30	32
Stub-output	470 - 862 MHz	[dB]	18	20	20	22
Isolation						
Stub-stub	5 - 470 MHz	[dB]	28	40	40	40
Stub-stub	470 - 862 MHz	[dB]	25	36	36	36
Return loss						
Input	5 - 40 MHz	[dB]	18	18	18	18
Input	40 - 862 MHz	[dB]	20*	20*	20*	20*
Return loss						
Output	5 - 40 MHz	[dB]	18	18	18	18
Output	40 - 862 MHz	[dB]	20*	20*	20*	20*
Return loss						
Stub	5 - 40 MHz	[dB]	18	18	18	20
Stub	40 - 862 MHz	[dB]	20*	20*	20*	20*

* at 40 MHz, -1,5 dB/Oct. Technical changes, changed design and errors excepted.

HFT 416, HFT 618, HFT 820

4- / 6- / 8-way taps asymmetrical



KLASSE
A
CLASS

- top-quality distribution material for terrestrial frequencies up to 1000 MHz
- blocking capacitor at in- and outputs
- screening: class A

Type			HFT 416	HFT 618	HFT 820
Order number			408 200	408 210	408 220
			4-way tap	6-way tap	8-way tap
Frequency range	[MHz]		5 ... 1000		
Through loss					
In-output	5 - 470 MHz	[dB]	4,5 ± 1	6,8 ± 0,8	8,8 ± 0,6
In-output	470 - 862 MHz	[dB]	4,8 ± 1	7,5 ± 1	9,5 ± 0,8
Isolation					
Stub-output	5 - 40 MHz	[dB]	25	25	25
Stub-output	40 - 470 MHz	[dB]	22	22	22
Stub-output	470 - 862 MHz	[dB]	20	20	20
Isolation					
Stub-stub	5 - 470 MHz	[dB]	40	40	40
Stub-stub	470 - 862 MHz	[dB]	36	36	36
Return loss					
Input	5 - 20 MHz	[dB]	14	14	14
Input	20 - 862 MHz	[dB]	20*	20*	20*
Return loss					
Output	5 - 20 MHz	[dB]	16	16	16
Output	20 - 862 MHz	[dB]	20*	20*	20*
Return loss					
Stub	5 - 20 MHz	[dB]	16	16	16
Stub	20 - 862 MHz	[dB]	20*	20*	20*
Tap value					
Output 1	5 - 862 MHz	[dB]	13 ± 1,5	13 ± 1,5	13 ± 1,5
Output 2	5 - 862 MHz	[dB]	13,5 ± 1,5	13,5 ± 1,5	13,5 ± 1,5
Output 3	5 - 862 MHz	[dB]	15 ± 1,5	15 ± 1,5	15 ± 1,5
Output 4	5 - 862 MHz	[dB]	15,5 ± 1,5	15,5 ± 1,5	15,5 ± 1,5
Output 5	5 - 862 MHz	[dB]	—	17,5 ± 1,5	17,5 ± 1,5
Output 6	5 - 862 MHz	[dB]	—	18 ± 1,5	18 ± 1,5
Output 7	5 - 862 MHz	[dB]	—	—	20 ± 1,5
Output 8	5 - 862 MHz	[dB]	—	—	20,5 ± 1,5

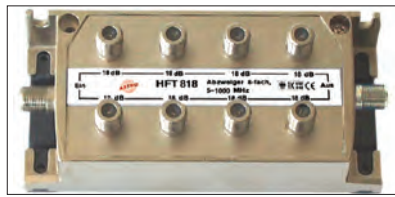
* at 40 MHz,-1,5 dB/Oct.; detailed attenuation values according to frequency range per request

Technical changes, changed design and errors excepted.



HFT 411, HFT 616, HFT 818

Symmetrical taps



KLASSE
A
CLASS

- top-quality distribution material for terrestrial frequencies up to 1000 MHz
- blocking capacitor at in- and outputs
- suitable for return path and UHF
- EN 50083-1, EN 50083-2 (screening: class A)
- unused tap-outputs in return path networks have to be terminated with termination resistor (FUR 75 order number: 610770)

Type			HFT 411	HFT 616	HFT 818
Order number			408 411	408 616	408 818
			4-way tap	6-way tap	8-way tap
Frequency range	[MHz]		5 ... 1000		
Tap value					
	[dB]		11 / 12	16	18
Through loss					
In-Output	5 - 40 MHz	[dB]	—	5,7	7,8
In-Output	40 - 470 MHz	[dB]	—	5,7	7,2
In-Output	470 - 862 MHz	[dB]	—	5,7	8
In-Output	862 - 1000 MHz	[dB]	—	6	8
Isolation					
Output-output	5 - 40 MHz	[dB]	≥ 36	≥ 36	≥ 36
Output-output	40 - 470 MHz	[dB]	≥ 38	≥ 40	≥ 40
Output-output	470 - 862 MHz	[dB]	≥ 32	≥ 36	≥ 36
Output-output	862 - 1000 MHz	[dB]	≥ 30	≥ 32	≥ 32
Directivity					
	5 - 40 MHz	[dB]	—	≥ 26	≥ 26
	40 - 470 MHz	[dB]	—	≥ 30	≥ 30
	470 - 1000 MHz	[dB]	—	≥ 26	≥ 26
Return loss					
	5 - 40 MHz	[dB]	≥ 18	≥ 16	≥ 16
	40 - 1000 MHz	[dB]	≥ 20*	≥ 20*	≥ 20*

* at 40 MHz, -1,5 dB/Oct. Technical changes, changed design and errors excepted.

HFD 2, HFD 3, HFD 4, HFD 8

2- / 3- / 4- / 8-way SAT splitters



KLASSE
A
CLASS

- top-quality distribution material for frequencies up to 2400 MHz
- for use in CATV and SAT-IF-systems
- EN 50083-1, EN 50083-2 (screening: class A)
- HFD 2 with power pass to all ports
- HFD 3 - HFD 8 with power pass to one port, 24 V / 0,5 A max.

Type		HFD 2	HFD 3	HFD 4	HFD 8	
Order number		414 200	414 300	414 400	414 800	
		2-way splitter	3-way splitter	4-way splitter	8-way splitter	
Frequency range	[MHz]	5 ... 2400				
Through loss						
5 - 40 MHz	[dB]	4,0	8,0	11	13,5 ± 2,5	
40 - 1000 MHz	[dB]	5,0	8,0	10	13,5 ± 1,5	
1000 - 1750 MHz	[dB]	5,5	10,0	10,5	14 ± 2,0	
1750 - 2050 MHz	[dB]	6,0	10,5	11,5	16 ± 2,0	
- 2400 MHz	[dB]	8,0	12,0	13,5	17 ± 2,0	
Isolation loss						
5 - 40 MHz	[dB]	10	13	13	11	
40 - 1000 MHz	[dB]	20	21	21	18	
1000 - 1750 MHz	[dB]	20	17	17	16	
1750 - 2050 MHz	[dB]	15	15	15	14	
- 2400 MHz	[dB]	10	10	10	14	
Return loss						
In- / outputs	5 - 40 MHz	[dB]	10 / 9	8 / 6	7 / 7	10
In- / outputs	40 - 1000 MHz	[dB]	12 / 10	12 / 10	12 / 10	12
In- / outputs	1000 - 1750 MHz	[dB]	10 / 8	10 / 10	10 / 10	8
In- / outputs	1750 - 2050 MHz	[dB]	10 / 8	10 / 8	10 / 8	8
In- / outputs	- 2400 MHz	[dB]	7 / 7	7 / 5	7 / 7	8

Technical changes, changed design and errors excepted.



HFD 111, HFD 212

SAT taps



KLASSE
A
CLASS

- top-quality distribution material for frequencies up to 2400 MHz
- for use in CATV and SAT-IF-systems
- EN 50083-1, EN 50083-2 (screening: class A)
- HFD 111 – HFD 212 with power pass to one port, 24 V / 1 A max.

Type		HFD 111			HFD 212		
Order number		414 140			414 150		
		1-way tap			2-way tap		
Frequency range	[MHz]	5 ... 2400					
Through loss							
5 - 40 MHz	[dB]	10,5			10,5		
40 - 1000 MHz	[dB]	10,5			11,0		
1000 - 2050 MHz	[dB]	12,0			11,5		
2050 - 2400 MHz	[dB]	13,5			13,0		
Isolation loss							
		stub / trunk			stub / trunk		stub / stub
5 - 40 MHz	[dB]	10,5			17		15
40 - 1000 MHz	[dB]	10,5			25		30
1000 - 2050 MHz	[dB]	12,0			20		25
2050 - 2400 MHz	[dB]	13,5			15		20
Return loss							
		input	output	stub	input	output	stub
5 - 40 MHz	[dB]	11	13	5	8	10	5
40 - 1000 MHz	[dB]	14	12	14	14	14	13
1000 - 2050 MHz	[dB]	14	10	14	15	15	12
2050 - 2400 MHz	[dB]	8	10	10	8	10	10

Technical changes, changed design and errors excepted.



Terrestrial technology

DVB-T Aerials

for reception of digital terrestrial TV- and radio-programs

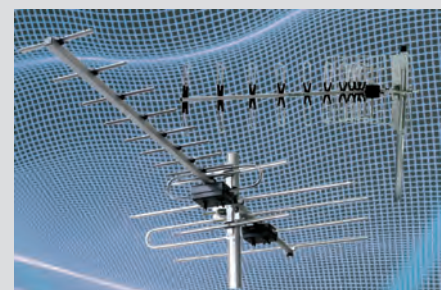
page **162**



Aerials

The wide range of ASTRO aerials offers solutions for all reception requirements.

page **162**



Antenna duplexers

for mast and indoor mounting to combine antenna cables

page **164**



Broadband amplifiers

for community aerials, separate inputs for band I - V

page **164**



ADI 3, ADO 1

Active digital antennas



- for digital terrestrial TV- and radio-programs according to DVB-T standard
- remote supply 5 V via receiver or power supply diplexer SSW 11

see page 167

Type		ADI 3	ADO 1
Order number		300 911	300 901
		indoor	outdoor
Frequency range	[MHz]	174 - 862, channel 5 - 69	
Gain	[dB]	3 - 14	10 - 17
Connectors		IEC jacks	

Technical changes, changed design and errors excepted.

VE 312

VHF / UHF (BIII / BIV-V) antenna



- for digital terrestrial TV- and radio-programs according to DVB-T

Type		VE 312
Order number		040 640
Frequency range	[MHz]	VHF 174 - 230, channel 5 - 12 / UHF 470 - 838, channel 21 - 66
Elements		VHF 3 / UHF 12
Gain	[dB]	VHF 4,5 - 6 / UHF 6,5 - 11,5
Front-to-back-ratio	[dB]	VHF 14 - 17 / UHF 19 - 23
Beamwidth	[°]	VHF hor. 78 - 72, vert. 63 - 36 / UHF hor. 63 - 36, vert. 88 - 47
Windload	[N]	52
Length	[cm]	141
Connectors		screw clamps, coaxial

Technical changes, changed design and errors excepted.

UVX 43 C, UVX 91 C

UHF (BIV-V) channel-group antennas



- for digital terrestrial TV- and radio-programs according to DVB-T standard

Type		UVX 43 C	UVX 91 C
Order number		012 520	012 620
Frequency range	[MHz]	UHF 470 - 838, channel 21 - 66	
Elements		43	91
Gain	[dB]	9 - 15,5	11 - 17
Front-to-back-ratio	[dB]	24 - 30	24 - 33
Beamwidth	[°]	hor. 49 - 26, vert. 57 - 32	hor. 44 - 21, vert. 49 - 23
Windload	[N]	89	148
Length	[cm]	129	225
Connectors		screw clamps, coaxial	

Technical changes, changed design and errors excepted.

RUF 21, UK 3, UK 5

FM (LMKU / BII) stereo directional antennas



- for terrestrial analogue radio-programs

Type		RUF 21	UK 3	UK 5
Order number		000 210	002 200	002 500
Frequency range	[MHz]	UKW 87,5 - 108		
Elements		1	3	5
Gain	[dB]	0	4,5 - 5,5	6 - 8
Front-to-back-ratio	[dB]	—	13 - 17	14 - 18
Beamwidth	[°]	ring dipole	hor. 78 - 72, vert. 115	hor. 65 - 72, vert. 195
Windload	[N]	29	62	93
Length	[cm]	Ø 49	93	181
Connectors		screw clamps, coaxial		

Technical changes, changed design and errors excepted.



AZX 13, ADX 32, HMW 13

Antenna duplexers



- AZX, ADX: outdoor duplexers for mast mounting, waterproof plastic case

Type		AZX 13	ADX 32	HMW 13
Order number		108 130	120 320	112 130
1. input				
Frequency range	[MHz]	47 - 230 (B I - III)	47 - 68 (B I)	-452 (B I - III / SC)
Through loss	[dB]	0,5	0,5	0,5 - 1,5
2. input				
Frequency range	[MHz]	470 - 862 (B VI - V)	174 - 230 (B III)	(B IV - V)
Through loss	[dB]	1,5	0,5	0,5 - 1,5
3. input				
Frequency range	[MHz]	—	470 - 862 (B VI - V)	—
Through loss	[dB]	—	1,5	—
Connectors		screw clamps, coaxial		F jack

Technical changes, changed design and errors excepted.

AC 30, AC 35, AC-UKW

Broadband amplifiers, FM amplifiers

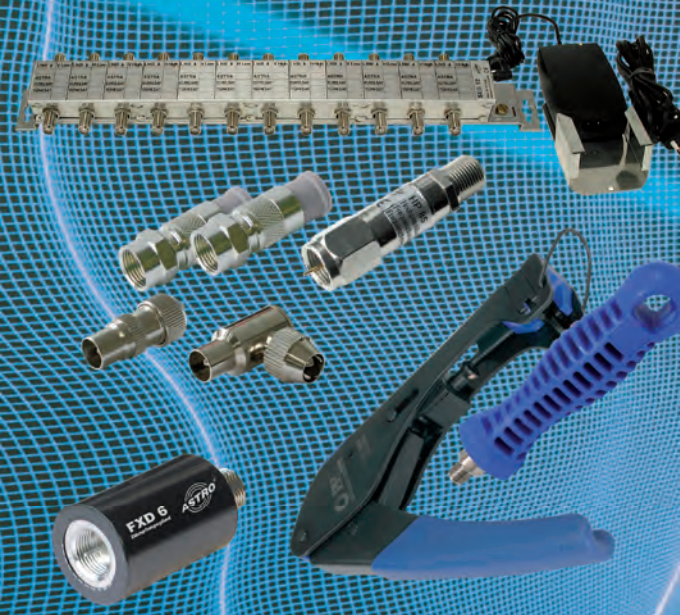


KLASSE
A
CLASS

- for use in small-sized up to middle-sized installations

Type			AC 30	AC 35	AC-UKW
Order number			230 300	230 350	262 021
Gain					
B I	(C 2 - 4)	[dB]	30	35	—
B II	(UKW / FM)	[dB]	30	35	18 ± 1
B III	(C 5 - 12)	[dB]	30	35	—
B IV - V	(C 21 - 69)	[dB]	30	35	—
Maximum output level					
60 dB IMA2, EN 50083-3		[dBμV]	114	117	—
66 dB KMA, EN 50083-5		[dBμV]	114	116	112 (60 dB KMA)
Level control		[dB]	0 - 10	0 - 15 interstage	0 - 10
Noise figure		[dB]	5 - 7	5 - 4	4
Power supply		[V~ / Hz]	100 - 240, 50, 8 W	100 - 240, 50, 12 W	100 - 240, 50, 1,8 VA
Connectors		[Ω]	F jack, 75		

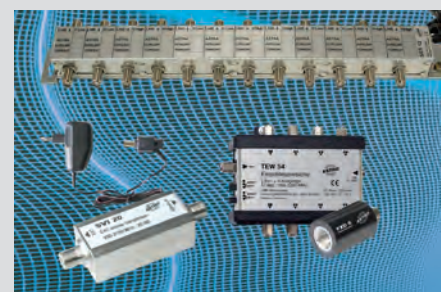
Technical changes, changed design and errors excepted.



Accessories

Accessories for
SAT- and broadband
installation

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Connectors / Cables /
Tools

page **168**



SES 12

Power supply earthing bars



power supply for up to 12 LNBs, LNB inputs short-circuit-proof, outputs DC decoupled, power supply with power LED

Type		SES 12
Order number		310 090
Frequency range	[MHz]	950 - 2200
Isolation	[dB]	> 30
Through loss	[dB]	≤ 1
Return loss	[dB]	> 12
Connectors	[Ω]	12 In- outputs, F jack, 75
Remote current per input	[mA]	450
Remote supply	[V / A]	19, maximum 3

SVP 20

Overvoltage protection



for protection of devices, mechanically compatible for multiswitches of the AMS / SAM-series



see page 13

Type		SVP 20
Order number		310 121
Frequency range	[MHz]	5 - 2150
Through loss	[dB]	≤ -1
Maximum voltage	[V-DC]	18
Connectors	[Ω]	In- Outputs, F jack, 75

SSW 11

Power supply diplexer



for remote powering of active DVB-T antennas

Type		SSW 11
Order number		350 121
Frequency range	[MHz]	47 - 862
Through loss	[dB]	1 - 2 typ.
Output voltage	[V-]	5 (50 mA)
Connectors	[Ω]	In- Output, IEC jack, 75

Technical changes, changed design and errors excepted.

SVI 20

SAT inline amplifier



Type		SVI 20
Order number		340 200
Frequency range	[MHz]	950 - 2150
Gain	[dB]	12 ... 20
Power supply	[V]	11 - 20 (5 mA)
DC-power pass	[mA]	maximum 500
Connectors	[Ω]	In- Outputs, F jack, 75

Technical changes, changed design and errors excepted.



FDS 04, FDS 07, FDS 11

F-connectors



to be screwed onto coaxial cable

Type		FDS 04	FDS 07	FDS 11
Order number		620 240	620 270	620 110
for cable Ø	[mm]	3,6 - 4,0	6,6 - 7,0	10,0 - 10,3

Technical changes, changed design and errors excepted.

FCS 07, FDS 11

F-crimp-plugs



to be crimped onto coaxial cable by means of a crimp-gripper

Type		FCS 07	FCS 11
Order number		620 070	620 090
for cable Ø	[mm]	6,6 - 7,0	10,0 - 11,0

Technical changes, changed design and errors excepted.

FKS 03, FKS 06

F-compression-plugs



to be pressed onto coaxial cable by means of a compression-gripper

Type		FKS 03	FKS 06
Order number		620 230	620 281
for cable Ø	[mm]	CSA 9539 (Midicoax)	6,6 - 7,0

Technical changes, changed design and errors excepted.

IKB 06, IKS 06

IEC-compression-jacks, IEC-compression-connectors



IEC-connectors to be pressed on to coaxial cable by means of a compression-gripper, for use with cables CSA 9511A HF, CSA 9511A

Type		IKB 06	IKS 06
Order number		620 261	620 260

Technical changes, changed design and errors excepted.

FSS 07, FSS 07 Q

F-double-plugs



FSS 07: two F-female plugs with screwing
FSS 07 Q: two F-female plugs to be plugged on Quick-connectors for connection of cascable multiswitches

Type	FSS 07	FSS 07 Q
Order number	620 340	620 350

Technical changes, changed design and errors excepted.

FBB 07, FBB 07 prof

F-double-jacks



F-jack on both sides

Type	FBB 07	FBB 07 prof
Order number	620 330	620 331

Technical changes, changed design and errors excepted.

FAI 01, FAI 02

Adapter, F-connector to IEC



FAI 01: IEC- plug to F-jack
FAI 02: F-plug to IEC-jack

Type	FAI 01	FAI 02
Order number	620 060	620 061

Technical changes, changed design and errors excepted.

FUR 75, FUR 75 DC

F-plug-termination resistor 75 Ω



FUR 75 DC with DC-block

Type	FUR 75	FUR 75 DC
Order number	610 770	610 771

Technical changes, changed design and errors excepted.



GUR 750

Termination resistor for GUT 1..-series



to be plugged into trunk line outlets, to make them usable as end outlets in trunk lines

Type	GUR 750	
Order number		610 760

Technical changes, changed design and errors excepted.

GUS ..., GUZ ...

surface mounting frames, cover plates



Type	GUS 40	GUS 400
Order number	610 500	610 501
Function	mounting frames	mounting frames
Colour	electro white	pure white

Type	GUZ 40	GUZ 45	GUZ 44
Order number	610 500	610 501	
Function	2-jacks cover	3-jacks cover	4-jacks cover
Colour	electro white		

Type	GUZ 400	GUZ 450
Order number	610 500	610 501
Function	2-jacks cover	3-jacks cover
Colour	pure white	

Technical changes, changed design and errors excepted.

KRZ 05

Compression-gripper



gripper for easy connection of compression-plugs to coaxial cable with 6,6 – 7,0 mm Ø

Type	KRZ 05	
Order number		718 360
for	FKS 03, FKS 06, IKS 06, IKB 06	

Technical changes, changed design and errors excepted.

KRA 03

Cablestripper



tool for easily strip coaxial cable 4,5 - 6,5 mm Ø

Type	KRA 03
Order number	718 350
for	FDS 04, FDS 07, FCS 07, FKS 06

FDK 06

Turning knob



tool for easily positioning F-plugs on coax-cable before crimping or fixing compression plugs

Type	FDK 06
Order number	718 371
for	FDS 04, FDS 07, FCS 07, FKS 06

KR-SET

Compression-plugs-kit



Consisting of:

- 1 x KRA 03 cablestripper
- 100 x FKS 06 compression plugs
- 1 x KRZ 05 compression-gripper
- 1 x tool box made from impact resistant and shockproof polypropylene

Type	KR-Set
Order number	718 000

KRZ-SET prof

Compression-plugs-kit



Consisting of:

- 1 x professional cablestripper
- 1 x professional compression-gripper
- 1 x tool box made from impact resistant and shockproof polypropylene

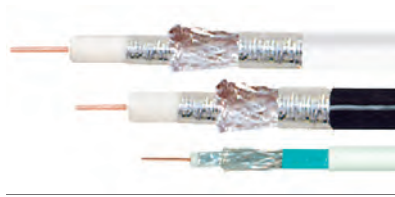
Type	KRZ-Set prof
Order number	718 001

Technical changes, changed design and errors excepted.



CSA ...

House installation cable for terrestrial TV, cable-TV and satellite



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Common features:

- suitable for analogue and digital signals as well as HDTV
- screening factor and transfer impedance in the whole frequency range according class A or better (EN 50117)
- 3-way screening / length marks
- PE cable, gas-foamed dielectric for low attenuation values
- very good return loss values in the satellite frequency range
- excellent price-performance ratio
- suitable ASTRO plugs: FDS 07, FCS 07, FKS 06, IKB 06 and IKS 06 (for CSA 9511A / CSA 9511A HF) and FKS 03 for CSA 9539

Features CSA 9511 AHF:

- Halogen-free cables are flame retardant and can be installed in modern buildings with big gatherings, like train stations, airports, museums, congress halls and department stores.
- 3-way screening (2 x AL foil + CuSn braid)
- available in 100 m including cable reel

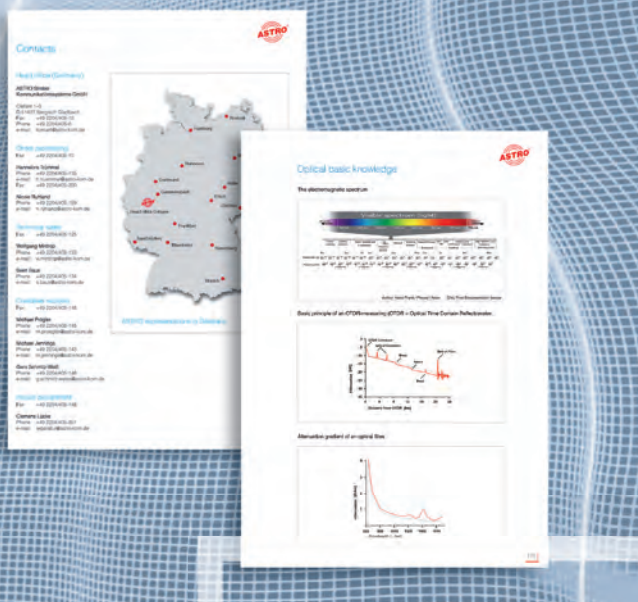
Features CSA 9539:

- Midi-coax-cable, Ø 4,5 mm
- 3-way screening (1 x Al foil + Al braid + 1 x Al foil)
- KDG certified

Type		CSA 9511 A	CSA 9511 A HF	CSA 9539
Order number		750 952 (100 m) 750 955 (250 m) 750 953 (500 m)	750 956 (100 m)	750 938 (305 m)
Inner conductor Cu blank / massive	[ø mm]	1,13	1,13	0,61
Isolation PEE gas foamed	[ø mm]	4,80	2,72	
Jacket / PVC	[ø mm]	6,90	6,90	4,50
Minimal bending radius	[mm]	35	35	45
Impedance	[Ω]	75,0 ± 3,0	75,0 ± 3,0	75,0 ± 3,0
Attenuation @ 20°C / 68°F				
55 MHz	[dB/100m]	4,2	4,2	8,0
230 MHz		8,0	8,0	15,4
300 MHz		9,8	9,8	17,5
500 MHz		12,1	12,1	22,8
860 MHz		17,0	17,0	30,3
1000 MHz		19,3	19,3	32,8
1800 MHz		26,3	26,3	44,5
2150 MHz		29,7	29,7	48,8
2400 MHz		—	—	51,8
Screening factor				
Coupling resistance				
5 - 30 MHz	[dB]	< 2 mΩ / m	< 2 mΩ / m	< 5 mΩ / m
30 - 1000 MHz		> 108	> 108	> 95
1000 - 2400 MHz		> 98	> 98	> 98

Technical changes, changed design and errors excepted.

Common information



EMC / Level limits
Product labelling

page **174**

Optical basic knowledge

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Channels and frequencies

page **176**

Glossary

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Terms and Conditions of Delivery
and Payment

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Contacts

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EMC-limits

For **active** devices the following values for maximum acceptable **spurious radiation** are valid according to DIN EN 50083-2/A1:

30 - 1000 MHz	20 dBpW (39 dB μ V/75 Ω)
1000 - 2500 MHz	43 dBpW (62 dB μ V/75 Ω)

For **passive** devices the following values limits for **screening** are valid according to DIN EN 50083-2/A1:

Frequency range (MHz)	Screening (dB)	
	Class A	Class B
30 - 300	85	75
300 - 470	80	75
470 - 1000	75	65
1000 - 3000	55	55

Level limits

Level limits at the receiving port

Range	minimum	maximum
FM	40 dB μ V mono / 50 dB μ V stereo	70 dB μ V
F I	60 dB μ V	80 dB μ V
F III	60 dB μ V	80 dB μ V
F IV/V	60 dB μ V	80 dB μ V
SAT-IF	60 dB μ V	77 dB μ V

Product labelling



By the **CE** mark of conformity **ASTRO** approves the conformity of products with the standards DIN EN 50083-1 and A1, DIN EN 50083-2 and A1 and DIN EN 60065 where applicable. The labelling can be found in the catalogue, on the product – if possible -, on the package and in user manuals and application notes.



Products are labelled with the Class A label, when they comply with the demanding screening requests of Class A in the amendment of DIN EN 50083-2. The labelling can be found in the catalogue, on the product – if possible -, on the package and in user manuals and application notes.

For active devices the Class A label also documents the compliance with the amendment A1.

The labelling can be found in the catalogue and on the package.

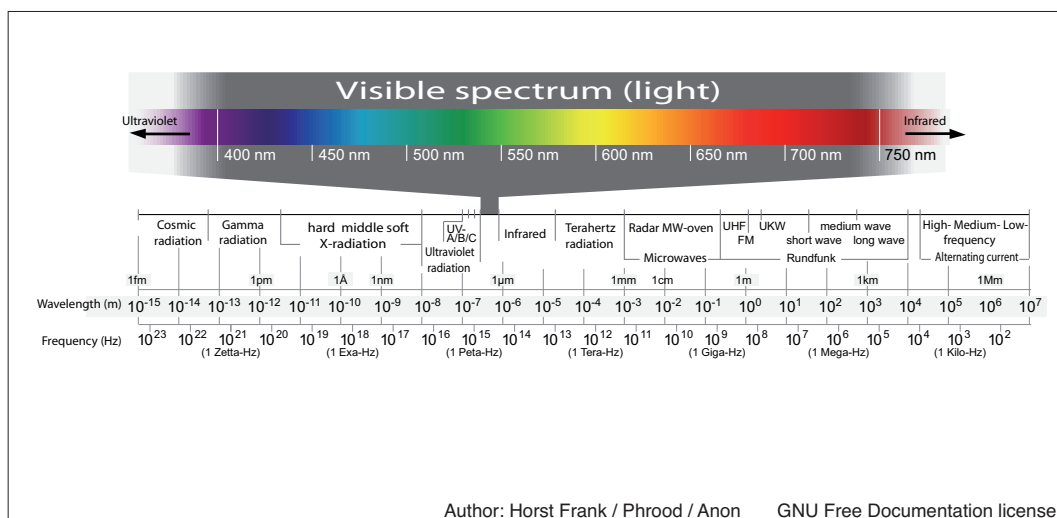
The Class A label is a for ZVEI registered trademark[®].



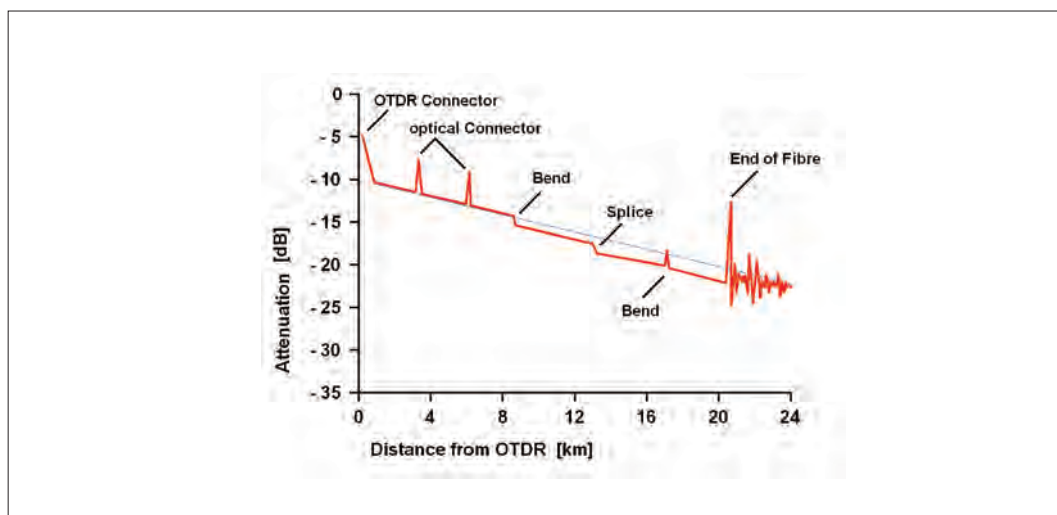
In the past active and passive products had to be labelled with the BZT-mark and licensed at the BZT. Since the introduction of the mandatory CE-labelling a BZT-license is no longer required. Therefore ASTRO abstains for the BZT-licensing of new products which is replaced by the EG-accepted CE-labelling.

Optical basic knowledge

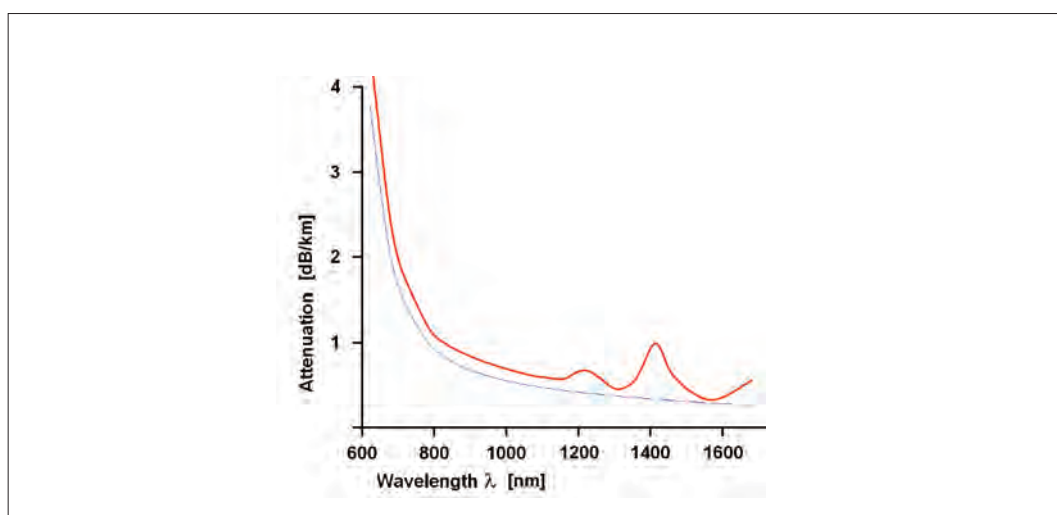
The electromagnetic spectrum



Basic principle of an OTDR-measuring (OTDR = Optical Time Domain Reflectometer)



Attenuation gradient of an optical fibre



Channels and frequencies

according to CCIR standard

Range	Channel	Channel limits MHz	Picture carrier MHz	Sound ¹⁾ carrier MHz	
Standard B + G	Europe	(+ H, I, K, L for B IV / V) ²⁾			
I	2	47- 54	48,25	53,75	
	3	54- 61	55,25	60,75	
	4	61- 68	62,25	67,75	
	S 2	111-118	112,25	117,75	
Lower scope of special channels	S 3	118-125	119,25	124,75	
	S 4	125-132	126,25	131,75	
	S 5	132-139	133,25	138,75	
	S 6	139-146	140,25	145,75	
	S 7	146-153	147,25	152,75	
	S 8	153-160	154,25	159,75	
	S 9	160-167	161,25	166,75	
	S 10	167-174	168,25	173,75	
III	5	174-181	175,25	180,75	
	6	181-188	182,25	187,75	
	7	188-195	189,25	194,75	
	8	195-202	196,25	201,75	
	9	202-209	203,25	208,75	
	10	209-216	210,25	215,75	
	11	216-223	217,25	222,75	
	12	223-230	224,25	229,75	
	Upper scope of special channels	S 11	230-237	231,25	236,75
		S 12	237-244	238,25	243,75
		S 13	244-251	245,25	250,75
		S 14	251-258	252,25	257,75
S 15		258-265	259,25	264,75	
S 16		265-272	266,25	271,75	
S 17		272-279	273,25	278,75	
S 18		279-286	280,25	285,75	
S 19		286-293	287,25	292,75	
S 20		293-300	294,25	299,75	
Expanded scope of special channels	S 21	302-310	303,25	308,75	
	S 22	310-318	311,25	316,75	
	S 23	318-326	319,25	324,75	
	S 24	326-334	327,25	332,75	
	S 25	334-342	335,25	340,75	
	S 26	342-350	343,25	348,75	
	S 27	350-358	351,25	356,75	
	S 28	358-366	359,25	364,75	
	S 29	366-374	367,25	372,75	
	S 30	374-382	375,25	380,75	
	S 31	382-390	383,25	388,75	
	S 32	390-398	391,25	396,75	
	S 33	398-406	399,25	404,75	
	S 34	406-414	407,25	412,75	
	S 35	414-422	415,25	420,75	
	S 36	422-430	423,25	428,75	
	S 37	430-438	431,25	436,75	
	S 38	438-446	439,25	444,75	
IV	21	470-478	471,25	476,75	
	22	478-486	479,25	484,75	
	23	486-494	487,25	492,75	
	24	494-502	495,25	500,75	
	25	502-510	503,25	508,75	
	26	510-518	511,25	516,75	
	27	518-526	519,25	524,75	
	28	526-534	527,25	532,75	
	29	534-542	535,25	540,75	
	30	542-550	543,25	548,75	
	31	550-558	551,25	556,75	
	32	558-566	559,25	564,75	
	33	566-574	567,25	572,75	
	34	574-582	575,25	580,75	
35	582-590	583,25	588,75		
36	590-598	591,25	596,75		
37	598-606	599,25	604,75		

Range	Channel	Channel limits MHz	Picture carrier MHz	Sound ¹⁾ carrier MHz
V	38	606-614	607,25	612,75
	39	614-622	615,25	620,75
	40	622-630	623,25	628,75
	41	630-638	631,25	636,75
	42	638-646	639,25	644,75
	43	646-654	647,25	652,75
	44	654-662	655,25	660,75
	45	662-670	663,25	668,75
	46	670-678	671,25	676,75
	47	678-686	679,25	684,75
	48	686-694	687,25	692,75
	49	694-702	695,25	700,75
	50	702-710	703,25	708,75
	51	710-718	711,25	716,75
	52	718-726	719,25	724,75
	53	726-734	727,25	732,75
	54	734-742	735,25	740,75
	55	742-750	743,25	748,75
	56	750-758	751,25	756,75
	57	758-766	759,25	764,75
	58	766-774	767,25	772,75
	59	774-782	775,25	780,75
	60	782-790	783,25	788,75
	61	790-798	791,25	796,75
	62	798-806	799,25	804,75
	63	806-814	807,25	812,75
	64	814-822	815,25	820,75
	65	822-830	823,25	828,75
	66	830-838	831,25	836,75
67	838-846	839,25	844,75	
68	846-854	847,25	852,75	
69	854-862	855,25	860,75	
Standard D	OIRT			
B I	R I	48,5- 56,5	49,75	56,25
	R II	58- 66	59,25	65,75
	R III	76- 84	77,25	83,75
(B II)	R IV	84- 92	85,25	91,75
	R V	92-100	93,25	99,75
Special channels	s1	110-118	111,25	117,75
	s2	118-126	119,25	125,75
	s3	126-134	127,25	133,75
	s4	134-142	135,25	141,75
	s5	142-150	143,25	149,75
	s6	150-158	151,25	157,25
	s7	158-166	159,25	165,75
	s8	166-174	167,25	173,75
(B III)	R VI	174-182	175,27	181,75
	R VII	182-190	183,25	189,75
	R VIII	190-198	191,25	197,75
	R IX	198-206	199,25	205,75
	R X	206-214	207,25	213,75
	R XI	214-222	215,25	221,75
	R XII	222-230	223,25	229,75
Special channels	s9	230-238	231,25	237,75
	s38	462-470	463,25	469,75

1) Sound carrier = Picture carrier + 5, 742 MHz

2) Variant sound carrier

Standard I:

Sound carrier = Picture carrier + 6 MHz

Standard K, L:

Sound carrier = Picture carrier + 6,5 MHz

Glossary

Astra

Satellite system operated by the Société Européenne des Satellites (Luxembourg). The Astra family (1A-G) comprises 7 satellites in the orbit position 19.2° East for the transmission of radio and television channels. Foreign and virtually all German-speaking programs can be received with a Sat antenna, which must have a diameter of 60 cm.

Bandwidth

Colloquial term for data (transmission) rate, indicating the volume of data which can be transmitted in 1 second on a link.

BAT/Bouquet

Bouquet Association Table. Presentation of a group of different TV stations for bundling into a multiplex, or into an offering for the TV user.

Broadcast

Broadcast means the simultaneous transmission of content to any given, unlimited number of receivers.

CA

Conditional Access System. Controls subscriber access to specific programs, service offerings, etc., e.g. Irdeto, Viaccess, Nagra, Cryptoworks, Conax.

CA Module

Conditional Access Module. A module which is inserted into the receiver to enable decoding of encrypted signals with an activated additional card.

C-Band

Frequency 3.7GHz – 4.2 GHz.

Common Interface

CI. Interface of the receiving device for a CA module.

Conditional Access

Access to an offering which is linked to a condition (e.g. a subscription). Due to content encryption, only authorized users have access to the program content.

Data Transmission Rate

Volume of data which can be transmitted on a link within a specific period of time, normally specified in bits per second (bit/s). The data rate determines the image quality of digital TV programs. Data rates of 5 to 6 Mbit/s correspond to the image quality delivered by analog TV.

Decoder

Electronic device which reconstructs presentable images from video material stored in data-reduced form.

Digital Compression

Mathematical algorithms are used and irrelevant image information is filtered out in order to reduce the data volume of digital signals.

DiSEqC

Digital Satellite Equipment Control. A method used to control the switchover between different satellites, e.g. Astra and Eutelsat. Can also be used to control multiple subscriber systems.

Dolby Digital, AC-3

Multi-channel audio format which transmits six discrete channels. Frequently abbreviated to DD.

DVB

Digital Video Broadcasting. Transmission standard for digital televisions via cable, satellite or terrestrial systems.

EPG

The Electronic Program Guide is a combined user interface and program guide for set-top boxes. Various functions can be activated via remote control using a number of buttons. It also provides background information on all programs for the current day and the following day.

Eutelsat

This European satellite operator owns an entire fleet of satellites in space. They transmit numerous foreign programs. The Hotbird satellites which are important for Germany are located at 13° East.

FEC

Forward Error Correction. Redundancy information is added to digital signals. The aim is to identify and correct typical faults which occur on the transmission link.

Footprint

The geographical area into which the satellite transmits. Within this footprint, the satellite can be received without problems, provided the specified size of the satellite dish is observed.

Free-To-Air (FTA)

Digital receiver without a Conditional Access Module for the reception of free radio and television programs.

Free TV

Television programs which can be received by the viewer with no monthly charge, under private or public law (but with GEZ [Central License Fee Collection Office] fee).

HDTV

High Definition Television. TV with a resolution up to five times greater than that of conventional TV (SDTV), with a widescreen aspect ratio of 16:9. This enables reproduction of video with significantly greater detail, increased sharpness and brighter colors. The European system operates using 1,080 lines x 1,920 pixels, while the American/Japanese system operates using 720 lines x 1,280 pixels.

LNB

Low Noise Block Converter. The LNB is the receiver head at the focal point of a parabolic antenna. It amplifies and converts the satellite signals, which can then be further processed by the satellite receiver.

MPEG

Motion Picture Experts Group. MPEG-1 (data rate 1.5 Mbit/s) MPEG-2 (data rate 100 Mbit/s) and MPEG-4. Compresses the audio and video signals into digital quality above the level of analog television. The improved MPEG-4 standard enables processing of the increased data volume of HDTV signals. The conventional digital television signal (SDTV) is and for the time being remains compressed in the MPEG-2 standard.

OSD

OSD stands for On-Screen Display. This refers to additional information on the screen (e.g. programming data, settings menus).

PVR

Personal Video Recording. Hard-disk-based video recorder with storage capacity and additional service functions such as EPG, deferred television, skipping of commercial breaks. Point-to-point transmission of data to a specific recipient.

QAM and QPSK

Quadrature Phase Shift Keying is a modulation method for digital television programs received via satellite. Cable networks have different requirements for the transmission of digital signals. A different modulation method, quadrature amplitude modulation, is required for this purpose. In QAM, digital signals are presented by a combination of four phases and four amplitudes. The data are mapped in the resulting matrix.

Receiver

A receiver receives a digital TV transmission, further processes and amplifies the signal, and can control a display screen.

RF Modulator

The RF modulator of the satellite receiver converts audio and video signals into an antenna signal. This enables the connection of older television sets with no Scart connection facility via the normal antenna cable and the antenna input on the television set.

RS-232C Interface

The operating system of a receiver can be updated by the service engineer via the RS-232C interface, with no need to open the device. A null modem cable and the corresponding software are required for this purpose. Station listings can also be transmitted via the data interface.

SDTV

Standard Definition Television. Conventional television with low image resolution according to the PAL or NTSC standards.

Set-Top Box

A receiving device for digital TV.

Simulcast

Parallel transmission of a transmitter, in both analog and digital form.

Simulcrypt

Transmission of a signal with several different types of encryption simultaneously.

Smartcard

The card, which looks like a phonecard or cash card, contains a chip which provides the CA module with the owner's identification, along with information on available programs.

Transponder

A combined transmitter and responder. Electronic device which receives and automatically forwards a signal. TV satellites receive a signal and then broadcast it within a large transmission area.

Triple Play

Term for the offering of telephony, Internet and TV via a single "path". Telephony or cable companies offer this via their infrastructure.

USB

Stands for "Universal Serial Bus", a standard for connecting ancillary devices such as a mouse, keyboard or scanner to the PC.

Universal LNB

Receiving unit on the satellite antenna which receives both the 11 GHz range and the 12 GHz range, which is used for digital transmissions. The universal LNB is required to operate the d-box. Switchover is performed via the 22kHz signal.



Terms and Conditions of Delivery and Payment

§ 1 General/Scope

1. All commercial relationships with national and international purchasers shall be governed irrevocably by German law, excluding the United Nations Convention on Contracts for the International Sale of Goods (CISG). The general terms and conditions set forth below shall apply in the version which is valid on the contract conclusion date.

2. Acceptance of our order confirmation shall be regarded as acknowledgement of our terms and conditions of delivery and payment. Different arrangements and subsidiary agreements shall be valid only if confirmed in writing by ASTRO. Verbal agreements shall not be legally binding.

Differing purchasing conditions of individual purchasers shall apply only if they have been expressly acknowledged in writing by ASTRO.

The "Grüne Lieferbedingungen" ["Green Terms of Delivery"] of the ZVEI [German Electrical and Electronic Manufacturers' Association] shall apply to all procedures which are not defined in these conditions and by written agreement.

3. Our products may not be exported without our approval.

ASTRO Strobel Kommunikationssysteme GmbH delivers its goods and services in accordance with the quality assurance system certified to DIN ISO 9001, corresponding to EN 29001.

§ 2 Contract conclusion

1. The terms and conditions for our goods are non-binding and subject to confirmation. Presentation of our goods on the Internet does not constitute an offer, but rather a non-binding invitation to the client to place an order. We reserve the right to make technical or other modifications within reasonable limits.

2. The purchaser is bound by placed orders for two weeks; such orders shall not be valid without our written confirmation.

3. The contract may not be performed or may only be performed in part if the purchaser fails to fulfill its own responsibilities duly and correctly. This shall only apply in cases where we cannot be held responsible for the non-delivery. Unforeseen force majeure events, strike, shortage of raw materials, accidents, transport, manufacturing or operational disruptions in our own company or in supplier companies and other circumstances beyond our control shall entitle ASTRO to delay delivery or withdraw from the contract.

If the order is placed electronically, the contract text will be stored by us and e-mailed to the client along with the legally incorporated General Terms and Conditions following the conclusion of the contract.

The contract is subject to design modifications and to prior sale. We retain the right of ownership in respect of cost estimates, drawings and other documentation which may not be made accessible to third parties. Infringements may result in criminal proceedings.

§ 3 Scope of the delivery obligation/Leadtimes

1. The scope of the delivery is determined by our written order confirmations. Increases or reductions of up to 5% may be applied to customized goods and services. The original packaging unit represents the minimum purchase.

We may withdraw from the contract or, notwithstanding agreed terms of payment, demand payment prior to delivery if unfavorable credit information relating to the purchaser becomes known following the contract conclusion.

2. To ensure that delivery deadlines are met, the purchaser must provide all the necessary documentation and approvals, particularly plans, in a timely manner, and must fulfill the agreed terms of payment and other obligations. If these requirements are not met in good time, the deadlines shall be extended accordingly; this shall not apply if ASTRO is responsible for the delay.

3. If the failure to meet deadlines is due to force majeure, e.g. mobilization, war, unrest or similar events, the deadlines shall be extended accordingly.

4. If ASTRO delays a delivery, the purchaser may, insofar as it can prove that it has incurred a loss as a result, demand compensation, for each full week of delay, of 0.5%, but not exceeding 5% in total, of the price for the part of the delivery which could not be put into effective operation due to the delay. Further claims for compensation shall be excluded, unless ASTRO is responsible for the delay, at least through gross negligence.

§ 4 Prices

1. All prices are binding and are to be understood as ex works/ex stock, plus statutory VAT and packaging.

If a delivery is delayed for more than four months for reasons beyond our control, the price applicable on the delivery date shall be charged.

2. If the item is collected by the purchaser in another country, the statutory VAT must be charged and will be reimbursed on presentation of the corresponding customs documentation. Any VAT due in the purchaser's country shall be paid by the purchaser.

3. In the event of bankruptcy or composition proceedings, any special rebates, bonuses or discounts shall lapse.

§ 5 Place of fulfillment, shipping and packaging, transfer of risk

1. The place of fulfillment is Bergisch Gladbach.

2. The risk of accidental destruction and accidental deterioration of the goods shall be transferred to the purchaser on handover or, in the case of consignment purchase, on delivery of the goods to the shipping agent, haulage contractor or other person

or body appointed to carry out the shipment. In the case of goods designated for collection, the transfer of risk shall take place when the goods are duly packed and made available. Delay on the part of the client in accepting the goods shall be deemed equivalent to handover.

If data are downloaded and sent via the Internet, the risk of destruction and modification of the data transfers to the client when the data pass through the network interface.

3. Additional costs for requested express shipment, urgent and timed deliveries, and also non-standard packaging costs shall be paid by the purchaser.

4. For orders relating to flat delivery with a value of € 500 or more, i.e. net goods value as per our invoice, we shall pay the packaging and shipment costs to the destination (in the case of export, free German border). For orders below € 500 net goods value as per our invoice, we shall charge a flat-rate handling, packaging and shipment fee of € 10 per shipment. Transfer of risk shall remain ex-works.

§ 6 Regulation on the avoidance of packaging waste

In accordance with the regulation on packaging (Verpackungsverordnung - VO) applicable within Germany, our deliveries use environmentally friendly packaging, which bears the "RESY" mark or the "Interseroh" logo.

ASTRO packaging is recovered in Germany if the returning party sorts and pallets it according to wood, plastic, polystyrene and cardboard.

The purchaser shall pay the costs incurred in returning packaging. If the purchaser disposes of packaging in situ, the supplier shall not reimburse any costs.

§ 7 Terms of payment

Payment of the purchase price must be made without deduction no later than 30 days following the invoice date. At the end of the payment period, the purchaser shall be in payment default and shall be obliged to reimburse all reminder and collection costs. In the case of cash on delivery, prepayment or payment within 14 days, the purchaser shall be entitled to deduct 3% discount, unless otherwise agreed.

If the purchaser is a company, it shall add interest to the monetary debt in the sum of 8% above the basic interest rate during the default period. We reserve the right to prove and claim for a higher loss as a result of the delay.

Bills of exchange of any type will only be accepted by special arrangement by way of payment and subject to the applicability of discounts. Exchange costs must be paid immediately by the purchaser. In the case of collection of your own or third-party bills of exchange, we shall not be liable for the timely submission and recharging of exchange costs.

If facts become known which cast doubt on the creditworthiness of the purchaser, all sums receivable, including bills of exchange, shall be payable immediately regardless of the payment period. Any outstanding deliveries shall only be made with advance payment.

The purchaser shall have a right of offset only if its counterclaims have been legally established or have been acknowledged by us. Subject to these conditions, the purchaser may also exercise a payment retention right on the grounds of a counterclaim from the same delivery.

§ 8 Reservation of ownership

1. We reserve ownership of the goods until the settlement in full of all accounts receivable from an ongoing business relationship. If the value of the reserved goods exceeds the sums receivable to be secured from the ongoing business relationship by more than 20%, we shall be obliged to release the excess value of the reserved goods at the purchaser's request.

Assignment of the right conferring prospective entitlement shall be excluded.

The purchaser may neither pledge the delivery item nor assign it as security to third-party creditors.

2. The purchaser must inform us immediately in writing of any access to the goods by third parties, in particular compulsory enforcement measures, and of any damage to or destruction of the goods. The purchaser must inform us immediately of any change in ownership of the goods or any change to its own address.

The purchaser shall reimburse us for all losses and costs resulting from a breach of these obligations and from required intervention measures to prevent third-party access to the goods.

3. In the event of any contractual breach by the purchaser, we shall be entitled to withdraw from the contract and demand the return of the goods.

4. The purchaser shall be entitled to resell the goods in the ordinary course of business. The purchaser shall hereby assign to us all accounts receivable by the purchaser from a third party through the resale, in the sum of the invoice amount. We accept the assignment. Following the assignment, the company shall be authorized to collect the account receivable. We reserve the right to collect the accounts receivable ourselves as soon as the company fails to duly fulfill its payment obligations and is thereby in payment default.

The purchaser shall be obliged to provide details of the addresses and the amount of the account receivable from its clients. This shall be done immediately in the event of payment default. If the company is allowed a payment target of more than two months, the client addresses must be provided immediately.

§ 9 Inability to deliver

If ASTRO is responsible for the inability to deliver, the following shall apply:

1. In the case of a breach of obligations through minor negligence, our liability, and the liability of our agents, shall be limited to average, foreseeable, typical, direct contractual losses.

However, the client's claim for compensation shall be limited to 10% of the value of that part of the delivery which cannot be put into effective service due to the inability to deliver. The purchaser may not demand reimbursement of wasted expenditure.

We, and our agents, shall not be liable in the event of a breach of non-essential contractual obligations in cases where the performance of the contract is not jeopardized by the breach of such obligations.

2. Moreover, the client's right to withdraw from the contract shall remain unaffected. Astro's claim to payment shall not lapse if the client is responsible for the inability to deliver.

§ 10 Warranty (liability for material defects)

1. Goods delivered or services provided must be inspected by the client on receipt and any defects must be reported immediately or within four working days at the latest. The same applies even if a defect already present on handover subsequently becomes apparent. If such defects are not reported in a timely manner, warranty claims shall be excluded in pursuance of § 377 HGB [German Commercial Code].

2. We shall, at our own discretion, either remedy defects already present on handover of the goods delivered or service provided, or shall deliver new goods or provide a new service (remedial action).

3. We must always be given the initial opportunity to eliminate the defect (remedial action) within an appropriate period of time.

If the remedial action fails, the purchaser may, at its own discretion, either withdraw from the contract or reduce the payment and demand compensation. If the purchaser opts for compensation, the liability restrictions set out in para. 7 shall apply.

4. Defect claims shall not arise in the event of only minor differences compared with the agreed characteristics, only minor impairment of usability, natural wear or damage arising following the transfer of risk as a result of defective or negligent treatment, overuse, unsuitable facilities, defective installation work or through external influences which are not specified in the contract, nor in the event of non-reproducible software errors. In particular, defect claims in the event of failure to follow the instructions for use and the installation specifications shall be excluded. Similarly, if the purchaser or third parties inappropriately carry out modifications or repair work, no defect claims shall arise in respect thereof or in respect of any resulting consequences.

5. Claims made by the purchaser on the grounds of expenditure incurred for the purpose of remedial action, in particular shipment, travel, labor and additional costs, shall be excluded insofar as such expenditure is increased because the delivered item has subsequently been moved to a location other than the purchaser's branch office, unless such relocation corresponds to its intended use. However, no additional expenditure shall be reimbursed if the location of use of the goods is more than 30 km away from the purchaser's branch office.

6. The purchaser shall have a right of recourse against us only in cases where the purchaser and its client have not reached any agreements above and beyond the statutory claims for defects. The provisions of para. 5 shall apply accordingly to the scope of the purchaser's right of recourse against ASTRO. Disproportionate expenditure shall not be reimbursed. The provisions of para. 7 shall otherwise apply to claims for compensation.

7. Claims for compensation made by the purchaser, on whatever legal grounds, in particular due to infringement of contractual obligations and unlawful acts, shall be excluded. This shall not apply in cases where we are subject to mandatory liability pursuant to the product liability law [Produkthaftungsgesetz], in cases of willful intent or gross negligence, due to death, physical injury or damage to health, due to the assurance of the absence of a defect or infringement of essential contractual obligations. Compensation for infringement of essential contractual obligations shall be limited to typical foreseeable contractual losses, unless willful intent or gross negligence applies, or due to death, physical injury or damage to health. The above provisions do not entail a change in the burden of proof to the detriment of the purchaser.

Further claims, or claims other than those specified in this paragraph made by the purchaser against us and our agents due to a material defect shall be excluded.

8. Material defect claims shall expire 24 months following delivery ex works (initial transfer of risk), unless longer periods are required by law.

§ 11 Place of performance and jurisdiction

The place of fulfillment and jurisdiction for both parties, and also for disputes relating to exchange and check transactions shall be Bergisch Gladbach.

Bergisch Gladbach Bensberg, May 2009

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