



SAT

CATALOGUE 2019/2020

TV Reception Solutions

SAT, Broadband, IP and Optical Distribution from Kathrein Digital Systems



100 YEARS | 1919-2019
Passion to connect.

KATHREIN

Digital Systems GmbH

KATHREIN | Digital Systems GmbH

Who we are and **what** we stand for

We ensure the best possible radio and TV reception

With decades of experience, Kathrein Digital Systems is an innovation and technology driver in the field of satellite reception. Our comprehensive portfolio ranges from antennas and components for signal processing to extensive installation accessories and high quality measuring instruments.

Thanks to extensive know-how in development and unsurpassed quality standards in production, our solutions and systems are absolutely top class. High-quality satellite reception systems in conjunction

with sophisticated solutions for signal distribution, whether in single-family homes or in large building complexes, bring the signals to the receiving equipment in best HD quality.

New technologies such as SAT>IP, optical SAT distribution or modular headend technology for hotel TVs are closing the gap between traditional signal distribution and modern optical fibre and network technology.

Kathrein Digital System's advanced solutions are also the best choice for mobile TV reception in caravans and mobile homes.

Find out more about us at www.kathrein-ds.com

Our awards in 2019:



General Information

The products listed in this catalogue are intended for exclusive use in TV and radio reception systems. Any claims under the warranty claims or claims for liability are excluded in case of misuse. The reception systems are only to be mounted, installed, repaired and earthed by qualified specialist personnel who are familiar with and follow the applicable safety stipulations, regulations and standards.

The version 2016/2017 catalogue is no longer valid with the receipt of this catalogue. This catalogue may be valid beyond 2021. If in doubt, please enquire about its validity at our plant or on the Internet.

Technical values

The technical data indicated here have been calculated and defined in accordance with the specifications of the trade association for reception antennas in the ZVEI. The values for the amplifiers were determined in accordance with EN 50083 and EN 60728. The calculation values for the mechanical stability of the antenna superstructures (wind loads and bending moments) comply with EN 60728-11. Also refer to "Mast calculation" on Page 57 and the "Technical Appendix" starting on Page 290.

The appearance and value of the articles listed were valid at the time this catalogue went to press. We reserve the right to change the appearance of articles and/or values related to the articles. For the latest information on our products, please visit our product database at www.kathrein.com.

General Terms and Conditions

The respective valid version of our General Terms and Conditions (general delivery and payment terms) applies. The packaging units stated in the catalogue are minimum order units. Our products are sold through wholesalers. Our specialist retail and specialist trade clients are charged the net prices for catalogue articles by these wholesalers.

In other countries, please request the price list from our sales offices in your own country (see www.kathrein.com).

Contents

Offset Parabolic Antennas	9	Mounting Accessories	65
Planning and installation instructions	10	Mast installation and calculation	66
Warranty Conditions	10	Wall supports, made of steel	67
Offset parabolic antennas	11	Stub masts	67
Cable junction box	18	Clamping plate set for ZSO 180/181	68
Feed systems without LNB	19	Wall mount	68
Planar antenna	20	Rafter brackets	69
General installation note	21	Flat roof antenna mount	70
Multi-feed adapter plate	22	Masts	71
Azimuth/Elevation clamp	24	Booms	73
Control unit for reflector temperature	24	Mast spacer	73
Reflector heating	25	Mast mounting bracket set	74
Heating system for CAS 90/HD	26	Mast clamps, holders	74
Outside temperature control unit for ESO 124/180	27	Rubber bushing	75
Heating systems for CAS 124/180	28	Mast shoe	75
Outside temperature/sensor control unit	29	Rooftop cover plates	75
Temperature control for ESO 95/ESO 120	30	Sealing collars	76
		Mast caps	77
Feed Systems	31	Installation sets	77
General quality features	32	Earthing accessories	80
Warranty Conditions	32		
Universal single feed system	33	Outlets	81
Universal twin feed system	33	Single-cable sockets	82
Wideband feed system	34	Broadband cable/Sat outlets	85
Universal quatro feed system	34	Sat outlets	87
Universal quad feed system	35	High-end broadband outlets	89
Connection examples	35	Modem outlets (selective)	90
Technical data	38	Modem outlets (broadband)	92
		Satellite single connection boxes	93
Receiver	39	Wall outlet frame, cover plates	95
Satellite receiver	40		
DVB-T2-Receiver	41	Cables, Plugs and Adapters	97
		Features and Benefits of Kathrein Coaxial Cables	98
Camping and Caravan	43	Cable	100
Receiver-independent turntables	44	F accessories/adapters/couplings	106
Connection example	46	IEC connector (m)/(f)/couplings	106
The "CAPcontrol" app	46	F-type connector (m)	107
USB/WLAN adapter	47	Cable fittings	107
Caravan TV Systems	47	Terminating resistors	108
Planar antennas	50	Cable connector	108
Inclinometer for the BAS 66 planar antenna	51	Note for assembling the connectors	108
Display device for HDZ 60/66	51	Cable stripper	109
External control unit for the CAP 650 GPS/750 GPS	51	Compression pliers	109
Caravan roof duct	52	Compression connector set	109
Sat jointed masts	52	Self-install connector set	109
Choice of Location	53	F-type earthing blocks	110
SHAPEG-Inanten mast	53	Earthing rails	110
Satellite tripod	53	Connection cables	111
Antenna connection set	53		
Satellite antenna sets	54	Amplifier Systems	113
Further information	54	General information	114
		Sat IF amplifier	116
Terrestrial Antennas	55	House connection amplifiers	116
General information	56	Monitorable house connection amplifiers	126
Mast calculation in accordance with EN 60728-11	57	PG 11 connection technology	128
AM/FM antennas	58	De-emphasis equaliser/attenuators	129
FM antennas	58	Monitoring transp. HMS protocol	130
Band III TV antennas	59	Monitoring transp. DOCSIS/EuroDOCSIS 2.0	131
UHF TV antennas	60	Return path amplifiers/passive return path card	132
Mast installation and calculation	62	Return path filters	133
DVB-T / T2 Antenna, active	63	Interstage equaliser filter	133
Further information	64	Remote feed transformer	134

Optical Satellite Splitter	135		
General information	136	Amplifier for UFOcompact plus®	233
Optical Transmitter	137	Power supply unit for UFOcompact plus®	234
Optical receivers	139	Central control module	235
Optical patch cables and optical coupler	140	Connection example	236
Optical attenuators	140		
Optical cleaning set, cleaning tool	141	UFOmini Signal Processing System	237
Optical splitters	141	System description	238
Optical taps	142	Headend 8-way DVB-S(2)/-T(2)/-C – DVB-C/-T	239
Optical termination	142	Headend 18-way DVB-S(2)/-T(2)/-C – DVB-C	242
Fibre management box	143	Overview of functions	245
Feed-in diplexer	144		
		UFOnano Signal Processing System	247
Sat>IP	145	System description	248
General information	146	Headend 8-way DVB-S(2) – DVB-C (J.83A)	248
Sat>IP server	147		
Connection examples	148	Accessories for the Distribution Network	251
		General information	252
Sat IF Distribution System	151	Tap, threaded	253
General information	152	Tap with F connectors	254
DiSEqC™ switching matrix	153	Taps for star distribution	256
Multi-switch	155	Splitter	258
Sat distribution network amplifiers	165	Over-voltage protection	260
Sat IF tap / splitter	169	Equaliser	265
Connection lines	172	Adjustable attenuator	265
Sat IF amplifier	172	TV T-connector	266
Power supply unit	173	Low-pass filter	266
Splitter	173	Diplexers	267
5-way connector	174	Variable attenuators	269
9-way connector	174	Receiver connection cables (straight)	270
IP Over Coax	175	Meters	271
General information	176	Signal meter for Sat/TV/DAB+/FM/optical	272
Multi-switch with built-in modem	177	Signal meter Sat/TV/FM/IPTV/ASI/TS/optical	275
Single-cable multi-switch with built-in modem	179	Signal Meter Sat/TV	278
Modem	181	Further information	280
High-pass filter	185		
Satellite single connection box	186	Euroline Products	281
		Offset parabolic antennas	282
Single Cable System	187	Multi-feed holder	283
General information	188	Wall supports, aluminium	283
Frequency assignment	189	Universal LNBS	284
Single-cable mini-multi-switch	190	Single-cable LNB	285
Single-cable multi-switch	191	Multi-switch	286
Sat IF tap / splitter	199	Power supply unit for Euroline multi-switch	288
5-way connector	200		
9-way connector	200	Technical Appendix	289
Single-cable sockets	201	Television standards	290
Programming device	204	Channel allocation	291
		CENELEC channel plan	294
UFOcompact plus® Signal Processing System	205	Catalogue data	296
System description	206	Planning and installation instructions	298
Module carrier	207	Notes and requirements	300
Centrl control software	208	Guidelines and standards	301
IP streamer multi-DVB/DVB-S(2) – DVB-IPTV	208		
Transmodulators	211		
6-way CI module	224		
HDMI encoder MPEG-4 AVC/H.264 HD/SD	226		
HDMI encoder MPEG-4 AVC/H.264 HD/SD	228		
Channel unit adapter for UFOcompact plus®	230		
Quad DVB transcoder QPSK-PAL	231		
8-way DVB transcoder DVB-S - FM	232		

Register

Type	Order No.	Page	Type	Order No.	Page	Type	Order No.	Page
A			EAC 02/G	21610090	254	EMP 35	275300	128
ABA 20	210340	58	EAC 03/G	21610091	254	EMU 01	273247	106
ABE 01	210332	58	EAC 04/G	21610092	254	EMU 02	273245	106
ABH 01	210335	58	EAC 12	272327	253	EMU 03	273246	106
AOI 65	212340	60	EAC 16	272328	253	EMU 04	273244	106
AON 65	212344	60	EAC 22	272329	253	EMU 05	273270	106
AOP 52	212347	60	EAD 01/G	21610093	255	EMU 06	273271	106
AOP 65	212348	60	EAD 02/G	21610094	255	EMU 07	273272	106
AOS 32	212349	60	EAD 03/G	21610095	255	EMU 08	273273	106
AOS 65	212352	60	EAD 04/G	21610096	255	EMU 09	273274	106
AOT 65	212353	60	EAD 21	272307	253	EMU 10	273275	106
ARA 10	210115	58	EAS 124	227243	19	EMU 12	273281	106
ARA 20	210116	58	EAS 126	227249	19	EMU 21	273284	110
AU 14/60	212126	61	EAX 24/G	21610097	257	EMU 22	273285	110
AU 16/29-32	212138	61	EAX 24/U	21610100	256	EMU 24	21210020	110
AUY 69	212121	61	EAX 26/G	21610098	257	EMU 50	2120000003	110
AV 06	211450	59	EAX 26/U	21610101	256	EMU 90	21210021	110
AV 09	211453	59	EAX 28/G	21610099	257	EMU 250	20510044	174, 200
AV 11	211463	59	EAX 28/U	21610102	256	EMU 290	20510023	174, 200
AV 12	211473	59	EAX 2512	20510035	169	ERA 12	272822	108
B			EAX 2912	20510025	170	ERA 14	272899	108
BAS 65	20010032	20, 50	EBC 02/G	21610084	258	ERD 21	272868	269
BAS 66 Skew	2000000001	50	EBC 03/G	21610085	258	ERD 23	272869	269
BZD 30	20710002	63	EBC 04/G	21610086	258	ERD 810	24510110	129
BZD 32	20710013	63	EBC 06/G	21610087	258	ERD 813	24510117	129
BZD 40	20710005	64	EBC 08/G	21610088	258	ERD 814	24510120	129
C			EBC 10	272859	173, 258	ERD 815	24510127	129
CAP 650 GPS	20310055	45	EBC 13	21610004	173, 258	ERE 01	274854	265
CAP 750 GPS	20310056	44	EBC 14	21610005	173, 258	ERE 02	274855	265
CAS 06	20010005	11	EBC 110	21610006	200, 259	ERT 907	273696	133
CAS 60	20010006	11	EBC 114	21610007	200, 259	ERZ 60	272783	265
CAS 80gr	20010027	12	EBC 114	21610007	200, 259	ERZ 940	24510059	130
CAS 80ro	20010028	12	EBC 114	21610007	200, 259	ESC 30	21110013	87
CAS 80ws	20010029	12	EBC 114	21610007	200, 259	ESC 44	21110014	86
CAS 90gr	20010033	13	EBC 114	21610007	200, 259	ESC 84	21110009	85
CAS 90gr/HD	21610032	15	EBC 114	21610007	200, 259	ESD 08	274197	87
CAS 90ro	20010034	13	EBC 114	21610007	200, 259	ESD 30	274209	87
CAS 90ws	20010035	13	EBC 114	21610007	200, 259	ESD 32	274421	87
CAS 90ws/HD	21610031	15	EBC 114	21610007	200, 259	ESD 44	274418	86
CAS 120	20010008	16	EBC 114	21610007	200, 259	ESD 44	274418	86
CAS 120/G	20010011	16	EBC 114	21610007	200, 259	ESD 52	274224	87
CAS 124	216236	17	EBC 114	21610007	200, 259	ESD 63	21110038	89
CAS 124 HS	26910112	17	EBC 114	21610007	200, 259	ESD 64	274198	86
CAS 124 M	5902142	17	EBC 114	21610007	200, 259	ESD 83	21110035	89
CAS 180	216235	17	EBC 114	21610007	200, 259	ESD 84	274425	85
CAS 180 HS	26910250	17	EBC 114	21610007	200, 259	ESD 85	274426	85
CAS 180 M	5902141	17	EBC 114	21610007	200, 259	ESE 10	274233	86
CTS 650-19 GPS	20310057	48	EBC 114	21610007	200, 259	ESM 20	21110008	91
CTS 650-22 GPS	20310058	48	EBC 114	21610007	200, 259	ESM 30	274429	92
CTS 650-24 GPS	20310059	48	EBC 114	21610007	200, 259	ESM 31	274430	92
CTS 750-19 GPS	20310060	49	EBC 114	21610007	200, 259	ESM 32	21110010	92
CTS 750-22 GPS	20310061	49	EBC 114	21610007	200, 259	ESM 40/G	21110053	90
CTS 750-24 GPS	20310062	49	EBC 114	21610007	200, 259	ESM 41/G	21110054	90
E			EBC 114	21610007	200, 259	ESM 42/G	21110055	90
EAC 01/G	21610089	254	EBC 114	21610007	200, 259	ESM 70	21110019	93
			EMP 34	275289	128	ESO 005	23710022	30

Type	Order No.	Page	Type	Order No.	Page	Type	Order No.	Page
ESO 95	271983	25	EXR 158	20510012	157	KEZ 02	20010056	283
ESO 96	271985	24	EXR 221	20510059	190	KEZ 2525	2040000001	283
ESO 97	271986	27	EXR 1512	20510013	157	KEZ 3525	2040000002	283
ESO 99	271988	29	EXR 1516	20510014	157	KEZ 4525	2040000003	283
ESO 101	271990	29	EXR 1708	20510027	162	L		
ESO 120	23710023	25	EXR 1718	20510028	162	LCD 89	21510004	100
ESO 124	271982	28	EXR 2508	20510095	158	LCD 90	21510015	100
ESO 125	26910035	28	EXR 2554	20510097	158	LCD 111 A+	21510025	101
ESO 126	26910036	28	EXR 2558	20510096	158	LCD 115 A+	21510028	101
ESO 128	26910057	28	EXR 2908	20510019	160	LCD 120 A+	21510036	102
ESO 129	26910058	28	EXR 2916-19"	2050000001	164	LCD 130 A+	21510039	102
ESO 180	271984	28	EXR 2932-19"	2050000002	164	LCM 14 A+	21510030	103
ESU 33	21110012	82, 201	EXR 2998	20510020	160	LCM 17 A+	21510034	103
ESU 34	21110011	82, 201	H			LCM 33	271623	104
ESU 36	21110022	82, 201	HDM 135	218429	53	LCM 50	271622	104
ESU 37	21110023	82, 201	HDM 140	218456	52	LCM 96	271624	104
ESU 51	21110061	83, 202	HDM 141	218457	52	M		
ESU 53	21110026	83, 202	HDM 143	218458	52	MSK 30	21710048	278
ESU 54	21110027	83, 202	HDS 50	20410070	51	MSK 130/OIA	21710054	275
ESU 56	21110028	83, 202	HDS 66	20410060	51	MSK 140/OHD	2170000002	272
ESU 57	21110029	83, 202	HDS 100	20410059	53	N		
ESZ 44	274318	95	HDS 166	20310052	54	NCF 18	20510067	173
ESZ 50	274226	95	HDS 166 plus	2030000002	54	O		
ESZ 52	274227	95	HDZ 66	20410057	51	OAC 7030	20510073	142
ESZ 53	274228	95	HDZ 100	20410032	52	OAC 8020	20510074	142
ESZ 54	274453	95	K			OAC 9010	20510075	142
ETG 15	274779	111, 270	KAZ 10	2180000001	261	OCC 1	20510076	140
ETG 30	274778	111, 270	KAZ 11	507205	260	OCC 4	20510077	140
ETH 1500	20410042	111, 270	KAZ 12	21810002	262	OCC 5	20510078	140
ETH 3000	20410046	111, 270	KEA 650 G	20010048	282	OCC 10	20510079	140
ETH 5000	20410050	111, 270	KEA 650 R	20010049	282	OCC 15	20510080	140
EV 06	218464	53	KEA 650 W	20010047	282	OCC 25	20510081	140
EVK 21	273134	108	KEA 750 G	20010051	282	OCC 50	20510082	140
EVL 165	20410005	111, 172	KEA 750 R	20010052	282	OCC 100	20510083	140
EVL 340	20410030	111, 172	KEA 750 W	20010050	282	ODC 2	20510084	140
EVL 980	20410031	111, 172	KEA 850 G	20010053	282	ODC 3	20510086	140
EXD 158 Twin	20510142	191	KEA 850 R	20010055	282	ODC 6	20510087	140
EXD 258 Twin	20510143	191	KEA 850 W	20010053	282	ODC 10	20510088	140
EXD 1524	20510137	193	KEA 1000 G	20010060	282	OEC 40 mini	20510139	139
EXD 1532	20510104	195	KEA 1000 R	20010061	282	OEC 44 mini	20510140	139
EXD 2524	20510138	193	KEA 1000 W	20010059	282	OFB 5	20510085	143
EXD 2532	20510105	195	KEL 411	20110027	284	ORS 1	20510089	141
EXE 1581	20510146	197	KEL 422	20110028	284	ORW 1	20510090	141
EXE 2581	20510147	197	KEL 440	20110029	284	OSC 100	20510068	137
EXI 01	20510061	181	KEL 444	20110030	284	OTC 1	20510092	142
EXI 30	21110024	94, 186	KEL 4124	20110031	285	OVC 250	20510071	141
EXI 90	20510062	185	KEM 31312	20510115	286	OVC 425	20510072	141
EXI 3508	20510060	177	KEM 31316	20510116	286	S		
EXI 3591	20510065	179	KEM 31324	20510117	286	SWP 50	21110025	204
EXIP 418	20510148	147	KEM 31332	20510118	286	T		
EXIP 4124	20510136	147	KEM 41712	20510119	287	TVF 20	236678	134
EXR 58/ECO	20510051	155	KEM 41716	20510120	287	TVK 44	23710004	18
EXR 121	20510053	153	KEM 41724	20510121	287	TVM 850/H	26210077	130
EXR 124	20510054	153	KEM 41732	20510122	287	TVM 1000	26210086	131
EXR 156	20510011	157	KEMP 15	20510131	288			

Register

Type	Order No.	Page	Type	Order No.	Page	Type	Order No.	Page
U			VOS 952-1G	24410162	126	ZSH 48	218394	72
UAS 571	20110017	33	VOS 953-1G	24410163	126	ZSH 59	218382	72
UAS 572	20110018	33	VWS 04	20510057	116, 172	ZSH 62	218383	72
UAS 582	20110032	34	VWS 2500	20510098	165	ZSO 25	276281	68
UAS 584	20110019	34	VWS 2551	20510099	165	ZSO 120	376214	68
UAS 585	20110020	35	VWS 2900	20510026	167	ZSO 125	376215	68
UFG 810	20610122	207	VWS 2991	20510021	167	ZSO 127	276029	26
UFN 800	20610121	234	W			ZSO 180	23710014	68
UFO 30	20610146	248	WFS 28	21210025	267	ZSO 181	23710015	68
UFO 83	20610134	239	WFS 31	21210022	267	ZSU 11	281322	72
UFO 83/CI	20610136	239	WFS 33	21210023	267	ZTA 11	218010	73
UFO 87-18	2060000003	242	WFS 55	21210028	144, 268	ZTA 12	218011	73
UFO 87-18/CI	2060000004	242	WFS 114	20510056	269	ZTB 42	20410071	75
UFO 87	20610135	239	WFS 130	222262	133	ZTB 60ro	21410010	76
UFO 87/CI	20610137	239	WFS 166	20910010	133	ZTB 60sw	21410011	76
UFO 313	20610076	232	Z			ZTB 61	20410072	75
UFO 395	20610101	231	ZAH 12	21410008	109	ZTC 01	218210	76
UFO 828	20610142	211	ZAH 15	21410013	109	ZTC 05	218205	77
UFO 834	20610131	222	ZAS 02	218612	71	ZTC 06	218214	77
UFO 836	20610132	213	ZAS 03	218613	71	ZTC 08	218219	77
UFO 836/MX	20610144	216	ZAS 04	218687	71	ZTC 42	218208	76
UFO 844	20610138	208	ZAS 05	20410007	71	ZTC 48	218209	76
UFO 848	2060000002	208	ZAS 06	20410008	71	ZTC 60	218338	76
UFO 858	20610143	211	ZAS 15	218603	67	ZTC 91	218201	75
UFO 874	20610128	219	ZAS 16	218606	68	ZTH 01	218362	74
UFO 876	20610133	213	ZAS 33	23710010	18	ZTH 12	218364	74
UFO 876/MX	20610145	216	ZAS 34	23710011	18	ZTH 13	218365	74
UFO 878	20610127	219	ZAS 40	20410011	69	ZTI 01	218363	73
UFS 810	2020000001	40	ZAS 41	20410012	69	ZTM 01	218359	75
UFT 930	20210241	41	ZAS 46	20410085	69	ZTS 40	20410073	78
UFX 100	20610147	228	ZAS 60	218682	67	ZTS 41ro	20410026	78
UFX 800	20610123	235	ZAS 61	218683	67	ZTS 41sw	20410027	78
UFX 894	20610151	226	ZAS 62	218685	67	ZTS 48ro	20410020	79
UFZ 131	20410061	47	ZAS 63	218686	67	ZTS 48sw	20410021	79
UFZ 800	20610124	230	ZAS 90	218684	22	ZTS 60ro	20410023	79
UFZ 896	20610129	224	ZAS 120	218672	24	ZTS 60sw	20410024	79
USW 800	20610125	208	ZAS 140	20410069	70	ZTS 148	20410074	79
UVO 830	20610130	233	ZAS 150	20410068	70	ZTS 160	20410075	79
V			ZAS 180	218661	17	ZTU 142	21410001	74
VGR 28/65	20910009	132	ZAS 181	218667	17	ZTU 148	21410002	74
VGR 122	232202	132	ZAS 186	218676	17	ZTU 160	21410003	74
VGR 132	232205	132	ZAS 187	218688	17, 23	ZTZ 42	218410	77
VOS 11/F	230073	116	ZAS 188	23710018	23	ZTZ 48	218412	77
VOS 20/F	230075	116	ZAW 13	21410012	109	ZTZ 60	218413	77
VOS 20/FR	230076	116	ZAW 16	21410014	109			
VOS 20/RA-1G	20910031	117	ZEK 111	21410021	80			
VOS 22/FR	20910024	122	ZES 11	276020	110			
VOS 22/RA	20910025	122	ZEU 168	21410023	80			
VOS 29/RA-1G	20910032	117	ZEV 111	21410021	80			
VOS 32/F	20910020	121	ZSA 21	218312	71			
VOS 32/RA-1G	20910033	119	ZSA 46	218334	71			
VOS 43/RA	20910030	119	ZSD 48	218380	72			
VOS 137/RA	20910027	124	ZSF 47	218385	72			
VOS 138/RA	20910028	124	ZSF 48	218381	72			
VOS 139/RA	20910029	124	ZSH 47	218386	72			

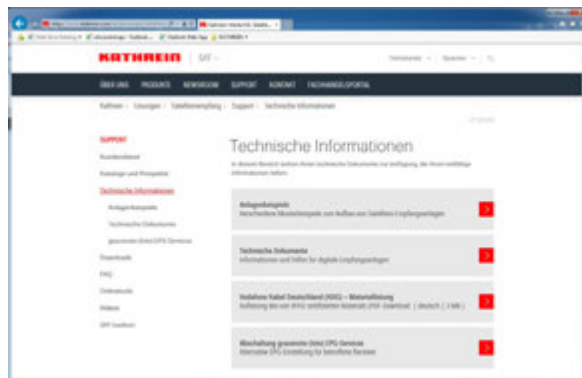
Offset Parabolic Antennas

➤ Planning and installation instructions	10
➤ Warranty Conditions	10
➤ Offset parabolic antennas	11
➤ Cable junction box	18
➤ Feed systems without LNB	19
➤ Planar antenna	20
➤ General installation note	21
➤ Multi-feed adapter plate	22
➤ Azimuth/Elevation clamp	24
➤ Control unit for reflector temperature	24
➤ Reflector heating	25
➤ Heating system for CAS 90/HD	26
➤ Outside temperature control unit for ESO 124/180	27
➤ Heating systems for CAS 124/180	28
➤ Outside temperature/sensor control unit	29
➤ Temperature control for ESO 95/ESO 120	30

➤ Planning and installation instructions

A variety of practical tips for planning, installation and alignment of offset parabolic antennas can be found on the Internet at <http://www.kathrein.com>.

- Tips for professional installation of antenna systems
- Azimuth/elevation values for a selection of German and European locations
- Mast calculation in accordance with EN 60728-11
- Planning for community satellite systems



For more help you can contact our planning team at sat-planung@kathrein.de.

➤ Warranty Conditions



Important instructions relating to the warranty conditions regarding corrosion durability:

- The antenna must be professionally constructed and assembled, taking into account the instructions given in the application notes.
- The antenna design must not be modified (e.g., by drilling).
- The antenna must not be mechanically damaged (e.g., deformations, deep or large-area damage or scrapings of the powder or surface coatings)
- The antenna must not be damaged by chemicals (e.g., solvents, paints, cleaning agents, etc.)
- Only original Kathrein accessories may be used with the antenna

Furthermore, corrosion durability is not warranted for the consequences of force majeure, e.g. lightning strike, or if the antenna is used in regions where frequently occurring, abrasive weather conditions may wear off the protective coating within a short period of time (e.g. sandstorms).

Only the original proof of purchase is acceptable for warranty claims.

Test verdicts



> Offset parabolic antennas

Offset parabolic antennas with 60 cm Ø

CAS 06 20010005

CAS 60 20010006



CAS 60 with UAS 58x

- Includes reflector, feed system mounting and mast clamp
 - Reflector in proven aluminium design, powder-coated
 - Feed system mounting made of galvanised sheet steel, plastic coated
 - Mast mounting bracket made of hot-dip galvanised sheet steel
 - Optimal electrical data within smallest mechanical dimensions due to offset feed
 - Available in graphite or white
- Multi-feed reception enabled with a feed system mounting for two universal feed systems to receive the digital signals of ASTRA (19° East) and EUTELSAT/HOTBIRD (13° East) or of any other two satellites 9° apart

Technical data

Type | Order no.		CAS 06 20010005	CAS 60 20010006
Diameter	cm	57	57
Colour		White (similar to RAL 9002)	Graphite (similar to RAL 7012)
Reception range	GHz	10.70-12.75	
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	Typ. 34.9/35.5/35.9	
Half power beam width ¹⁾	°	Typ. < 2.8	
Figure of merit ²⁾ central feed system	UAS 571/572/582/584/585	dB/K	14.7/15.7
Figure of merit ²⁾ Feed system spacing 6°	UAS 571/572/582/584/585	dB/K	14.3/15.3
Figure of merit ²⁾ Feed system spacing 9°	UAS 571/572/582/584/585	dB/K	13.6/14.4
Cross-polarisation decoupling	dB	Typ. > 27	
Wind load ³⁾	N	300	
Max. permissible wind speed	km/h	157	
Mast clamp range	mm	38-60	
Adjustment range Elevation/Azimuth	°	5–45/360	
Dimensions (width x height max. x protrusion max. from mast centre without feed system)	mm	599 x 759 x 528	
Packing unit	mm	800 x 655 x 200	
Weight approx. net/gross	kg	4.8/5.6	

¹⁾ At mid-band ²⁾ Typ. G/T at 11.3/12.5 GHz ³⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)



Multi-feed reception in combination with CAS 06 and CAS 60 only with digital signals.

Test verdicts



Offset parabolic antennas with 80 cm Ø

CAS 80gr	20010027
CAS 80ro	20010028
CAS 80ws	20010029



CAS 80 with UAS 58x

- Includes reflector, feed system mounting and mast clamp
 - Reflector in proven aluminium design, powder-coated
 - Patented tiltable multi-feed adapter plate in robust, corrosion-resistant aluminium
 - All connectors (screws, rivets, washers, M8 threaded clips) are made of corrosion-resistant stainless steel or die-cast zinc
 - Snap cable clips of weather-proof plastic for up to eight coaxial cables
 - Exchangeable multi-feed adaptor plate included in scope of delivery
 - High installation comfort: Completely pre-mounted, reflector keyhole fixing system, large wing nuts angled for AF 13 open-ended spanner, elevation scale on both sides, minimal support arm dimensions due to fold-down feature
 - Mast mounting bracket made of hot-dip galvanised sheet steel
- Feed system mounting made of galvanised sheet steel, powder coated
 - Optimal electrical data in lowest mechanical dimensions due to offset feed and slewable multi-feed adapter plate allowing the feed systems to be positioned into the secondary focal points typical in multi-feed reception
 - Available in graphite, white or red brown
 - No additional components are required to be able to mount two universal feed systems to receive the signals of satellites 3° to 4° (ASTRA 19.2°/23.5°) or 6° (e.g. ASTRA/EUTELSAT-HOTBIRD) apart on the boom

For other combinations, the ZAS 90 multi-feed adapter plate is also required (see Page 22).

Technical data

Type | Order no.		CAS 80gr 20010027	CAS 80ro 20010028	CAS 80ws 20010029
Diameter	cm	75	75	75
Colour		Graphite grey (similar to RAL 7012)	Red-brown (similar to RAL 8012)	White (similar to RAL 9002)
Reception range	GHz	10.70-12.75		
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	36.8/37.3/37.7		
Half power beam width ¹⁾	°	Typ. < 2.2		
Figure of merit ²⁾ Feed system in centre	UAS 571/572/582/584/585	dB/K	16.9/17.9	
Figure of merit ²⁾ Feed system spacing 3°-4°	UAS 571/572/582/584/585	dB/K	16.6/17.4	
Figure of merit ²⁾ feed system spacing 6°	UAS 571/572/582/584/585	dB/K	16.3/17.1	
Cross-polarisation decoupling	dB	Typ. > 26		
Wind load ³⁾	N	450		
Max. permissible wind speed	km/h	190		
Mast clamp range	mm	38-90		
Adjustment range Elevation/Azimuth	°	Mast-side mounting: 5-48/360 Wall-bracket mounting: 90/360		
Multi-feed adaptor plate adjustment range	°	±15		

Type | Order no.		CAS 80gr 20010027	CAS 80ro 20010028	CAS 80ws 20010029
Diameter	cm	75	75	75
Colour		Graphite grey (similar to RAL 7012)	Red-brown (similar to RAL 8012)	White (similar to RAL 9002)
Dimensions width	mm	750		
Dimensions height max.	mm	884		
Dimensions protrusion max. (from mast centre without feed system)	mm	830		
Packing unit	mm	1100 x 800 x 180		
Weight approx. net/gross	kg	6.7/8.0		

¹⁾ At mid-band ²⁾ Typ. G/T at 11.3/12.5 GHz ³⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

Test verdicts



Offset parabolic antennas with 90 cm Ø

- CAS 90gr** 20010033
- CAS 90ro** 20010034
- CAS 90ws** 20010035



CAS 90gr with two UAS 58x feed systems

- Includes reflector, feed system mounting and mast clamp
- Reflector in proven aluminium design, powder-coated
- Patented tilttable multi-feed adapter plate in robust, corrosion-resistant die-cast aluminium
- All connectors (screws, rivets, washers, M10 threaded clips) are made of corrosion-resistant stainless steel or die-cast zinc
- Snap cable clips of weather-proof plastic for up to eight coaxial cables
- Mast mounting bracket made of hot-dip galvanised sheet steel
- High installation comfort: High installation comfort: Completely pre-mounted, reflector keyhole fixing system, large wing nuts angled for AF 17 open-ended spanner, elevation scale on both sides
- Optimal electrical data in lowest mechanical dimensions due to offset feed and slewable multi-feed adapter plate allowing the feed systems to be positioned into the secondary focal points typical in multi-feed reception
- Exchangeable multi-feed adaptor plate included in scope of delivery

- Available in graphite, white or red brown
- Feed system mounting made of galvanised sheet steel, powder coated
- No additional components are required to be able to mount two universal feed systems to receive the signals of satellites 3° to 4° (ASTRA 19.2°/23.5°) or 6° (e.g. ASTRA/ EUTELSAT-HOTBIRD) apart on the boom

For other combinations, the ZAS 90 multi-feed adapter plate is also required (see Page 22).

Technical data

Type | Order no.		CAS 90gr 20010033	CAS 90ro 20010034	CAS 90ws 20010035
Diameter	cm	90	90	90
Colour		Graphite grey (similar to RAL 7012)	Red-brown (similar to RAL 8012)	White (similar to RAL 9002)
Reception range	GHz	10.70-12.75		
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	38.6/39.2/39.6		
Half power beam width ¹⁾	°	Typ. < 1.9		
Figure of merit ²⁾ central feed system	UAS 571/572/582/584/585 dB/K	18.8/19.8		
Figure of merit ²⁾ feed system spacing 3°-4°	UAS 571/572/582/584/585 dB/K	18.3/18.3		
Figure of merit ²⁾ feed system spacing 6°	UAS 571/572/582/584/585 dB/K	17.9/18.7		
Cross-polarisation decoupling	dB	Typ. > 27		
Wind load ³⁾	N	730		
Max. permissible wind speed	km/h	190		
Mast clamp range	mm	48-90		
Adjustment range Elevation/Azimuth	°	Mast-side mounting: 5-45/360 Wall-bracket mounting: 5-50/360		
Multi-feed adaptor plate adjustment range	°	±20		
Dimensions width	mm	987		
Dimensions height max.	mm	1030		
Dimensions protrusion max. (from mast centre without feed system)	mm	880		
Packing unit	mm	1050 x 1050 x 230		
Weight approx. net/gross	kg	9.9/13.5		

¹⁾ At mid-band ²⁾ Typ. G/T at 11.3/12.5 GHz ³⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

CAS 90ws/HD 21610031

CAS 90gr/HD 21610032

- Includes reflector, feed system mounting and mast clamp
- Reflector in proven aluminium design, powder-coated, without logo
- Feed system mounting made of galvanised sheet steel, plastic-coated, with swivelling LNB head
- Closing clamp made of hot-dip galvanised sheet steel
- Optimal electrical data within smallest mechanical dimensions due to offset feed
- No additional components are required to be able to mount two universal feed systems to receive the signals of satellites 3° to 4° or 6° (e.g. ASTRA/ EUTELSAT-HOT-BIRD) apart on the boom
- HD: For installation sites with more stringent demands, robust mounting material
- Available in the colours graphite or white



- Set ZSO 127 (order no. 276029): Consists of CAS 09/HD (graphite, without label), ESO 95 (heating) and ESO 96 (control)

Technical data

Type | Order no.		CAS 90ws/HD 21610031	CAS 90gr/HD 21610032
Diameter	mm	987	987
Colour		White	Grey
Reception range	GHz	10.70-12.75	
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	38.6/39.2/39.6	
Half power beam width ¹⁾	°	Typ. < 1.9	
Figure of merit ²⁾ central feed system	UAS 571/572/582/584/585 dB/K	18.8/19.8	
Figure of merit ²⁾ feed system spacing 3°-4°	UAS 571/572/582/584/585 dB/K	18.3/18.3	
Figure of merit ²⁾ feed system spacing 6°	UAS 571/572/582/584/585 dB/K	17.9/18.7	
Cross-polarisation decoupling	dB	Typ. > 27	
Wind load ³⁾	N	730	
Max. permissible wind speed	km/h	190	
Mast clamp range	mm	48-90	
Adjustment range Elevation/Azimuth	°	5-50/360	
Multi-feed adaptor plate adjustment range	°	±20	
Dimensions width	mm	987	
Dimensions height max.	mm	1030	
Dimensions protrusion max. (from mast centre without feed system)	mm	880	
Packing unit	mm	1015 x 1015 x 210	
Weight approx. net/gross	kg	9.3/11.9	

¹⁾ At mid-band ²⁾ Typ. G/T at 11.3/12.5 GHz ³⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

Offset parabolic antennas 120 and 180 cm Ø

CAS 120 20010008

CAS 120/G 20010011



CAS 120 with two UAS 58x

- Antenna including reflector and feed system mounting
- Patented tiltable multi-feed adapter plate in robust, corrosion-resistant cast aluminium
- Reflector in proven aluminium design, powder-coated
- Feed system mounting and reflector rear part made of galvanised sheet steel, powder coated
- Snap cable clips of weather-proof plastic for up to eight coaxial cables
- Optimal electrical data in lowest mechanical dimensions due to offset feed and slewable multi-feed adapter plate allowing the feed systems to be positioned into the secondary focal points typical in multi-feed reception
- Additionally required for mounting: ZAS 120 azimuth/elevation clamp (see Page 24)
- No additional components are required to be able to mount two universal feed systems to receive the signals of satellites 3° to 4° (e.g. ASTRA 19.2°/23.5°) or 6° apart on the boom
- When satellites are positioned 6° apart, an additional feed system can be mounted in the centre (three satellites, 3° apart each)
- Exchangeable multi-feed adaptor plate included in scope of delivery
- CAS 120/G: model without logo, colour: Graphite grey

Technical data

Type | Order no.		CAS 120 20010008	CAS 120/G 20010011
Diameter	m	1.2	
Colour		White (similar to RAL 9002)	Graphite (similar to RAL 7012)
Reception range	GHz	10.70-12.75	
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	41.5/42.15/42.5	
Half power beam width ¹⁾	°	Typ. < 1.43	
Figure of merit ²⁾ central feed system	UAS 571/572/582/584/585	dB/K	22.0/23.0
Figure of merit ²⁾ Feed system spacing 3°-4°	UAS 571/572/582/584/585	dB/K	21.8/22.8
Figure of merit ²⁾ Feed system spacing 6°	UAS 571/572/582/584/585	dB/K	21.5/22.6
Cross-polarisation decoupling	dB	Typ. > 30	
Wind load ³⁾	N	1296	
Max. permissible wind speed	km/h	157	
Mast clamp range	mm	50-90	
Adjustment range Elevation/Azimuth	°	5-50/360	
Dimensions width/height max.	mm	1234/1570	
Dimensions protrusion max. (from mast centre without feed system)	mm	1408	
Packing unit	mm	1330 x 1330 x 250	
Weight approx. net/gross	kg	18.3/29.0	

¹⁾ At mid-band ²⁾ Typ. G/T at 11.3/12.5 GHz ³⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)



For individual multifeed reception systems with a satellite spacing of max. 13°, you can place an order for a multi-feed adapter plate without indentations with autronic electronic-service GmbH, order no. 16800187.

CAS 124	216236
CAS 124 M	5902142
CAS 124 HS	26910112
CAS 180	216235
CAS 180 M	5902141
CAS 180 HS	26910250
ZAS 180	218661
ZAS 181	218667
ZAS 186	218676
ZAS 187	218688

- Reflector in proven aluminium design, powder-coated, colour: White, matt
- Optional CAS 124 M and CAS 180 M with pre-assembled mirror heater
- Optional CAS 124 HS and CAS 180 HS with pre-assembled mirror heating
- Feed system mounting consisting of aluminium hollow section (boom) and aluminium plate (feed system installation)
- Mast clamp made of aluminium and stainless steel
- Optimal electrical data within smallest mechanical dimensions due to offset feed
- In conjunction with compact feed systems, multi-feed systems can be realised. As delivered, up to two compact feed systems to receive the signals of satellites 3° to 6° (CAS 124) or 3° (CAS 180) apart can be mounted on the boom.
For other combinations, a multi-feed adapter plate is also required.
- Required components for CAS 124:
 - Offset parabolic antenna CAS 124 (order no. 216236)
 - Feed system mounting ZAS 124C (order no. 23710026)
 - Azimuth/elevation clamp ZAS 180 (order no. 218661)



CAS 180 with feed system mounting ZAS 181 on mast clamp ZAS 186

- Required components for CAS 180:
 - Offset parabolic antenna CAS 180 (order no. 216235)
 - Feed system mounting ZAS 181 (order no. 218667)
 - Azimuth/elevation clamp ZAS 186 (order no. 218676)
- Accessories for CAS 124/CAS 180:
 - Azimuth fine tuning device ZAS 189 (order no. 23710017)
- Accessories for CAS 124:
 - Stub masts ZSO 120 (order no. 376214) and 125 (order no. 376215)
- Accessories for CAS 180:
 - Stub masts ZSO 180 (order no. 23710014) and 181 (order no. 23710015)

Technical data

Type | Order no.		CAS 124 216236	CAS 124 M 5902142	CAS 124 HS 26910112	CAS 180 216235	CAS 180 M 5902141	CAS 180 HS 26910250
Diameter	m	1.2			1.8		
Reception range	GHz	10.70-12.75			10.70-12.75		
Antenna gain at 10.70-11.70 GHz/11.70-12.50 GHz/12.50-12.75 GHz	dBi	41.5/42.15/42.5			44.5/45.15/45.5		
Half power beam width	°	1.43			0.9		
Cross-polarisation decoupling	dB	> 30			> 30		
Wind load ¹⁾	N	1296			3396		
Mast clamp range ZAS 180/ZAS 186	mm	75-114			75-114		
Setting range, elevation	°	5-50			5-50		
Setting range, azimuth	°	360			360		
Dimensions width	mm	1234			1980		
Dimensions height max.	mm	1501			1511		
Dimensions protrusion max. (from mast centre without feed system)	mm	1353			1511		
Packing unit	mm	1430 x 1430 x 370			2230 x 2120 x 390		
Weight approx. net/gross	kg	18.4/30.7			60.0/81.5		

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

> Cable junction box

TVK 44	23710004
ZAS 33	23710010
ZAS 34	23710011

The TVK 44 cable junction box serves as an interface between the flexible connection cables of a feed system and the output to a signal processing system with, for example, LCM 33 (1qkx) or LCM 50 (1nkx).

- With earthing point
- Remote feeding

Accessories for TVK 44:

- ZAS 33: Band clamp for mounting Ø 60–120 mm
- ZAS 34: Band clamp for mounting Ø 120–300 mm



TVK 44



ZAS 33/ZAS 34

Technical data

Type | Order no.		TVK 44 23710004
Frequency range	MHz	950–2150
Through loss	dB	0.2
Return loss	dB	20
Impedance	Ω	75
Remote feed current (max.)	A	2
Connections		8 x F socket
Temperature range	°C	-25 to +65
Protection class		IP 54
Dimensions (W x H x D)	mm	155 x 148 x 122
Packaging dimensions (W x H x D)	mm	225 x 183 x 145
Weight	kg	1.5

> Feed systems without LNB**EAS 124** 227243**EAS 126** 227249

- Feed system without LNB fitted; for use of special feed systems
- Modular offset housing
- For one (EAS 124) or two (EAS 126) polarisations
- With one (EAS 124) or two (EAS 126) waveguide transitions R120
- Suitable for offset parabolic antennas CAS 06-CAS 180
- Power supply via drop cable
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

**Technical data**

Type | Order no.		EAS 124 227243	EAS 126 227249
Suitable for offset parabolic antennas		CAS 06, CAS 60, CAS 80xx, CAS 90xx, CAS 124, CAS 180	
Waveguide transitions		1 x R120	2 x R120
Polarisation		One polarisation plane	Two polarisation planes
Input frequency	GHz	10.70-12.75	
Dimensions including protective hood (W x H x D)	mm	393 x 129 x 116	
Packaging dimensions (W x H x D)	mm	405 x 115 x 115	
Weight	kg	2.0	2.1



For multifeed arrangement, please observe notes for ZAS 187 or ZAS 188.

> Planar antenna

BAS 65

20010032



- To receive analogue and digital TV and radio channels and other satellite signals
- Frequency range: 10.70-12.75 GHz
- For stationary use
- With built-in twin LNB
- Option to select horizontal/vertical, low band/high band from each receiver
- Power supply via drop cable
- Can be mounted onto walls, masts, booms and on flat surfaces



Technical data

Type | Order no.		BAS 65 20010032
Reception range	GHz	Switchable: 10.70-11.70 (0 kHz) - 11.70-12.75 (22 kHz)
Polarisation		Switchable: Vertical (14 V)–Horizontal (18 V)
Gain	dB	> 55
Half power beam width ¹⁾	°	Typ. < 3
LNB		2 switchable outputs
Output frequency	MHz	950-1950/1100-2150
Oscillator frequency (L.O.)	GHz	9.75/10.6
LNB supply voltage	V	Vertical: 11.5-14.0; Horizontal: 16.0-19.0
Max. current drain	mA	220
Wind load ²⁾	N	240
Mast clamp range	mm	38-50
Setting range, elevation	°	0-50
Setting range, azimuth	°	± 65 (wall mounting) – 360 (mast installation)
Dimensions	mm	500 x 500 x 121 (without support)
Packaging unit/weight	pc./kg	1/8.2

¹⁾ At mid-band ²⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

Installation options



On walls



On masts

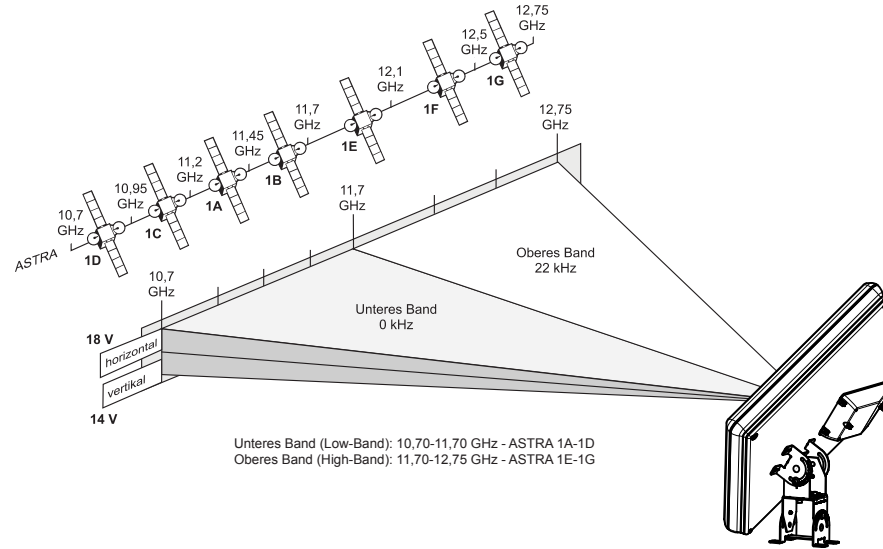


On flat surfaces

Test verdict



Alignment tips



To align the BAS 65 you will need either a satellite measurement receiver or a helper who will monitor the alignment on your TV set. If you use a Kathrein MSK series satellite measurement receiver, you must connect it to the LNB on the antenna. Use the signal meter to adjust the signal to the maximum level. If you control the alignment of the antenna using a TV

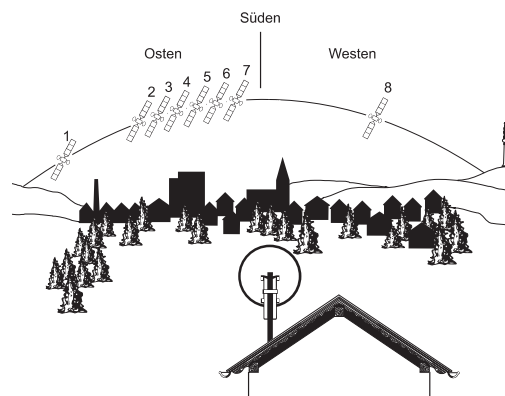
set, the picture quality will be your reference for signal quality. The best picture quality is always obtained using a satellite measurement receiver.

General installation note

In order to ensure perfect reception, there must be a clear line of sight to the satellite, at an angle of approximately 30°. The following satellites *) will then be available:

1 TÜRKSAT	42° East
2 ASTRA 2 group	28.2° East
3 ASTRA 3 group	23.5° East
4 ASTRA 1 group	19.2° East
5 EUTELSAT W 2	16° East
6 EUTELSAT-HOTBIRD	13° East
7 EUTELSAT W 1	10° East
8 HISPA-Sat	30° West

*) The reception is dependent upon the respective location and the satellite coverage zone

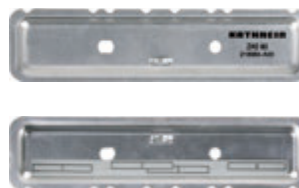


Ensure that there are no obstacles between the parabolic antenna and the respective satellite (e.g. trees, roof or building sections, other antennas). These can hamper reception to such a degree that there is no reception at all during bad weather conditions.

> Multi-feed adapter plate

ZAS 90 218684

- To accept two or three universal feed systems in order to receive max. three satellites with one parabolic antenna
- The ZAS 90 adapter plate is only suitable for the parabolic antennas CAS 80gr/80ro/80ws and CAS 90gr/90ro/90ws
- ZAS 90 is only required if two satellites that have an orbit distance 9° from one another or three satellites are to be received
- The feed systems UAS 571, UAS 572, UAS 582, UAS 584 or UAS 585 can be used optionally



Allocation of feed systems/system figure of merit

Mounting position		1	2	3	4
Reception possibility 1		ASTRA 19.2° East	EUTELSAT 16° East	–	EUTELSAT 10° East
System figure of merit G/T (dB/Ch) *)	CAS 80–CAS 90	15.2/15.8–16.6/17	16.8/17.6-18.7/19.5		15.5/16.2-16.9/17.5
Reception possibility 2		ASTRA 19.2° East	–	EUTELSAT 13° East	EUTELSAT 10° East
System figure of merit G/T (dB/Ch) *)	CAS 80–CAS 90	15.2/15.8–16.6/17		16.8/17.6-18.7/19.5	15.5/16.2-16.9/17.5
Reception possibility 3		ASTRA 28.2° East **)	–	–	ASTRA 19.2° East
System figure of merit G/T (dB/Ch) *)	CAS 80–CAS 90	12.7/13 – 13.8/14.2			12.7/13-13.8/14.2
Reception possibility 4		ASTRA 23.5° East	ASTRA 19.2° East	–	EUTELSAT 13° East
System figure of merit G/T (dB/Ch) *)	CAS 80–CAS 90	14.1/14-14.7/13.8	16.8/17.6-18.7/19.5		15.5/16.2-16.9/17.5
Reception possibility 5		ASTRA 23.5° East	–	EUTELSAT 16° East	EUTELSAT 13° East
System figure of merit G/T (dB/Ch) *)	CAS 80–CAS 90	14.1/14-14.7/13.8		16.8/17.6-18.7/19.5	15.5/16.2-16.9/17.5

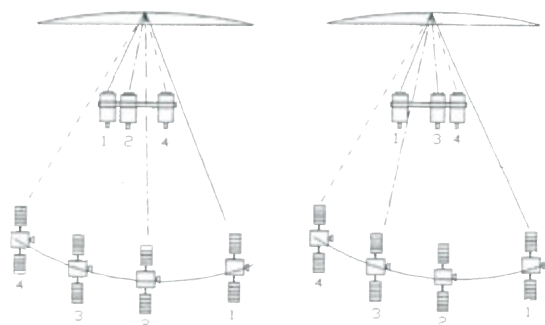
*) Typ. G/T at 11.3/12.5 GHz. Values apply to feed systems UAS 571, UAS 572, UAS 584 or UAS 585. The difference in satellite positions must not exceed 0.7°

**) Check the footprint of the required channels. Due to the differences in elevation, we recommend using the CAS 120 equipped with a variable slew adapter plate

The values given apply to an alignment to mounting position 4 (see graphics below). Alignment onto the preferred or weakest satellite is also possible. The alignment is carried out using a satellite measurement receiver.

Other satellites are checked using visual control. If necessary, the parabolic antenna's elevation is to be readjusted. In reception possibility 3, elevation must be readjusted.

Mounting positions ZAS 90



> Mounting positions 2 and 3 cannot be used at the same time. Elevation values for your reception site can be calculated using the azimuth/elevation calculator on our website www.kathrein.com.

ZAS 187 218688
ZAS 188 23710018

The ZAS 187 and ZAS 188 multi-feed adapter plates are used for multi-feed reception of satellite combinations with the CAS 180 offset parabolic antenna that are not possible with the standard mounting plate of the ZAS 181.



- The ZAS 187 and ZAS 188 adapter plates are suitable for the CAS 180 parabolic antenna with ZAS 181 feed system mounting
- For further settings, refer to the user instructions

ZAS 187

- Typical orbit distances up to a maximum of 10.5°
- With the prescribed grid, the arrangements described in the table can be realized

ZAS 188

- Typical orbit distances up to a maximum of 12.8°
- The ZAS 188 offers stepless adjustment options for feed systems. As a result, any satellite combinations can be optimally adjusted
- For settings, refer to the user instructions

Arrangement of feed systems							
1	2	3	4	5	6	7	8
ASTRA 2 28.2°	-	-	-	SES 16 23.5°	-	-	ASTRA 1 19.2°
-	SES 16 23.5°	-	-	ASTRA 1 19.2°	-	Eutelsat 16A 16°	
ASTRA 1 19.2°	-	-	Eutelsat 16A 16°	-	Eutelsat Hot Bird 13°	-	Eutelsat 10 10°
Eutelsat 16A 16°	-	-	Eutelsat Hot Bird 13°	-	Eutelsat 10 10°	-	Eutelsat 7 7°
-	-	ASTRA 1 19.2°	-	Eutelsat 16A 16°	-	Eutelsat Hot Bird 13°	-
-	-	Eutelsat 16A 16°	-	Eutelsat Hot Bird 13°	-	ECS 10°	-
-	-	-	ASTRA 1 19.2°	-	Eutelsat 16A 16°	-	-
-	-	-	Eutelsat 16A 16°	-	Eutelsat Hot Bird 13°	-	-
-	-	-	Eutelsat Hot Bird 13°	-	Eutelsat 10 10°	-	-
-	-	-	Eutelsat 10 10°	-	Eutelsat 7 7°	-	-
-	-	-	TELEKOM 2B -5°	-	TELEKOM 2A -8°	-	-
22.3	22.5	23.7	24.4	24.7	24.4	23.7	22.3
G/T [dBi/K]							

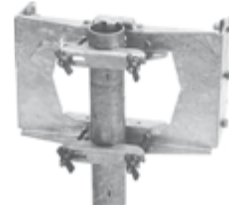


For a satellite spacing of less than 4.5° (e.g., 19.2°/23.5°), for space reasons, either two compact feed systems or a module feed system and a compact system must be installed. This combination is possible for a satellite spacing down to 3°.

> Azimuth/Elevation clamp

ZAS 120 218672

- Suitable for CAS 120 offset parabolic antenna
- To align the parabolic antenna onto one satellite
- Made of hot-dip galvanised sheet steel and stainless steel, wing nuts of die-cast zinc
- The antenna can be installed either in front of or on the tip of the mast, elevation: 5°–40°
- Mast clamp range: 50–90 mm
- With elevation-fine tuning
- Setting range:
In height (elevation): 5–50° – to the side (azimuth): 360°
- Packaging unit/weight (pc./kg): 1/10.7



> Control unit for reflector temperature

ESO 96 271985

- For control of the ESO 95 reflector heater (suitable for CAS 90)
- Electronic two-point controller with adjustable temperature threshold
- Reflector is heated if the outside temperature falls below the set value
- With tensioning belt for mast installation



Technical data

Type | Order no.		ESO 96 271985
Suitable for reflector heating		ESO 95
Power supply		230 ±10%/50 Hz
Breaking capacity		Max. 16 A/230 V
Measuring input		PT 100, 2 conductor
Setting range	°C	-5 to +15
Ambient temperature	°C	-30 to +80
Type of control		Two-level controller
Output		Relay contact
Signal lamp		Heating ON (yellow)
Casing material		Polycarbonate
Dimensions	mm	130 x 130 x 75
Mast clamp range	mm	48-90
Weight	kg	Approx. 0.7
Cable insertions		1 x PG 7; 1 x PG 11; 1 x PG 16
Packaging unit/weight	pc./kg	1/1.0

> Reflector heating

ESO 95 271983

- Suitable for operation in combination with CAS 90gr/90ro/90ws parabolic antennas
- Prevents ice and snow on the reflector surface
- Specially designed heating panel with built-in heat insulation guaranteeing effective heat distribution
- Built-in temperature switch as overheat protection
- Appropriate control unit: ESO 96



ESO 95, CAS 90,
ESO 96, ZAS 15

Technical data

Type | Order no.		ESO 95 271983
Suitable for parabolic antennas		CAS 90gr/90ro/90ws
Number of heating segments	pc.	1
Mains voltage per segment	V	230 + 6 %/- 10 %
Mains frequency	Hz	50/60
Nominal current	A	1.5
Power consumption total	W	345
Weight per segment, approx.	kg	1.5
Protection class		IP 65
Temperature protection		60 °C opener
Packing unit/weight	pc./kg	1/6.5

ESO 120 23710023

- Reflector heating for CAS 120
- Prevents ice and snow on the reflector surface
- Good heat distribution due to an optimal fit of the heating mat on the reflector
- Special heating mat with built-in heat insulation and PTFE isolated heating elements
- Easy installation
- Recommended control unit: ESO 005



Technical data

Type | Order no.		ESO 120 23710023
Suitable for parabolic antennas		CAS 120/CAS 120/G
Heating element		Resistance material PTFE isolated
Element carrier		Aluminium foil, self-adhesive foil strips at the front
Heat insulation		Bubble wrap with a reflective layer, 4 mm
Temperature resistance	°C	-40 to +80
Recommended installation temperature	°C	5 to 20
Nominal temperature (frost protection)	°C	3
Temperature protection		80 °C opener
Operational voltage	V	230 +6%/-10%; 50 – 60 Hz
Nominal current	A	approx. 3
Nominal voltage	V	230
Nominal power	W	approx. 500
Power	W	approx. 716
Insulation resistance	MΩ	> 20
Dielectric strength	kV	2.5
Protection class		IP 65
Service life		Min. 10 years
Weight of the heating mat	kg	approx. 0.5
Design and construction type in accordance with		DIN VDE 0100, DIN EN 60519-1, VDE 0721-1 DIN EN 50173-4, VDE 0800-173-4
Corresponds to the standards		EN 61000-6-1, EN 61000-6-3, EN 1010-1, EN 60519-1, EN 60519-2

> Heating system for CAS 90/HD

ZSO 127 276029

- Complete set consisting of:
 - CAS 90/HD offset parabolic antenna
 - ESO 95 reflector heating
 - Control unit for ESO 96 reflector heating
- Prevents ice and snow on the reflector surface
- Specially designed heating panel with built-in heat insulation guaranteeing effective heat dissipation
- Built-in temperature switch as overheat protection
- Colours: Graphite grey without label



Technical data

Type | Order no.		ESO 95 271983
Suitable for parabolic antennas		CAS 90/HD
Number of heating segments	pc.	1
Mains voltage per segment	V	230 + 6 %/- 10 %
Mains frequency	Hz	50/60
Nominal current	A	1.5
Power consumption total	W	345
Weight per segment, approx.	kg	1.5
Protection class		IP 65
Temperature protection		60 °C opener
Packaging unit/weight	pc./kg	1/6.5

> Outside temperature control unit for ESO 124/180

ESO 97 271986

- For control of Kathrein reflector heaters ESO 124/ESO 180
- Electronic two-point controller with adjustable temperature threshold
- Reflector is always heated if the outside temperature falls below the set value



Technical data

Type | Order no.		ESO 97 271986
Suitable for reflector heating		ESO 124/ESO 180
Power supply	V _{ac}	230 ±10%/50 Hz
Breaking capacity		Max. 16 A/230 V
Measuring input		PT 100 (2-conductor)
Setting range	°C	-5 to +15
Ambient temperature	°C	-30 to +80
Type of control		Two-point control unit
Output		Relay contact
Indicator light		Heating ON (yellow)
Casing material		Polycarbonate
Dimensions (W x H x D)	mm	254 x 180 x 90
Weight (approx.)	kg	1.5
Cable insertions		2 x PG 7; 4 x PG 9; 1 x PG 16

➤ Heating systems for CAS 124/180

ESO 124	271982
ESO 180	271984
ESO 125	26910035
ESO 128	26910057
ESO 126	26910036
ESO 129	26910058

ESO 124/ESO 180 heating panels

- For operation with CAS 124/180 offset parabolic antennas
- Prevent snow and ice formation on the reflector surface, power: 650 W/1400 W
- Specially designed heating panel with built-in heat insulation guaranteeing effective heat distribution
- Built-in temperature switch as overheat protection

ESO 128 heating panels for exposed locations

- Heating for CAS 180 with increased power, 2750 W/230 V_{AC}

ESO 125 heating

- Special heating for CAS 124

ESO 126 heating

- Heating for ZAS 124 feed system mounting (CAS 124 offset parabolic antenna), 113 W/230 V_{AC}; protection class: IP 56
- Can be operated with ESO 97/99

ESO 129 heating

- Heating for ZAS 181 feed system mounting (CAS 180 offset parabolic antenna), 181 W/230 V_{AC}; protection class: IP 56
- Can be operated with ESO 97/99



Technical data

Type | Order no.		ESO 124 271982	ESO 180 271984
Suitable for parabolic antenna		CAS 124	CAS 180
Associated control unit and sensors		ESO 97/ESO 99	ESO 97/ESO 99
Number of heating segments	Units	2	4
Mains voltage per segment	V _{AC}	230 + 6 %/- 10 %	230 + 6 %/- 10 %
Mains frequency	Hz	50/60	50/60
Nominal current	A	3	6
Power consumption total	W	650	1400
Weight per segment	kg	Approx. 1.5	Approx. 1.5
Protection class		IP 65	IP 65
Temperature protection		60-°C NC contact	60-°C NC contact in shell 1 + 4

> Outside temperature/sensor control unit

ESO 99	271988
ESO 101	271990
ELSM 124/180	26910001

ESO 99

- For control of the ESO 124/180 Kathrein reflector heaters and evaluation of the following parameters:
 - Outside temperature
 - Reflector temperature
 - Snow or ice cover
 - Dirt
- The reflector is always heated when the outside and reflector temperatures fall below the set values and snow or ice has been detected on the reflector surface
- Signalling when reflector surface is dirty
- Overheating protection
- Manual or remote switching operation possible
- Requires ESO 101 and ESO 124/180 for CAS 124 and CAS 180

ESO 101

- Opto-sensors with terminal box for controlling the ESO 99
- Opto-sensor for detection of snow and ice or dirt
- Temperature sensors for measurements of outside and reflector temperature

ELSM 124/180

- For mounting the opto-sensor to the boom of the ZAS 124 or ZAS 181 feed system mounting
- Suitable for CAS 124 or CAS 180



ESO 99



ESO 101



ELSM 124/180

- Requires ESO 101

Technical data

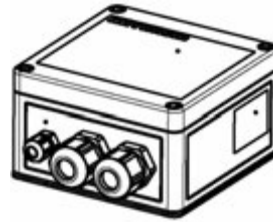
Type | Order no.		ESO 99 271988
Nominal voltage	V _{AC}	230
Operating temperature	°C	-20 to +60
Temperature adjustment range		
Ambient temperature upper switching threshold/lower switching threshold	°C	-3 to +5/-25 to -5
Reflector temperature	°C	+20 to +60
Switching hysteresis	°C	1
Heating shut-off delay	Min.	3-180

All specifications are typical values, unless otherwise stated.

➤ Temperature control for ESO 95/ESO 120

ESO 005 23710022

- Temperature control for the ESO 95 / ESO 120 reflector heaters
- Use for frost protection heating as air thermostat or surface thermostat with remote sensor



Technical data

Type | Order no.		ESO 005 23710022
Housing material		Polycarbonate
Cable insertion		1 x M12, 2 x M2
Measuring input		PT 100 temperature sensor
Recommended installation temperature	°C	5 to 20
Ambient temperature	°C	-30 to +80
Operational voltage	V	230 +6%/-10 %; 50 – 60 Hz
Breaking capacity		16 A/230 V
Setting range	°C	3
Protection class		IP 66
Dimensions (H x W x D)	mm	130 x 130 x 75
Weight	g	530

Feed Systems

➤	General quality features	32
➤	Warranty Conditions	32
➤	Universal single feed system	33
➤	Universal twin feed system	33
➤	Wideband feed system	34
➤	Universal quatro feed system	34
➤	Universal quad feed system	35
➤	Connection examples	35
➤	Technical data	38

> General quality features



The feed system, also referred to as LNB, is the heart of a satellite system. Here, the signals are processed and amplified. At the moment, satellite television uses two different frequency ranges: The high band (11.70-12.75 GHz) and low band (10.70-11.70 GHz). Since both the high and low bands are required for reception of all channels, Kathrein feed systems are factory-installed for both ranges. The systems are technologically mature and offer top picture and sound quality at all times. HDTV (High Definition Television) and 3D can be received with any Kathrein LNB.

As far as long-term usage is concerned, the feed systems are sealed in such a manner that they are protected against rain water and can therefore be used in bad weather conditions. A low noise factor and a high system figure of merit, achieved through the optimal tuning to our Kathrein parabolic antennas, ensure excellent reception quality. Due to their compact design, up to three Kathrein feed systems for multi-feed reception can be mounted on one parabolic antenna. Kathrein has five different types of feed systems on offer:

- UAS 571 universal single feed system
Switching between the frequency bands (low/high) and polarisations (horiz./vert.) is effected by choosing the programme on the receiver.
- Universal twin feed system UAS 572
For individual reception systems with two receivers or systems for two participants. Switching between the frequency ranges (low/high) and the polarisations (horiz./vert.) is effected, as in the individual reception system, through channel selection on the receiver.
- UAS 582 wideband feed system
Suitable for community units with two polarisations. Highly energy efficient through the use of internal circuit regulators.
- UAS 584 universal quatro feed system
The UAS 584 feed system is suitable for supplying switching matrices or headend units in cable TV systems.
- UAS 585 universal quad feed system
For communal subscriber system with built-in switching matrix. Switching between the frequency ranges is effected through channel selection on the receiver, as is done in the individual reception system. It is possible to subsequently extend the system to more than four connections.

> Warranty Conditions

Warranty terms for Kathrein feed systems UAS 571, UAS 572, UAS 582, UAS 584 and UAS 585:

- The warranty only covers replacement of the product.
- The LNB must be professionally installed in line with the enclosed instruction sheet
- The LNB must not be modified (e.g. by drilling)
- The LNB must not be damaged mechanically (e.g. deformations caused by falling from a roof)
- The LNB must not be damaged due to exposure to chemicals (e.g. solvents, paints, detergents or similar)
- The LNB must only be used on and with original Kathrein accessories
- Furthermore, the warranty does not apply to damage resulting from force majeure, such as lightning strike, storm or hail



Only the original proof of purchase is acceptable for warranty claims.

> Universal single feed system (10.70–11.70 and 11.70–12.75 GHz)

UAS 571 20110017



- For reception of satellites in the Ku-band, such as ASTRA, EUTELSAT/HOTBIRD and TürkSat
- The feed system complies with the ASTRA specifications for universal feed systems
- Suitable for individual reception systems with two polarisations and two frequency ranges (2 x low band/high band)
- For linear polarisation
- Equipped with a single LNB, switchable (one output)
- Horizontal/vertical, low band/high bands can be selected independently from each receiver
- Power supply via drop cable
- Switching between horiz./vert., low band/high band via the coaxial cable through 14/18 V and 22 kHz
- Multi-feed suitable due to compact design (CAS 60/80/90/120)
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

> Universal twin feed system (10.70–11.70 and 11.70–12.75 GHz)

UAS 572 20110018



- For reception of satellites in the Ku-band, such as ASTRA, EUTELSAT/HOTBIRD and TürkSat
- The feed system complies with the ASTRA specifications for universal feed systems
- Suitable for community units with two polarisations and two frequency ranges (2 x low band/high band)
- For linear polarisation
- Equipped with twin LNB, (two switchable outputs)
- For two connections without an additional multi-switch
- Option to select horizontal/vertical, low band/high band from each receiver
- Switching between horiz./vert., low band/high band via the coaxial cable through 14/18 V and 22 kHz
- Power supply via drop cable
- Multi-feed suitable due to compact design (CAS 60/80/90/120)
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

> Wideband feed system (10.70-12.75 GHz)

UAS 582 20110032



- For reception of satellites in the Ku-band, such as ASTRA, EUTELSAT/HOTBIRD and TürkSat
- The feed system complies with the ASTRA specifications for wideband feed systems
- For community units with two polarisations (vertical/horizontal)
- For linear polarisation
- Equipped with wideband LNB
- Highly energy efficient through the use of internal circuit regulators.
- Power supply via drop cable
- **Only two drop cables are needed for one satellite.**
- Multi-feed suitable due to compact design (CAS 60/80/90/120)
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

> Universal quatro feed system (10.70–11.70 and 11.70–12.75 GHz)

UAS 584 20110019



- For reception of satellites in the Ku-band, such as ASTRA, EUTELSAT/HOTBIRD and TürkSat
- The feed system complies with the ASTRA specifications for universal SMATV feed systems
- Suitable for community units with two polarisations and two frequency ranges (2 x low band/high band)
- Only to be used in conjunction with multi-switches EXR, EXE, etc.
- For linear polarisation
- Power supply via drop cable, remote feeding is possible via any output
- Equipped with quatro LNB (four outputs)
- Polarisation and frequency range independent of supply voltage
- Multi-feed suitable due to compact design (CAS 60/80/90/120)
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

Test verdict



> Universal quad feed system (10.70–11.70 and 11.70–12.75 GHz)

UAS 585 20110020



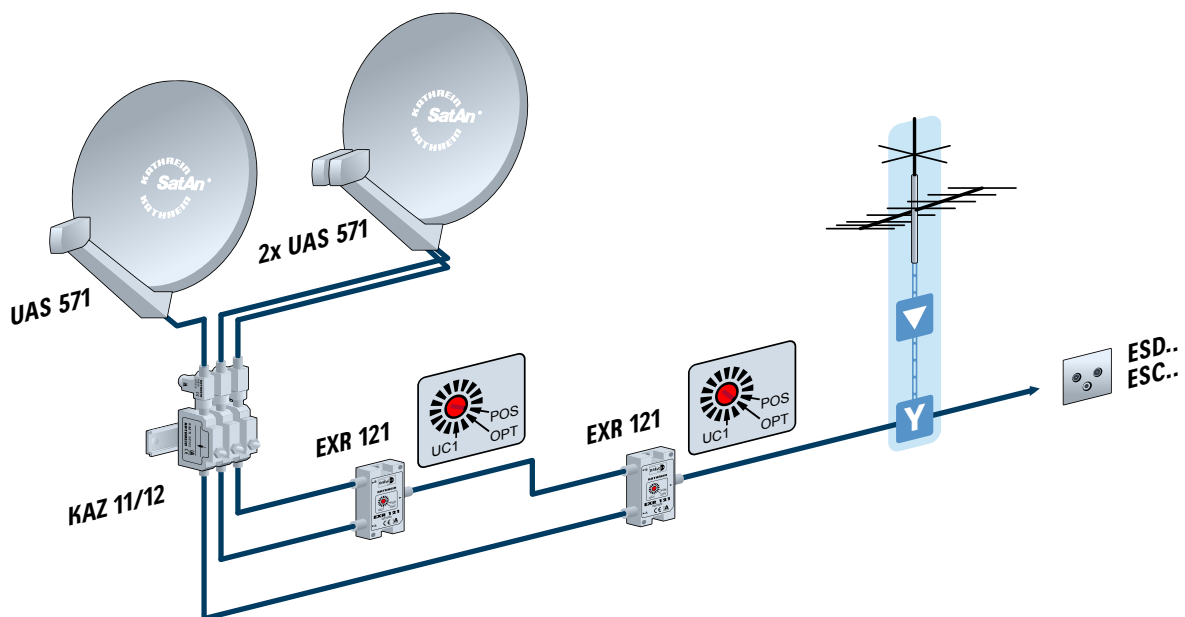
- For reception of satellites in the Ku-band, such as ASTRA, EUTELSAT/HOTBIRD and TürkSat
- The feed system complies with the ASTRA specifications for universal feed systems
- Suitable for community units with two polarisations and two frequency ranges (2 x low band/high band)
- For linear polarisation
- Equipped with quad LNB, (four switchable outputs)
- Option to select horizontal/vertical, low band/high band from each receiver
- Switching between horiz./vert., low band/high band via the coaxial cable through 14/18 V and 22 kHz
- Power supply via drop cable
- For four connections without additional multi-switch
- Also for use in conjunction with multi-switches EXR, EXE, etc.
- Multi-feed suitable due to compact design (CAS 60/80/90/120)
- Complete protection of LNB and cable connections in a ventilated housing, protection category: IP 54

Test verdicts

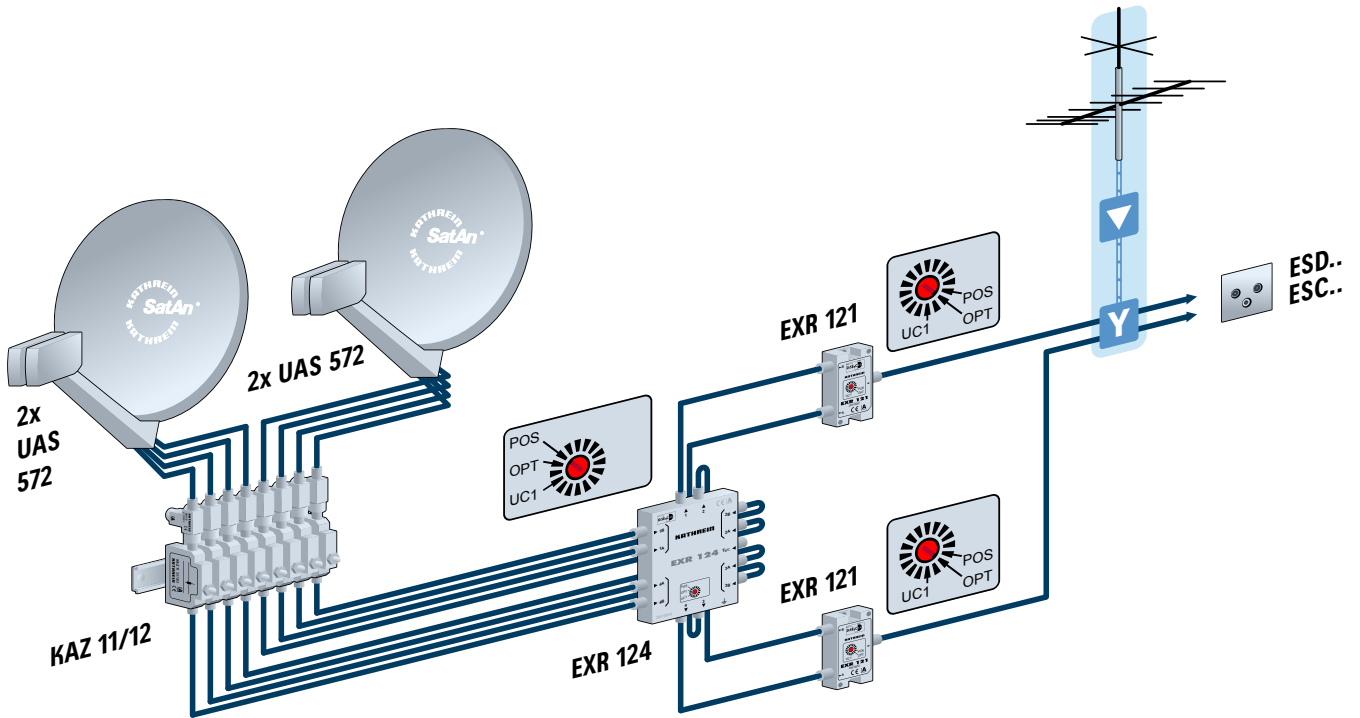


> Connection examples

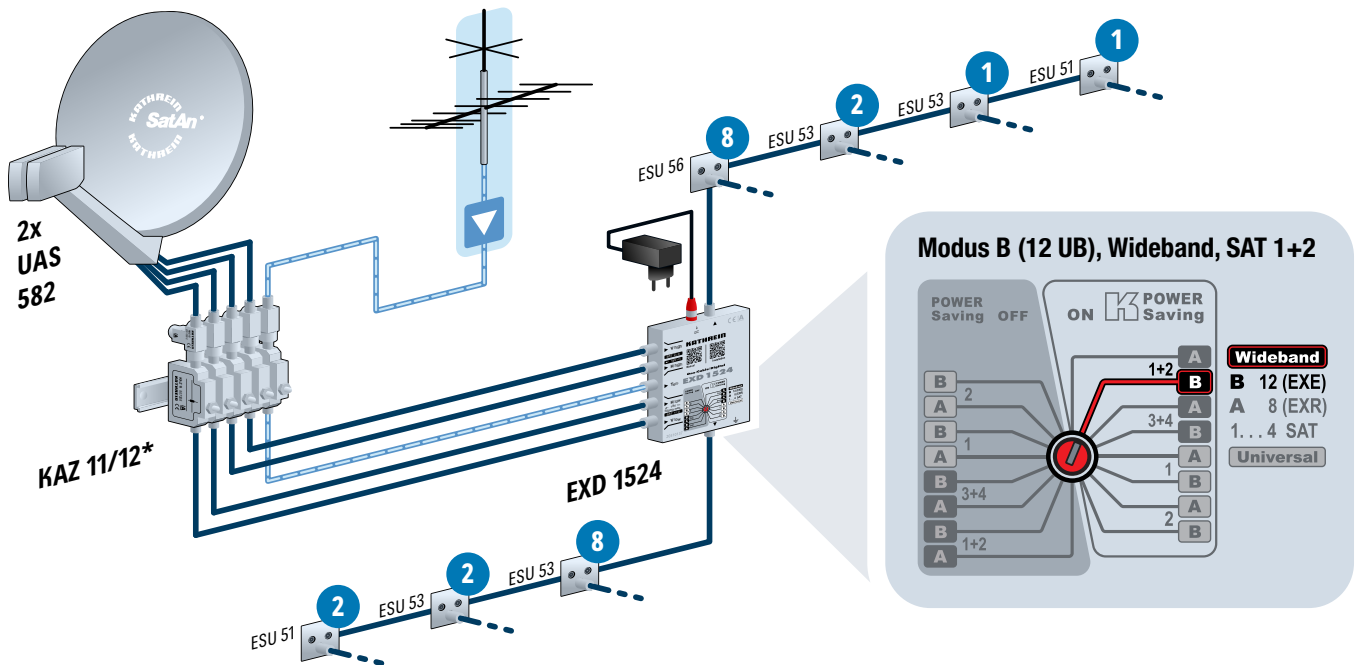
UAS 571



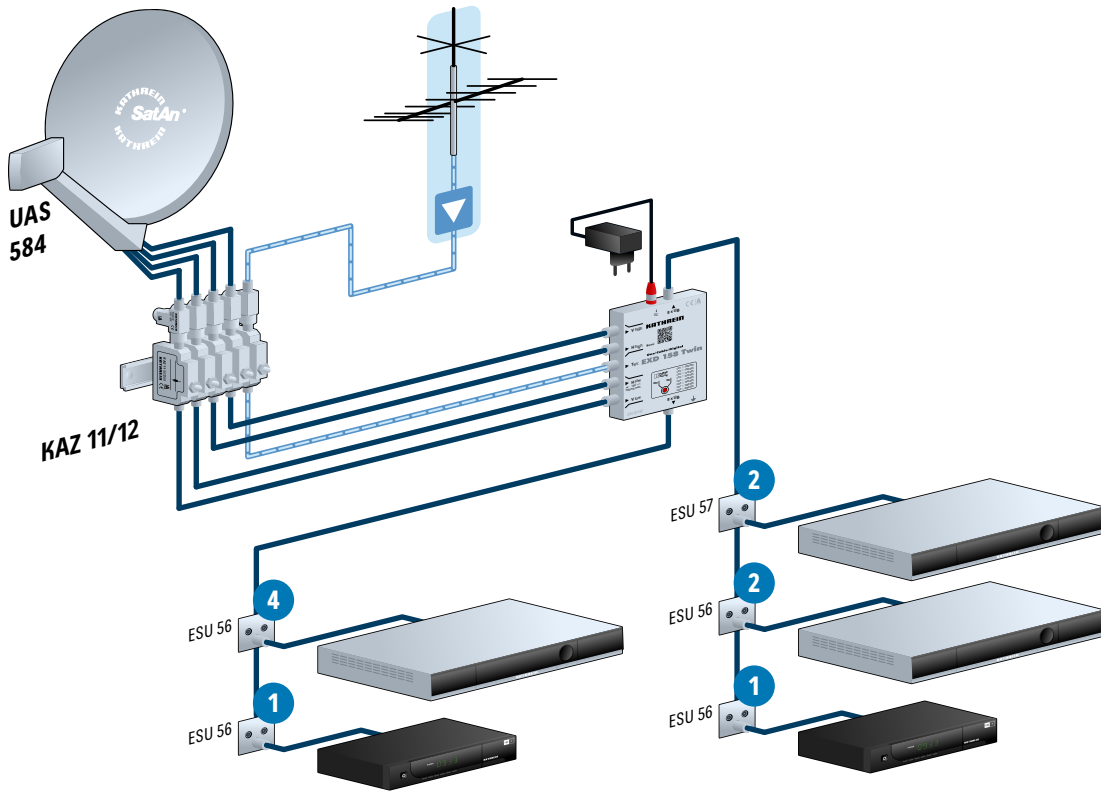
UAS 572



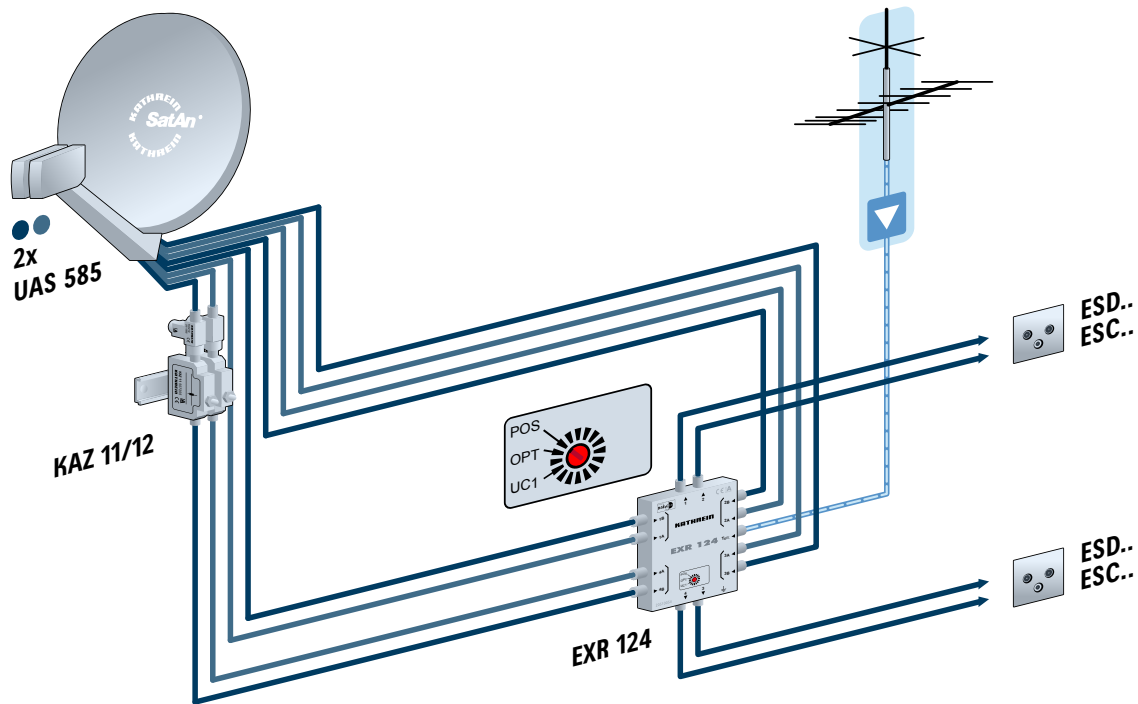
UAS 582



UAS 584



UAS 585



> Technical data

Technical data

Type | Order no.		UAS 571 20110017	UAS 572 20110018	UAS 584 20110019	UAS 585 20110020	UAS 582 20110032
Suitable for reflector		CAS 60/80/90/120				
Polarisation		Switchable: Vertical (14 V) Hori- zontal (18 V)	Switchable: Vertical (14 V) Hori- zontal (18 V)	4 x (2 x horizontal and 2 x vertical)	Switchable: Vertical (14 V) Hori- zontal (18 V)	Vertical and horizontal
Input frequency	GHz	Switchable: 10.70–11.70 (0 kHz) 11.70–12.75 (22 kHz)	Switchable: 10.70–11.70 (0 kHz) 11.70–12.75 (22 kHz)	10.70–11.70 and 11.70- 12.75	Switchable: 10.70–11.70 (0 kHz) 11.70–12.75 (22 kHz)	10.70–12.75
Gain	dB	> 50				
Output frequency	MHz	950–1950/1100–2150				300–2350
Oscillator frequency (L.O.)	GHz	9.75/10.60				10.40
Phase noise (L.O.: 10.60 GHz)	dBc	1 kHz: -50; 10 kHz: -75M; 100 kHz: -95				
Figure of merit (G/T)	dB/K	See offset parabolic antennas				
Polarisation decoupling	dB	Typ. 25				Typ. 28
Output/impedance	Ω	1 x F connector/75	2 x F connector/75	4 x F connector/75	4 x F connector/75	2 x F connector/75
Supply voltage LNB	V	Vertical: 11.5–14 Horizontal: 16–19	Vertical: 11.5–14.8 Horizontal: 15.5–19.0	11.5–19.0	Switchable: Vertical: 11.5–14.8 Horizontal: 15.5–19.0 With multi-switches Horizontal/low: 15.5–19 All other: 0	9–19
Power consumption LNB	mA	Typ. 80	Typ. 175	Typ. 150	Typ. 200	Max. 133 ¹⁾
Dimensions	mm	112 x 72 x 44	235 x 135 x 44	235 x 135 x 44	235 x 135 x 44	235 x 135 x 44
Packing unit	mm	177 x 127 x 68	295 x 185 x 65	295 x 185 x 65	295 x 185 x 65	295 x 185 x 65
Weight (approx.)	kg	0.36	1.14	1.16	1.16	1.14

¹⁾ Maximum power consumption 1.2 W through internal circuit regulator

Receiver

- **Satellite receiver** **40**
- **DVB-T2-Receiver** **41**

> Satellite receiver

UFS 810 2020000001



- Pre-programmed channel list – immediate viewing without a programme scan
- Electronic Programme Guide (EPG)
- DiSEqC™ 1.0/1.2/USALS, SCR single cable (EN 50494) and SCD2 (EN50607)
- Videotext decoder with storage space for 800 pages
- Power switch
- Reception of digital satellite TV and radio programmes in DVB-S2 (HDTV) and DVB-S transmission standards
- Video decoding of MPEG-2 and MPEG-4/H.264 signals (HDTV)
- Up-scaler for upscaling the PAL signal to 576p, 720p, 1080i and 1080p
- Electric audio output for Dolby ¹⁾ Digital data stream (AC 3)
- Eight pre-programmed favourite programme lists each for TV and radio
- Suitable for software updates via satellite and USB stick
- Language selection for programmes broadcast in several languages
- On-screen display (OSD) in eight languages (DE, EN, FR, IT, ES, CS, NL, PL, TR)
- 4000 programme memory positions
- Playback of images (jpeg) via USB
- Stand-by: < 0.5 W
- 4-character display

¹⁾ Dolby and the double-D symbol are registered trademarks of Dolby Laboratories



Connections

- 1 x F socket (1 x input)
- 1 x USB 2.0 (rear panel)
- 1 x HDMI out
- 1 x digital audio S/PDIF electrical
- 1 x Scart

Scope of supply

- Infra-red remote control
- Batteries
- HDMI cable
- Operating instructions
- Safety instructions

Technical data

Type | Order no.		UFS 810 2020000001
Colour		Black
RF characteristics		
Sat IF band	MHz	950–2150
Input level range	dBµV	44-83
TV system video		
Modulation, FEC, demultiplexer		DVB-S/DVB-S2 standard
Video resolution		CCIR 601 (720 x 576 lines), 576i, 576p, 720p, 1080i, 1080p
Video decoding		MPEG-2, MPEG-4/H.264
Input data rate	MSymb/s	2-45 (30 for DVB-S2/8PSK)
S/N	dB	> 53
TV system audio		
Decoding		AC 3, MPEG-1, Layer 1, 2
Sampling rate	kHz	32/44.1/48
S/N	dB	> 65

Type | Order no.		UFS 810 202000001
Power supply		
Power supply voltage	V/Hz	230 (±10%)/50–60
Power consumption max./typ. Operation/stand-by	W	< 20/10/0.5
LNB supply (horiz./vert.)	V/mA	14/18; max. 350
Control signal	kHz	22; DiSEqC™ 1.0, 1.2, USALS, SCR single cable (EN 50494) and SCD-2 (EN 50607)
Connections		
Sat IF input		1 x F socket
Video/audio output (digital)		1 x HDMI
Audio output (digital)		1 x Cinch socket
USB		1 x 2.0
General information		
Ambient temperature	°C	+5 to +40
Dimensions (W x H x D)	mm	260 x 46 x 190
Weight	kg	approx. 2.0

> DVB-T2-Receiver

UFT 930 20210241



With the UFT 930sw, TV transmitters can be received digitally in HD via a terrestrial antenna.

The built-in IRDETO coding system allows the reception of both free (public service) and private channels in HD quality.

The receiver is also able to use additional content via the Internet (HbbTV).



- Reception of free and encrypted DVB-T2 channels in HD quality
- High-efficiency signal processing by HEVC Video Processor
- HbbTV (additional content via the Internet)
- Language selection for programmes broadcast in several languages
- Electric audio output for Dolby¹⁾ Digital data stream (AC 3)
- Automatic date and time setting via DVB data stream
- Programme scan
- Programme position sort function
- Remote feeding of an active DVB-T2 antenna (e.g. BZD 30, BZD 40) via RF input possible
- Power switch
- Extremely low power consumption in stand-by mode: < 0.5 W

Connections

- 1 x IEC connector (f) (1 x input)
- 2 x USB 2.0 (front and rear panel)
- 1 x HDMI out
- 1 x digital audio S/PDIF electrical
- 1 x Analogue audio
- 1 x Ethernet

Scope of supply

- Infra-red remote control
- Batteries
- Operating instructions
- Safety instructions
- HDMI cable
- 12-V power supply unit

¹⁾ Dolby and the double-D symbol are registered trademarks of Dolby Laboratories

Technical data

Type | Order no.		UFT 930 20210241
Colour		Black
RF characteristics		
input frequency range	MHz	470-862
Input level range	dB μ V	28-86 (at 16 QAM)
Channel bandwidth	MHz	7/8, automatic switching
Modulation type		COFDM 2k, 8k
Mapping		QPSK, 16 QAM, 64 QAM
Guard interval		1/4, 1/8, 1/16, 1/32
FEC		1/2, 2/3, 3/4, 5/6, 7/8
TV system video		
Modulation, FEC, demultiplexer		DVB-T2 standard (HEVC/H.265)
Video resolution		CCIR 601 (720 x 576 lines), 576p, 720p, 1080i, 1080p
Video decoding		MPEG-1/2/4 and H.265 compatible
Input data rate	MSymb/s	5-32
S/N	dB	> 53
Bitrate	Mbps	1.5-15
Frequency range	MHz	0.02-5
Output voltage	V _{ss}	1
TV system audio		
Decoding		MPEG-1 and -2, layer 1 and 2
Sampling rate	kHz	32/44.1/48
Frequency range	kHz	0.04-20
Output voltage	mV _{ss}	Typ. 770
S/N	dB	> 65
Power supply		
Power supply voltage	V/Hz	230 (\pm 10%)/50-60
Power consumption max./typ. Operation/stand-by	W	< 10/7/0.5
Remote feeding	V/mA	5/50
Connections		
RF input		1 x IEC connector (f)
Video/audio output (digital)		1 x HDMI
Video/audio output (analogue)		3.5 mm jack
Audio output (digital)		1x standard fibre-optic (S/PDIF)
Network port		RJ 45
USB		2 x 2.0 (front and back)
General information		
Ambient temperature	°C	+5 to +40
Dimensions (W x H x D)	mm	155 x 36 x 110
Weight	kg	approx. 1.0

Camping and Caravan

➤ Receiver-independent turntables	44
➤ Connection example	46
➤ The “CAPcontrol” app	46
➤ USB/WLAN adapter	47
➤ Caravan TV Systems	47
➤ Planar antennas	50
➤ Inclinometer for the BAS 66 planar antenna	51
➤ Display device for HDZ 60/66	51
➤ External control unit for the CAP 650 GPS/750 GPS	51
➤ Caravan roof duct	52
➤ Sat jointed masts	52
➤ Choice of Location	53
➤ SHAPEG-Inanten mast	53
➤ Satellite tripod	53
➤ Antenna connection set	53
➤ Satellite antenna sets	54
➤ Further information	54

Receiver-independent turntables

CAP 750 GPS 20310056



Receiver-independent, fully automatic camping sat antenna.

One of the lightest systems on the market: < 10 kg

Easy installation - only one cable for control and transmission of the satellite signals needed.

GPS receiver for quick adjustment of the antenna.

Complete package for fully automatic HDTV satellite reception, including control unit:

- Turntable with built-in electronic controller, parabolic reflector with twin LNB and cabling set
- Suitable for every receiver/TV set with a satellite tuner
- Twin LNB for connecting a second receiver or TV set
- The entire rotating unit can be controlled via a connected receiver or a TV set
- Automatic alignment onto other satellites on changing to a programme on another satellite
- Easy to install as only few cables are required (2 x coaxial and one power cable)
- Parabolic reflector with LNB is pre-assembled on the turntable
- LNB can be adjusted to adapt polarisation
- Emergency stop in case of overload
- Automatically lowers (park position) when the engine is started
- Little space is required for antenna alignment
- Maximum permissible vehicle speed: 130 km/h
- Aerodynamic construction with only 21 cm in height (when lowered)
- Optimised weight (< 10 kg)
- Scope of supply:
Turntable complete with control electronics, parabolic reflector, twin LNB, mounting plate, mounting material with roof duct, complete cabling set with 8-m coax, 3-m coax and 10-m power supply cable, controller and external button



Technical data

Type | Order no.		CAP 750 GPS 20310056
Diameter parabolic reflector approx.	cm	60
LNB		2 switchable outputs: V/H (14/18 V) Low/high (0/22 kHz)
Supply voltage LNB	V	Vertical: 11.5–14; horizontal: 16-19
Input frequency	GHz	10.70-12.75
Output frequency	MHz	950-1950/1100-2150
Oscillator frequency (L.O.)	GHz	9.75/10.60
Figure of merit (G/T) at 11.3/12.5 GHz	dB/K	13.4/13.7
Supply voltage (vehicle battery)	V	10.5-15.5
Power consumption from the 12-V vehicle electrical system: Inrush current/satellite search/TV reception/stand-by	A	Typ. 10, max. 12/typ. 3/typ. 1.2/typ. 0.024
Power consumption from the receiver	mA	Typ. 160
Setting range: Elevation/azimuth/skew	°	0–75/370/±45
Weight of the turntable with parabolic reflector	kg	9.7
Packaging unit/weight	pc./kg	1/19.5

CAP 650 GPS 20310055



Receiver-independent, fully automatic camping sat antenna.

The compact design requires a small amount of roof space.

Easy installation - only one cable for control and transmission of the satellite signals needed.

GPS receiver for quick adjustment of the antenna.



Complete package for fully automatic satellite reception, including control unit:

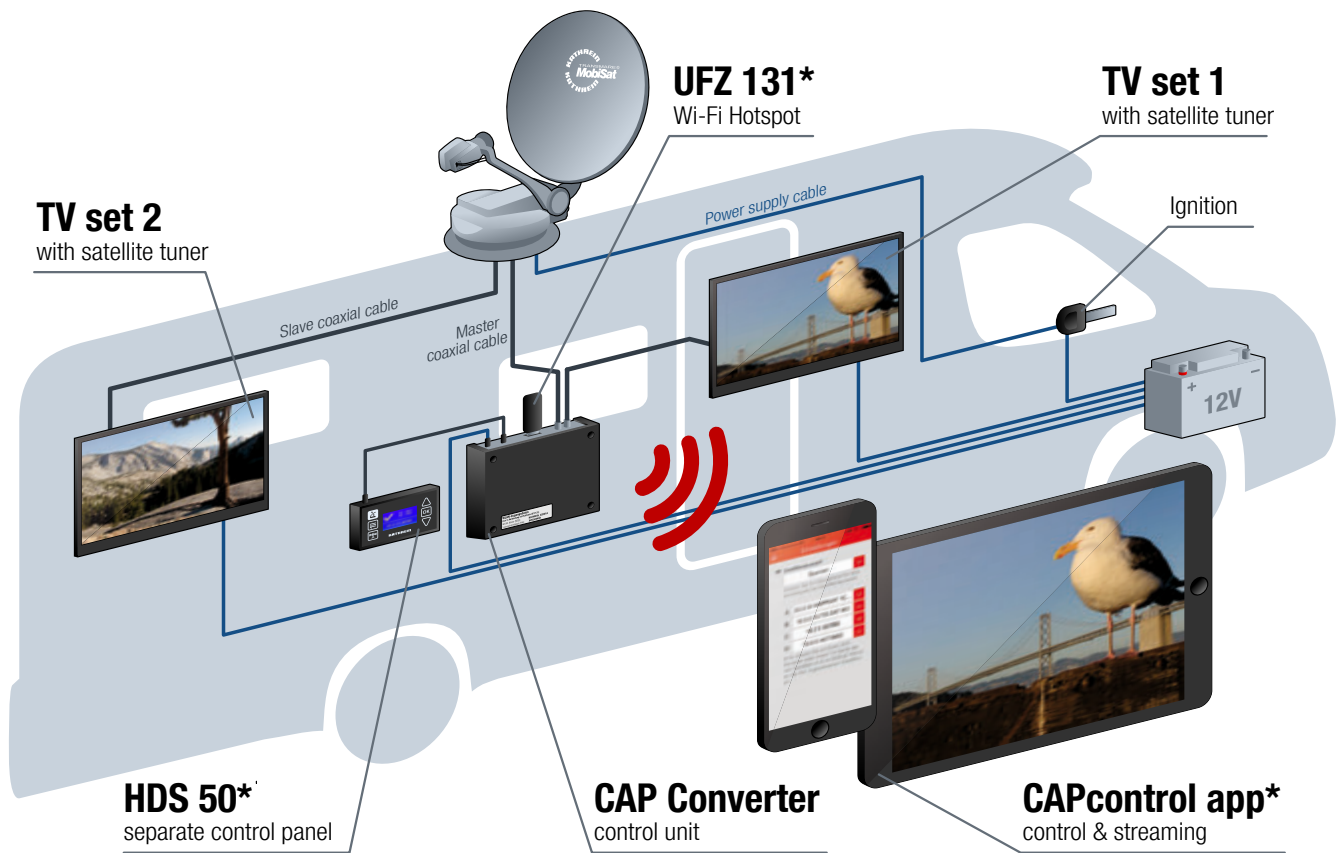
- Turntable with built-in electronic controller, BAS 66 Twin planar antenna and cabling set
- Suitable for every receiver/TV set with a satellite tuner
- Twin LNB for connecting a second receiver or TV set
- The entire rotating unit can be controlled via a connected receiver or a TV set
- Automatic alignment onto other satellites on changing to a programme on another satellite
- Easy to install as only few cables are required (2 x coaxial and one power cable)
- Automatically lowers (park position) when the engine is started
- Emergency stop in case of overload
- Little space is required for antenna alignment
- BAS 66 Twin planar antenna pre mounted on turntable (see BAS 66 catalogue page for technical data and features)
- Maximum permissible vehicle speed: 130 km/h
- Aerodynamic construction with only 21 cm in height (when lowered)
- Scope of supply:
Turntable complete with control electronics, planar antenna BAS 66 Twin, mounting plate, mounting material with roof duct, complete cable set with 2 x 8-m coax and 10-m power supply cable, controller, external button and installation manual

Technical data

Type | Order no.		CAP 650 GPS 20310055
LNB		2 switchable outputs: V/H (14/18 V) Low/high (0/22 kHz)
Supply voltage LNB	V	Vertical: 11.5–14; horizontal: 16-19
Input frequency	GHz	10.70-12.75
Output frequency	MHz	950-1950/1100-2150
Oscillator frequency (L.O.)	GHz	9.75/10.60
Figure of merit (G/T) at 11.3/12.5 GHz	dB/K	13.3/13.7
Supply voltage (vehicle battery)	V	10.5-15.5
Current drain from the 12-V supply: Inrush current/satellite search/TV reception/stand-by	A	Typ. 10, max. 12/typ. 3/typ. 1.2/typ. 0.024
Power consumption from the receiver	mA	Typ. 160
Setting range: Elevation/azimuth/skew	°	0-80/370/±45
Weight of the turntable with planar antenna	kg	14.5
Packaging unit/weight	pc./kg	1/23.4

> Connection example

CAP 650 GPS/CAP 750 GPS



> The “CAPcontrol” app

Convenience and versatility as standard

The new Kathrein "CAP control" app offers you a wealth of useful functions which until now were obtainable only from stationary receivers in the caravan or motorhome. With just a few clicks you can configure and operate the CAP 950, 750 GPS and 650 GPS receiver-independent turntables in conjunction with the UFZ 131 WLAN/USB adapter.

This includes satellite search from a parked position, location-specific setting options and switching satellites. A further highlight is the streaming of TV and radio content to mobile terminals such as smartphones or tablets for even greater independence and versatility.

In addition, the HDS 166 plus antenna set can be comfortably aligned with the app: the app shows and tells you whether the antenna has to be steeper or flatter and how far the antenna has to be turned.



> USB/WLAN adapter

UFZ 131 20410061



The UFZ 131 WLAN/USB adapter, in conjunction with the "CAP-control" app, makes it possible to control the CAP 650 GPS/750 GPS/950. By setting up a Wi-Fi hotspot, TV and radio broadcasts can be streamed to mobile devices (smartphones, tablets, etc.) without an additional Internet router.

In addition, the HDS 166 plus antenna set can be comfortably aligned.

- Supports the Wireless Standards IEEE 802.11a/b/g/n with a data rate of up to 300 Mbps
- Power supply via the receiver's USB port
- Easy installation via the receiver menu, no additional software required
- Supports 64-/128-bit WEP, WPA, WPA2 and WAPI encryption
- Connection indicator LED
- Power supply via the receiver's USB port
- Suitable for the CAP 650 GPS/CAP 750 GPS camping sat antennas as well as for the HDS 166 plus antenna set

Technical data

Type | Order no.		UFZ 131 20410061
Standard		IEEE 802.11a, 802.11b, 802.11g, 802.11n
Connection		USB 2.0 type A
Data rates		11b: 1/2/5.5/11 Mbps
		11g: 6/9/12/24/36/48/54 Mbps
		11n: up to 300 Mbps
Operating temperature	°C	0 to +50
Dimensions (W x H)	mm	19 x 40

> Caravan TV Systems

The "one-cable solution" from Kathrein and alphasatronics

The caravan TV system consists of a Kathrein CAP turntable and an alphasatronics TV set. The entire operation of the fully automatic rotary unit directly on a TV set from alphasatronics - without additional integration of a separate control unit or receiver. Control of the turntable and transfer of the satellite signals to the TV set are both carried out over one and the same coaxial cable. All turntables are equipped with a twin LNB as standard, allowing the connection of a second TV set or satellite receiver if necessary.

Streaming to mobile devices

A special highlight of the Kathrein USB/WLAN adapter UFZ 131. Plugging it into the alphasatronics TV set automatically creates a Wi-Fi hotspot. This makes live streaming of TV and radio channels to mobile devices (e.g. smartphones, tablets) possible.

CTS 650-19 GPS	20310057
CTS 650-22 GPS	20310058
CTS 650-24 GPS	20310059



- Turntable with built-in electronic controller, BAS 66 Twin planar antenna and cabling set
- With alphatronics TV set of the SL-line*) line with Kathrein control
- Twin LNB for connecting a second receiver or TV set
- Easy to install as only few cables are required (2 x coaxial and one power cable)
- BAS 66 Twin planar antenna pre mounted on turntable (see BAS 66 catalogue page for technical data and features)
- Automatically lowers (park position) when the engine is started
- Emergency stop in case of overload
- Little space is required for antenna alignment
- Maximum permissible vehicle speed: 130 km/h
- Aerodynamic construction with only 21 cm in height (when lowered)
- Scope of supply
Turntable complete with electronic controller, BAS 66 Twin planar antenna, mounting plate, fixings with roof duct, TV set, complete set of cables with 2 x 8-m coaxial and 10-m power supply cables, and installation manual.

* For more information on TV sets go to www.alphatronics.de

Technical data

Type | Order no.		CTS 650-19 GPS 20310057	CTS 650-22 GPS 20310058	CTS 650-24 GPS 20310058
TV set		alphatronics SL-19 DSB+K	alphatronics SL-22 DSB+K	alphatronics SL-24 DSB+K
Turntable		With BAS 66 planar antenna		
LNB		2 switchable outputs: V/H (14/18 V); Low/High (0/22 kHz)		
Supply voltage LNB	V	Vertical: 11.5–14; horizontal: 16–19		
Input frequency	GHz	10.70–12.75		
Output frequency	MHz	950–1950/1100–2150		
Oscillator frequency (L.O.)	GHz	9.75/10.60		
Figure of merit (G/T) at 11.3/12.5 GHz	dB/K	13.3/13.7		
Supply voltage (vehicle battery)	V	10.5–15.5		
Current drain from the 12-V supply: Transient current/satellite search	A	Typ. 10, max. 12/typ. 3		typ. 1.2/typ. 0.024
TV reception/stand-by mode				
Power consumption from the receiver	mA	Typ. 160		
Setting range: Elevation/azimuth/skew	°	0–80/370/±15		
Weight of the turntable with planar antenna	kg	14.5		
Packaging unit/weight	pc./kg	1/23.4		

CTS 750-19 GPS 20310060
CTS 750-22 GPS 20310061
CTS 750-24 GPS 20310062



- Turntable with built-in electronic controller, 60-cm parabolic reflector with twin LNB and cabling set
- With alphatronics TV set of the SL-line*) line with Kathrein control
- Twin LNB for connecting a second receiver or TV set
- Easy to install as only few cables are required (2 x coaxial and one power cable)
- Parabolic reflector (60 cm) with LNB is pre-assembled on the turntable
- LNB can be adjusted to adapt polarisation
- Automatically lowers (park position) when the engine is started
- Emergency stop in case of overload
- Little space is required for antenna alignment
- Maximum permissible vehicle speed: 130 km/h
- Aerodynamic construction with only 21 cm in height (when lowered)
- Optimised weight (< 10 kg)
- Scope of supply:
 Turntable complete with electronic controller, parabolic reflector, twin LNB, mounting plate, fixings with roof duct, TV set, complete cabling set (8-m coax, 3-m coax, 10-m power supply cable), installation manual

* For more information on TV sets go to www.alphatronics.de

Technical data

Type | Order no.		CTS 750-19 GPS 20310060	CTS 750-22 GPS 20310061	CTS 750-24 GPS 20310062
TV set		alphatronics SL-19 DSB+K	alphatronics SL-22 DSB+K	alphatronics SL-24 DSB+K
Turntable		With 60-cm parabolic reflector		
LNB		2 switchable outputs: V/H (14/18 V); Low/High (0/22 kHz)		
Supply voltage LNB	V	Vertical: 11.5–14; horizontal: 16-19		
Input frequency	GHz	10.70-12.75		
Output frequency	MHz	950-1950/1100-2150		
Oscillator frequency (L.O.)	GHz	9.75/10.60		
Figure of merit (G/T) at 11.3/12.5 GHz	dB/K	13.4/13.7		
Supply voltage (vehicle battery)	V	10.5-15.5		
Current drain from the 12-V supply: Transient current/satellite search TV reception/stand-by mode	A	Typ. 10, max. 12/typ. 3 typ. 1.2/typ. 0.024		
Power consumption from the receiver	mA	Typ. 160		
Setting range: Elevation/azimuth/skew	°	0–75/370/±45		
Weight of the turntable with parabolic reflector	kg	9.7		
Packaging unit/weight	pc./kg	1/19.5		

> Planar antennas

BAS 66 Skew 2000000001

BAS 65 20010032



Despite their small size the BAS 65 and BAS 66 planar antennas offer optimal satellite reception. This is due to the specific honeycombed dipole structure of the reception surface.

- To receive analogue and digital TV and radio channels and other satellite signals
- Frequency range: 10.70–12.75 GHz
- Power supply via drop cable
- With built-in twin LNB (two outputs)
- Option to select horizontal/vertical, low band/high band from each receiver

BAS 66 Skew

- For use on stationary motorhomes, caravans or HGVs
- **With skew adapter plate -20 ° to +20° for reception optimisation at the edge of the satellite footprint**



- Can be mounted onto the Sat-jointed masts
- HDM 14x
- Maximum permissible vehicle speed: 130 km/h

BAS 65

- For stationary use
- Can be mounted onto walls, masts, booms and on flat surfaces
- Including mounting support for easy antenna alignment

Technical data

Type | Order no.		BAS 66 Skew 2000000001	BAS 65 20010032
Application		Mobile use	Stationary use
To be mounted onto		HDM 140, 141, 143	Wall, mast, boom, flat surface
Reception range	GHz	Switchable: 10.70-11.70 (0 kHz) - 11.70-12.75 (22 kHz)	
Polarisation		Switchable: vertical (14 V); horizontal (18 V)	
Gain	dB	> 55	
Half power beam width ¹⁾	°	Typ. < 3	
LNB		2 switchable outputs	
Output frequency	MHz	950-1950/1100-2150	
Oscillator frequency (L.O.)	GHz	9.75/10.6	
Supply voltage LNB	V	Vertical: 11.5-14.0; horizontal: 16.0-19.0	
Max. current drain	mA	220	
Wind load ²⁾	N	240	
Mast clamp range	mm	–	38-50
Setting range, elevation	°	0-90 (HDM 14x)	0-50
Setting range, azimuth	°	360	± 65 (wall mounting) – 360 (mast installation)
Dimensions	mm	500 x 500 x 109 (without support)	500 x 500 x 121 (without support)
Packaging unit/weight	pc./kg	1/6.5	1/8.2

¹⁾ At mid-band ²⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

Test verdict



> Inclinator for the BAS 66 planar antenna

HDZ 66 20410057

For easy alignment of the BAS 66 planar antenna

The Kathrein HDZ 66 inclinometer is an installation kit for the BAS 66 planar antenna and enables easy alignment of the antenna to the desired satellite for digital and HDTV satellite reception. The combination of the CAP converter, UFZ 131 WLAN stick and the "CAPcontrol" Kathrein app is the ideal combination to quickly and easily align the BAS 66 (see HDS 166 plus). The elevation indicator is fitted to the LNB housing at the rear of the BAS 66, with just a few manual fitting actions. The antenna cable is used to notify the CAP converter of the current elevation setting, and this information is then forwarded to the app via WLAN. No additional installation of cables required. There is no need to install additional cables!



- Installation kit for the BAS 66 planar antenna
- Easy alignment of the antenna in conjunction with CAP converter, UFZ 131 and "CAPcontrol" app
- Installation with a few simple steps on the LNB housing of the BAS 66
- Both the required and actual elevation are displayed in the app
- Alternative site determination by selecting the town in the receiver menu
- No extra cabling is needed between the antenna and cap converter

> Display device for HDZ 60/66

HDS 66 20410060



Displays the actual elevation of HDZ 60 and HDZ 66 inclinometer.



- Compatible with any receiver or TV set with satellite tuner
- Exclusively for use in connection with the HDZ 60 or HDZ 66 inclinometer
- Power is supplied via the receiver
- No external power supply required
- Two F sockets (IEC 169-24) as an interface
- The display backlighting switches on automatically if the elevation changes (energy saving mode)
- Easy wall mounting
- Dimension (L x W x H in mm): 100 x 65 x 28

> External control unit for the CAP 650 GPS/750 GPS

HDS 50 20410070



- Compatible with CAP 650 GPS and CAP 750 GPS
- No own power supply required
- Easy wall mounting
- Including 3-m connection cable
- Dimension (L x W x H in mm): 125 x 68 x 25



> Caravan roof duct

HDZ 100 20410032

- Protective casing for cable interfaces
- Suitable as a roof duct and cable feed-through on the roof
- For a maximum of two RF cables and one DC cable
- Optimised for CAP systems
- Easy installation
- Unused cable insertions can be closed off with built-in blind caps
- Cable duct interface size: up to 29 x 17 mm



> Sat jointed masts

HDM 140 218456

HDM 141 218457

HDM 143 218458

- The masts can be turned and swivelled from inside the vehicle and are therefore easy to use
- Masts made of duraluminium, swivel heads made of die-cast aluminium
- Complete set including two pulled-in cables and four plugs
- Maximum permissible vehicle speed: 130 km/h (with antenna retracted)



HDM 140

- For mounting the BAS 60/66 planar antenna on the roof of a caravan or motorhome

HDM 141

- Shorter model for mounting the BAS 60/66 planar antenna on the roof of a caravan or motorhome

HDM 143

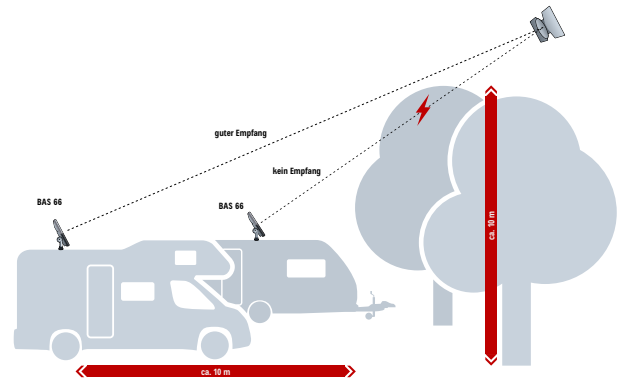
- For refitting a terrestrial system (e.g. HD 35, set up with HDM 135 SHAPEG-Inanten mast) to a sat reception system with BAS 60/66 planar antenna

Technical data

Type | Order no.		HDM 140 218456	HDM 141 218457	HDM 143 218458
Length	mm	1030	765	1030
Diameter	mm	34	34	34
Setting range, elevation	°	0-90	0-90	0-90
Setting range, azimuth	°	360	360	360
Packing unit	mm	1020 x 130 x 100	1020 x 130 x 100	1020 x 110 x 80
Weight (approx.)	kg	1.7	1.6	1.5

> Choice of Location

When choosing the location, make sure that the antenna has an unimpeded "view" of the satellite. Trees, bushes or buildings can partially or completely obstruct the view, rendering reception poor or non-existent. Heavy rain or snow can also affect the picture quality, as can snow or ice on the antenna.



> SHAPEG-Inanten mast

HDM 135

218429



- Suitable for the HD 35 antenna for mobile use
- Can be mounted inside a caravan or mobile home
- You can align the antenna from inside
- Just lower the antenna before the vehicle is driven
- Complete with attachments
- Easy installation
- Packaging unit/weight (pc./kg): 1/1.5



> Satellite tripod

HDS 100

20410059

Tripod for variable installation of BAS 65, CAS 60 and CAS 80 sat antennas.

- Extendable, rotating extension for simple alignment of the antenna in the assembled state
- Aluminium tripod with 2-mm wall thickness - light and very stable
- Pegs for stabilisation on the ground
- Including carry bag
- Packaging unit/weight (pc./kg): 1/2.0 kg



> Antenna connection set

EV 06 218464

Outdoor outlet with 5-metre long coaxial cable and F-type connector (m).

- Outdoor outlet with 5-metre long coaxial cable
- Connection: F connector
- Packaging unit/weight (pc./kg): 1(10)/0.24



> Satellite antenna sets

HDS 166 20310052
HDS 166 plus 2030000002

Excellent alternative to the fully automatic, permanently mounted turntable.

- Built with a few simple steps
- Easy alignment of the antenna by using the smartphone
- Very small space requirement during transport
- Twin LNB for connecting a second receiver or TV set
- Scope of supply for HDS 166:
 - BAS 66 planar antenna
 - HDS 100 sat tripod mast stand
 - Adapter joint
 - 15-m coaxial cable
 - Carry bag
 - Installation note



* nur in HDS 166 plus enthalten

- Scope of supply with HDS 166 plus:
 - HDS 166 antenna set
 - HDZ 66 elevation indicator
 - CAP Converter
 - 12 V connection cable
 - Button
 - UFZ 131 WLAN-USB adapter

NEU

Technical data

Type | Order no.		HDS 166 20310052	HDS 166 plus 2030000002
Dimensions, sat tripod mast			
Altitude	mm		1500 max.
Stand diameter	mm		1200 max.
Pipe diameter	mm		35
Antenna dimensions BAS 66 (H x W x D)	mm	495 x 495 x 120	
Weight			
Tripod mast, approx.	kg	2.4	2.4
BAS 66 with the adapter joint, approx.	kg	6.4	6.4
CAP Converter	kg	–	0.574
Package dimensions (H x W x D)	mm	792 x 177 x 1030	

> Further information

You will find the latest information on the Kathrein caravan programme in the special brochure "Camping & Caravan", which you can order online or download from www.kathrein.com. You can also order a hard copy of the brochure from the Kathrein sales centres, representatives or directly from Kathrein Digital Systems GmbH. See back page for addresses.

Terrestrial Antennas

➤	General information	56
➤	Mast calculation in accordance with EN 60728-11	57
➤	AM/FM antennas	58
➤	FM antennas	58
➤	Band III TV antennas	59
➤	UHF TV antennas	60
➤	Mast installation and calculation	62
➤	DVB-T / T2 Antenna, active	63
➤	Further information	64

> General information

Gain and wind load values



Radio antennas

AM/FM

Special features:

- Antenna foot is self-centring, for masts with a diameter 32-50 mm
- Raised FM antenna, entire mast length can be used
- Additional antenna cable can be inserted through the antenna foot into the mast

FM

- Mast clamp for diameters of 22–60 mm

TV antennas

VHF range, Band III

- Tiltable mast clamp, for diameters of 22-60 mm
For vertical polarisation, turn mast clamp by 90°

UHF range, Bands IV and V

- Tiltable mast clamp, for diameters of 22-60 mm
For vertical polarisation, turn mast clamp by 90°

Impedance

- All television antennas are equipped with connection housings for 75 and 300 Ω cables.

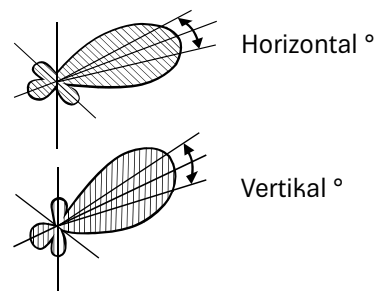
DVB-T antennas

- Active VHF/UHF antennas for indoor and outdoor use

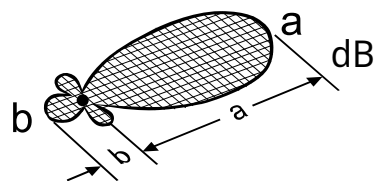
Gain values

- The gain values for antennas refer to the dipole.
- For gain values that refer to the isotropic radiator, the following applies: catalogue value + 2.15 dB

Half power beam width



Front-to-back ratio



Wind load values

The stated values are based on a dynamic pressure of 800 N/m². A dynamic pressure of 800 N/m² corresponds to a wind speed of 36 m/s or approx. 130 km/h, i.e. wind force 12. When installed higher than 20 m above ground, a dynamic pressure of 1,100 N/m² must be applied. This corresponds to a wind speed of 42 m/s, approximately 150 km/h.

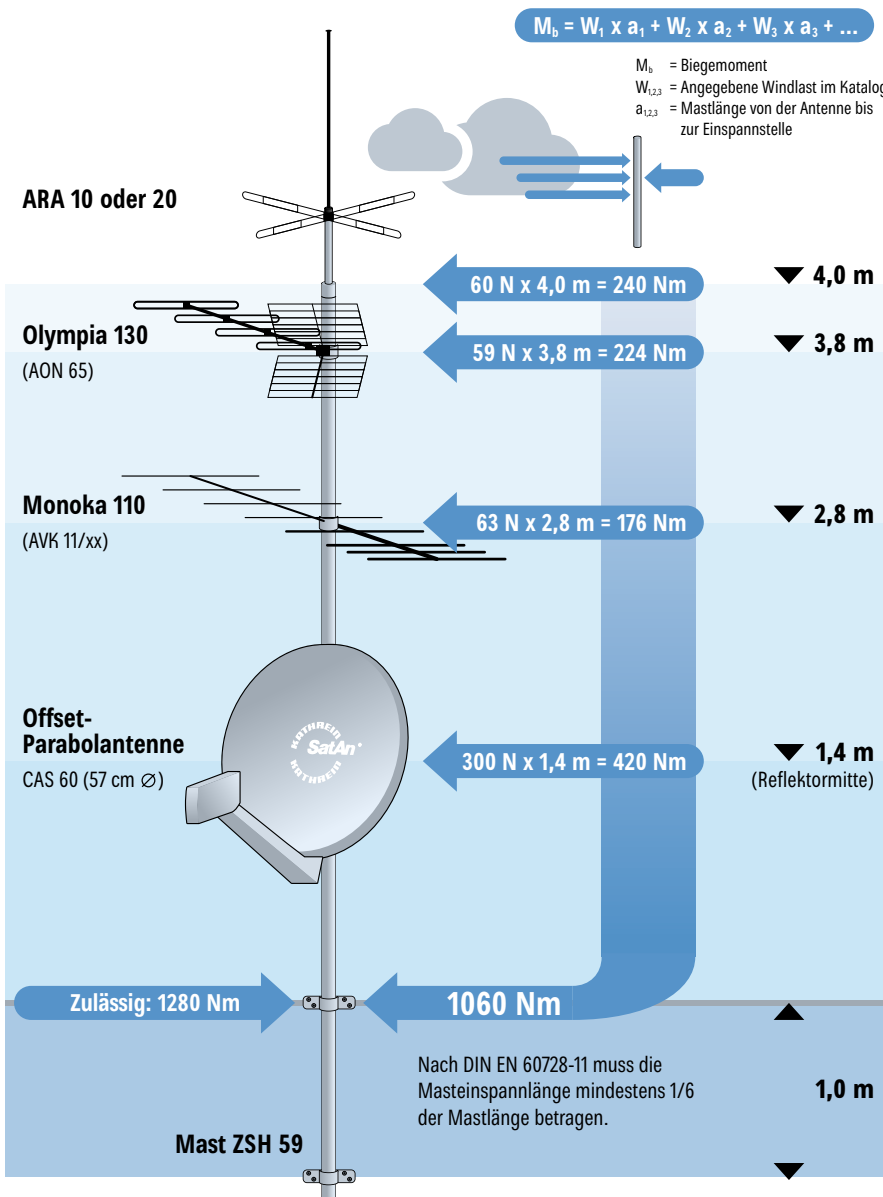
Conversion factor:

>

Wind load (1100 N/m²) =
Wind load (800 N/m²) x 1.37

Unless otherwise stated, a maximum permissible wind speed of 150 km/h applies to the antennas.

> Mast calculation in accordance with EN 60728-11



The bending moment affects the mast on the upper attachment point for all antennas. **The wind load on the mast must be included in the calculation.**

The overall bending moment is not to exceed the maximum permitted bending moment of the mast and must not be greater than **1,650 Nm**. If the bending moment is greater, a static engineer is required to provide verification of the transfer of forces into the structure of the building.

For guidelines and standards, see Page 301.

> AM/FM antennas

ARA 10 210115

ARA 20 210116



ARA 10



ARA 20

Technical data

Type | Order no.		ARA 10 210115	ARA 20 210116
Channels		AM/FM	AM/FM
Gain	dB	AM: 5 ¹⁾ /FM: 0	AM: 5 ¹⁾ /FM: -3
Elements		1	2
Reception range	MHz	0.15-26.1/87.5-108	0.15-26.1/87.5-108
Half power beam width	horiz. °/vert. °	80/-	-/-
Front-to-back ratio	dB	0	0
Mast clamp range	mm Ø	32-50	32-50
Length	mm	2600	2600
Wind load ²⁾	N	60	60
Packaging unit/weight	pc./kg	1/2.2	1/2.3
Single pack dimensions	mm	1665 x 140 x 115	1665 x 140 x 115

¹⁾ With respect to the reference antenna in accordance with EN 50083, Part 2 ²⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

> FM antennas

ABA 20 210340

ABE 01 210332

ABH 01 210335



ABA 20



ABH 01



ABE 01

Technical data

Type | Order no.		ABA 20 210340	ABE 01 210332	ABH 01 210335
Channels		FM	FM	FM
Gain	dB	-3	4-5.5	7-8
Elements		2	3	5
Reception range	MHz	87.5-108	87.5-108	87.5-108
Half power beam width	horiz. °/vert. °	-/-	68-65/130-100	65-60/100-75
Front-to-back ratio	dB	0	12-14	19-22
Mast clamp range	mm Ø	22-60	22-60	22-60
Length	mm	1485	1070	1200
Wind load ¹⁾	N	25	62	100
Packaging unit/weight	pc./kg	1/0.85	1/2.2	1/2.8
Single pack dimensions	mm	720 x 155 x 65	1540 x 195 x 120	1540 x 195 x 120

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

> Band III TV antennas

AV 06 211450  **DIGITALRADIO**
AV 09 211453 Digital Video Broadcasting *Radio der Zukunft*
geeignet für DVB-T/T2

- For horizontal and vertical polarisation
- For vertical polarisation, ZTA 11 must be used



AV 06 Multika 60



AV 09 Multika 90

Technical data

Type | Order no.		AV 06 211450	AV 09 211453
Channels		5-12	5-12
Gain	dB	5-6.5	6-9
Elements		4	6
Reception range	MHz	174-230	174-230
Half power beam width	horiz.°/vert.°	67-60/125-95	69-50/110-64
Front-to-back ratio	dB	14-17	12-19
Mast clamp range	mm Ø	22-60	22-60
Length	mm	630	1300
Wind load ¹⁾	N	28	39
Packaging unit/weight	pc./kg	1/1.1	1/1.6
Single pack dimensions	mm	930 x 180 x 130	930 x 180 x 130

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

AV 11 211463  **DIGITALRADIO**
AV 12 211473 Digital Video Broadcasting *Radio der Zukunft*
geeignet für DVB-T/T2

- For horizontal and vertical polarisation
- For vertical polarisation, ZTA 11 must be used



AV 11 Multika 111



AV 12 Multika 125

Technical data

Type | Order no.		AV 11 211463	AV 12 211473
Channels		5-12	5-12
Gain	dB	7-11	7.5-12.5
Elements		9	11
Reception range	MHz	174-230	174-230
Half power beam width	horiz.°/vert.°	61-41/90-49	60-38/83-42
Front-to-back ratio	dB	18-27	18-26
Mast clamp range	mm Ø	22-60	22-60
Length	mm	2250	3315
Wind load ¹⁾	N	65	77
Packaging unit/weight	pc./kg	1/2.3	1/3.0
Single pack dimensions	mm	1260 x 160 x 110	1510 x 160 x 110

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

UHF TV antennas

AOI 65	212340
AON 65	212344
AOP 52	212347
AOP 65	212348



AOI 65 Olympia 90



AON 65 Olympia 130



AOP 52/65 Olympia 150

- For horizontal and vertical polarisation
- Mast clamp is turned by 90° for vertical polarisation.

Technical data

Type | Order no.		AOI 65 212340	AON 65 212344	AOP 52 212347	AOP 65 212348
Channels		21-69	21-69	21-52	21-69
Gain	dB	7-9.5	8.5-13.5	11-15	9.5-15
Reception range	MHz	470-862	470-862	470-726	470-862
Half power beam width	horiz.°/vert.°	58-40/90-65	57-32/70-44	43-26/52-32	50-28/59-31
Front-to-back ratio	dB	20-25	21-26	24-30	22-28
Mast clamp range	mm Ø	22-60	22-60	22-60	22-60
Length	mm	360	710	1380	1270
Wind load ¹⁾	N	39	59	108	103
Packaging unit/weight	pc./kg	1/1.0	1/1.7	1/2.3	1/2.2
Single pack dimensions	mm	510 x 490 x 75	740 x 520 x 75	890 x 520 x 100	785 x 520 x 100

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

AOS 32	212349
AOS 65	212352
AOT 65	212353



AOS 32/65 Olympia 170



AOT 65 Olympia 180

- For horizontal and vertical polarisation
- Mast clamp is turned by 90° for vertical polarisation.

Technical data

Type | Order no.		AOS 32 212349	AOS 65 212352	AOT 65 212353
Channels		21-32	21-65	21-65
Gain	dB	15.5-17	11-17	12-18
Reception range	MHz	470-566	470-830	470-830
Half power beam width	horiz.°/vert.°	26-21/30-23	43-21/47-23	37-18/39-19
Front-to-back ratio	dB	27-31	25-32	23-32
Mast clamp range	mm Ø	22-60	22-60	22-60
Length	mm	2830	2240	2820
Wind load ¹⁾	N	209	179	192
Packaging unit/weight	pc./kg	1/3.9	1/3.5	1/3.9
Single pack dimensions	mm	1080 x 520 x 130	960 x 520 x 130	1080 x 520 x 130

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

AU 14/60	212126
AU 16/29-32	212138
AUY 69	212121



AUY 69

- For horizontal and vertical polarisation
- Mast clamp is turned by 90° for vertical polarisation.



AU 14/60



AU 16/29-32

Technical data

Type | Order no.		AU 14/60 212126	AU 16/29-32 212138	AUY 69 212121
Channels		21-60	29-32	21-69
Gain	dB	8-14	15-16	8-14
Elements		16	23	22
Reception range	MHz	470-790	534-566	470-862
Half power beam width	horiz.°/vert.°	60-31/70-34	33-30/34-31	59-37/71-35
Front-to-back ratio	dB	20-23	23-29	21-28
Mast clamp range	mm Ø	22-60	22-60	22-60
Length	mm	1495	2275	1165
Wind load ¹⁾	N	32.3	66.5	67.2
Packaging unit/weight	pc./kg	1/1.7	1/2.5	1(2)/1.95
Single pack dimensions	mm	1510 x 360 x 180	1180 x 340 x 120	1200 x 520 x 130

¹⁾ At dynamic pressure of 800 N/m² in accordance with EN 60728-11 (see Page 57)

> Mast installation and calculation

Safety instructions

General safety information on selecting the installation site for antennas:

Kathrein antennas are designed in accordance with the specifications of EN 60728, part 11 and fulfil these requirements. When selecting the installation site, take into account the structural features of the building (e.g. susceptibility to oscillation, roof characteristics, installation on cylindrical structures), which

could lead to increased wind loads in accordance with DIN 1055, part 4/2005-03 or DIN 4131. The dynamic properties of the antenna and the structure can influence each other and cause negative changes.

Mast installation and calculation

- When mounting the mast, make sure that it is in an upright position
- Use only masts or structural tubes that are specially designed to carry antennas. Other tubes generally do not have the strength required to withstand the forces of wind and weather. Kathrein masts and clamps do satisfy these requirements. For an overview of Kathrein masts see the table below.
- Where a mast is installed on a roof, it must be clamped for at least 1/6 of its length.
- Make sure that the mast clamps (e.g. clips) are installed on solid ground (wood, concrete, brickwork)
- Make sure that the mast fixings (e.g. clamps) are installed on solid ground (wood, concrete, brickwork)

Mast Overview

Type		ZSD 48	ZSF 47	ZSF 48	ZSH 47	ZSH 48	ZSH 59	ZSH 62 ²⁾
Order no.		218380	218385	218381	218386	218394	218382	218383
Length L	m	2 x 2 = 4	2 x 2.5 = 5	2 x 2.5 = 5	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6
Diameter D1/D2	mm	40/48	40/48	40/48	40/48	40/48	48/60	48/60
Cable insertions		3	-	3	-	3	5	5
Grade (steel)		S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 355 (St 52)	S 355 (St 52)
Wall thickness in clamping area	mm	2.5	2	2.5	2	2.5	2.5	4.5
Perm. bending moment ¹⁾ useful length at 800 N/m ²	5.0 m	-	-	-	320	850	1150	1950 (1150)
	4.0 m	-	500	1040	430	960	1280	2120 (1280)
	3.0 m	1170	540	1080	-	-	-	-
Perm. bending moment ¹⁾ useful length at 1100 N/m ²	5.0 m	-	-	-	160	700	900	1700 (900)
	4.0 m	-	390	920	300	840	1080	1960 (1080)
	3.0 m	1110	480	1000	-	-	-	-
Packaging unit/weight	pc./kg	1/11.4	1/11.3	1(25)/14.2	1(25)/13.1	1(25)/17.8	1(25)/20.5	1/35.0

¹⁾ The max. perm. bending moment at the attachment point applies to the useful length. The wind load of the mast has already been considered. According to EN 60728-11, the mast clamped length must be at least 1/6 of the mast length

²⁾ The technical data is based on the calculation principles specified in DIN 4131. If the calculated bending moment exceeds the values given in brackets (= 1,650 Nm on the clamping point), static proof is required, in accordance with EN 60728-11.

> DVB-T / T2 Antenna, active

BZD 30 20710002

BZD 32 20710013



With LTE filter

Active VHF/UHF antenna for receiving digital terrestrial TV and radio channels (DVB-T/-T2).

- DVB-T/DVB-T2 indoor antenna for horizontal and vertical polarisation
- Active antenna with built-in amplifier
- Attractive, space-saving design
- Very low noise figure
- No specific alignment required as almost omni-directional characteristics
- Built-in rapping filter for GSM and LTE interference
- BZD 30: Remote feeding (5 V/30 mA) via the coaxial cable through connected DVB-T/T2 receiver, or with NCF 18 power supply unit and WFS 28 remote feed diplexer

- BZD 32: Remote feeding (5 V/30 mA) via the USB remote feeder cable, e.g. from the connected TV set
- Connection: IEC connector (f)
- Accessories included:
 - Foot for easy mounting
 - Wall support with fixing material
 - 2 metre connection cable with a straight and an angled IEC connector (m) BZD 30
 - 3 metre USB remote-feeding cable with one straight and one angled IEC connector (m) and one USB plug (BZD 32)

Technical data

Type | Order no.		BZD 30 20710002	BZD 32 20710013
Reception range	MHz	174-230/470-790	
Figure of merit ¹⁾	dB/K	Typ. -28.5	
Gain	dB	B III: 18, B IV/V: 15	
Max. output level ²⁾	dBμV	Typ. 95	
Permissible remote power feed of antenna	V	5	
Dimensions	mm	140 x 195	
Packaging unit/weight	pc./kg	1(10)/0.5	
Single pack dimensions	mm	250 x 160 x 70	

¹⁾ In mid-range, at 8-MHz bandwidth and Tu 290 K ²⁾ Acc. to EN 50083-5 for 60-dB XMod (3rd order)

BZD 40 20710005



Active VHF/UHF antenna for receiving digital terrestrial TV and radio channels (DVB-T/-T2).

- DVB-T / T2 antenna for outdoor use
- For horizontal and vertical polarisation
- Attractive, space-saving design
- Active antenna with built-in amplifier
- Very low noise figure
- Easy to mount on walls, masts or balconies
- Connection: F socket with weather shield cap
- Remote feeding (5 V/30 mA) via the coaxial cable through connected DVB-T/T2 receiving device, or with NCF 18 power supply unit and WFS 28 remote feed diplexer
- Accessories included:
 - Protective cap, protection category: IP 54
 - Fixing material for wall or balcony mounting
 - 10 metre long connection cable, F plug and IEC plug

Technical data

Type | Order no.		BZD 40 20710005
Reception range	MHz	174-230/470-862
Figure of merit ¹⁾	dB/K	Typ. -32
Gain	dB	B III: 18, B IV/V: 15
Max. output level ²⁾	dB μ V	95
Wind load (see page 55)	N	39
Permissible remote power feed of antenna	V	5-25
Dimensions	mm	204 x 196 x 71 ³⁾
Packaging unit/weight	pc./kg	1(10)/1.1
Single pack dimensions	mm	210 x 250 x 75

¹⁾ In mid-range, at 8-MHz bandwidth and Tu 290 K ²⁾ Acc. to EN 50083-5 for 60-dB XMod (3rd order) ³⁾ With holder

> Further information

For up-to-date information on Kathrein's DVB-T/-T2 antennas and receivers, see "www.kathrein.com".

Mounting Accessories

➤ Mast installation and calculation	66
➤ Wall supports, made of steel	67
➤ Stub masts	67
➤ Clamping plate set for ZSO 180/181	68
➤ Wall mount	68
➤ Rafter brackets	69
➤ Flat roof antenna mount	70
➤ Masts	71
➤ Booms	73
➤ Mast spacer	73
➤ Mast mounting bracket set	74
➤ Mast clamps, holders	74
➤ Rubber bushing	75
➤ Mast shoe	75
➤ Rooftop cover plates	75
➤ Sealing collars	76
➤ Mast caps	77
➤ Installation sets	77
➤ Earthing accessories	80

> Mast installation and calculation

General safety information on selecting the installation site for antennas:

Kathrein antennas are designed in accordance with the specifications of EN 60728, part 11 and fulfil these requirements. When selecting the installation site, take into account the structural features of the building (e.g. susceptibility to oscillation, roof characteristics, installation on cylindrical structures), which

could lead to increased wind loads in accordance with DIN 1055, part 4/2005-03 or DIN 4131. The dynamic properties of the antenna and the structure can influence each other and cause negative changes.

Mast installation and calculation

- When mounting the mast, make sure that it is in an upright position
- Use only masts or structural tubes that are specially designed to carry antennas. Other tubes generally do not have the strength required to withstand the forces of wind and weather. Kathrein masts and clamps do satisfy these requirements. For an overview of Kathrein masts, see the table below
- Where a mast is installed on a roof, it must be clamped for at least 1/6 of its length.
- Make sure that the mast clamps (e.g. clips) are installed on solid ground (wood, concrete, brickwork)
- Make sure that the mast fixings (e.g. clamps) are installed on solid ground (wood, concrete, brickwork)

Mast Overview

Type		ZSD 48	ZSF 47	ZSF 48	ZSH 47	ZSH 48	ZSH 59	ZSH 62 ²⁾
Order no.		218380	218385	218381	218386	218394	218382	218383
Length L	m	2 x 2 = 4	2 x 2.5 = 5	2 x 2.5 = 5	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6
Diameter D1/D2	mm	40/48	40/48	40/48	40/48	40/48	48/60	48/60
Cable insertions		3	–	3	–	3	5	5
Grade (steel)		S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 355 (St 52)	S 355 (St 52)
Wall thickness in clamping area	mm	2.5	2	2.5	2	2.5	2.5	4.5
Perm. bending moment ¹⁾ useful length at 800 N/m ²	5.0 m	–	–	–	320	850	1150	1950 (1150)
	4.0 m	–	500	1040	430	960	1280	2120 (1280)
	3.0 m	1170	540	1080	–	–	–	–
Perm. bending moment ¹⁾ useful length at 1100 N/m ²	5.0 m	–	–	–	160	700	900	1700 (900)
	4.0 m	–	390	920	300	840	1080	1960 (1080)
	3.0 m	1110	480	1000	–	–	–	–
Packaging unit/weight	pc./kg	1/11.4	1/11.3	1(25)/14.2	1(25)/13.1	1(25)/17.8	1(25)/20.5	1/35.0

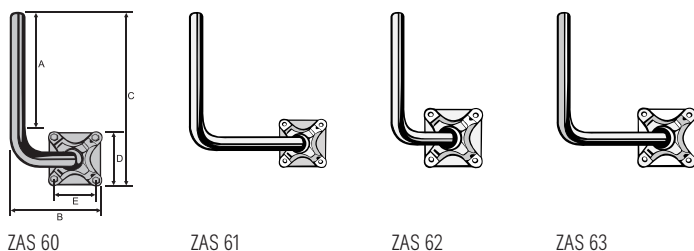
¹⁾ The max. perm. bending moment at the attachment point applies to the useful length. The wind load of the mast has already been considered.

According to EN 60728-11, the mast clamped length must be at least 1/6 of the mast length.

²⁾ The technical data is based on the calculation principles specified in DIN 4131. If the calculated bending moment exceeds the values given in brackets (= 1,650 Nm on the clamping point), static proof is required, in accordance with EN 60728-11.

> Wall supports, made of steel

- ZAS 60 218682
- ZAS 61 218683
- ZAS 62 218685
- ZAS 63 218686



Technical data

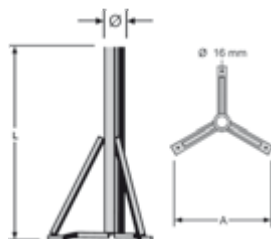
Type | Order no.		ZAS 60 218682	ZAS 61 218683	ZAS 62 218685	ZAS 63 218686
Suitable for parabolic antenna		CAS 60/06/80		CAS 90	
Antenna adjustment range	Elevation	°	5–45 (CAS 60/06) – 5–50 (CAS 80)	5-50	5-50
	Azimuth	°	± 53 (CAS 60/06) ± 43 (CAS 80)	± 90	± 90
Material		Steel, hot-dip galvanised			
A Clamping piece clamp height	mm	205			
B Wall distance	mm	175	390	255	500
C Total height	mm	354	383	426	426
D Plate size	mm	130 x 130	160 x 160	222 x 222	222 x 222
E Hole spacing/∅	mm	103 x 103/ 11	133 x 133/ 11	190 x 190/ 13	190 x 190/ 13
Pipe-∅	mm	38	45	50	50
Max. forces exerted on attachment points ¹⁾ Tension/compression CAS 60/CAS 06/CAS 80/CAS 90	N	430/760/–	600/1000/–	–/–/780	–/–/1270
Max. forces exerted on attachment points ¹⁾ Shear strain CAS 60/CAS 06/CAS 80/CAS 90	N	420/740/–	330/580/–	–/–/710	–/–/710
Packaging unit/weight	pc./kg	1/1.2	1/2.0	1/3.2	1/4.0

¹⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

> Stub masts

- ZAS 15 218603

- Hot-dip galvanised



Technical data

Type | Order no.		ZAS 15 218603
Suitable for parabolic antenna		CAS 120
Dimensions: ∅/L/A	mm	76/810/400 ± 3
Forces exerted on attachment points: pressure/pull/shearing strain	kN ¹⁾	5.0/5.0/0.7
Weight (approx.)	kg	9.9

¹⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

- ZSO 120** 376214
- ZSO 125** 376215
- ZSO 180** 23710014
- ZSO 181** 23710015

- Can be disassembled



ZSO 120



ZSO 181

Technical data

Type | Order no.		ZSO 120 376214	ZSO 125 376215	ZSO 180 23710014	ZSO 181 23710015
Suitable for parabolic antenna		CAS 124		CAS 180	
Wind load	kN	5.7		7.53	
Torque at pipe socket	kNm	0.9		1.62	
Forces exerted on attachment points (wind speed: 200 km/h)					
- Compression	kN	6.2	8.6	19.6	18.8
- Tension	kN	4.9	8.9	18.3	13.1
Dimensions (clamping Ø/height)	mm	114/1405	114/2405	114/2640	114/1455
Weight (approx.)	kg	56	70	200	137
Transverse load (shear)	kN	8.7	11.2	10.9	9.6

> Clamping plate set for ZSO 180/181

- ZSO 25** 276281

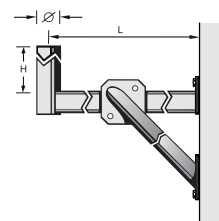
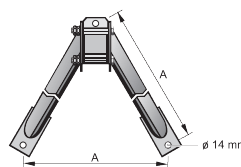
- Clamping plate set for ZSO 180/181, for IPB 200 carriers



> Wall mount

- ZAS 16** 218606

- Hot-dip galvanised
- Not suitable for turning tables



Technical data

Type | Order no.		ZAS 16 218606
Suitable for parabolic antenna		CAS 120
Dimensions: Ø/A/L/H	mm	76/550/850/330
Forces exerted on attachment points: pressure/pull/shearing strain	kN ¹⁾	2.7/3.7/3.5
Weight (approx.)	kg	17.0

¹⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

> Rafter brackets

ZAS 46 20410085



- To mount parabolic antennas on rooftops
- TÜV certified for parabolic antennas with a diameter of up to Ø 1.3 m
- Mounting directly from the outside or through the battens onto the rafter
- Flexibly adjustable to the gaps between the rafters by means of a telescopic tube
- Continuously adjustable for any roof slope (limited only by cover plate)
- Material: Steel, hot-dip galvanised
- Cable is inserted through mast tip with ZTC 08 (available as accessory)
- With earth screw, mast cap and six fixing screws



- Designed to withstand lightning current (100 kA, 10/350 µs, as per DIN VDE 0855-300)

Technical data

Type | Order no.		ZAS 46 20410085
Mast-Ø / mast length / rafter spacing	mm	60/1200/520-850
Roof slope	°	0-90
Frame dimensions approx.	mm	580-980 x 148 x 40
Suitable for parabolic antennas		CAS 60/06/80/90/120, KEA 650/750/850/1000
Suitable mounting accessories		ZTB 60ro, ZTB 60sw, ZTB 61, ZTC 60, ZTC 08
Perm. bending moment ¹⁾	Nm	1350
Packaging unit/weight	pc./kg	1/14.5

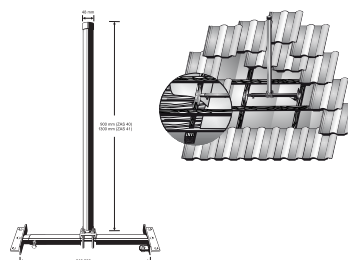
¹⁾ The wind load of the mast has already been considered (applies to 800 N/m² and 1100 N/m²). Wind load calculation in accordance with EN 60728-11, see page 57

ZAS 40 20410011

ZAS 41 20410012



- To mount parabolic antennas on rooftops
- TÜV certified for parabolic antennas with a diameter of up to Ø 1 m
- ZAS 40 for one parabolic antenna
- ZAS 41 for one parabolic antenna and an additional FM antenna
- Mounting directly from the outside or through the battens onto the rafter
- Flexibly adjustable to the gaps between the rafters by means of a telescopic tube
- Continuously adjustable for any roof slope (limited only by cover plate)



- Material: Steel, hot-dip galvanised
- Cable is inserted through mast tip with ZTC 08 (included in delivery scope of ZTS 40/41)
- With earth screw, mast cap and six fixing screws 10 x 100 mm
- Designed to withstand lightning current (100 kA, 10/350 µs, as per DIN VDE 0855-300)

Mounting recommendations

- During installation, pay careful attention to the load bearing capacity of the substructure
- Installing the parabolic antenna (max. Ø: 100 cm) is only permitted up to the max. mast height (approx. 800 mm)
- At a mast length of 1,300 mm (ZAS 41), the reflector must be mounted below and the FM antenna above (the max. permissible bending moment must be observed)

Technical data

Type | Order no.		ZAS 40 20410011	ZAS 41 20410012
Mast-Ø / mast length / rafter spacing	mm	48/900/510-900	48/1300/510-900
Roof slope	°	0-90	
Frame dimensions approx.	mm	580 to 980 x 148 x 40	
Suitable for parabolic antennas		CAS 60/CAS 06/CAS 80/CAS 90	
Suitable mounting accessories		Rafter bracket mounting set ZTS 40/41	
Perm. bending moment ¹⁾	Nm	700	
Packaging unit/weight	pc./kg	1/6.5	1/7.5

¹⁾ The wind load of the mast has already been considered (applies to 800 N/m² and 1100 N/m²). Wind load calculation in accordance with EN 60728-11, see page 64

> Flat roof antenna mount

ZAS 140 20410069

ZAS 150 20410068

The flat roof antenna mounts ZAS 140 and ZAS 150 are designed for the installation of a satellite antenna on a flat surface. The stable mounting system ensures precise alignment.

ZAS 150

- Continuously tiltable up to 10°
- Material: hot-dip galvanised steel EN ISO 1461
- Suitable for at least four concrete slabs, 50 x 50 cm
- Suitable for offset parabolic antennas up to Ø 130 cm
- Quick and easy installation with nine screws
- Anti-slip rubber feet
- Scope of supply: mast with tripod, frame, stabilising legs, screws and two rails for securing the concrete slabs



ZAS 150



ZAS 140

ZAS 140

- Continuously adjustable mast tilt
- Material: hot-dip galvanised steel EN ISO 1461
- Suitable for concrete slabs, 40 x 40 cm
- Suitable for offset parabolic antennas up to Ø 90 cm
- Quick and easy mounting with 4 screw nuts and a twinned U-bolt construction
- Scope of supply: mast, frame, 4 screw nuts M10, U-bolt construction

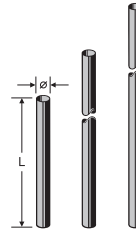
Technical data

Type | Order no.		ZAS 140 20410069	ZAS 150 20410068
Suitable for offset parabolic antennas up to Ø (at 800 N/m ²)	cm	90	130
Tiltable up to	°	–	10
Mast diameter	mm	48	60
Dimensions (L x W x H)	cm	86.5 x 86.5 x 120	103.5 x 111.5 x 105
Packaging unit/weight	pc./kg	1/15.6	1/24.0

> Masts

Mast tubes

ZAS 02	218612
ZAS 03	218613
ZAS 04	218687
ZAS 05	20410007
ZAS 06	20410008



- Hot-dip galvanised
- Mast calculation (max. bending moment) see page 64

Technical data

Type | Order no.			ZAS 02 218612	ZAS 03 218613	ZAS 04 218687	ZAS 05 20410007	ZAS 06 20410008
Dimensions	∅	mm	60	60	60	48	48
	L	m	0.56	2.0	3.0	2.0	3.0
	Wall thickness	mm	–	–	–	2.3	2.3
Grade (steel)			S 235 (St 37)	S 235 (St 37)	S 355 (St 52)	S 235 (St 37)	S 355 (St 52)
Perm. bending moment at 800 N/m ² ¹⁾		Nm	–	1449	1935 (1502) ²⁾	772	1042
Perm. bending moment at 1100 N/m ² ¹⁾		Nm	–	1424	1880 (1447) ²⁾	706	995
Suitable for parabolic antenna			CAS 60/06/80/90	CAS 60/06/80/90/120	CAS 60/06/80/90/120	CAS 60/06/80	CAS 60/06/80
Packaging unit/weight		pc./kg	1(5)/1.75	1(25)/9.0	1(25)/12.0	1(25)/5.5	1(25)/8.5

¹⁾ The wind load of the masts has already been considered. The max. allowable bending moment on the attachment point applies to max. usable length. According to EN 60728-11, the mast clamped length must be at least 1/6 of the mast length.

²⁾ Applies to 1,650 Nm on the clamping point. If this value is exceeded, static proof is required in accordance with EN 60728-11

Plug-in masts

ZSA 21	218312
ZSA 46	218334



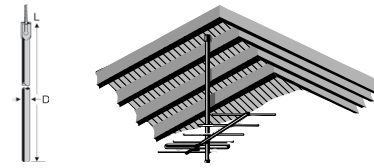
- Hot-dip galvanised
- Anti-twist
- Equal outer diameters can be plugged
- Does NOT conform to EN 60728-11

Technical data

Type | Order no.		ZSA 21 218312	ZSA 46 218334
Length L	m	2	2
Diameter D	mm	42	48
Grade (steel)		S 235 (St 37)	S 235 (St 37)
Wall thickness in clamping area	mm	2	2
Packaging unit/weight	pc./kg	1(5)/4.4	1(4)/5.5

Under-roof masts

ZSU 11 281322

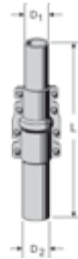


Technical data

Type | Order no.		ZSU 11 281322
Length L	m	1
Diameter D	mm	22
Packaging unit/weight	pc./kg	5/3.75

Extending masts

ZSD 48 218380
ZSF 47 218385
ZSF 48 218381
ZSH 47 218386
ZSH 48 218394
ZSH 59 218382
ZSH 62 218383



- Conform to: EN 60728-11
- Hot-dip galvanised
- Anti-twist
- Inclusive clamping piece and seal
- Simple rooftop-mounting
- Can be pulled out together with the mounted antennas
- Mast calculation (max. bending moment) see page 64

Technical data

Type | Order no.		ZSD 48 218380	ZSF 47 218385	ZSF 48 218381	ZSH 47 218386	ZSH 48 218394	ZSH 59 218382	ZSH 62 ²⁾ 218383
Length L	m	2 x 2 = 4	2 x 2.5 = 5	2 x 2.5 = 5	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6	2 x 3 = 6
Diameter D1/D2	mm	40/48	40/48	40/48	40/48	40/48	48/60	48/60
Cable insertions		3	–	3	–	3	5	5
Grade (steel)		S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 235 (St 37)	S 355 (St 52)	S 355 (St 52)	S 355 (St 52)
Wall thickness in clamping area	mm	2.5	2	2.5	2	2.5	2.5	4.5
Perm. bending moment ¹⁾ useful length at 800 N/m ²	5.0 m 4.0 m 3.0 m	– 1170	– 500 540	– 1040 1080	320 430 –	850 960 –	1150 1280 –	1950 (1150) 2120 (1280) –
Perm. bending moment ¹⁾ useful length at 1100 N/m ²	5.0 m 4.0 m 3.0 m	– – 1110	– 390 480	– 920 1000	160 300 –	700 840 –	900 1080 –	1700 (900) 1960 (1080) –
Packaging unit/weight	pc./kg	1/11.4	1/11.3	1(25)/14.2	1(25)/13.1	1(25)/17.8	1(25)/20.5	1/35.0

¹⁾ The max. perm. bending moment at the attachment point applies to the useful length. The wind load of the mast has already been considered.

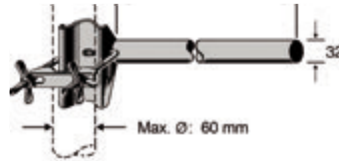
According to EN 60728-11, the mast clamped length must be at least 1/6 of the mast length

²⁾ The technical data is based on the calculation principles specified in DIN 4131. If the calculated bending moment exceeds the values given in brackets (= 1,650 Nm on the clamping point), static proof is required, in accordance with EN 60728-11.

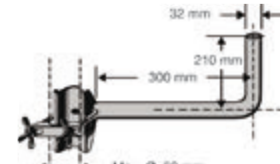
> Booms

ZTA 11 218010

ZTA 12 218011



ZTA 11



ZTA 12

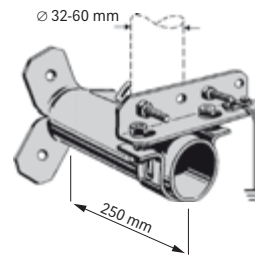
Technical data

Type | Order no.		ZTA 11 218010	ZTA 12 218011
		For B III antennas up to 286-N wind load	For UHF antennas up to 286-N wind load
Wind load (see page 64)	N	13.5	15
Packaging unit/weight	pc./kg	1(4)/1.4	1(4)/1.4

> Mast spacer

ZTI 01 218363

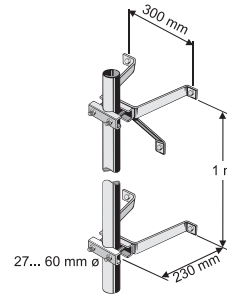
- To mount masts with an allowable bending moment of max. 1,650 Nm
- To even out staggered attachment points in the roof beams
- Hole diameter of attachment points: 8.5 mm
- Designed to withstand lightning current (100 kA, 10/350 μ s, as per DIN VDE 0855-300)
- Packaging unit/weight (pc./kg): 1(4)/1.2



> Mast mounting bracket set

ZTH 01 218362

- To mount masts with an allowable bending moment of max. 1,650 Nm
- With extra strut and fixture for upright alignment of the mast
- In combination with ZAS 02 suitable for wall mounting of 60-cm, 75-cm and 90-cm offset parabolic antennas
- Max. forces exerted on the attachment points (hole diameter: 11.5 mm) if a 90-cm antenna is used:
Pressure: 300 N – Tension: 300 N – Shearing: 835 N
- Packaging unit/weight (pc./kg): 1(4)/5.1



> Mast clamps, holders

ZTH 12 218364

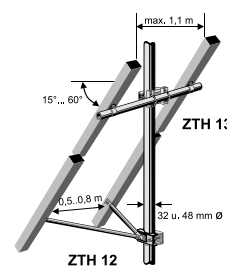
ZTH 13 218365

ZTH 12 - Mast clamp, lower part

- To mount masts with an allowable bending moment of max. 1,650 Nm
- Packaging unit/weight (pc./kg): 1(2)/3.2

ZTH 13 - Mast clamp, upper part

- To mount masts with an allowable bending moment of max. 1,650 Nm

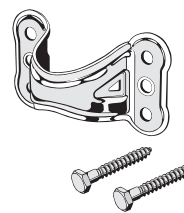


ZTU 142 21410001

ZTU 148 21410002

ZTU 160 21410003

- To mount masts with an allowable bending moment of 1,650 Nm
- Hot-dip galvanised
- Suitable for straight and sloped mounting
- Includes fixing screws



Technical data

Type | Order no.		ZTU 142 21410001	ZTU 148 21410002	ZTU 160 21410003
Suitable for mast-Ø	mm	42	48	60
Hole diameter of attachment points	mm	9	9	11
Packaging unit/weight	pc./kg	10/1.8	10/2.2	10/3.9

> Rubber bushing

ZTC 91 218201

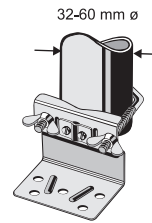
- For mast hole \varnothing of 7 mm
- Packaging unit/weight (pc./kg): 50(500)/0.10



> Mast shoe

ZTM 01 218359

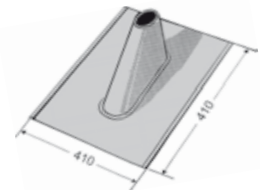
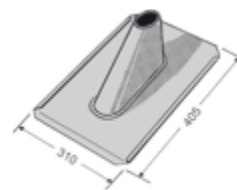
- To mount masts with an allowable bending moment of max. 1,650 Nm
- Hole diameter of attachment points: 9 mm
- Designed to withstand lightning current (100 kA, 10/350 μ s, as per DIN VDE 0855-300)
- Packaging unit/weight (pc./kg): 1(10)/0.45



> Rooftop cover plates

ZTB 42 20410071

ZTB 61 20410072

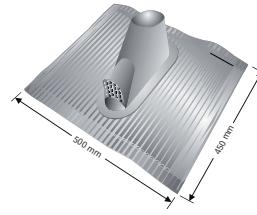


Technical data

Type | Order no.		ZTB 42 20410071	ZTB 61 20410072
Material		Sheet lead	Sheet lead
Thickness	mm	1.0	1.0
Suitable for mast- \varnothing	mm	Max. 48	Max. 60
Packaging unit/weight	pc./kg	1(5)/1.55	1(5)/1.35

ZTB 60ro 21410010

ZTB 60sw 21410011



- Made of aluminium and plastics
- Environmentally friendly (free of heavy metals)
- Up to 16 cables can be inserted on the base of the mast
- Available in two colours: brick-red and black

Technical data

Type | Order no.		ZTB 60ro 21410010	ZTB 60sw 21410011
Colour		Copper brown (RAL 8004)	Black (RAL 9017)
Dimensions	mm	450 x 500	450 x 500
Suitable for mast-Ø	mm	38-60	38-60
Packaging unit/weight	pc./kg	1(10)/0.32	1(10)/0.32

> **Sealing collars**

ZTC 01 218210

ZTC 42 218208

ZTC 48 218209

ZTC 60 218338



ZTC 01



ZTC 42/48/60

- Rainproof cover for the insert opening in rooftop cover plates
- ZTC 01 sealing collar can be retrofitted

Technical data

Type | Order no.		ZTC 01 218210	ZTC 42 218208	ZTC 48 218209	ZTC 60 218338
Suitable for mast-Ø	mm	27-60	42	48	60
Packaging unit/weight	pc./kg	5(50)/0.38	5(150)/0.25	5(150)/0.38	5(150)/0.5

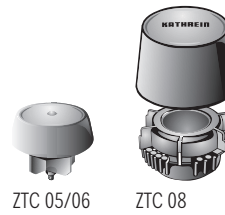
> Mast caps

ZTC 05 218205

ZTC 06 218214

ZTC 08 218219

- For watertight sealing of masts
- ZTC 08: Ten coaxial cables LCD 90, 111 A+, 115 A+, 120 A+ or eight cables LCD 89 can be inserted over the mast tip



ZTC 05/06

ZTC 08

Technical data

Type | Order no.		ZTC 05 218205	ZTC 06 218214	ZTC 08 218219
Suitable for mast-Ø	mm	32-48	48-60	48/60
Packaging unit/weight	pc./kg	10(50)/0.40	1(50)/0.03	10(50)/1.0

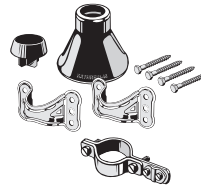
> Installation sets

ZTZ 42 218410

ZTZ 48 218412

ZTZ 60 218413

- To mount masts with an allowable bending moment of 1,650 Nm
- All parts required for mounting a standpipe are included in these sets
- Please order the standpipe and suitable rooftop cover plates separately



Technical data

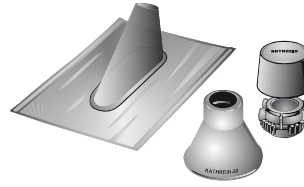
Type | Order no.		ZTZ 42 218410	ZTZ 48 218412	ZTZ 60 218413
Suitable for mast-Ø	mm	42	48	60
Packaging unit/weight	pc./kg	1(20)/0.55	1(20)/0.55	1(20)/1.06

ZTS 40 20410073

To fix the rafter brackets ZAS 40/ZAS 41

The set comprises:

- ZTB 61: Lead cover sheet (410 x 410 mm)
- ZTC 08: Mast cap for insertion of eight or ten cables
- ZTC 48: Cover flange (Ø: 48 mm)

**Technical data**

Type | Order no.		ZTS 40 20410013
Suitable for		Rafter fasteners ZAS 40, ZAS 41
Packaging unit/weight	pc./kg	1/2.9

ZTS 41ro 20410026**ZTS 41sw** 20410027

Accessory set to install ZAS 40 and ZAS 41 rafter brackets

(also suitable for other masts with a 48-mm Ø)

The set comprises:

- ZTB 60xx: Aluminium cover plate (450 x 500 mm)
- ZTC 08: Mast cap for insertion of eight or ten cables
- ZTC 48: Cover flange (Ø: 48 mm)

**Technical data**

Type | Order no.		ZTS 41ro 20410026	ZTS 41sw 20410027
Colour rooftop cover plate		Copper brown	Black
Suitable for mast-Ø	mm	48	48
Packaging unit/weight	pc./kg	1/1.8	1/1.8

- ZTS 48ro** 20410020
- ZTS 48sw** 20410021
- ZTS 60ro** 20410023
- ZTS 60sw** 20410024



To mount masts with an allowable bending moment of 1,650 Nm

A set comprises:

- ZTM 01: Mast shoe with earth wire clamp
- ZTU 1xx: Clamping piece
- ZTB 60xx: Aluminium cover plate (450 x 500 mm)
- ZTC xx: Sealing collars
- ZTC 08: Mast cap for insertion of eight or ten cables
- Required fastening screws

Technical data

Type | Order no.		ZTS 48ro 20410020	ZTS 48sw 20410021	ZTS 60ro 20410023	ZTS 60sw 20410024
Colour rooftop cover plate		Copper brown	Black	Copper brown	Black
Suitable for mast-Ø	mm	48		60	
Packaging unit/weight	pc./kg	1/2.2		1/2.4	

- ZTS 148** 20410074
- ZTS 160** 20410075



To mount masts with an allowable bending moment of 1,650 Nm

A set comprises:

- ZTM 01: Mast shoe with earth wire clamp
- ZTU 1xx: Clamping piece
- ZTB xx: Lead cover sheet
- ZTC xx: Sealing collars
- ZTC 08: Mast cap for insertion of eight or ten cables
- Required fastening screws

Technical data

Type | Order no.		ZTS 148 20410074	ZTS 160 20410075
Suitable for mast-Ø	mm	48	60
Packaging unit/weight	pc./kg	1/2.55	1/3.55

> Earthing accessories

Guttering earthing clamp

ZEK 111 21410021

- Galvanised
- Clamping range, earthing wire cross section:
25–70 mm²
- Reference to standards DIN EN 62561-1 (VDE 0185-561-1)
- Clamping range, bead \varnothing 16–22 mm
- Packaging unit/weight (pc./kg):
1 (25) / 133g (3.33 kg)



Earthing connector

ZEV 111 21410022

- Galvanised
- Clamping range, wire cross section: 16–70 mm²;
Screw M8 x 30 mm
- Reference to standards DIN EN 62561-1 (VDE 0185-561-1)
- Packaging unit/weight (pc./kg):
1 (50) / 0.146 kg (7.3 kg)



Earthing strap

ZEU 168 21410023

- Material: Stainless steel
- Earthing connection for:
2 round conductors, wire cross section 25–50 mm²
1 round conductor, wire cross section 4–50 mm²
- Reference to standards DIN EN 62561-1 (VDE 0185-561-1)



Technical data

Type | Order no.		ZEU 168 21410023
For mast diameter	mm	27-168
For water pipe diameter	Inch	3/4-6
Dimensions of stainless steel strap (H x W x D)	mm	570 x 25 x 0.3
Packaging unit/weight	pc./kg	1 (10)/0.133 (1.33)

Outlets

➤ Single-cable sockets	82
➤ Broadband cable/Sat outlets	85
➤ Sat outlets	87
➤ High-end broadband outlets	89
➤ Modem outlets (selective)	90
➤ Modem outlets (broadband)	92
➤ Satellite single connection boxes	93
➤ Wall outlet frame, cover plates	95

> Single-cable sockets

- ESU 33** 21110012
- ESU 34** 21110011
- ESU 36** 21110022
- ESU 37** 21110023



- For single-cable systems in accordance with EN 50494 and EN 50607
- With DC voltage passage to trunk line via satellite connection (max. 20 V/400 mA, 22-kHz and DiSEqC™ signal)
- Protection of the system function in case of receiver malfunction: The connected receiver is switched off if it is not equipped with the DiSEqC™ set of single-cable commands as per EN 50494 (voltage from the satellite connection to input is cut off at +18 V after approximately 400 ms)
- Overload protection by electronic cut-out and decoupling diodes
- Can be combined with nearly all installation programmes
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Packaging unit/weight (pc./kg): 10(50)/1.0

ESU 33

- Directional coupler outlets, 3-way, for loop-through systems in single-cable systems conforming to EN 50494 or EN 50607. With DC voltage passage to trunk line via satellite connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal)

ESU 34

- Single outlet, 3-way, for stub or star distribution systems in single-cable systems conforming to EN 50494 or EN 50607. With DC voltage feed through via satellite connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal).

ESU 36, ESU 37

- Directional coupler outlets, 3-way, for loop-through systems in single-cable systems conforming to EN 50494 and EN 50607
- Available with graduated connection losses for optimal system design with equalised useful levels on subscriber connections:
ESU 33: 10 dB; ESU 36: 14 dB; ESU 37: 17 dB

Technical data

Type | Order no.		ESU 33 21110012			ESU 36 21110022			ESU 37 21110023			ESU 34 21110011		
Connection		TV	Radio	Sat-IF	TV	Radio	Sat-IF	TV	Radio	Sat-IF	TV	Radio	Sat-IF
Frequency range/ connection loss [MHz/ dB]	47-68 B I	10			14			17			1.0		
	87.5-108 FM		11			15			18			1.0	
	118-470 VHF	10			14			17			1.0		
	470-862 UHF	10			14			17			1.0		
	950-2150 Sat-IF			10			14			17			1.0
Through loss [dB]		VHF: 1.0 UHF: 1.0 Sat-IF: 1.9			VHF: 0.7 UHF: 0.8 Sat-IF: 1.5			VHF: 0.7 UHF: 0.8 Sat-IF: 1.5			-		
Interal decoupling ¹⁾ [dB]		VHF/UHF: > 42 Sat-IF: > 32			VHF/UHF: > 42 Sat-IF: > 32			VHF/UHF: > 42 Sat-IF: > 32			-		

¹⁾ Between two subscribers



The corresponding wall outlet frame and cover plates for all sockets can be found under "Wall outlet frame, cover plates" on page 95.

- ESU 54** 21110027
- ESU 51** 21110061
- ESU 53** 21110026
- ESU 56** 21110028
- ESU 57** 21110029



- For single-cable systems in accordance with EN 50494 and EN 50607
- Basic functions in delivery status:
 - **Delivery status corresponds to ESU 3x antenna outlets (no programming necessary)**
 - Switch-off of connected receiver if it does not use the single-cable DiSEqC™ command set in accordance with EN 50494 or EN 50607
 - Configured for single-cable systems
 - All userbands (UB1 ... UB32) are enabled
 - LED display switched off
- Configurable functions using the SWP 50 programming device:
 - Disable individual userbands
 - operation in Legacy mode (no switch-off at 18 V constant signal for standard multi-switch system)
 - Configurable LED for displaying error messages
 - Functions can be extended
- Return path compatible for systems with cable connection (CATV modem) or in IP-over-coax systems, e.g. with KLAN modem (EXI 01)
- Monitoring of DiSEqC™ signalling by microcontroller
- Connections:
 - TV – IEC connector (m) (IEC 61169-2)
 - Radio – IEC connector (f) (IEC 61169-2)
 - SAT – F socket (IEC 61169-24)

- With DC voltage passage to trunk line via satellite connection (max. 20 V/400 mA, 22-kHz and DiSEqC™ signal)
- Overload protection by electronic cut-out and decoupling diodes
- Can be combined with nearly all installation programmes
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Packaging unit/weight (pc./kg): 10(50)/1.0

Technical data

Type | Order no.		ESU 54 21110027			ESU 51 21110061			ESU 53 21110026			ESU 56 21110028			ESU 57 21110029		
Connection		TV	R	Sat	TV	R	Sat	TV	R	Sat	TV	R	Sat	TV	R	Sat
Frequency range/ connection loss [MHz/ dB]	5-68 B I	1.0			8.0			10			14			17		
	87.5-108 FM		2.0			9.0			11			15			18	
	118-470 VHF	1.0			8.0			10			14			17		
	470-862 UHF	1.0			8.0			10			14			17		
	950-2150 Sat-IF			1.0			8.0			10			14			17
Frequency range/ through loss [MHz/dB]	5-10									1.5			1.5			1.5
	10-862		-			-				1.1			1.1			1.1
	862-2150									1.9			1.9			1.9
Frequency range/ decoupling ¹⁾ [MHz/dB]	5-862									≥ 42			≥ 42			≥ 42
	950-2150									≥ 32			≥ 32			≥ 32

¹⁾ Between two subscribers

ESU 53, ESU 56, ESU 57

- Directional coupler outlet, 3-way, for loop-through systems in single-cable systems in compliance with EN 50494 or EN 50607, or for stub and star distribution systems.
- Available with graduated connection losses for optimal system design with equalised useful levels on subscriber connections:
ESU 53: 10 dB; ESU 56: 14 dB; ESU 57: 17 dB

ESU 54

- Single outlet, 3-way, for stub or star distribution systems in single-cable systems conforming to EN 50494 or EN 50607

ESU 51

- Terminated end outlet, 3-way, for loop-through systems in single-cable systems in compliance with EN 50494 and EN 50607, or for stub and star distribution systems.

Further information

The programmable single-cable sockets of the ESU 50 series ensure interference-free reception in single-cable satellite reception systems.

By means of these single-cable sockets it is possible to program the userbands. The single-cable sockets contain a microcontroller that monitors the signalling inside single-cable systems.

User ID checks ensure that only the enabled userbands are transmitted from the end device to the multi-switch via the outlet.

Together with the "Kathrein ESU" app, the SWP 50 programming device (see "Programmiergerät" on page 204) enables the configuration of the ESU 50 series single-cable sockets from Kathrein.

The configuration of the single-cable sockets ensures that connected devices can only use the respectively enabled userbands. If an end device is configured incorrectly, is incompatible with a single-cable system or in first installation mode, it will not affect the devices connected to other programmed outlets. This enables the entire single-cable satellite system to operate permanently across several residences with failure-free operation.

Please use the "Kathrein ESU" app for configuration. It is available free of charge for the Android, iOS and Windows operating systems. This app allows you to disable and enable userbands quickly and intuitively. Furthermore, you can use a PIN code to protect the configuration of each outlet against unauthorised modifications.

➤ **Broadband cable/Sat outlets**

ESC 84 21110009
ESD 84 274425
ESD 85 274426



- Single outlets for stub and star distribution systems
- Conforms to: EN 60728-11 and EN 50083-2
- Robust die-cast housing
- Can be combined with nearly all installation programmes
- With screw and claw fastening, suitable for flush-mounted boxes with a diameter of 55-65 mm
- Packaging unit/weight (pc./kg): 10 (50)/1.0-1.1

Technical data

Type | Order no.	ESC 84 21110009	ESD 84 274425	ESD 85 274426
Symbol			
Special features	Broadband single outlet for broadband cable and house distribution system	Broadband antenna outlet for broadband, CATV and satellite home house distribution systems. With DC voltage feed through via TV connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal).	Broadband antenna outlet for broadband, CATV and satellite home house distribution systems. With DC voltage feed through via TV connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal).

Attenuations

Type | Order no.	Connection	Attenuation [dB]	Frequency range [MHz]							
			0.15-30 AM	5-47 Return	47-68 B I	87.5-108 FM	118-470 VHF	470-1006 UHF	950-2150 Sat-IF	2150-2400 Sat-IF
ESC 84 | 21110009	TV: IEC (plug)	Connection		1.8	1.8	1.8	1.8	1.8		
	Radio: IEC (socket)	Connection		6.2	6.2	6.2	6.4	6.6		
ESD 84 | 274425	TV: IEC (plug)	Connection		4.0	3.5	3.5	3.5	3.8	4.3	4.8
	Radio: IEC (socket)	Connection		4.0	3.5	3.5	3.5	3.8	4.3	4.8
ESD 85 | 274426	TV: IEC (plug)	Connection			0.5		0.5	0.5	1.0	1.0
	Radio: IEC (socket)	Connection	7.0			1.0				



In continuous frequency bars, the frequency gaps below and above the FM range and between the UHF and sat IF band are also transmitted.

ESC 44 21110014
ESE 10 274233
ESD 44 274418
ESD 64 274198



- Directional coupler outlets for loop-through systems
- Conforms to: EN 60728-11 and EN 50083-2
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes
- Packaging unit/weight (pc./kg): 10 (50)/1.0-1.1

Technical data

Type | Order no.	ESC 44 21110014	ESE 10 274233	ESD 44 274418	ESD 64 274198
Symbol				
Special features	Broadband directional coupler outlet (14 dB) for broadband cable and house distribution systems	Broadband directional coupler outlet (10 dB) for broadband cable, community antenna networks and satellite house distribution systems	Broadband directional coupler outlet (15 dB) for broadband cable, community antenna networks and satellite house distribution systems without a DC outlet	Selective directional coupler outlet (8 dB) for broadband cable and house distribution systems with max. 4 series-connected outlets
Decoupling ¹⁾ [dB]	Return: > 44 VHF/UHF: > 44	Return: > 30 VHF/UHF: > 46 Sat-IF: > 32	Return: > 30 VHF/UHF: > 46 Sat-IF: > 32	Return: > 30 VHF/UHF: > 46
Decoupling ²⁾ [dB]	Return: > 22 VHF/UHF: > 22	Return: > 30 VHF/UHF: > 40 Sat-IF: > 30	Return: > 18 VHF/UHF: > 22 Sat-IF: > 20	Return: > 22 FM: > 10 VHF/UHF: > 22

¹⁾ Between two subscribers ²⁾ Between TV and radio connections

Attenuations

Type | Order no.	Connection	Attenuation [dB]	Frequency range [MHz]							
			0.15-30 AM	5-47 Return	47-68 B I	87.5-108 FM	109 ¹⁾ -470 VHF	470-1006 UHF	950-2150 Sat-IF	2150-2400 Sat-IF
ESC 44 | 21110014	TV: IEC (plug)	Connection		14	14	14	14	14		
	Radio: IEC (socket)	Connection		14	14	14	14	14		
		loop-through		0.8	0.8	0.8	0.8	0.8		
ESE 10 | 274233	TV: IEC (plug)	Connection		10	10	10	10	10	11	11.5
	Radio: IEC (socket)	Connection		11.5	11	11	11	11	11	11.5
		loop-through		2.9	2.4	2.4	2.4	2.4	3.5	3.9
ESD 44 | 274418	TV: IEC (plug)	Connection		14.5	14.5	14.5	14.5	14.5	15	16
	Radio: IEC (socket)	Connection		14.5	14.5	14.5	14.5	14.5	15	16
		loop-through		2.0	0.8	0.8	0.8	1.0	1.6	2.2
ESD 64 | 274198	TV: IEC (plug)	Connection		8	8		8	8		
	Radio: IEC (socket)	Connection				10				
		loop-through		1.6	1.4	1.4	1.4	1.8		

¹⁾ Additional attenuation at 109 MHz: approx. 2-3 dB

> Sat outlets




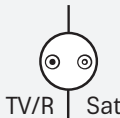
ESC 30	21110013
ESD 08	274197
ESD 30	274209
ESD 32	274421
ESD 52	274224



- Conforms to: EN 60728-11 and EN 50083-2
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with a diameter of 55-65 mm
- Can be combined with nearly all installation programmes
- Packaging unit/weight (pc./kg): 10 (50)/0.85-1.1

Technical data

Type | Order no.		ESC 30 21110013	ESD 08 274197	ESD 30 274209
Symbol				
Special features		<p>Satellite single connection box, 3-way, for stub and star distribution systems in satellite house distribution systems.</p> <p>With DC voltage feed through via satellite connection (max. 24 V/320 mA, 22-kHz and DiSEqC™ signal).</p>	<p>Connection outlet for individual reception systems, stub and star distribution systems in systems with two drop cables (e.g. twin receivers).</p> <p>With DC voltage feed through via both connections (max. 24 V/1 A, 22-kHz and DiSEqC™ signal).</p>	<p>Satellite single connection box, 3-way, for stub and star distribution systems in satellite house distribution systems.</p> <p>With DC voltage feed through via satellite connection (max. 24 V/320 mA, 22-kHz and DiSEqC™ signal).</p>
Decoupling ¹⁾ [dB]		–	–	–

Type | Order no.		ESD 32 274421	ESD 52 274224
			
Symbol			
Special features		<p>Satellite single connection box, 3-way, for stub and star distribution systems in systems with two drop cables (e.g. for twin receivers).</p> <p>With DC voltage feed through via satellite connections (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal).</p>	<p>Broadband directional coupler outlet for loop through systems in MATV systems.</p> <p>With DC passage (built-in diode) via the TV connection to the trunk line (max. 24 V/350 mA, 22-kHz and DiSEqC™ signal).</p> <p>ERA 14 terminating resistor must be used.</p>
Decoupling ¹⁾ [dB]		–	VHF/UHF: > 42 Sat-IF: > 32

¹⁾ Between two subscribers

Attenuations

Type | Order no.	Connection	Attenuation [dB]	Frequency range [MHz]							
			0.15-30 AM	5-47 Return	47-68 B I	87.5-108 FM	118-470 VHF	470-862 UHF	950-2150 Sat-IF	2150-2400 Sat-IF
ESC 30 | 21110013	TV: IEC (plug)	Connection			1.0		1.0	1.0		
	Radio: IEC (socket)	Connection				2.0				
	Sat: F (socket)	loop-through							1.0	
ESD 08 | 274197	TV: IEC (plug)	Connection	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4
	Radio: IEC (socket)	Connection	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.4
ESD 30 | 274209	TV: IEC (plug)	Connection		5.0	3.5	3.5	3.5	4.0		
	Radio: IEC (socket)	Connection		5.0	3.5	3.5	3.5	4.0		
	Sat: F (socket)	loop-through							1.0	2.0
ESD 32 | 274421	TV: IEC (plug)	Connection			0.5	0.5	0.5	0.5		
	Sat: F (socket)	Connection							1.0	1.0
	Sat: F (socket)	loop-through	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
ESD 52 | 274224	TV: IEC (plug)	Connection			14.5	14.5	14.5	14.5	15	16
	Radio: IEC (socket)	Connection			14.5	14.5	14.5	14.5	15	16
		loop-through			1.0	1.0	1.0	1.0	1.9	2.7



In continuous frequency bars, the frequency gaps below and above the FM range and between the UHF and sat IF band are also transmitted.

> High-end broadband outlets

ESD 83 21110035

ESD 63 21110038



- Exceed the requirements of EN 60728-11 and EN 50083-2
 - For ultra-wideband optimised (5-2150 MHz)
 - Novel insulation optimising technology
 - Extremely high screening factor
 - Extended radiation resistance to LTE interference
 - Nickel-free, non-allergenic
 - Designed for home networking using MoCATM technology
 - Robust die-cast housing
 - Inner conductor is electrically isolated
 - Packaging unit/weight (pc./kg): 10 (50)/0.87 (4.4)
- ESD 83: Broadband single outlet, 2-way, for stub and star distribution systems, IEC (male and female)
 - ESD 63: Broadband junction box, 2-way, through socket, IEC (plug and socket)

Technical data

Type | Order no.		ESD 83 21110035	ESD 63 21110038	
Connection		TV: IEC (plug) Rf: IEC (socket)	TV: IEC (plug) Rf: IEC (socket)	
Attenuation [dB]		Connection		loop-through
Frequency range [MHz]	5-12	≤ 4.0	≤ 7.4	≤ 4.0
	12-30	≤ 3.6	≤ 7.2	≤ 3.6
	30-300	≤ 3.7	≤ 7.3	≤ 3.7
	300-470	≤ 3.8	≤ 7.6	≤ 3.8
	470-1006	≤ 4.0	≤ 8.0	≤ 4.0
	1006-1700 1700-2150	≤ 4.6 ≤ 5.2	≤ 9.0 ≤ 10.0	≤ 4.6 ≤ 5.2
Decoupling [dB]			5-30 MHz ≥ 25 30-470 MHz ≥ 30 470-1006 MHz ≥ 25 1006-1700 MHz ≥ 20 1700-2150 MHz ≥ 15	
Typ. screening factor [dB]		5-12 MHz ≥ 100 12-30 MHz ≥ 95 30-300 MHz ≥ 95 300-470 MHz ≥ 90 470-1006 MHz ≥ 90 1006-1700 MHz ≥ 80 1700-2150 MHz ≥ 75		

> Modem outlets (selective)

ESM 40/G 21110053

ESM 41/G 21110054

ESM 42/G 21110055



- Conforms to: EN 60728-11 and EN 50083-2
- For interactive CATV/HFC networks
- Very high decoupling between modem connection and TV/radio connection suppresses disturbance of TV/radio reception by the modem
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Broadband signal splitting to TV and radio outlet ports
- Built-in solution without plug-in filters, thus high system protection against manipulations by the subscribers
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes

- Connections: TV: IEC (male); Radio - IEC (female); Modem - F-type (female)
- Packaging unit/weight (pc./kg): 10(50)/1.1

ESM 40/G:

Single outlet for stub and star distribution systems with very low connection loss (4 dB, return path: 1 dB)

ESM 41/G, ESM 42/G:

Directional coupler outlet for loop-through systems
Connection loss: ESM 41/G: 14 dB; ESM 42/G: 10 dB

Technical data

Type | Order no.		ESM 40/G 21110053			ESM 41/G 21110054				ESM 42/G 21110055			
Connection		TV	Radio	Modem	TV	Radio	Modem		TV	Radio	Modem	
Frequency range [MHz]	5-65 Return	≥ 60 ²⁾	≥ 60 ³⁾	1.0	≥ 70 ²⁾	≥ 55 ³⁾	13.5	1.3	≥ 70 ²⁾	≥ 55 ²⁾	10	
	87.5-108 FM		5.0	3.5		15	13.5	1.3		11.5	10	
	109-1200 VHF/UHF	4.0		3.5	13.5		13.5	1.3	10		10	
Attenuation [dB]		Connection loss			Connection loss				loop-through	Connection loss		
Internal decoupling [dB] ¹⁾		5-47 MHz ≥ 75 47-65 MHz ≥ 60 87.5-108 MHz ≥ 16 109-1200 MHz ≥ 30			5-65 MHz ≥ 78 87.5-470 MHz ≥ 42 470-1200 MHz ≥ 30					5-65 MHz ≥ 78 87.5-470 MHz ≥ 42 470-1200 MHz ≥ 30		

¹⁾ Between output and TV/radio connection ²⁾ In the frequency range of 5-47 MHz

ESM 20 21110008



- Single outlet for stub and star distribution systems with very low connection loss
- For interactive CATV/HFC networks
- Very high decoupling between modem connection and TV/radio outlet ports suppresses disturbance of TV/radio reception by the modem
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Broadband signal splitting to TV and radio outlet ports
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes

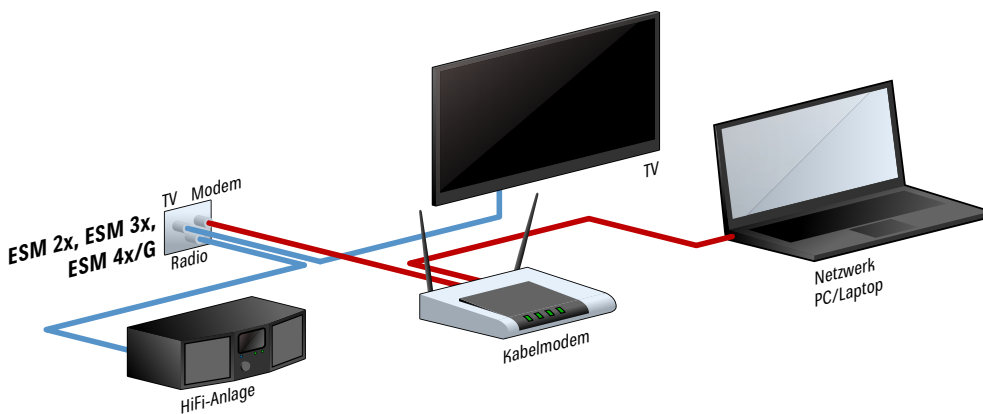
- Connections:
TV: IEC (male); Radio - IEC (female); Modem - F-type (female)
- Complies with: EN 60728-11 and EN 50083-2
- Packaging unit/weight (pc./kg): 10(50)/1.1

Technical data

Type | Order no.	Connection	Attenuation [dB]	Frequency range [MHz]				Decoupling internal ¹⁾ [dB]
			5-47 Return	47-68 B I	87.5-108 FM	111 ³⁾ -1006 VHF/UHF	
ESM 20 21110008	TV	Connection loss	≥ 60 ²⁾	4.0		4.0	5-34 MHz > 78 47-68/ 111-1006 MHz > 25 87-108 MHz > 25
	Radio		≥ 70 ²⁾		5.0		
	Modem		4.0	4.0	4.0	4.0	

¹⁾ Between modem connection and TV/radio connection ²⁾ In the frequency range 5-34 MHz
³⁾ Transmission start from 109 MHz possible (additional attenuation: approx. 2-3 dB)

Connection example



> Modem outlets (broadband)

ESM 30	274429
ESM 31	274430
ESM 32	21110010



- Conforms to: EN 60728-11 and EN 50083-2
- For interactive CATV/HFC networks
- Very high decoupling between modem connection and TV/radio outlet ports suppresses disturbance of TV/radio reception by the modem
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Broadband signal splitting to TV and radio connections
- Built-in solution without plug-in filters, thus high system protection against manipulations by the subscribers

ESM 30

- Single outlet for stub and star distribution systems with very low connection loss (6 dB)

ESM 31, ESM 32

- Directional coupler outlet for loop-through systems
- Connection loss: ESM 31: 14 dB; ESM 32: 10 dB
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes
- Connections:
 - TV: IEC (male); Radio - IEC (female); Modem - F-type (female)
- Packaging unit/weight (pc./kg): 10(50)/1.1

Technical data

Type | Order no.	Con- nection	Attenua- tion (dB)	Frequency range (MHz)				Decoupling internal 1) (dB)	Directional attenuation 2) (dB)
			5-65 Return	85-470 VHF	470-862 UHF	862-1006		
ESM 30 274429	TV	Connection loss	≥ 52 ³⁾	6.0	6.0	7.0	5-47 MHz ≥ 70	-
	Radio		≥ 52 ³⁾	6.0	6.0	7.0	47-65 MHz ≥ 60	
	Modem		6.5	6.5	6.5	7.0	85-1006 MHz ≥ 30	
ESM 31 274430	TV	Connection loss	≥ 52 ³⁾	14	14	14	5-47 MHz ≥ 78	5-47 MHz ≥ 64
	Radio		≥ 52 ³⁾	14	14	14	47-65 MHz ≥ 60	85-470 MHz ≥ 33
	Modem		14	14	14	14	85-862 MHz ≥ 40	470-862 MHz ≥ 30
		loop- through	2.0	1.6	2.0	2.0	862-1006 MHz ≥ 34	862-1006 MHz ≥ 25
ESM 32 21110010	TV	Connection loss	≥ 52 ³⁾	10	10	10	5-65 MHz ≥ 78	5-65 MHz ≥ 64
	Radio		≥ 52 ³⁾	10	10	10	87.5-862 MHz ≥ 40	87.5-862 MHz ≥ 30
	Modem		10	10	10	10	862-1006 MHz ≥ 30	862-1006 MHz ≥ 25
		loop- through	3.0	3.0	3.5	4.5		

¹⁾ Between modem connection and TV/radio connection ²⁾ Between output and TV/radio connection ³⁾ In the frequency range 5-47 MHz

> Satellite single connection boxes

ESM 70 21110019



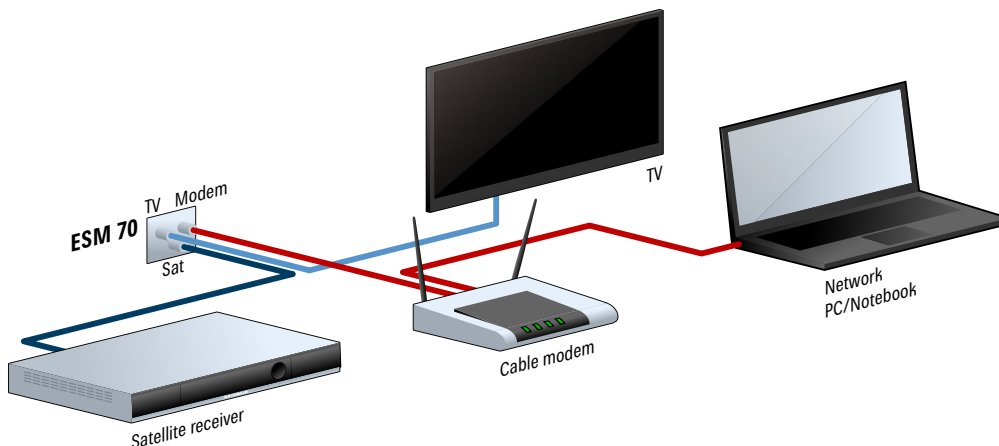
- Satellite modem single connection box, 3-way, for stub and star distribution systems in satellite house distribution systems.
- Enables use of interactive CATV/HFC services in Sat distribution systems (suitable for DOCSIS modems)
- Ideal to use cable network operator Internet/telephony packages in satellite systems
- Very high decoupling between modem connection and TV/radio outlet ports suppresses disturbance of TV/radio reception by the modem
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Modem connection is green for easy identification
- Satellite connection with DC voltage passage (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal)
- Built-in diode on satellite connection and capacitive separation on modem connection (inner conductor) to protect wrongly connected terminals
- Combined broadband TV and radio connection
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with a diameter of 55-65 mm
- Can be combined with nearly all installation programmes
- Connections:
 - TV and radio - IEC (male)
 - Modem - F-type (female) green
 - Sat - F-type (female) black
- Complies with: EN 60728-11 and EN 50083-2
- Packaging unit/weight (pc./kg): 10(50)/1.1

Technical data

Type | Order no.	Connection	Attenuation (dB)	Frequency range (MHz)				Internal decoupling ¹⁾ (dB)
			5-65 Return	85-470 VHF	470-862 UHF	950-2150 Sat-IF	
ESM 70 | 21110019	TV and radio	Connection loss	> 50	2.5	2.5	-	5-47 MHz > 70
	Modem		6.5	6.5	7.0	-	47-65 MHz > 65
	Sat-IF		> 50	-	-	1.0	87.5-2150 MHz > 25

¹⁾ Decoupling between modem connection and TV/radio or satellite connection

Connection example



EXI 30 21110024

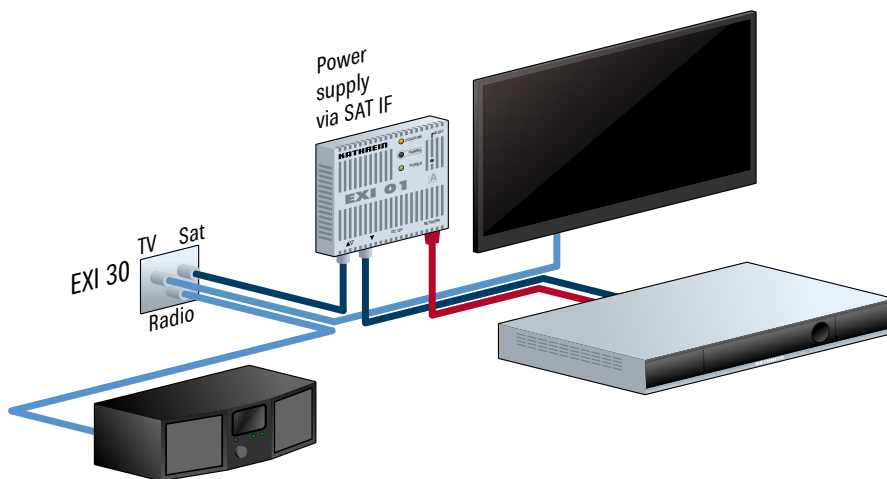


- Satellite single connection box, 3-way, for stub and star distribution systems in satellite house distribution systems.
- For the use of the Kathrein home networking technology "K-LAN" with EXI 01 and EXI 3508 – return path frequency range is available at the satellite connection and thus simplifies wiring
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Satellite connection with DC voltage passage (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal)
- TV and radio connection are selectively filtered for optimal reception parameters
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes
- Connections:
 - TV - IEC (male)
 - Radio - IEC (female)
 - Sat IF & modem - F (female)
- Conforms to: EN 60728-11 and EN 50083-2
- Packaging unit/weight (pc./kg): 10/1.0

Technical data

Type | Order no.	Connection	Attenuation (dB)	Frequency range (MHz)				
			0-68 Return	87.5-108 FM	118-470 VHF	470-862 UHF	950-2150 Sat-IF
EXI 30 21110024	TV: IEC (plug)	Connection loss			1.0	1.0	
	Radio: IEC (socket)			2.0			
	Sat: F (socket)		1.0				1.0

Connection example



> Wall outlet frame, cover plates

ESZ 50 274226

- Suitable for ESZ 52, ESZ 53, ESZ 54 cover plates
- Pure white RAL 9010
- Dimensions: 80 x 80 x 31 mm



ESZ 44 274318

ESZ 52 274227

ESZ 53 274228

ESZ 54 274453

ESZ 44

- Central plate, universal use
- Pearly white RAL 1013
- Dimensions: 55 x 55 mm
- Packaging unit/weight (pc./kg): 10 (100, 500)/0.11



ESZ 44



ESZ 52



ESZ 53



ESZ 54

ESZ 52

- Cover plate
- Pure white RAL 9010
- Dimensions: 80 x 80 mm
- Packaging unit/weight (pc./kg): 10 (100, 800)/0.2

ESZ 53/ESZ 54

- 3-hole plates
- ESZ 53 suitable for outlets ESC 30, ESD 30, ESD 32, ESM 20, ESM 30, ESM 31, ESM 32, ESM 40, ESM 41, ESM 42, ESM 70, ESU 33, ESU 34, ESU 36, ESU 37, EXI 30
- ESZ 54 suitable for outlets ESM 20, ESM 30, ESM 31, ESM 32, ESM 40, ESM 41, ESM 42
- ESZ 54 with imprint "TV, R, Data" at the corresponding outlets
- Pure white RAL 9010
- Dimensions: 80 x 80 mm
- Packaging unit/weight (pc./kg): 10 (100, 800)/0.2





Cables, Plugs and Adapters

➤ Features and Benefits of Kathrein Coaxial Cables	98
➤ Cable	100
➤ F accessories/adapters/couplings	106
➤ IEC connector (m)/(f)/couplings	106
➤ F-type connector (m)	107
➤ Cable fittings	107
➤ Terminating resistors	108
➤ Cable connector	108
➤ Note for assembling the connectors	108
➤ Cable stripper	109
➤ Compression pliers	109
➤ Compression connector set	109
➤ Self-install connector set	109
➤ F-type earthing blocks	110
➤ Earthing rails	110
➤ Connection cables	111





Features and Benefits of Kathrein Coaxial Cables

- The cables meet the electrical requirements of the cable companies (except LCD 89 and 90)
- The CE Declarations of Conformity correspond to the following standards and directives: EN 50575, EN 60728-11, EN 50581, EN 50117-2-3/-2-4, RoHS

		 LCD 89	 LCD 90	 LCD 111 A+	 LCD 115 A+
Order no.	100 m (one-way coil)	21510004	21510015	21510025	21510028
	250 m (one-way coil)	x	x	21510026	x
	500 m (one-way drum)	x	21510017	21510027	21510029
	250 m (reel-off box)	x	x	x	x
	Special lengths on request	x	x	x	x
Features	Attenuation	Low	Low	Very Low	Very Low
	Screening	Good	Good	Extremely good	Extremely good
	Cost per metre	Low	Very Low	Low	Low
	Fire classification	Low	Low	Low	High
	Diameter	Extra thin/flex.	Standard	Standard	Standard
	UV-resistant	✓	✓	✓	✓
Method of laying the cables	Inside buildings	✓	✓	✓	✓
	Outside buildings	x	x	x	✓
	Underground	x	x	x	x
Dimensions	Centre conductor	0.75 mm Cu	1.0 mm steel clad	1.13 mm Cu	1.13 mm Cu
	External sheathing	5 mm	6.8 mm	6.9 mm	6.9 mm
Fire classification	CPR 305/2011	Eca	Eca	Eca	Cca s1a d1 a1
External sheathing	Material	PVC white	PVC white	PVC white	LSZH black
Screening class		A	A	A++	A++
Screening attenuation typ./100 m	5-2400 MHz	90 dB	90 dB	130 dB	130 dB
Attenuation typ./100m	50 MHz	6.3 dB	4.3 dB	4.1 dB	4.1 dB
	450 MHz	18.3 dB	13.4 dB	12.0 dB	12.0 dB
	862 MHz	26.1 dB	18.4 dB	17.1 dB	17.1 dB
	1000 MHz	28.0 dB	20.1 dB	18.5 dB	18.5 dB
	2150 MHz	43.1 dB	30.5 dB	28.4 dB	28.4 dB
	2400 MHz	45.0 dB	32.6 dB	29.9 dB	29.9 dB
Return loss typ./100 m	5-2400 MHz	≥ 20-16 dB	≥ 26-20 dB	≥ 26-18 dB	≥ 26-18 dB
Coupling resistance DOCSIS 3.1 return path	5-30 MHz	< 5 mΩ/m	< 10 mΩ/m	≤ 0.9 mΩ/m DOCSIS 3.x	≤ 0.9 mΩ/m DOCSIS 3.x
Suitable connectors	Threaded	EMK 15	EMK 01 / EMK 02 / EMK 21 / EMK 62	EMK 01 / EMK 02 / EMK 21 / EMK 62	EMK 01/EMK 02/EMK 21/EMK 62
	Crimpable F-male	x	EMK 11	EMK 11	EMK 11
	Compress. F-male	x	EMK 12	EMK 12	EMK 12
	Self-install F-male	x	EMK 20	EMK 20	EMK 20
	Compress. IEC male	x	EMK 63	EMK 63	EMK 63
	Compress. IEC female	x	EMK 64	EMK 64	EMK 64

- The cables comply with the Construction Products Regulation 305/2011; valid since 1 July 2017 (Fire Safety Regulations)
- The cables have meter and jacket markings (manufacturer's name)

 LCD 120 A+	 LCD 130 A+	LCM 14 A+	LCM 17 A+	LCM 33	LCM 50	LCM 96
21510036	21510039	21510030	21510034	x	x	x
x	x	x	x	x	x	x
21510038	21510041	21510031	21510035	271623	271622	271624
21510043	21510042	x	x	x	x	x
x	x	x	x	24510061	24510062	24510063
Low	Very Low	Very Low	Very Low	Extremely low	Extremely low	Extremely low
Extremely good	Extremely good	Extremely good	Extremely good	Extremely good	Extremely good	Extremely good
Very Low	Low	Low	Low	Average	Average	Average
Low	Very high	Medium	Low	Low	Low	Low
Standard	Standard	Large	Large	1 qKx broadband cable	1 nKx broadband cable	1 nKx broadband cable
✓	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	✓
x	x	✓	✓	✓	✓	✓
x	x	x	✓	✓	✓	✓
1.02 mm Cu	1.13 mm Cu	1.63 mm Cu	1.63 mm Cu	3.3 mm Cu	2.2 mm Cu	1.1 mm Cu
6.8 mm	6.9 mm	10.4 mm	10.4 mm	17 mm	12.5 mm	11.0 mm
Eca	B2ca s1 d0 a1	Dca s1a d1 a1	Fca	Underground cable/FCA	Underground cable/FCA	Underground cable/FCA
PVC white	HFFR white	HFFR black	PE black	PE black	PE black	PE black
A+	A++	A+	A+	A++	A++	A++
130 dB	130 dB	120 dB	120 dB	120 dB	120 dB	120 dB
4.3 dB	4.1 dB	2.8 dB	2.8 dB	1.2 dB	1.8 dB	3.6 dB
12.9 dB	12.0 dB	8.6 dB	8.6 dB	4.0 dB	6.0 dB	11.5 dB
18.2 dB	17.1 dB	12.2 dB	12.2 dB	5.5 dB	8.7 dB	16.0 dB
19.7 dB	18.5 dB	13.1 dB	13.1 dB	7.0 dB	10.0 dB	18.3 dB
29.9 dB	28.4 dB	20.3 dB	20.3 dB	10.6 dB	16.2 dB	29.2 dB
31.8 dB	29.9 dB	21.8 dB	21.8 dB	11.5 dB	17.7 dB	31.7 dB
≥ 26-18 dB	≥ 26-18 dB	≥ 26-20 dB	≥ 26-20 dB	≥ 28-20 dB	≥ 28-20 dB	≥ 28-20 dB
≤ 2.5 mΩ/m	≤ 0.9 mΩ/m DOCSIS 3.x	≤ 2.5 mΩ/m	≤ 2.5 mΩ/m	≤ 0.1 mΩ/m DOCSIS 3.x	≤ 0.1 mΩ/m DOCSIS 3.x	≤ 0.1 mΩ/m DOCSIS 3.x
EMK 01/EMK 02/ EMK 21/EMK 62	EMK 01/EMK 02/ EMK 21/EMK 62	EMK 17	EMK 17	EMK 104	EMK 105	EMK 106
EMK 11	EMK 11	EMK 18	EMK 18	x	x	x
EMK 12	EMK 12	EMK 19	EMK 19	x	x	x
EMK 20	EMK 20	x	x	x	x	x
EMK 63	EMK 63	x	x	x	x	x
EMK 64	EMK 64	x	x	x	x	x

> Cable

LCD 89 21510004

LCD 90 21510015



- Impedance: 75 Ω
- Insulation of special PE compound, gas-injection foam
- Metre marking
- Lead and silicone free
- Conforms to: EN 50117
- For in-house installation
- **Fire classification Construction Products Regulations**
305/2011: LCD 89/LCD 90 - ECA

LCD 90

- Simplified plug assembly due to the applied film

Technical data

Type			LCD 89	LCD 90
Order no.	100 m		21510004	21510015
	500 m		–	21510017
Centre conductor	mm		0.75 Cu	1.0 steel clad
Insulation	mm		3.2 PEE/PH	4.6 PEE/PH
Outer conductor			1 x Triplex Al/pet/Al foil – 1 x CuSn mesh	1 x Triplex Al/pet foil - 1 x Alu meshwork
External sheathing	mm		5.0 PVC white	6.9 PVC white
Bending radius	mm		> 25	> 35
Shortening factor			0.85	0.85
Attenuation at	5 MHz	dB/100 m	2.3	1.6
	50 MHz		6.3	4.3
	100 MHz		8.5	6.2
	450 MHz		18.3	13.4
	860 MHz		26.0	18.4
	1000 MHz		28.0	20.1
	2150 MHz		42.6	30.5
Return loss	5-470 MHz	dB	> 26	> 26
	470-862 MHz		> 23	> 25
	862-1000 MHz		> 23	> 23
	1000-2150 MHz		> 20	> 20
DC resistance	Ω /km		< 65	< 120
Screening attenuation typ./100 m	5-2400 MHz	dB	90	90
Coupling resistance 5-30 MHz		m Ω /m	< 5 ¹⁾	< 10
Permissible ambient temperature		$^{\circ}$ C	-25 to +70	-25 to +70
Packaging	100 m		One-way coil	One-way coil
	5 x 100 m		Cardboard box	Cardboard box
	500 m		–	One-way drum
Weight		kg/100 m	3.0	4.0

¹⁾ 5-7 MHz < 7 m Ω /m

LCD 111 A+ 21510025

LCD 115 A+ 21510028



LCD 111 A+



LCD 115 A+



- Impedance: 75 Ω
- Insulation of special PE compound, gas-injection foam
- Metre marking
- Lead and silicone free
- Conforms to: EN 50117 / screening class A +
- Approved by KDG/Vodafone Kabel Deutschland
- dibkom certified material
- Simplified plug assembly due to the applied film
- **Fire classification Construction Products Regulations 305/2011: LCD 111 A+ - ECA; LCD 115 A+ - Cca s1a d1 a1**

LCD 115 A+

- Halogen-free, flame-retardant, UV-resistant
- Suitable for outdoor use (no laying in the ground)

Technical data

Type			LCD 111 A+	LCD 115 A+
Order no.	100 m		21510025	21510028
	250 m		21510026	–
	500 m		21510027	21510029
Centre conductor	mm		1.13 Cu	1.13 Cu
Insulation	mm		4.8 PE	4.8 PE
Outer conductor			2 x Triplex Al/pet/Al foil – 1 x CuSn mesh	2 x Triplex Al/pet/Al foil – 1 x CuSn mesh
External sheathing	mm		6.9 PVC white	6.9 FRNC/LSZH black ²⁾
Bending radius	mm		> 35	> 35
Shortening factor			0.84	0.84
Attenuation at	5 MHz	dB/100 m	1.0	1.0
	50 MHz		4.1	4.1
	100 MHz		5.7	5.7
	450 MHz		12.0	12.0
	860 MHz		17.1	17.1
	1000 MHz		18.5	18.5
	2150 MHz		28.4	28.4
Return loss	5-470 MHz	dB	> 26	> 26
	470-862 MHz		> 25	> 25
	862-1000 MHz		> 23	> 23
	1000-2150 MHz		> 20	> 20
DC resistance		Ω /km	< 29	< 29
Screening attenuation typ./100 m	5-2400 MHz	dB	130	130
Coupling resistance 5-30 MHz		m Ω /m	< 0.9 ¹⁾	< 0.9 ¹⁾
Maximum allowed tensile force		N	150	150
Permissible ambient temperature		$^{\circ}$ C	-25 to +70	-25 to +70
Packaging	100 m		One-way coil	One-way coil
	5 x 100 m		Cardboard box	Cardboard box
	250 m		One-way coil	–
	500 m		One-way drum	One-way drum
Weight		kg/100 m	5.1	5.1

¹⁾ 5 MHz–8 MHz < 1.5 m Ω /m ²⁾ Halogen-free (in accordance with EN 50267-2-1 and EN 50267-2-2), flame-retardant (in accordance with EN 60332-1-1)

LCD 120 A+ 21510036

LCD 130 A+ 21510039



LCD 120 A+



LCD 130 A+



- Impedance: 75 Ω
- Insulation of special PE compound, gas-injection foam
- Metre marking
- Lead and silicone free
- Conforms to: EN 50117 / screening class A +
- Approved by KDG/Vodafone Kabel Deutschland
- dibkom certified material
- Simplified plug assembly due to the applied film
- Available in 100 m, 250 m and 500 m lengths
- **Fire classification Construction Products Regulations 305/2011: LCD 120 A+ - ECA; LCD 130 A+ - B2ca s1a d0 a1**

LCD 120 A+ dispenser/LCD 130 A+ dispenser

- Packaging with built-in reel-off function
- Available in length of 250 m

Technical data

Type			LCD 120 A+	LCD 130 A+
Order no.	100 m		21510036	21510039
	500 m		21510038	21510041
	250 m dis.		21510043	21510042
Centre conductor	mm		1.02 Cu	1.13 Cu
Insulation	mm		4.6 PE	4.8 PE
Outer conductor			2 x Triplex Al/pet/Al foil – 1 x CuSn mesh	2 x Triplex Al/pet/Al foil – 1 x CuSn mesh
External sheathing	mm		6.8 PVC white	6.9 HFFR white
Bending radius	mm		> 34	> 34
Shortening factor			0.85	0.85
Attenuation at	5 MHz	dB/100 m	1.3	1.0
	50 MHz		4.3	4.1
	100 MHz		6.0	5.7
	450 MHz		12.9	12.0
	860 MHz		18.2	17.1
	1000 MHz		19.7	18.5
	2150 MHz		29.9	28.4
2400 MHz	31.8	29.9		
Return loss	5-470 MHz	dB	> 26	> 26
	470-862 MHz		> 25	> 25
	862-1000 MHz		> 23	> 23
	1000-2150 MHz		> 20	> 20
DC resistance		Ω/km	< 34	< 34
Screening attenuation typ./100 m	5-2400 MHz	dB	130	130
Coupling resistance 5-30 MHz		mΩ/m	< 2.5 ¹⁾	< 0.9 ¹⁾
Maximum allowed tensile force		N	150	120
Permissible ambient temperature		°C	-25 to +70	-25 to +70
Packaging	100 m		One-way coil	One-way coil
	5 x 100 m		Cardboard box	Cardboard box
	250 m		Reel-off box	Reel-off box
	500 m		One-way drum	One-way drum
Weight		kg/100 m	4.8	5.1

¹⁾ 5 MHz–8 MHz < 1.5 mΩ/m

LCM 14 A+ 21510030

LCM 17 A+ 21510034



LCM 14 A+



LCM 17 A+



- Impedance: 75 Ω
- Insulation of special PE compound, gas-injection foam
- Metre marking
- Lead and silicone free
- Conforms to: EN 50117 / screening class A +
- **Fire classification Construction Products Regulations 305/2011: LCM 14 A+ - Dca S1a d1 a1; LCM 17 A+ - Fca**

LCM 14 A+

- Halogen-free, flame-retardant, UV-resistant; suitable for outdoor use (no underground installation)

LCM 17 A+

- Suitable for outdoor use and underground installation ²⁾

Technical data

Type			LCM 14 A+	LCM 17 A+
Order no.		100 m	21510030	21510034
		500 m	21510031	21510035
Centre conductor		mm	1.63 Cu	
Insulation		mm	7.2 cell PE	7.2 PEE/PH
External sheathing		mm	10.4 black ¹⁾	10.4 PE black
Outer conductor			1 x Triplex Al/pet/Al foil – 1 x CuSn mesh	
Bending radius		mm	> 110	
Shortening factor			0.84	
Attenuation at	5 MHz	dB/100 m	0.9	0.9
	50 MHz		2.8	2.8
	100 MHz		3.9	3.9
	450 MHz		8.6	8.6
	860 MHz		12.2	12.2
	1000 MHz		13.1	13.1
	2150 MHz		20.3	20.3
2400 MHz	21.8	21.8		
Return loss	5-470 MHz	dB	> 26	> 26
	470-862 MHz		> 23	> 23
	862-1000 MHz		> 23	> 23
	1000-2150 MHz		> 20	> 20
DC resistance		Ω /km	< 16	< 16
Screening attenuation typ./100 m	5-2400 MHz	dB	120	120
Coupling resistance 5-30 MHz		m Ω /m	< 2.5	< 2.5
Permissible ambient temperature		$^{\circ}$ C	-25 to +70	-25 to +70
Packaging		100 m	Collar	Collar
		500 m	One-way drum	One-way drum
Weight		kg/100 m	9.5	9.5

¹⁾ Halogen-free (in accordance with EN 50267-2-1 and EN 50267-2-2), flame-retardant (in accordance with EN 603321-1)

²⁾ Precondition: No mechanical damage to the external sheathing

LCM 33	271623
LCM 50	271622
LCM 96	271624



- Impedance: 75 Ω
- Order no. 24510061, 24510062 and 24510063:
Special lengths on request
- High-quality broadband underground cable for use in broadband communication networks
- Conforms to: EN 50117; screening class A++
- LCM 33 1qKx, LCM 50 1nKx, LCM 96 1iKx

- **Fire classification Construction Products Regulations 305/2011: LCM 33/LCM 50/LCM 96 - underground cable/FCA**
- Suitable for outdoor use and underground installation
- Ideal for use in public and private broadband networks

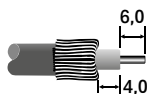
Technical data

Type			LCM 33	LCM 50	LCM 96
Order no.		500 m Special length	271623 24510061	271622 24510062	271624 24510063
Centre conductor		mm	3.3 Cu	2.2 Cu	1.1 Cu
Insulation		mm	13.5 PE/air (bamboo)	8.8 PE/air (bamboo)	7.3 PE (cell edge)
External sheathing		mm	17.0 PE black	12.5 PE black	11.0 PE black
Outer conductor			14 Cu welded	9.3 Cu welded	7.8 Cu welded
Bending radius ¹⁾		mm	> 280	> 150	> 150
Shortening factor			0.89		0.66
Attenuation at 20 °C	50 MHz	dB/100 m	1.2	1.8	3.6
	100 MHz		1.7	2.6	5.2
	450 MHz		4.0	6.0	11.5
	860 MHz		5.5	8.7	16.0
	1000 MHz		7.0	10.0	18.3
	2150 MHz		10.6	16.2	29.2
	2400 MHz		11.5	17.7	31.7
Return loss	5-470 MHz	dB	≥ 28		
	470-1000 MHz		≥ 26		
	1000-2400 MHz		≥ 20		
DC resistance		Ω/km	2.5	5.6	25.5
Screening attenuation typ./100 m	5-2400 MHz	dB	120		
Coupling resistance 5-30 MHz		mΩ/m	< 0.1 DOCSIS 3.x		
Permissible ambient temperature		°C	-20 to +50		
Packaging		500 m	One-way drum		
Weight		kg/100 m	35	18.5	15.0

¹⁾ Value for one-time bending, for repeated bending: × 2.5

Connection cables → plugs

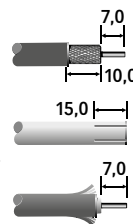
LCD 89



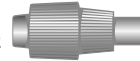
EMK 15



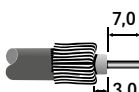
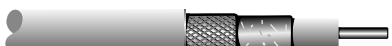
Screw-on connector



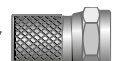
EMK 21
EMK 62



LCD 90

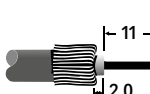
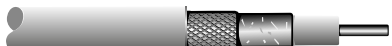


EMK 01*

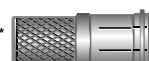


Screw-on connector

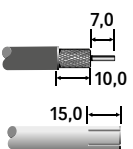
LCD 120 A+



EMK 02*



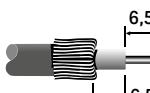
Quick screw-on connector



EMK 21
EMK 62



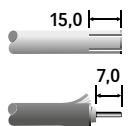
LCD 111 A+ / LCD 130 A+



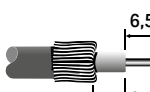
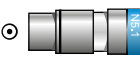
EMK 11*



Crimp connector
⊙ 8,2 mm



EMK 63 ⊙

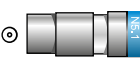


EMK 12*

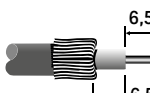


Compression connector

EMK 64 ⊙



LCD 115 A+



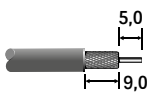
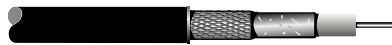
EMK 20*



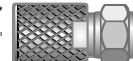
Self-install connector

* can be combined with all cables of this category

LCM 14 A+

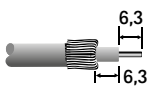
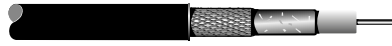


EMK 17*



Screw-on connector

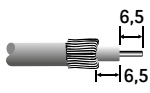
LCM 17 A+



EMK 18*



Crimp connector
⊙ 12,1 mm



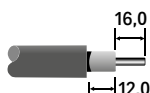
EMK 19*



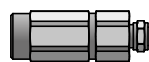
Compression connector

* can be combined with all cables of this category

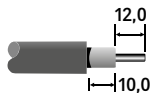
LCM 33



EMK 104



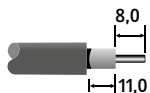
LCM 50



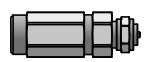
EMK 105



LCM 96



EMK 106



> F accessories/adapters/couplings



Type | Order no.	Designation	Screening factor		Packaging unit/weight (pc./kg)
EMU 02 273245	F-type angled connector (m)	> 90 dB		10 (100, 2000)/0.11
EMU 03 273246	F jack-to-jack adaptor	> 90 dB		10 (100, 2000)/0.07
EMU 04 273244	F-type double plug	> 90 dB		10 (100, 2000)/0.13
EMU 05 273270	F-type test plug	> 90 dB		10 (100, 1000)/0.12
EMU 06 273271	F adapter F-type (socket) - IEC (male)	VHF: > 85 dB UHF: > 75 dB		10 (100, 1000)/0.10
EMU 07 273272	F adapter F-type (socket) - IEC (socket)	VHF: > 85 dB UHF: > 75 dB		10 (100, 1000)/0.12
EMU 08 273273	F adapter F-type (male) - IEC (male)	VHF: > 85 dB UHF: > 75 dB		10 (100, 1000)/0.12
EMU 09 273274	F adapter F-type (male) - IEC (female)	VHF: > 85 dB UHF: > 75 dB		10 (100, 1000)/0.06
EMU 12 273281	F DC block (5-2400 MHz)	> 90 dB		5(100)/0.06

> IEC connector (m)/(f)/couplings



Type | Order no.	Designation	Screening factor		Suitable for cable	Packaging unit/weight (pc./kg)
EMK 21 273120	IEC connector (m)	VHF: > 75 dB UHF: > 65 dB		LCD 89, 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100)/ 0.11
EMK 62 273123	IEC connector (f)	VHF: > 75 dB UHF: > 65 dB		LCD 89, 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100)/ 0.12
EMU 01 273247	IEC coupler	–		Connection: IEC conn. (male) – IEC conn. (male)	10 (100, 1000)/ 0.04
EMU 10 273275	IEC coupler	–		Connection: IEC conn. (female) – IEC conn. (female)	10 (100, 1000)/ 0.1
EMK 63 21210030	IEC compression connector	> 85 dB (30-1000 MHz)		LCD 89, 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100)/ 0.11
EMK 64 21210031	IEC compression socket	> 85 dB (30-1000 MHz)		LCD 89, 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100)/ 0.11




> F-type connector (m)



Type | Order no.	Designation	Screening factor		Suitable for cable	Packaging unit/ weight (pc./kg)
EMK 01 273167	Screw-on connector	> 90 dB		LCD 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100, 2000)/ 0.01
EMK 02 21210014	Quick screw-on connector	> 90 dB		LCD 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100, 2000)/ 0.05
EMK 11 273263	Crimp connector	> 90 dB		LCD 90, 120 A+, 111 A+, 115 A+, 130 A+	10 (100, 2000)/ 0.03
EMK 12 21210018	Compression Connector	> 120 dB (5-1000 MHz) > 105 dB (1000-2400 MHz)		LCD 90, 120 A+, 111 A+, 115 A+, 130 A+	100 (2000)/ 0.92
EMK 15 273276	Screw-on connector	> 90 dB		LCD 89	10 (100)/ 0.08
EMK 17 273291	Screw-on connector	> 90 dB		LCM 14 A+, 17 A+	10 (100)/ 0.2
EMK 18 21210013	Crimp connector	> 90 dB		LCM 14 A+, 17 A+	10 (100)/ 0.14
EMK 19 21210019	Compression connector	> 120 dB (5-1000 MHz) > 105 dB (1000-2400 MHz)		LCM 14 A+, 17 A+	50 (1000)/ 2.5
EMK 20 21210024	Self-install connector	> 120 dB (5-1000 MHz) > 105 dB (1000-2400 MHz)		LCD 90, 120 A+, 111 A+, 115 A+, 130 A+	100 (2500)/ 0.01







> Cable fittings



Type | Order no.	Designation	Screening factor		Suitable for cable	Packaging unit/ weight (pc./kg)
EMK 104 273195	F-type cable fitting	90 dB		LCM 33	1 (10)/ 0.1
EMK 105 273196	F-type cable fitting	90 dB		LCM 50	1 (10)/ 0.1
EMK 106 273197	F-type cable fitting	90 dB		LCM 96	1 (25)/ 0.065

> Terminating resistors



Type | Order no.	Designation	Screening factor		Connection	Packaging unit/weight (pc./kg)
EMK 03 273169	 F-type terminating resistor	> 120 dB (5-1000 MHz) > 105 dB (1000-2400 MHz)		F-type (male)	10 (100, 2000)/0.03
EMK 05 21210027	 F-type terminating resistor with DC block	> 85 dB (5-3000 MHz)		F-type (male)	10 (100, 2000)/0.01
ERA 12 272822	Terminating resistor	-		Clampable	10 (100, 1000)/0.01
ERA 14 272899	Terminating resistor with DC block	-		Clampable with capacitive isolation	10 (100, 1000)/0.01

> Cable connector

EVK 21 273134



EVK 21

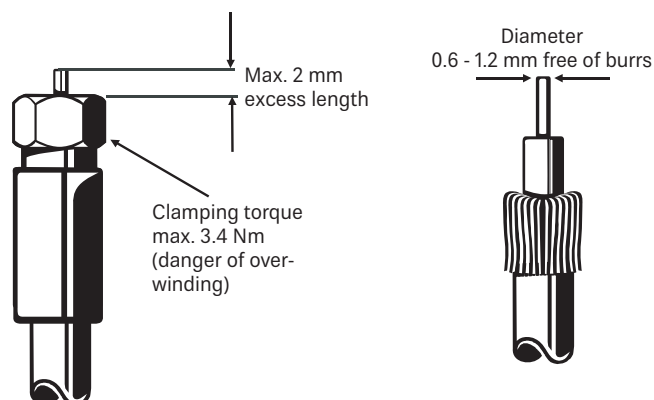
For indoor installation

Technical data

Type | Order no.			EVK 21 273134
Connection	Centre conductor Outer conductor	mm-Ø	Max. 1.4 Max. 8
Screening factor	dB		> 75
Packaging unit/weight	pc./kg		10(200)/0.11

> Note for assembling the connectors

If the inner cable conductor diameter is more than 1.2 mm, or if burring is present, the device sockets may be destroyed.



> Cable stripper

ZAW 16 21410014

- Cable stripper with 11-mm spanner
- Stripping length (mm): 6.5/6.5 (suitable for EMK 11, EMK 12 and EMK 20 plugs)
- Packing unit/weight (pc./kg): 1(25)/0.03



> Compression pliers

ZAW 13 21410012

- Suitable for EMK 12/EMK 19 compression connector
- Packaging unit/weight (pc./kg): 1/0.5



> Compression connector set

ZAH 12 21410008

- Compression connector set consisting of:
 - Plastic box
 - 100 EMK 12 compression connectors (suitable for LCD 90, LCD 120 A+, LCD 130 A+ and LCD 115 A+)
 - ZAW 13 Compression pliers (suitable for EMK 12/19)
- Cable stripper RG 6/59
- Dimensions (mm): 275 x 230 x 83
- Packaging unit/weight (pc./kg): 1(10)/1.8




> Self-install connector set

ZAH 15 21410013

- Self-install connector set consisting of:
 - Plastic box
 - 100 EMK 20 self-install F-type connectors (m) (suitable for LCD 90, LCD 120 A+, LCD 130 A+, LCD 111 A+ and LCD 115 A+)
 - ZAW 16 cable stripper RG 6/59 cable stripper
- Dimensions (mm): 255 x 210 x 72
- Packaging unit/weight (pc./kg): 1(10)/1.1



> F-type earthing blocks

EMU 21	273284	1-way	
EMU 22	273285	2-way	
EMU 24	21210020	4-way	
EMU 50	2120000003	5-way	
EMU 90	21210021	9-way	



- Screening factor: > 90 dB
- Remote feed max: 65 V/2 A
- Packaging unit/weight (pc./kg):
 EMU 21/22: 5 (100)/0.05; EMU 24: 5 (100)/0.08;
 EMU 50: 5 (50)/0.14; EMU 90: 5(100)/0.18



To connect the cable shields to potential equalisation. The components do not withstand lightning current and should therefore only be used for potential equalisation.

> Earthing rails

ZES 11 276020

- For six coaxial cables up to 8-mm Ø
- Packaging unit/weight (pc./kg):
 10(100)/0.8



To connect the cable shields to potential equalisation. The components do not withstand lightning current and should therefore only be used for potential equalisation.

> Connection cables

EVL 165 20410005
EVL 340 20410030
EVL 980 20410031



EVL 165

- To connect two components with F connections
- Completely mounted with F-type quick-plugs
- Cables and plugs in black

Technical data

Type | Order no.		EVL 165 20410005	EVL 340 20410030	EVL 980 20410031
Length	mm	165	340	980
Packaging unit/weight	pc./kg	5(50)/0.1	5(50)/0.15	5(50)/0.28

ETG 15 274779
ETG 30 274778



ETG 30

- To connect a satellite receiver to an antenna outlet equipped with an F connection
- Completely mounted with F-type quick-plugs
- Cables and plugs are white
- Frequency range: 0-2400 MHz

Technical data

Type | Order no.		ETG 15 274779	ETG 30 274778
Length	m	1.5	3.0
Packaging unit/weight	pc./kg	1(50)/0.1	1(50)/0.18

ETH 1500 20410042
ETH 3000 20410046
ETH 5000 20410050



- High-quality receiver connection cables for use as a TV connection cables or in multimedia networks
- Completely mounted including straight IEC connector (m) and IEC connector (f)
 - Screening factor 105 dB, class A+
 - Frequency range: 5-2400 MHz

Technical data

Type | Order no.		ETH 1500 20410042	ETH 3000 20410046	ETH 5000 20410050
Length	m	1.5	3.0	5.0
Packaging unit/weight	pc./kg	1(200)/0.05	1(150)/0.09	1(59)/0.143

Amplifier Systems

➤ General information	114
➤ Sat IF amplifier	116
➤ House connection amplifiers	116
➤ Monitorable house connection amplifiers	126
➤ PG 11 connection technology	128
➤ De-emphasis equaliser/attenuators	129
➤ Monitoring transp. HMS protocol	130
➤ Monitoring transp. DOCSIS/EuroDOCSIS 2.0	131
➤ Return path amplifiers/passive return path card	132
➤ Return path filters	133
➤ Interstage equaliser filter	133
➤ Remote feed transformer	134

> General information

With the multimedia-compliant extension of CATV networks, the demands on house distribution networks in network level 4 (NL 4) have also continuously increased. In addition to analogue and digital TV/radio signals, other services, such as Internet, telephony and video-on-demand, are also to be transmitted. To accommodate these additional services, high decoupling between subscriber connections and the lowest possible noise addition in the return path must be guaranteed. When planning NL 4, the following points must be taken into account:

- Creation of mainly star structures
- Installation of special modem outlets when using multimedia services
- Use of components and assemblies bearing the Class A symbol.



Modern house connection amplifiers

In the house connection amplifiers that are used at network level 4 this generally involves very versatile units that need to meet highly varied requirements and tasks.

As a rule, their sizing will depend on the maximum number of residential units or the number of those that need to be supplied in the building.

The amplifiers that are used at network level 4 are frequently supplied with 230 V AC from a local power supply, this being done by a separate infeed and fuse system from the power supply lines. Remote powered units are also used.

When selecting a suitable amplifier, the following criteria in particular should be taken into account:

- Operating level: The required operating level depends on the distribution loss inside the building and the necessary minimal level at the outlets inside the apartment.
- Gain in the forwards path: The required gain in the forwards path is dependent on the transfer signal level at the house transfer point (HTP) and on the required operating level.

- Gain in the return path: The choice of suitable return path amplifier depends on the attenuation inside the building and also on the connection loss to the line network and its return path dimensions. For this reason, the choice of a suitable return path amplifier and its adjustment should be made only after consultation with the operator of the respective line network.

Planning values for house connection amplifiers:

Type	Gain (dB)	Max. operating level CENELEC channel plan (dBµV)	Noise factor (dB)
			Forwards path ■ Return path
		60-dB-CTB/-CSO	
VOS 11/F	11	95/94	5 ■ –
VOS 20/F	20	95/94	5 ■ –
VOS 20/FR	20	95/94	6 ■ –
VOS 20/RA-1G	22	96/96	6 ■ 5
VOS 22/FR	14-22	97/97	6 ■ –
VOS 22/RA	14-22	97/97	6 ■ 5
VOS 29/RA-1G	30	96/96	6 ■ 5
VOS 32/RA-1G	26/32	102/102	7/6 ■ 5
VOS 43/RA	34/40	107/110	8/6 ■ 5
VOS 32/F	26/32	102/102	7/6 ■ 5 (with VGR 28/xx)
VOS 137/RA	40/34/30	113/116	6/7/7 ■ 5
VOS 138/RA	40/34/30	113/116	6/7/7 ■ 5
VOS 139/RA	40/34/30	113/116	6/7/7 ■ 5
VOS 952-1G	39.5	112/116	4/5/5 ■ 5
VOS 953-1G	39.5	112/116	4/5/5 ■ 5

The maximum operating level for the amplifiers is specified with 6 dB interstage pre-emphasis. For the amplifiers VOS 22/FR and VOS 22/RA the maximum operating level is specified with 8-dB interstage pre-emphasis.



The explanations for output level, EMC threshold values and noise factor can be found in chapter "Technical Appendix" starting on Page 289.

The permitted gain diminishment from nominal value = maximum value in range amplifiers is 4 dB (in accordance with ZVEI). In amplifiers with additional current consumption, the power consumption from the mains applies to the maximum current consumption. In the planning and installation of cable systems, the applicable guidelines and standards must be observed and implemented.

Symbols

Transmission frequency range characteristics

Symbol

Meaning



Frequency range is amplified. The frequencies between the defined ranges are also amplified.



Frequency range as passive bypass

HFC/CATV components/printed matter

A detailed description and illustration of the modules and components for broadband cable systems available from Kathrein can be found in the catalogue "Broadband Communication Systems".

You will find the latest information on Kathrein's compact and house connection amplifiers, including extensive accessories and numerous system examples, in the special brochure "Compact amplifiers", which can be ordered online or downloaded from www.kathrein.com. You can also order a hard copy of the brochure from the Kathrein sales centres, representatives or directly from Kathrein-Werke KG.

See page 307 for addresses.

Dealer portal

In the dealer portal on www.kathrein.com, you can find planning information and installation aids for designing systems in network level 4 (NL 4). This tool will help you to create plans for NL 4 in tree or star structures.

You can create an overview with wiring diagrams, level diagrams, outlet and cable diagrams and a material list in PDF form. There you can also make the level calculations for numerous system examples.

> Sat IF amplifier

VWS 04 20510057



- To amplify the Sat-IF range (950-2150 MHz)
- With passive bypass for the terrestrial range (5-862 MHz)
- To amplify the signals for distribution to several receivers/subscribers
- With built-in DC voltage bypass for LNB remote feeding (DC, 22-kHz and DiSEqC™ signal)
- Remote feeding via RF output
- For indoor installation

Technical data

Type | Order no.		VWS 04 20510057	
Reception range	MHz		
Gain	dB	-3	1-17 ¹⁾
Noise factor	dB	-	8
Max. output level 35-dB-IM2/IM3 ²⁾	dBμV	-	106
Remote power feed	V		+12 to +20
Power consumption	mA		Typ. 28
Remote feed current	mA		< 400
Connections			F connector
Dimensions	mm		74 x 46 x 21
Packaging unit/weight	pc./kg		1/0.20

¹⁾ The higher the frequency, the higher the gain ²⁾ In accordance with EN 60728-3

> House connection amplifiers

VOS 11/F 230073
 VOS 20/F 230075
 VOS 20/FR 230076



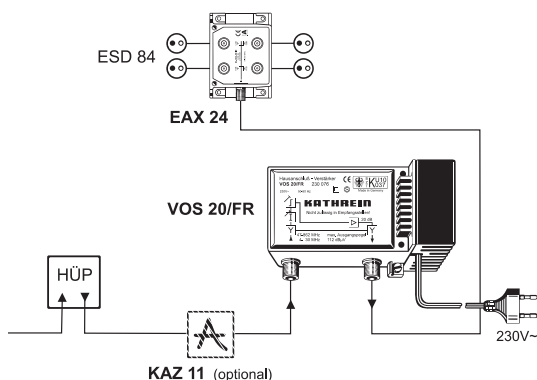
VOS 11/F



VOS 20/F

- With integrated power supply unit
- Conforms to: EN 60728-11, EN 50083-2 and EN 60065
- For indoor installation

Connection example VOS 20/FR



VOS 20/FR

Technical data

Type | Order no.		VOS 11/F 230073	VOS 20/F 230075	VOS 20/FR 230076
Forwards path				
Frequency range	MHz		47-862	
Gain	dB	11	20	20
Amplitude ripple	dB		± 1	
Adjustable attenuator adjustment range	dB	–	0-20	0-20
Setting range equaliser	dB	–	–	0-20
Maximum operating level ¹⁾ (60 dB CTB/CSO)	dB μ V		95/94	
Noise factor	dB	5	5	6
Return path				
Frequency range	MHz	–	–	4-30
Gain	dB	–	–	-0.5
General				
Impedance input/output	Ω		75	
Return loss input/output: Forwards path/return path	dB	14/-	14/-	13/15
RF connections			F connector	
Nominal input voltage	V _{AC}		230 (50/60 Hz)	
Power consumption	W	3	4.5	4.5
Protection class (in accordance with EN 60529)			II	
Temperature range	°C		-20 to +55	
Dimensions	mm		145 x 79 x 48	
Packaging unit/weight	pc./kg	1(10)/0.50	1(10)/0.50	1(10)/0.60

¹⁾ According to EN 60728-3; CENELEC channel plan; 42 carriers

VOS 20/RA-1G 20910031
VOS 29/RA-1G 20910032



- House connection amplifiers for modern HFC networks
- Built-in highly-efficient switched-mode power supply unit
- Complete unit with forward amplifier, return path amplifier, return path filter, actuators and power supply unit
- Die-cast housing with F connections
- Interstage equaliser switchable with jumpers (6 dB pre-emphasis)
- Built-in adjustable attenuator (forwards and return path; delivery condition: Return path max. attenuation)
- LED as mode indicator

- Built-in adjustable equaliser (forwards path)
- Built-in return path 5-65 MHz active
- Conforms to: EN 60728-11, EN 50083-2 and EN 60065
- For indoor installation

Accessories

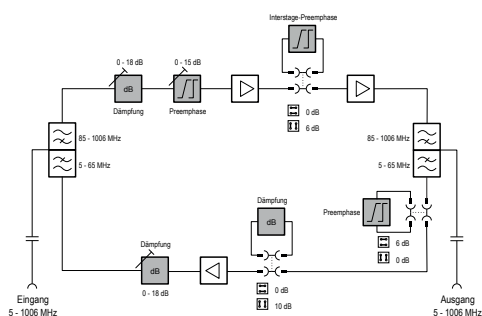
ERZ 120 de-emphasis equaliser, see Page 129.

Technical data

Type | Order no.		VOS 20/RA-1G 20910031	VOS 29/RA-1G 20910032
Forwards path			
Frequency range	MHz	85-1006	85-1006
Gain	dB	22	30
Max. operating level CENELEC 42 channels (60-dB-CTB/CSO)		96	96
Noise factor	dB	6	6
Gain setting range (on the input)	dB	0-18	0-18
Equalisation setting range (on the input)	dB	0-15	0-15
Interstage equaliser setting range ¹⁾		0/6	0/6
Return path			
Frequency range	MHz	5-65	5-65
Gain	dB	20	25
Gain setting range (on the output) ²⁾	dB	0-18	0-18
Gain setting range (on the input) ¹⁾	dB	0/10	0/10
Equalisation setting range (on input) ¹⁾	dB	6	6
Return path			
Noise factor	dB	5	5
Max. output level (60-dB IM3/IM2)	dB μ V	116/106	116/106
Input level density (CINR: 50 dB)	dB μ V/Hz	Typ. -8	Typ. -8
Dynamic range (input level density)	dB	22	22
Maximum output level as per KDG 1TS 140 (medium system load)	dB μ V	120	120
Classification in accordance with KDG 1 TS 140		B(1.1)	B(3.1)
General information			
Nominal input voltage	V _{AC}	230 (50/60 Hz)	230 (50/60 Hz)
Power consumption	W	4.5	4.5
Mode indicator		Green LED	Green LED
RF connections		F connectors	F connectors
Protection class/protection type (in accordance with EN 60529)		II/ IP 30	II/ IP 30
Temperature range	°C	-20 to +55	-20 to +55
Dimensions	mm	155 x 105 x 54	155 x 105 x 54
Packaging unit/weight	pc./kg	1(10)/0.8	1(10)/0.8

¹⁾ Settable using jumpers ²⁾ The adjustable attenuator is set to max. attenuation in the delivery status

Block diagram



VOS 32/RA-1G 20910033
 VOS 43/RA 20910030



- House connection amplifiers for modern HFC networks up to 1 GHz
- Built-in highly-efficient switched-mode power supply unit
- Power management: Unused amplifier stage switch-off for reduced power consumption
- Gain with through 6-dB interstage-attenuation is switchable with jumpers (delivery condition: high gain)
- The maximum operating levels also apply with interstage attenuation connected
- Interstage equaliser switchable with jumpers (6-dB pre-emphasis)
- Built-in 5-65 MHz active/passive return path that can be switched off (switchable with jumpers)
- Die-cast housing with F connections
- Integrated, adjustable attenuator (delivery condition, return path: max. attenuation) and adjustable equaliser
- LED as mode indicator
- Test socket on output -20 dB (with directional coupler)
- Test socket on input -20 dB
- Test sockets are terminated with the EMK 03 in the delivery status
- Conforms to: EN 60728-11, EN 50083-2 and EN 60065
- For indoor installation

Technical data

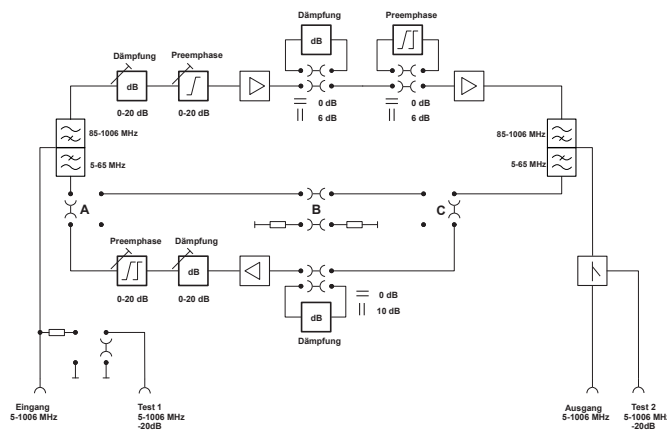
Type | Order no.		VOS 32/RA-1G 20910033	VOS 43/RA 20910030
Forwards path			
Frequency range	MHz	85-1006	85-1006
Amplification (switchable by interstage attenuation)	dB	26/32	34/40
Amplitude ripple	dB	± 1	± 1
Adjustable attenuator adjustment range	dB	0-20	0-20
Setting range equaliser	dB	0-20	0-20
Interstage attenuator setting range (switchable with jumpers)	dB	0/6	0/6
Interstage equaliser setting range (switchable with jumpers)	dB	0/6	0/6
Maximum operating level ¹⁾ (60 dB CTB/CSO)			
▪ flat	dB μ V	101/101	107/109
▪ with interstage pre-emphasis		102/102	107/110
Recommended maximum operating level ¹⁾ (66 dB CTB/66 dB CSO)			
▪ flat	dB μ V	98/95	–
▪ with 6-dB interstage pre-emphasis		99/96	105/105
Noise factor (interstage attenuation 0/6 dB)	dB	7/6	7/6
Number of outputs		1	1
Return path			
Frequency range	MHz	5-65	5-65
Amplification (switchable between passive/active)	dB	-1/28 and can be switched off	-1/28 and can be switched off
Setting range for amplifier input attenuation (switchable with jumpers)	dB	0/10	0/10
Adjustable attenuator setting range (amplifier output)	dB	0-20	0-20
Equaliser setting range (amplifier output)	dB	0-20	0-20
Noise factor	dB	5	5
Input level density (CINR: 55 dB)	dB μ V/Hz	-6	-6
Dynamic range (input level density)	dB	19	19

Technical data

Type | Order no.		VOS 32/RA-1G 20910033	VOS 43/RA 20910030
General information			
Impedance input/output	Ω	75	75
Return loss input/output: Forwards path/return path ²⁾	dB	18/20	18/20
RF connections		F connector	F connector
Test socket output with directional coupler (5-862 MHz)	dB	-20	-20
Test socket output return path (5-65 MHz)	dB	-20	-20
Nominal input voltage	V _{AC}	230 (50/60 Hz)	230 (50/60 Hz)
Power consumption (without/with return path)	W	6	6.5/8
Mode indicator		Green LED	Green LED
Protection class		II	II
Protection class (in accordance with EN 60529)		IP 50	IP 50
Classification in accordance with KDG 1 TS 140		C(3.2)	C(4.3)
Temperature range	°C	-20 to +55	-20 to +55
Dimensions	mm	184 x 134 x 63	184 x 134 x 63
Packaging unit/weight	pc./kg	1(10)/1.7	1(10)/1.7

¹⁾ According to EN 60728-3; CENELEC channel plan 41 subcarriers; level values also apply with interstage attenuation connected ²⁾ According to EN 60728-3 (category B); starting from 40 MHz ≥ 18 dB -1.5 dB/octave

Block diagram



Accessories

ERZ 120 de-emphasis equaliser, see Page 129.

VOS 32/F 20910020



- House connection amplifiers for modern HFC networks
- Complies with: EN 60728-11, EN 50083-2 and EN 60065
- With integrated power supply unit
- Die-cast housing with F connections
- LED as mode indicator
- Gain with interstage-attenuation is switchable with jumpers (delivery condition: high gain)
- The maximum operating levels also apply with interstage attenuation connected
- Return path optional, can be fitted individually: 5-30 MHz with VGR 28/30 - 5-65 MHz with VGR 28/65 (delivery condition: without return path amplifier, with jumper plug)
- Interstage equaliser (6 dB) can be connected using jumpers (pre-emphasis)
- Integrated, adjustable attenuator and adjustable equaliser
- Test socket on output -20 dB (with directional coupler)
- Test socket on input -20 dB (can be connected with jumper) for return path levelling
- For indoor installation

Technical data

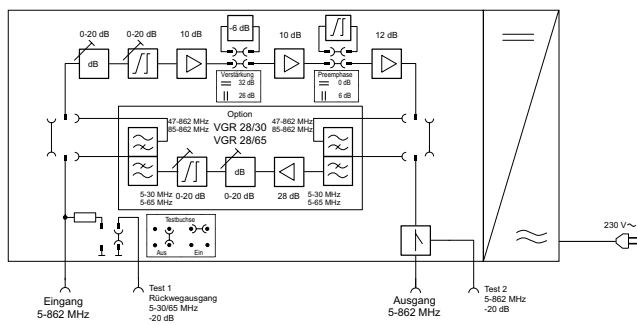
Type | Order no.		VOS 32/F 20910020
Forwards path		
Frequency range	MHz	47 (85)–862
Gain (switchable)	dB	26/32
Amplitude ripple	dB	± 1.5
Setting range for adjustable attenuator/equaliser	dB	0-20/0-20
Interstage attenuator setting range (switchable with jumpers)	dB	0/6
Interstage equaliser setting range (switchable with jumpers)	dB	0/6
Maximum operating level ¹⁾ (60 dB CTB/CSO)		
▪ flat		100/100
▪ with 6-dB interstage pre-emphasis	dB μ V	102/102
Recommended maximum operating level ¹⁾ (66 dB CTB/66 dB CSO)		
▪ flat	dB μ V	–
▪ with 6-dB interstage pre-emphasis		–
Noise factor (interstage attenuation 6/0 dB)	dB	7/6
Number of outputs		1
return path (see VGR 28/xx)		
General information		
Impedance input/output	Ω	75
Return loss input/output ²⁾	dB	14
RF connections		F connector
Test socket output with directional coupler (5-862 MHz)	dB	-20
Test socket output return path (5-65 MHz)	dB	-20
Nominal input voltage	V AC	230 (50/60 Hz)
Power consumption (without/with return path amplifier)	W	4/5
Mode indicator		Green LED
Protection class		II

Technical data

Type | Order no.		VOS 32/F 20910020
Protection class (in accordance with EN 60529)		IP 50
Classification in accordance with KDG 1 TS 140		C(3.2) with VGR 28/65 – A(3.2) without VGR 28/65
Temperature range	°C	-20 to +55
Dimensions	mm	184 x 134 x 63
Packaging unit/weight	pc./kg	1(10)/1.7

¹⁾ According to EN 60728-3; CENELEC channel plan 41 subtracks; level values also apply with interstage attenuation connected
²⁾ According to EN 60728-3 (category B); starting from 40 MHz ≥ 18 dB -1.5 dB/octave

Block diagram VOS 32/F



Accessories

VGR 28/65 de-emphasis equaliser, see Page 132.
 ERZ 120 return path amplifier, see Page 129.

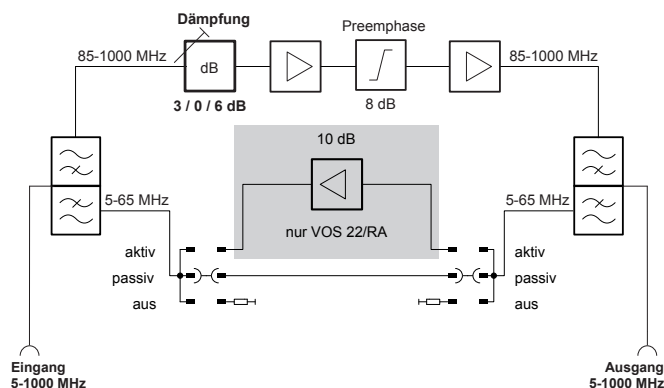
VOS 22/FR 20910024
 VOS 22/RA 20910025



- House connection amplifiers for modern HFC networks up to 1000 MHz
- Frequency-dependent amplification due to integrated interstage equaliser (pre-emphasis: 8 dB)
- Variable gain in forwards path using slide switches
- Built-in diplexers
- Die-cast housing with F connections
- LED as mode indicator
- For indoor installation

VOS 22/FR: Built-in 5-65 MHz passive return path that can be switched off (switchable with jumpers)
 VOS 22/RA: Built-in 5-65 MHz active/passive return path that can be switched off (switchable with jumpers)

Block diagram



Accessories

VGR 28/65 de-emphasis equaliser, see Page 132.
 ERZ 120 return path amplifier, see Page 129.

Technical data

Type | Order no.		VOS 22/FR 20910024	VOS 22/RA 20910025
Forwards path			
Frequency range	MHz	85-1000	85-1000
Gain	dB	14-22	14-22
Setting range for attenuation	dB	0/3/6	0/3/6
Maximum operating level ¹⁾ (60 dB CTB/CSO)			
▪ flat	dB μ V	–	–
▪ with 8-dB interstage pre-emphasis		97	97
Noise factor	dB	6	6
Number of outputs		1	1
Return path			
Frequency range	MHz	5-65	5-65
Gain (passive/active)	dB	-1/–	-1/10
Input level density (CINR: 55 dB)	dB μ V/Hz	–	-6
Dynamic range (input level density)	dB	–	30
Noise factor	dB	–	5
Max. output level 60-dB IM3/IM2	dB μ V	–	116/106
General information			
Impedance input/output	Ω	75	75
Return loss			
input/output:			
▪ Forwards path ²⁾	dB	14	14
▪ Return path		20	20
RF connections		F connector	F connector
Nominal input voltage	V AC	230 (50/60 Hz)	230 (50/60 Hz)
Power consumption	W	3	4
Protection class		II	II
Protection class (in accordance with EN 60529)		IP 30	IP 30
Temperature range	$^{\circ}$ C	-20 to +55	-20 to +55
Dimensions	mm	105 x 155 x 54	105 x 155 x 54
Packaging unit/weight	pc./kg	1(10)/0.8	1(10)/0.8

¹⁾ In accordance with EN 60728-3; CENELEC channel plan 42 carriers ²⁾ In accordance with EN 60728-3 (category C); starting from 40 MHz \geq 14 dB -1.5 dB/octave, but \geq 10 dB

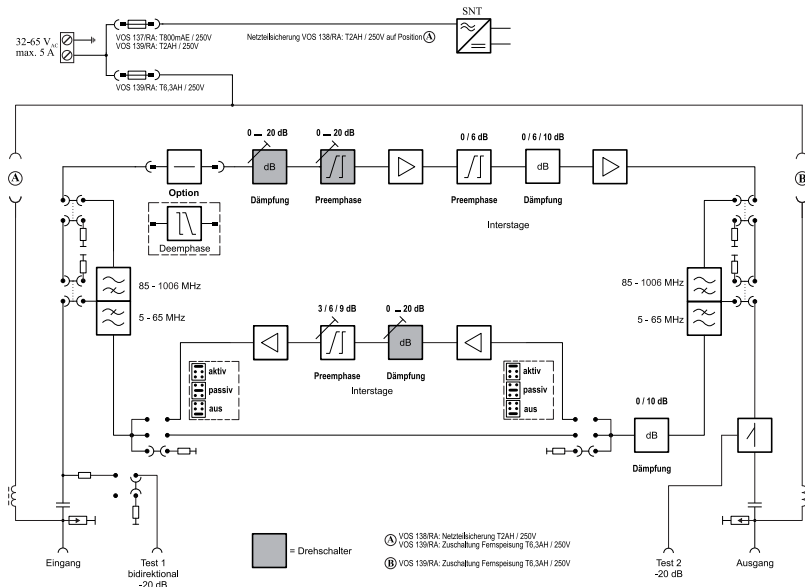
VOS 137/RA 20910027
VOS 138/RA 20910028
VOS 139/RA 20910029



- House connection amplifiers for modern HFC networks
- VOS 137/RA – locally fed
 VOS 138/RA – remotely fed via RF input (auto-supply)
 VOS 139/RA – remotely fed
- Latest GaAs-MMIC technology
- Very high output level at a favourable energy balance
- Highly efficient switched-mode power supply unit
- New innovative operational concept:
 - Easier levelling due to rotational switch, wide setting range (20 dB), small increments (1 dB)
 - Basic configuration via jumpers
 - Exactly reproducible device settings
- Insert position for additional functions in the forwards path (e.g. de-emphasis, system equaliser)
- Gain is switchable 40/34/30 dB with interstage attenuation using jumper (setting as supplied: 34 dB)
- Diplexer can be bypassed (I-band operation available with no return path)
- Classification in accordance with KDG 1 TS 140: Type D (4.4)
- Return path (active/passive/switched-off) with diverse built-in setting options
- Test sockets (F connectors):
 - Bi-directional on input (connectable)
 - With directional coupler on output
 - With directional coupler on output

- Internal LED function display
- Voltage surge conductor on input and output
- Comprehensive remote feeding concept (VOS 139/RA):
 - Remote feed current: max. 5 A
 - Remote power feed: 32–65 V~
 - Remote feed possibilities: Optionally via RF input and RF output as well as via local connection (power passing)
- Conforms to: EN 60728-11, EN 50083-2 and EN 60065
- Die-cast housing with F connections (VOS 137/RA, 138/RA) or PG 11 connections (VOS 139/RA: Cable fittings must be ordered separately, not included in delivery scope)
- For use in locations protected from weather conditions
- The amplifiers comply with the EMC directive 2004/103/EC and Low-Voltage Directive 2006/95/EC applicable at the time of shipping.

Block diagram VOS 139/RA



Technical data

Type | Order no.		VOS 137/RA 20910027	VOS 138/RA 20910028	VOS 139/RA 20910029
Forwards path				
Frequency range ¹⁾	MHz		47/85-1006	
Gain	dB		40/34/30	
Setting range for adjustable attenuator/equaliser ²⁾	dB		0-20/0-20	
Setting range for interstage attenuation	dB		0/6/10	
Setting range for interstage equalisation	dB		0/6	
Max. operating level at 862 MHz ³⁾ with 6-dB interstage pre-emphasis (60-dB CTB/CSO)	dB μ V		113/116	
Noise factor (interstage attenuation 0/6/10 dB)	dB		Typ. 6/7/7	
Number of outputs			1	
Return path				
Frequency range	MHz		5-65	
Gain				
▪ Active	dB		30	
▪ Passive	dB		-2	
Setting range input attenuation	dB		0/10	
Setting range for interstage attenuation	dB		0-20	
Setting range for interstage equalisation	dB		0/3/6	
Maximum output level				
▪ 60-dB-IMA3 (EN 50083-5)	dB μ V		116	
▪ 60-dB-IMA2 (EN 60728-3)	dB μ V		107	
Maximum output level satisfies KDG 1 TS 140 (full system load)	dB μ V		120	
Noise factor	dB		Typ. 5	
Input level density (CINR at 50 dB, EN 60728-3; 4.7)	dB μ V/Hz		-10	
Dynamic range (EN 60728-3; 4.7)	dB		17	
Test sockets				
Amplifier input (5-1006 MHz, bidirectional)	dB		-20	
Amplifier output (5-1006 MHz, with directional coupler)	dB		-20	
Switched-mode Power Supply Unit				
Nominal input voltage	V _{AC}	230 (50/60 Hz)	32-65 (50/60 Hz)	32-65 (50/60 Hz)
Typical nominal power consumption⁴⁾				
▪ Return path passive or deactivated	W	13	14	14
▪ Return path active	W	14	15	15
General information				
Impedance input/output	Ω	75	75	75
RF connections		F connector	F connector	PG 11
Test sockets		F connector	F connector	F connector
Remote feed power-capacity	A	–	–	5
Hum modulation distance (forwards path/return path)	dB	–	–	70/60
Protection class		II	–	–

Technical data

Type | Order no.		VOS 137/RA 20910027	VOS 138/RA 20910028	VOS 139/RA 20910029
Protection class (in accordance with EN 60529) ⁵⁾			IP 54	
Classification in accordance with KDG 1 TS 140			D(4.4)	
Temperature range	°C		-20 to +55	
Dimensions	mm		218 x 150 x 80	
Packaging unit/weight	pc./kg		1(10)/1.30	

¹⁾ Frequency range from 47 MHz without return path use ²⁾ Pivot point at 862 MHz ³⁾ According to EN 60728-3; CENELEC channel plan; 42 carriers ⁴⁾ VOS 138/RA and VOS 139/RA: Nominal input power as a function of the feed-in voltage when operating over the cable resistor ⁵⁾ Outdoor use only in weatherproof cabinets

> Monitorable house connection amplifiers

VOS 952-1G 24410162

VOS 953-1G 24410163



VOS 952-1G



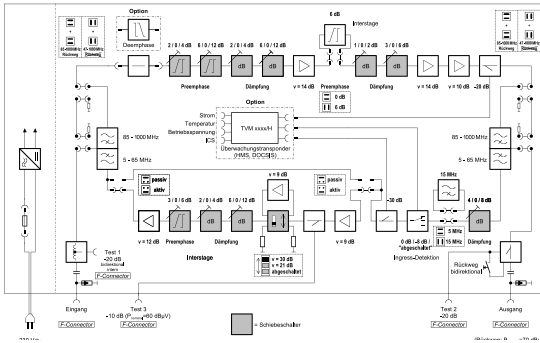
VOS 953-1G

- Monitorable house connection amplifiers for modern HFC networks
- Latest GaAs-MMIC technology
- Innovative operating concept:
 - Settings via slide switches
 - Exactly reproducible device settings
 - Fewer plug-in cards and variable attenuators required
- Very high output level with very low intermodulation products
- Built-in active and passive return path with numerous setting facilities
- Band-1 operation possible without return path
- 15-MHz high-pass filter can be activated in the return path
- Ingress Control Switch (ICS)
- Monitorable with HMS or DOCSIS (option)
- Insert position for additional functions in the forwards path (e.g. de-emphasis)
- Two-way test socket on amplifier input with inductive coupling
- Directional coupler test socket on amplifier output and in return path
- Test signals can be coupled in for the return path
- Highly efficient switched-mode power supply unit
- VOS 952-1G - locally fed, F sockets
- VOS 953-1G - remotely fed (auto-supply), F sockets
- Voltage surge conductor on all RF connections and in switched-mode power supply unit
- Die-cast housing
- Test sockets: F sockets

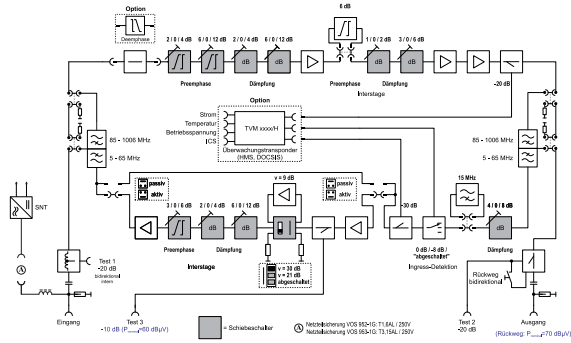
Accessories (not included in the delivery scope):

- ERZ 940 (Order No. 24510059): De-emphasis cable equivalent 7 dB, 862 MHz
- ERZ 630 (Order No. 24510108): Equaliser 47-630 MHz, switchable 2-18 dB in 2 dB steps
- ERS 800 (Order No. 24510109): System equaliser 862 MHz
- ERD 810 (Order No. 24510110): De-emphasis equaliser, switchable, 85-862 MHz: 3/6/9 dB 470-862 MHz: 0/4/8 dB
- ERD 813 (Order No. 24510117): De-emphasis equaliser 6 dB (based on 85-862 MHz) or 7 dB (based on 85-1006 MHz)
- ERD 814 (Order No. 24510120): Attenuation pad 6 dB, 1 GHz
- ERD 815 (Order No. 24510127): Attenuation pad 10 dB, 1 GHz
- TVM 850/H (Order No. 26210077): Monitoring transponder HMS (frequency agile)
- TVM 1000 (Order No. 26210086): Monitoring transponder DOCSIS

Block diagram VOS 952-1G



Block diagram VOS 953-1G



Technical data

Type | Order no.		VOS 952-1G 24410162	VOS 953-1G 24410163	Comments
		locally fed	Remotely fed	
Forwards path				
Frequency range	MHz	47/85-1006		Switchable using jumpers, 47-1006 MHz with no return path
Gain ¹⁾	dB	40-32		Interstage setting
Frequency response	dB	± 0.75		85-1006 MHz, at 25 °C
Frequency response (additional, from 862-1,006 MHz)	dB	± 0.5		At 25 °C, over slope, attenuation
Attenuation setting range in 2 dB and 1 dB steps	dB	0-16 and 0-8		On amplifier input and interstage
Pre-emphasis range can be set in 2 dB steps	dB	0-16 and 0/6		On amplifier input and interstage
Noise factor	dB	4/5/5		At 40/36/32 dB gain
Max. operating level: CENELEC channel plan ²⁾	dBµV	112/116		CTB: 60 dB/CSO: 60 dB (pre-emphasis 6 dB and gain 39.5 dB)
Max. operating level: CENELEC channel plan ²⁾	dBµV	110/114		CTB: 60 dB/CSO: 60 dB (pre-emphasis 0 dB and gain 39.5 dB)
Hum-modulation ratio	dB	-	> 60/70	
Return path				
Frequency range	MHz	5-65		
Gain, switchable	dB	30/21		
Passive path	dB	-2		
Frequency response	dB	0.5		
Attenuation range	dB	0/4/8 / 0-16		On input/interstage
Pre-emphasis range	dB	0/3 0/3/6		On input/interstage
Ingress Control Switch (ICS)	dB	0/8/> 40		Attenuated/switched off
Max. output level at 30 and 21 dB gain	dBµV	107/116		60-dB-IM2/IM3 (EN 60728-3/50083-5)
Maximum output level	dBµV	120		According to KDG 1 TS 140 (full system load)
Input level density	dBµV/Hz	-8		(CINR at 50 dB, EN 60728-3; 4.7)
Dynamic range at 30 dB gain (5-65 MHz) ³⁾	dB	> 17		
Dynamic range at 21 dB gain (5-65 MHz) ³⁾	dB	> 25		
Noise factor	dB	5		

Technical data

Type | Order no.		VOS 952-1G 24410162	VOS 953-1G 24410163	Comments
		locally fed	Remotely fed	
Network management				
Monitorable parameters		Internal supply voltage, internal current drain, temperature, ICS switch		
Test sockets				
Test socket 1 (on amplifier input)	dB	20		5-1,006 MHz two-way, internal
Test socket 2 (on amplifier output)	dB	20		5-1,006 MHz with directional coupler, external – return path signals can be fed in (5-65 MHz); if push-button is kept pressed, the incoming return path signal can be measured
Test socket 3 (in return path)	dB	10		5-65 MHz with directional coupler, external
Switched-mode Power Supply Unit				
Nominal input voltage	VAC	110-230	38-65	
Nominal mains frequency	Hz	50-60	50-60	
Power consumption	W	11	12	Return path amplifier active/without monitoring
General information				
Ambient temperature range	°C	-20 to +55		
RF connections / test sockets		F socket/F socket		
Housing protection class (in accordance with EN 60529)		IP 54		IP 54: Outdoor use in weather-proof cabinet
Dimensions (W x H x D)	mm	225 x 55 x 155		
Packaging unit/weight	pc./kg	1/1.8		

¹⁾ Adjustable with two slide switches in 1-dB steps ²⁾ CENELEC: 42 channels ³⁾ With connected 15-MHz high-pass filter, the dynamical range increases by 3 dB

> PG 11 connection technology

EMP 34 275289

EMP 35 275300



Adapters:

- EMP 34 (order no. 275289): PG 11 to IEC connector (f) with M14 male thread
- EMP 35 (order no. 275300): PG 11 to F socket (female)

> De-emphasis equaliser/attenuators

ERD 810 24510110

- Cable simulation switchable:
 - Cable equivalent de-emphasis 85-862 MHz: switchable 3, 6 and 9 dB
 - KDG de-emphasis 470–862 MHz: switchable 0, 4 and 8 dB
- Both de-emphases can be used in combination
- Suitable for: VOS 95x-1G, VGF/VGO 939-1G, VGP 90xx, VGP 92xx, ORA 920, ORA 921, ORA 9022-1G, ORA 9222-1G (VOS 95x, VGF/VGO 939, ORA 9022)



Technical data

Type | Order no.		ERD 810 24510110
Transmission range	MHz	85-862
Nominal impedance	Ω	75
De-emphasis, 85-862 MHz, fixed	dB	3
KDG de-emphasis, 470-862 MHz, switchable	dB	0/4/8
Cable equivalent de-emphasis 85-862 MHz switchable	dB	3/6/9
Basic loss (at 85 MHz)	dB	0.5

ERD 813 24510117

ERD 814 24510120

ERD 815 24510127



ERD 813



ERD 814

Equaliser and attenuators for application in compact amplifiers and compact fibre nodes.

Available types:

- ERD 813: Cable-equivalent de-emphasis: 7 dB ¹⁾
- ERD 814: 6 dB attenuation ¹⁾
- ERD 815: 10 dB attenuation ¹⁾
- Suitable for: VOS 95x-1G, VGF/VGO 939-1G, VGP 90xx, VGP 92xx, ORA 920, ORA 921, ORA 9022-1G, ORA 9222-1G (VOS 95x, VGF/VGO 939, ORA 9022)

Technical data

Type | Order no.		ERD 813 24510117	ERD 814 24510120	ERD 815 24510127
Transmission range	MHz	85-1006	85-1006	85-1006
Nominal impedance	Ω	75	75	75
Attenuation (linear)	dB	1	6	10
Tap attenuation E → A2 @ 85 MHz		–	–	–
De-emphasis (862 MHz)	dB	7	–	–
De-emphasis (1 GHz)	dB	8	–	–
Return loss	dB	20–1.5/octave	20–1.5/octave	25

¹⁾ Based on 85-862 MHz

ERZ 940 24510059

7 dB de-emphasis equaliser for VOS 95x

- Cable simulation 7 dB

**Technical data**

Type | Order no.		ERZ 940 24510059
Transmission range	MHz	47-862
Nominal impedance	Ω	75
De-emphasis	dB	7 ± 1
Basic loss (at 47 MHz)	dB	0.3
Return loss	dB	20-3

> Monitoring transp. HMS protocol

TVM 850/H 26210077

The TVM 850/H return path amplifier is situated inside of an amplifier or fibre node and can be integrated into existing cable modem management systems via SNMP. The TVM 850/H functions on its own frequencies outside of basic channels. All parameters of HMS-compatible monitoring systems can be displayed, switched or monitored:

- Operational voltage
- Internal temperature
- Operation of ICS switches

Additional functions in the fibre node:

- Switching of return path matrix
- Attenuation for return path transmitter
- Fibre identification on/off

- Optical input levels
- Optical output levels
- Switching to second receiver
- Monitoring transponder for compact and house connection amplifiers and optical compact receivers (see table)
- Monitoring of various parameters such as voltage, current consumption, internal temperature, etc.
- Control of the ingress control switch in devices that are equipped with this facility
- Transmission in the HMS protocol
- Frequency-agile in range 5-42 MHz

Technical data

Type | Order no.		TVM 850/H 26210077
Input frequency range	MHz	75-90.5
Input level range	dBμV	50-95
Output frequency range	MHz	5-42
Max. output level	dBμV	105
Power consumption	W	1
Transmission protocol		HMS
Suitable for device type		VGO 939-1G, VGF 939-1G, VOS 952-1G, VOS 953-1G, ORA 9222-1G, ORA 9022-1G, ORA 920/921, VGP 9033-1G, VGP 9041 as from A02 (Nov. 2008), VGF 9030/9040, VGP 9236-1G, VGP 9240

> Monitoring transp. DOCSIS/EuroDOCSIS 2.0

TVM 1000 26210086

The TVM 1000 frequency-agile DOCSIS/EuroDOCSIS transponder functions as a normal cable modem within an amplifier or fibre node and can be integrated into existing cable modem management systems through SNMP. No additional frequency bands are utilised, neither for downstream nor upstream. The additional data volume through the TVM 1000 is very low. All parameters of HMS-compatible monitoring systems can be displayed, switched or monitored:

- Operational voltage
- Internal temperature
- Operation of ICS switches

Additional functions in the ORA 9022-1G and ORA 9222-1G fibre

node:

- Switching of return path matrix
- Attenuation for return path transmitter
- Fibre identification on/off
- Optical input levels
- Optical output levels
- Switching to second receiver

Additional (Euro) DOCSIS 2.0 features for monitoring

- Monitoring transponder for compact and house connection amplifiers and optical compact receivers (see table)
- Monitoring of various parameters such as voltage, current consumption, internal temperature, etc.
- Frequency-agile in range 5–65 MHz and 90–862 MHz
- Control of the ingress control switch in devices that are



purposes: S/N measurement by carrier

- Analysis of the return path attenuation
- Packet error analysis
- Encrypted data transmission
- Display of the transponder status information
- Local access via web browser
- Ethernet connection from the transponder to the head-end for service purposes

equipped with this facility

- Transmission within DOCSIS or EuroDOCSIS protocol
- 10/100 BaseT-RJ 45 interface to headend for service purposes

Technical data

Type | Order no.		TVM 1000 26210086
Input frequency range	MHz	90-862
Input level range	dBµV	48-78
Output frequency range	MHz	5-65
Max. output level	dBµV	113-118
Power consumption	W	3.5
Transmission protocol		DOCSIS/EuroDOCSIS 2.0
Suitable for device type		VGO 939-1G, VGF 939-1G, VOS 952-1G, VOS 953-1G, ORA 9222-1G, ORA 9022-1G, ORA 920/921, VGP 9033-1G, VGP 9041 as from A02 (Nov. 2008), VGF 9030/9040, VGP 9236-1G, VGP 9240

> Return path amplifiers/passive return path card

VGR 122 232202

VGR 132 232205



- Suitable for the VOS 135/G, VOS 135/P and VOS 136/G house connection amplifiers
- Please order separately (not included in the delivery scope of VOS 13x/x)
- Variable equaliser (0-20 dB) and adjustable attenuator (0-20 dB, delivery status: max. attenuation) for return path amplifier at the output
- Temperature range: -20 to +55 °C
- Packaging unit/weight (pc./kg): 1(10)/0.02

Technical data

Type | Order no.	Frequency range Gain (MHz/dB)		Max. output level/setting range (dB μ V)	Input level density (dB μ V/Hz)	Dynamic range (input level density) (dB)	Feed voltage/ power consumption (V/ mA)
	5-30	30-65	60-dB-IM2/IM3			
VGR 122 | 232202	22		108/117	Typ. -6 ¹⁾	Typ. 21	+13 bis +15/ 60-70
VGR 132 | 232205	32		108/117	Typ. -10 ²⁾	Typ. 17	+13 to +15/ 60-80

¹⁾ For CINR 55 dB (in accordance with EN 60728-3, point 4.7) ²⁾ For CINR 50 dB (in accordance with EN 60728-3, point 4.7)

VGR 28/65 20910009



- Suitable for the VOS 30/F, VOS 32/F, VOS 40/F and VOS 40/P house connection amplifiers
- Please order separately (not included in the delivery scope of VOS 30/F, VOS 32/F, VOS 40/F and VOS 40/P)
- Variable equaliser and adjustable attenuator (delivery status: max. attenuation) at the output
- Ambient temperature range: -20 to +55 °C

Technical data

Type | Order no.		VGR 28/65 20910009
Frequency range	MHz	5-65
Gain	dB	28
Adjustable attenuator setting range (amplifier output)	dB	0-20
Equaliser setting range (amplifier output)	dB	0-20
Input level density (CINR: 55 dB)	dB μ V/Hz	-6
Dynamic range (input level density)	dB	19
Max. output level 60-dB IM2/IM3	dB μ V	112/118
Noise factor	dB	5
Dimensions (W x H x D)	mm	130x17x38
Packaging unit/weight	pc./kg	1(10)/0.08

> Return path filters

WFS 130 222262

WFS 166 20910010



- Suitable for the VOS 135/G, VOS 135/P and VOS 136/G house connection amplifiers
- Consists of two filter boards, complete for input and output
- Please order separately (not included in the delivery scope of VOS 13x/x)
- Packaging unit/weight (pc./kg): 1(10)/0.03

Technical data

Type | Order no.		Frequency range (MHz)			
		Return path 5-30	Return path 30-65	Forwards path 47-85	Forwards path 85-862
WFS 130 | 222262	Through loss (dB)	0.5		0.5	
WFS 166 | 20910010	Through loss (dB)		0.5		0.5

> Interstage equaliser filter

ERT 907 273696

- Suitable for the VOS 135/G, VOS 135/P and VOS 136/G house connection amplifiers
- Please order separately (not included in the delivery scope of VOS 13x/x)
- Frequency range: 47-862 MHz
- Packaging unit/weight (pc./kg): 1(100)/0.06



Technical data

Type | Order no.	ERT 907 273696
Equaliser value	7 dB

> Remote feed transformer

TVF 20 236678

- For remote supply of house connection amplifiers e.g. VOS 136/G, VOS 139/RA
- Overload protection and short-circuit protection by means of an automatic safety temperature switch and a fuse on the output circuit
- Protection class: IP 20
- Conforms to: EN 60065 and EN 61558, protection category
- Temperature range: -20 to +55 °C
- For fixed indoor installation



Technical data

Type | Order no.		TVF 20 236678
Voltage secondary	V	50 V~
Max. current	A	0-2
Nominal voltage primary	V	230 ± 10 %, 50-60 Hz
Current consumption typ.	W	113
Connections		Clamp
Dimensions	mm	166 x 77 x 76
Packaging unit/weight	pc./kg	1/2.3

Optical Satellite Splitter

➤ General information	136
➤ Optical Transmitter	137
➤ Optical receivers	139
➤ Optical patch cables and optical coupler	140
➤ Optical attenuators	140
➤ Optical cleaning set, cleaning tool	141
➤ Optical splitters	141
➤ Optical taps	142
➤ Optical termination	142
➤ Fibre management box	143
➤ Feed-in diplexer	144

General information

The main advantages in using an optical Sat IF distribution system lie in the very low distribution losses and otherwise in only using one very thin fibre-optic cable to distribute all four satellite polarities. The dependence on the price of copper and the difficulties in laying four relatively thick and heavy coaxial cables are thus surmounted. The particular charm of the CLIK! system lies specifically in the ease of handling such thin cables and in the design of the connectors used – very narrow and fitted with a slide-guided connector. CLIK! The audible connector engagement into the output port is an immediate confirmation that a perfect connection has been made. The Clk! system is a completely planned-through distribution system encompassing the transmitter, the miniaturised distribution components and the optical receiver. The fibre-optic cables are fitted with cablepull eyelets, so that cable laying through cable conduits is an extremely simple task. The slim-designed distribution material can be either on-wall screw fixed or installed discretely in a fibre management box. Up to five meters of fibre surplus length can be handled in a fibre management box.

As the system design utilises an optical transmitter, standard

universal quatro feed systems can be used. Systems can also be extended by cascading optical transmitters. The optical transmitter is fitted with AGC (Automatic Gain Control). As standard LNBS can be used with the CLIK! system, satellite antennas can be aligned as beforehand using standard Sat-IF receivers. The acquisition of new meters is not mandatory. The miniature connector design is used on all components in the system from the transmitter through all distribution components to the final optical receiver. Ensuring full ease of installation throughout the installation.

The high optical "link budget" allows one to simply and economically plan and install larger Sat-IF systems in larger tower blocks and in blocks of flats over longer distances. Terrestrial signals can also be fed into the system and distributed. Since one is using optical fibres (no metal screening is involved), the question of potential differences (i.e. Between buildings) is not relevant any more. The use of additional amplifiers is not necessary and this results in both an economic and an energy-saving effect.

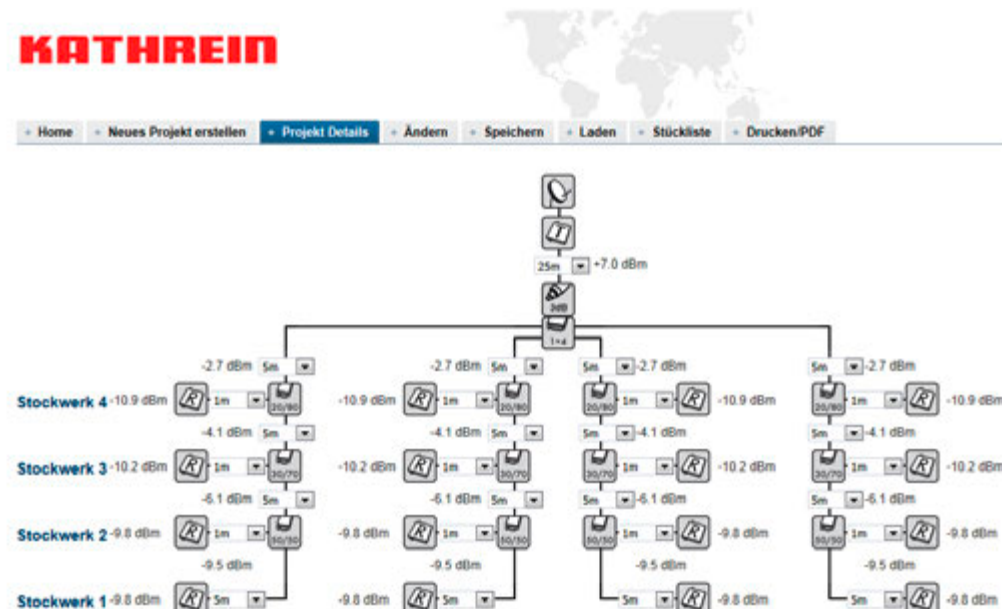
Calculation tool

Kathrein's optical satellite distribution products are the perfect solution for TV/radio reception in large distribution systems, such as residential complexes, high-rise buildings, underground garages etc.

With the "CLIKulator", a sophisticated calculation tool, the planning of optical satellite distribution systems is now even easier and can be performed with just a few clicks of the mouse.

- Scalable optical Sat distribution system consisting of optical transmitters, harmonised optical receivers and all necessary passive distribution components
- Easy installation due to miniaturised design
- Quick and easy creation of own projects with a complete installation scheme and parts list

The "CLIKulator" can be found at: <http://clikulator.com/kathrein>



> Optical Transmitter

OSC 100 20510068



- Standard universal quatro LNB (UAS 584) for installation and alignment of the sat antenna
- Easy system planning using the "CLIKulator". Address: <http://clikulator.com/kathrein>
- Transmission of the entire digital terrestrial frequency range incl. FM
- AGC (no adjustment required)
- Premium optical CLIK! connector
- Optical budget up to 21 dB
- For indoor installation

Technical data

Type | Order no.			OSC 100 20510068
RF inputs			5 (4 x Sat and 1 x digital terrestrial)
RF outputs			7 (4 Sat, 1 x digital terrestrial and 2 x test)
Optical output			CLIK!
Satellite inputs			
Bandwidth	MHz		950–2150
Connector type			F socket
Return loss	dB		Typ. 10
Insertion loss trunk	dB		Typ. 2
RF input level ¹⁾	dB μ V		69-86
Terrestrial input			
Bandwidth	MHz		87.5-862
Connector type			F socket
Return loss	dB		Typ. 10
Total input level ²⁾	dB μ V		Max. 90
Test outputs			
Bandwidth	MHz		87.5–862/1100–2150 (HH polarity)
Connector type			F socket
Return loss	dB		Typ. 10
HF output level ³⁾	dB μ V		Typ. 59 digital TV and Sat (H/H)
Optical output			
Connector type			CLIK!
Wavelength	nm		1310
Optical output power	dBm		Typ. +7
Return loss	dB		Min. 45
Protection class			1M

Technical data

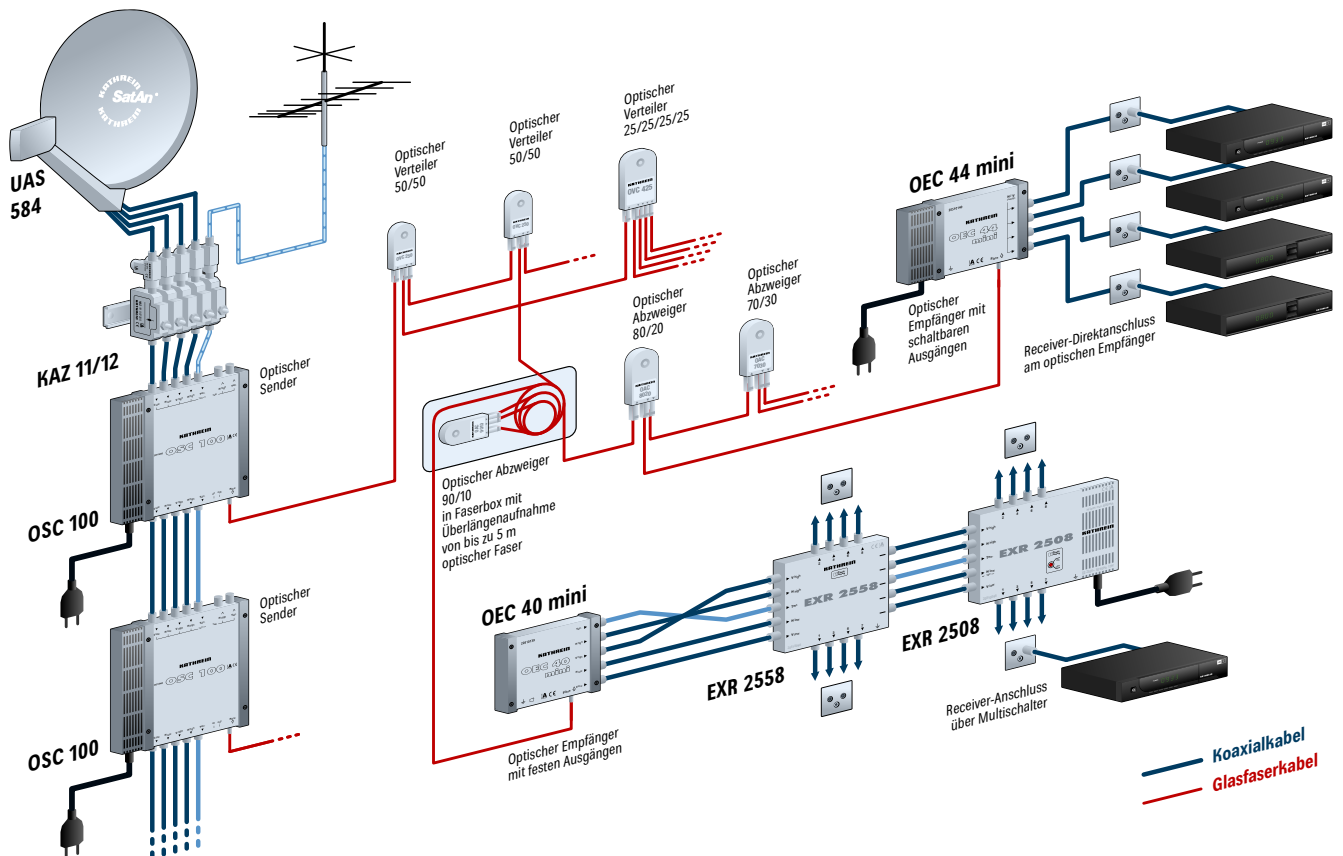
Type | Order no.		OSC 100 20510068
Main features		
Supply voltage	V~/Hz	220-240/50-60
Power consumption	W	Typ. 15
LNB remote feeding	mA	200 @ 14 V (4 satellite connections)
Operating temperature	°C	-5 to +45
AGC RF level dynamics	dB	20
LED information		Mode indicator: Green LED, overloading laser: Red LED
Dimensions (W x H x D)	mm	241 x 238 x 50
Packaging unit/weight	pc./kg	1/1.875

¹⁾ Level per transponder

²⁾ The minimum input level is 74 dBµV per TV channel. This results in the maximum number of 40 digital TV channels in combination with the maximum total input level

³⁾ Level for TV with respect to the channel, for Sat with respect to the transponder

Connection example



> Optical receivers

OEC 40 mini 20510139

OEC 44 mini 20510140

CE CLIK!

- Premium optical CLIK! connector
- Easy system planning using the “CLIKulator”. Address: <http://clikulator.com/kathrein>
- Transmission of the entire terrestrial frequency range
- For indoor installation

Variants:

- OEC 40 mini:
Optical receiver quatro (fixed outputs)
- OEC 44 mini:
Optical receiver quad (switchable outputs)



Technical data

Type | Order no.		OEC 40 mini 20510139	OEC 44 mini 20510140
Optical input		CLIK!	CLIK!
RF outputs		4 x Sat-IF and 1 x terrestrial	4 x Sat-IF and 1 x terrestrial
Optical input			
Optical connector		CLIK!	CLIK!
Wavelength	nm	1310	1310
Optical return loss	dB	> 45	> 45
Optical power (min - max)	dBm	-8 to -14	-8 to -14
RF outputs			
Bandwidth	MHz	87-862/950-2150	88-862/950-2150
Connector type		F socket	F socket
Return loss	dB	Typ. 10	Typ. 10
RF total output level @optical -21 dB	dBμV	Typ. 82 (Digital-TV); typ. 88 (Sat)	Typ. 77 (Digital-TV); typ. 80 (Sat)
Output SAT control		–	14/18 V, 0/22 kHz
Main features			
Power supply voltage	V/Hz	–	220-240/50-60
Operational voltage	V (DC) /mA	14/380; 18/330 (all outputs)	–
Power consumption	W	3.3	5
Operating temperature	°C	-5 to +45	-5 to +45
LED information		On: Green LED	On: Green LED
Dimensions (W x H x D)	mm	160 x 140 x 50	210 x 140 x 50
Packaging unit/weight	pc./kg	1/0.317	1/0.554

> Optical patch cables and optical coupler

OCC 1	20510076
OCC 4	20510077
OCC 5	20510078
OCC 10	20510079
OCC 15	20510080
OCC 25	20510081



OCC 50	20510082
OCC 100	20510083
ODC 2	20510084



- Easy-to-use CLIK! plug connections
- Miniaturised, space-saving design (diameter: < 5 mm); fits in any cable duct
- Pre-assembled patch cable for the simplest installation possible
- Robust push-pull connectors for quick and reliable installation
- Single-mode glass fibre with low bending radius as per ITU-T G.657 A2
- Best mechanical environmental behaviour
- LSFH coating (low-smoke, free of halogen)
- Blind plug insertion with slide-in guide; eases installation in narrow work areas
- Cable-pull eyelet

Technical data

Type		OCC 1	OCC 4	OCC 5	OCC 10	OCC 15	OCC 25	OCC 50	OCC 100	ODC 2
Order no. 2051....		....0076	....0077	....0078	....0079	....0080	....0081	....0082	....0083	....0084
Insertion loss at 1,310 nm	dB	Typ. 0.4	Typ. 0.4	Typ. 0.4	Typ. 0.4	Typ. 0.4	Typ. 0.4	Typ. 0.4	Typ. 0.4	Max. 0.1
Return loss	dB	Min. 45	Min. 45	Min. 45	Min. 45	Min. 45	Min. 45	Min. 45	Min. 45	–
Length	m	1	4	5	10	15	25	50	100	–
Packaging unit/weight	pc./kg	1 (100)/0.009	1 (100)/0.036	1 (100)/0.045	1 (100)/0.090	1 (80)/0.135	1 (50)/0.225	1 (30)/0.450	1 (20)/0.900	1/0.01

> Optical attenuators

ODC 3	20510086
ODC 6	20510087
ODC 10	20510088



- To adjust the optical budget
- For indoor installation

Technical data

Type | Order no.		ODC 3 20510086	ODC 6 20510087	ODC 10 20510088
Operational wave lengths	nm	1260-1650	1260-1650	1260-1650
Insertion loss	dB	Typ. 3	Typ. 6	Typ. 10
Return loss	dB	Min. 50		
Operating temperature range	°C	-20 to +70		
Dimensions	mm	26.8 x 6.95 x 9.3		
Packaging unit/weight	pc./kg	1(10)/0.01		

> Optical cleaning set, cleaning tool

ORS 1 20510089

ORW 1 20510090



ORW 1

- If handled appropriately, CLIK! products do not require cleaning prior to the first connection. However, in some cases it may be necessary to clean the connector interfaces. Special cleaning products have been developed for this purpose, allowing extremely easy and safe cleaning.
- ORS 1 - Fibre optic cleaning set:
Bag, QbE cleaning system, MX cleaning pen, fibre optic cleaning swabs
- ORW 1 - Optical cleaning tool:
Cleaning tool for CLIK! splitters and taps, etc.



ORS 1

> Optical splitters

OVC 250 20510071

OVC 425 20510072



OVC 250



OVC 425

- Easy-to-use CLIK! plug connections
- Wavelengths: 1,310 and 1,550 nm
- Bandwidth: ± 40 nm
- Compact dimensions due to mini-couplers
- Low polarisation sensitivity
- High degree of stability and reliability
- Outstanding mechanical and environmental behaviour
- Single-mode
- For indoor installation

Technical data

Type | Order no.		2-way	4-way
		OVC 250 20510071	OVC 425 20510072
Operational wave lengths	nm	1310 and 1550	1310 and 1550
Operating bandwidth	nm	± 40	± 40
Splitting ratio	%	50: 50	25: 25: 25: 25
Insertion loss	dB	Typ. 3.6	Typ. 6.8
Return loss	dB	Min. 55	Min. 50
Directivity	dB	Min. 55	Min. 55
Operating temperature	°C	-40 to +85	-40 to +85
Dimensions	mm	78 x 30 x 15	93 x 42.5 x 15
Packaging unit/weight	pc./kg	1(50)/0.020	1(40)/0.035

> Optical taps

OAC 7030 20510073

OAC 8020 20510074

OAC 9010 20510075

CE CLIK!



OAC 7030



OAC 8020



OAC 9010

- Easy-to-use CLIK! plug connections
- Wavelengths: 1,310 and 1,550 nm
- Bandwidth: ± 40 nm
- Compact dimensions due to mini-couplers
- Low polarisation sensitivity
- High degree of stability and reliability
- Outstanding mechanical and environmental behaviour
- Single-mode

Technical data

Type | Order no.		Taps, 1-way		
		OAC 7030 20510073	OAC 8020 20510074	OAC 9010 20510075
Operational wave lengths	nm	1310 and 1550	1310 and 1550	1310 and 1550
Operating bandwidth	nm	± 40	± 40	± 40
Splitting ratio	%	70: 30	80: 20	90: 10
Trunk/tap loss	dB	Typ. 2.1/typ. 6.0	Typ. 1.4/typ. 8.0	Typ. 0.9/typ. 10.8
Return loss	dB	Min. 55		
Directivity	dB	Min. 55		
Operating temperature	°C	-40 to +85		
Dimensions	mm	78 x 30 x 15		
Packaging unit/weight	pc./kg	1(50)/0.020		

> Optical termination

OTC 1 20510092

CE CLIK!



- To terminate unused optical outputs on
e.g. optical splitters or taps
- For indoor installation

Technical data

Type | Order no.		OTC 1 20510092
Operational wave lengths	nm	1250-1650
Return loss	dB	Min. 50
Temperature range	°C	-40 to +85
Dimensions	mm	24.75 x 4.7 x 4.7
Packaging unit/weight	pc./kg	1(10)/0.01

> Fibre management box

OFB 5 20510085

- Unique design
- Position for CLIK! distributor, tap, up to 5 m cable
- Wall mounting with M4 screws
- Access protection with adhesive tape
- Cable inputs and outputs on each side
- For indoor installation



Technical data

Type | Order no.		OFB 5 20510085
Colour		White (RAL 9003)
Windable length	m	Max. 5
Dimensions	mm	190 x 87 x 21
Packaging unit/weight	pc./kg	1/0.059

> Feed-in diplexer

WFS 55 21210028



- To operate a multi-switch cascade on an existing OEC 44 optical receiver
- For operation of a multi-switch on a universal quad LNB
- For supplying an active DVB-T antenna with supply voltage from a multi-switch
- 5-way feed-in diplexer with F connections
- For indoor installation
- From 18 V on "horizontal low" input it generates:
 - 14 volt at the output "vertical low"
 - 18 volt at the output "horizontal low"
 - 14 volt at 22 kHz at the output "vertical high"
 - 18 volt at 22 kHz at the output "horizontal high"
 - 5 volt at the input "terrestrial"

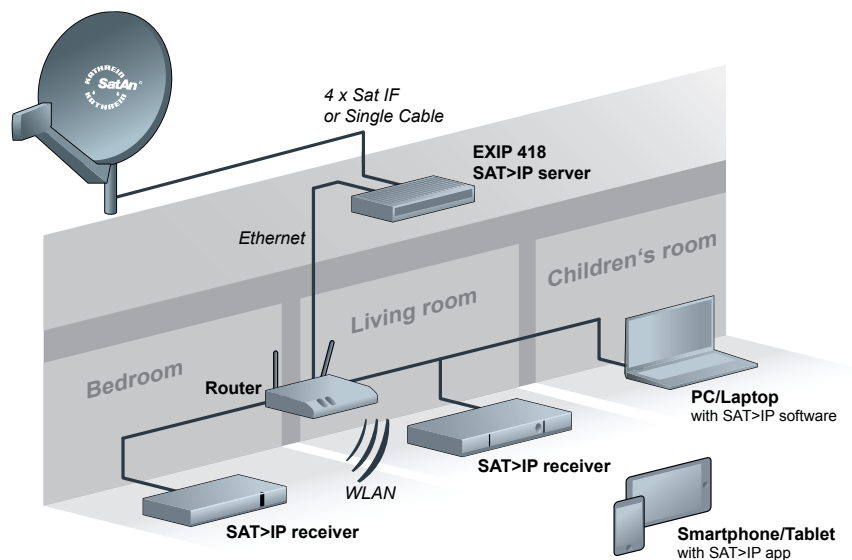
Technical data

Type | Order no.		WFS 55 21210028
Frequency range terrestrial / satellite	MHz	5-862/950-2150
Remote power feed Sat DC	V	"Vertical low" and "Vertical high": 14 "Horizontal low" and "Horizontal high": 18
Beat frequency	kHz	"Vertical high": 22 – "Horizontal high": 22
Remote power feed terrestrial DC	V	5
Remote feed current Sat	mA	Max. "Vertical low" and "Vertical high": 200 "Horizontal low": 1000 – "Horizontal high": 500
Remote feed current terrestrial	mA	Typ. 50/max. 80
Nominal impedance	Ω	75
through loss terrestrial/sat	dB	Typ. 0.4/typ. 0.4
Connections		F connectors
Temperature range	°C	-20 to +55
Dimensions	mm	117 x 35 x 23
Packaging unit/weight	pc./kg	1(10)/0.2

Sat>IP

➤	General information	146
➤	Sat>IP server	147
➤	Connection examples	148

> General information



What is SAT>IP?

SAT>IP is a communication protocol for the reception and distribution of satellite signals. It virtually “translates” satellite TV signals (DVB-S and DVB-S2) for their use on Internet-based end-user devices in the field of IP. It allows an entire household linked to a satellite reception antenna to view TV channels on tablet PCs, PCs, laptops, smartphones, connected TVs, game consoles and media players. Viewers can thereby enjoy top-quality satellite TV even on devices that are not equipped with their own tuners. Satellite signals can be transported over any IP infrastructure, with or without cable. This technology also substantially simplifies the distribution of satellite signals to multiple TV sets.

How does SAT>IP work?

SAT>IP is an IP-based architecture for the reception and distribution of satellite signals. Traditional satellite receivers (DVB-S) only translate signals into frequencies before they are forwarded over coaxial cable. Satellite receivers are required to receive and demodulate satellite signals. In SAT>IP technology, DVB-S/ DVB-S2 signals are directly demodulated and converted to IP at the reception point in a SAT>IP server. This can take place directly in the antenna, (IP-LNB), directly after it in the distribution line (SAT>IP multi-switch or converter) or in a master set-top box. Essentially, the SAT>IP server replaces the DVB-S/ DVB-S2 layer with an IP transport layer. Following conversion, satellite programmes can be transported to SAT>IP clients over a router and different IP networks (e.g. WLAN, Ethernet, Power Line, fibre-optic cable or K-LAN), just like conventional IPTV signals are. This allows simultaneous transmission of up to four TV channels to different end-user devices. In a SAT>IP environment, each IP device is automatically suitable for the

reception of satellite signals as soon as it has the required software, whether tablets, PCs, laptops, smartphones, Connected TVs, game consoles, media players, or IP STBs. Many only require a software update or app to become SAT>IP-capable.

Smart TVs, Blu-ray players and some consoles can receive IP signals mostly directly, i.e. without an additional client, as long as the Sat>IP server has a DNLA function. SAT>IP distinguishes between servers and clients. The new, open, manufacturer-independent protocol ensures that SAT>IP clients can communicate with SAT>IP servers.

What are the advantages for viewers?

The advantages for viewers are plain to see. TV viewers are able to watch TV channels on different end-user devices and screens in the usual high quality offered by satellite TV without media disruption or additional cabling and without having to use an Internet connection. On many of these units, one could either not watch this live content or only view it in poor quality. Furthermore, use of IP networks would result in high additional expenses.

What does SAT>IP cost viewers?

Besides costs for hardware and software (clients), there are no additional costs. SAT>IP is merely a new standard for the distribution of satellite signals to IP devices. No fees are charged for the transmission of linear free-TV channels to the IP network. All free-to-air channels stay free to air. Pay-TV channels can also be transmitted to the home network over SAT>IP. All TV providers are free to draw up special offers.

> Sat>IP server

EXIP 418 20510148

EXIP 4124 20510136



The OSC 418 and EXIP 4124 SAT>IP servers convert satellite-delivered TV signals (DVB-S and DVB-S2) towards IP so that they can be used on Internet-based end devices.

This allows top-quality satellite TV even on devices that are not equipped with their own tuners (e.g. tablets, PCs, etc.). Satellite signals can be transported over any IP infrastructure, with or without cable.

- Supports SAT>IP protocol
- Conforms to the SAT>IP standard in accordance with EN 50585
- Streams DVB-S/S2 (HDTV) signals in an IP data stream
- Can be fed into different network types: LAN (also K-LAN, Powerline), WLAN integration via router (e.g. FRITZ!Box)
- 8 (EXIP 418) or 24 (EXIP 4124) independent tuner for each data stream
- Web interface for configuration, administration and import of software updates
- Status display via LED
- Can be configured for different clients ¹⁾: tablet PCs, smartphones, notebooks, SAT>IP-capable receivers

¹⁾ Provided the required software/app is installed on the device

- On/Off switch
- Can be operated on different types of LNBs, multi-switches and single-cable multi-switches
- Supports standard switching signals: 14/18 V, 22 kHz, single-cable in accordance with EN 50607
- Four (EXIP 418) or two (EXIP 4124) satellite inputs; one Ethernet RJ 45 connector
- High screening factor prevents interference
- For horizontal installation (e.g. like receivers) or on-wall installation with the supplied mounting support
- For indoor installation
- Certified by SES ASTRA

Scope of supply:

- EXIP 418 or EXIP 4124
- High-efficiency plug-in power supply unit for voltage supply
- Support for wall mounting



Rear panel EXIP 418



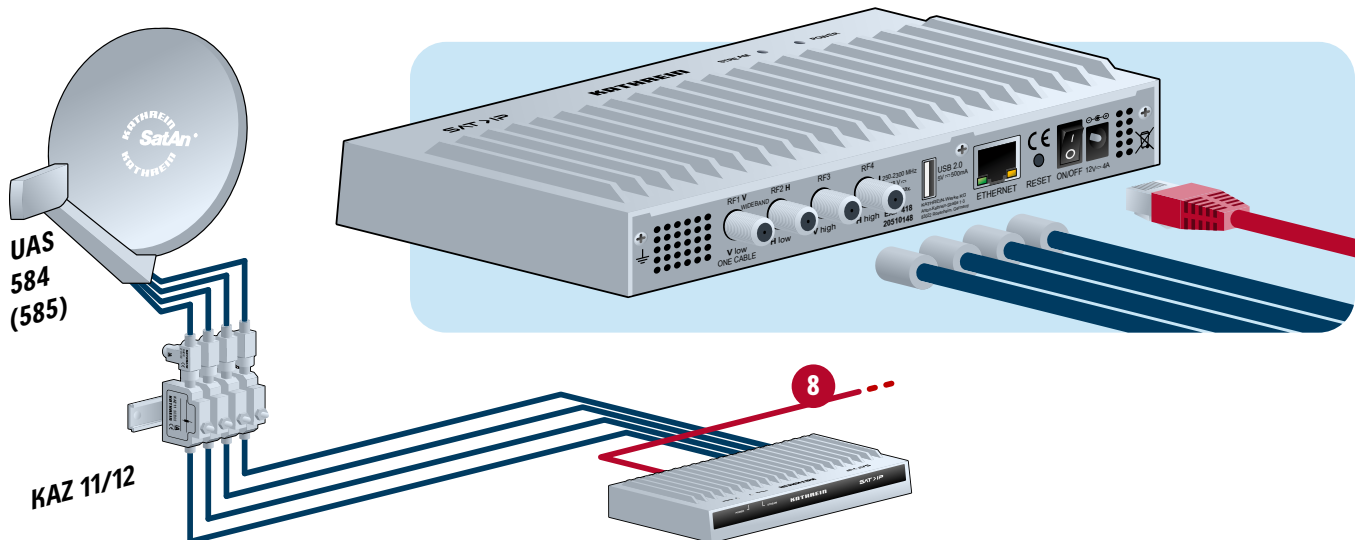
Rear panel EXIP 4124

Technical data

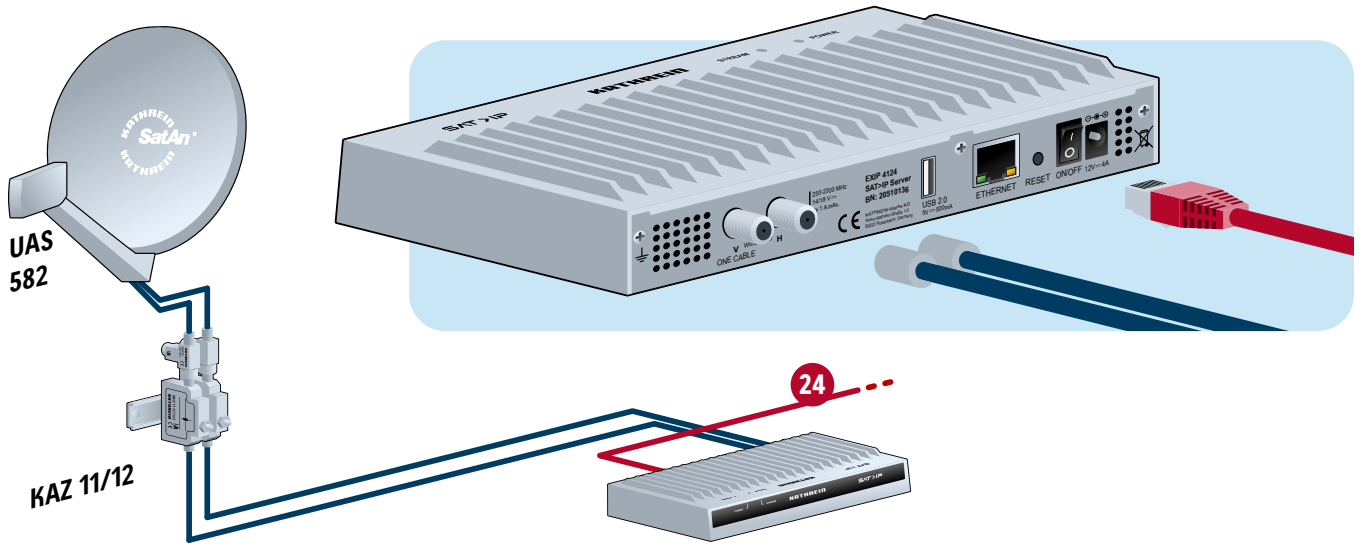
Type | Order no.		EXIP 418 20510148	EXIP 4124 20510136
Inputs		4 x Sat	2 x Sat
Subscriber connections		1 x 8	1 x 24
Frequency range	MHz	250-2300	
Input level range	dBµV	42-87	
Impedance	Ω	75	
Screening factor	dB	5-300 MHz > 85; 300-470 MHz > 80 470-1000 MHz > 75; 1000-2400 MHz > 55	
Permissible remote power feed input	V	12-20	
Max. allowable remote feed current	mA	RF1: 1000; RF2 - RF4: 800	2 x 1000
Output voltage horizontal	V	> 17.5 (at 400 mA)/< 19 (at 0 mA)	
Output voltage vertical	V	> 12.5 (at 400 mA)/< 14 (at 0 mA)	
Power consumption of server	W	Typ. 9	Typ. 12
Ambient temperature range	°C	0 to +40	
Connections		4x F connector, RJ 45, USB, DC socket 5.5 x 2.5 mm	
Dimensions (W x H x D)	mm	222 x 138 x 43	
Packaging unit/weight	pc./kg	1 (4)/ca. 0.75	1 (4)/ca. 0.72
Power supply unit			
Nominal input voltage	V	230	
Voltage secondary	V	12	
Max. output current	A	4	
In compliance with		EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013	

> Connection examples

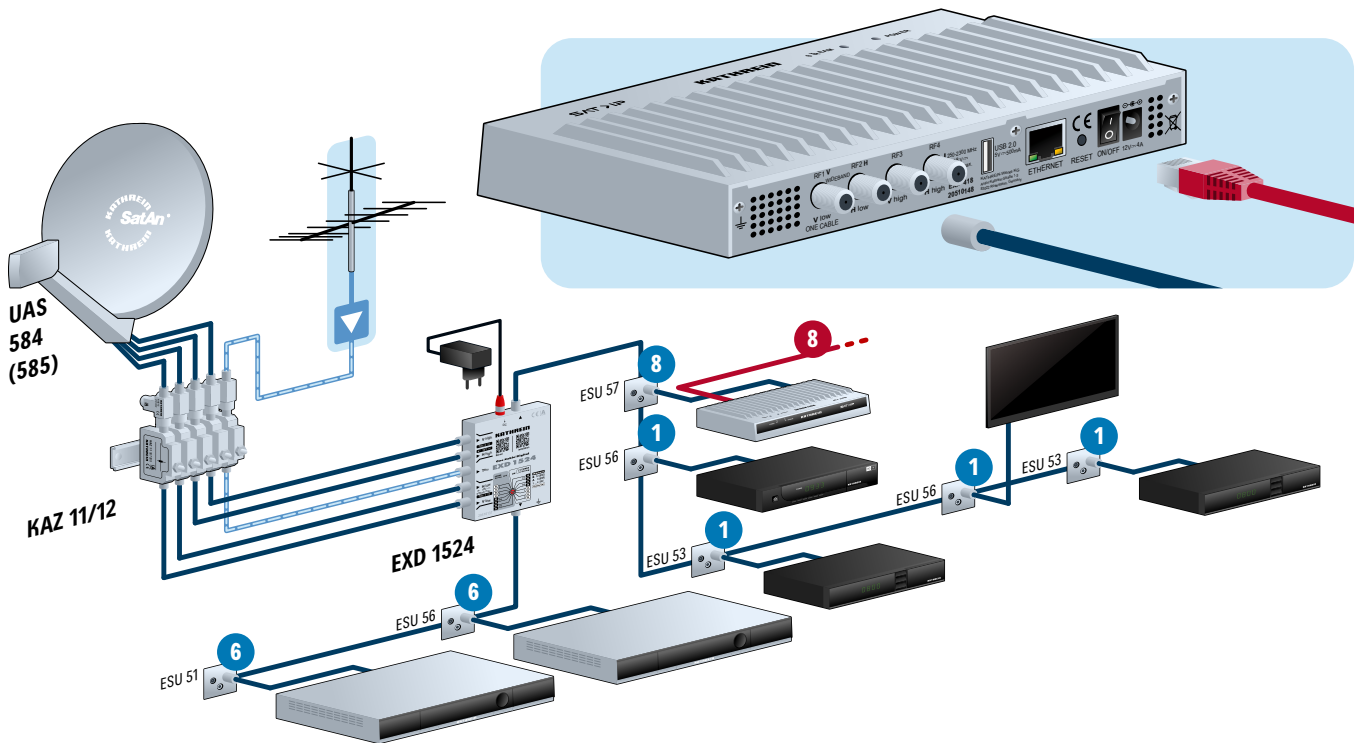
Connection of EXIP 418 directly to feed system



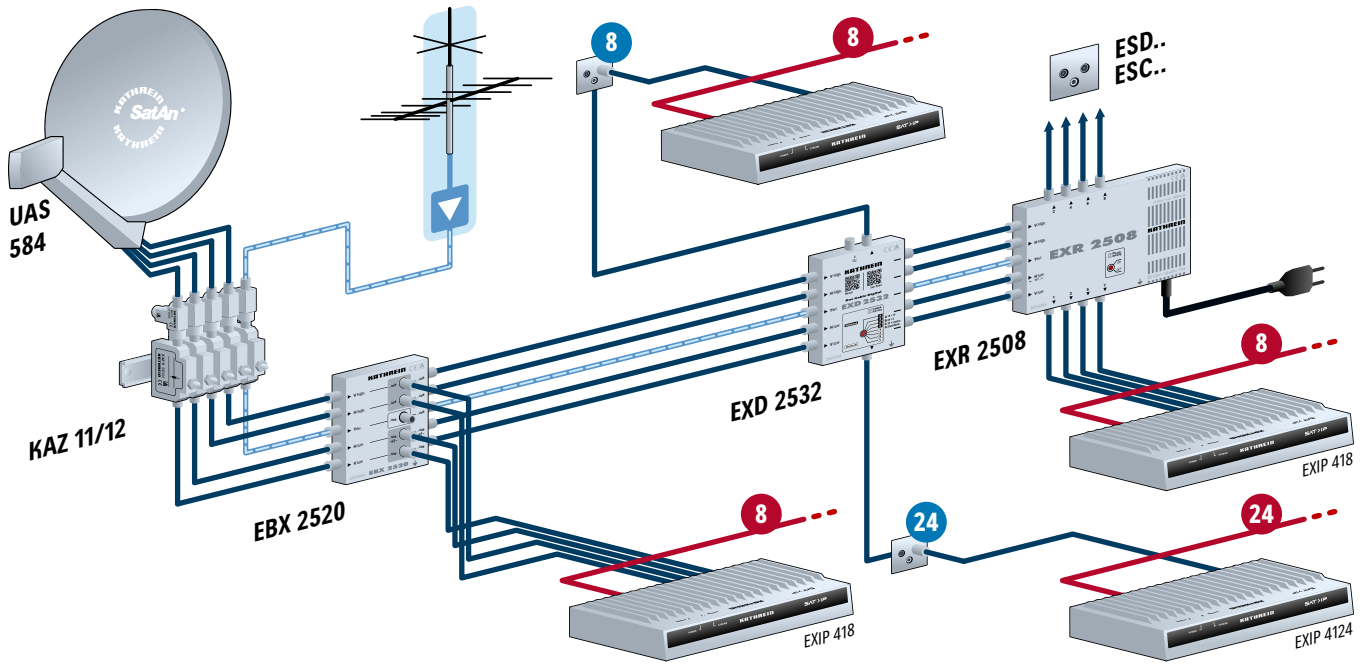
Connection of EXIP 4124 directly to wideband LNB



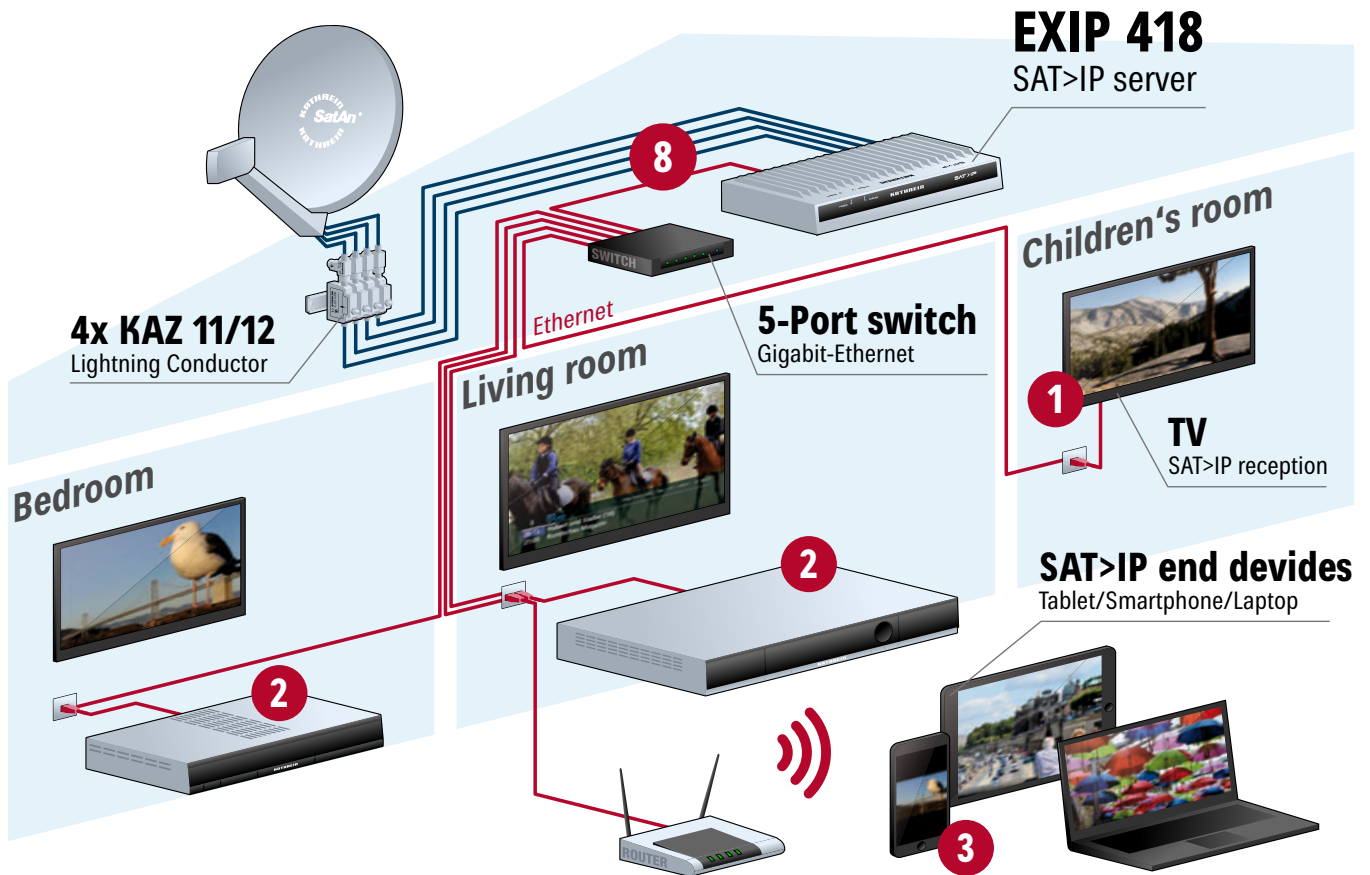
Connection of EXIP 418 in conjunction with single-cable multi-switch



Connection of SAT>IP server with multi-switch



Complete house cabling including SAT>IP-capable terminals



Sat IF Distribution System

➤ General information	152
➤ DiSEqC™ switching matrix	153
➤ Multi-switch	155
➤ Sat distribution network amplifiers	165
➤ Sat IF tap / splitter	169
➤ Connection lines	172
➤ Sat IF amplifier	172
➤ Power supply unit	173
➤ Splitter	173
➤ 5-way connector	174
➤ 9-way connector	174

General information

Due to current distribution technology, one parabolic antenna can now supply entire apartment buildings with the range of programmes from different satellites. The Kathrein system components for Sat IF distribution systems make it possible to create communal subscriber systems, even for a large number of connections with different requirements.

System components

- DiSEqC™ switching matrices 2 to 1
- Multi-switch for 4 levels with 6, 8, 12 or 16 connections
- Sat-IF distribution system with cascadable multi-switches for 4, 8 or 16 levels
- Accessories

Power supply

Powering of the cascadable Sat-IF distribution system has been designed to follow a power-saving concept. A built-in, high-efficiency, short-circuit proof switched-mode power supply unit solely supplies the feed systems and any Sat-IF distribution network amplifiers.

The multi-switches themselves are supplied by the respective receiver, i.e. each individual multi-switch branch is cut off whenever the receiver is switched off.

Mechanical concept

The individual system components in cascadable Sat-IF distribution systems are designed as free assembly modules in accordance with application and functionality conditions and are equipped for universal wall mounts with standard fastening fixtures. This concept permits the greatest possible adaptation to different installation structures, whether it be a star or floor star configuration. The compact design with the latest SMD technology enables deployment of star points with many connections and minimum space requirements. To simplify installation during the set-up of star networks, connectors are available which enable one to connect several system components together in the easiest possible way.

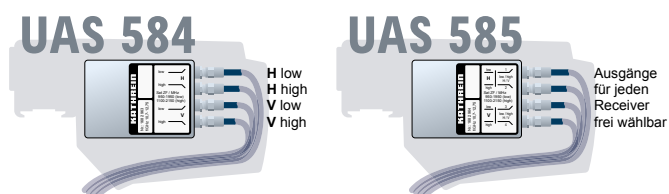
The multi-switches and sat distribution network amplifiers are equipped with F connections, which have become the standard screw connections for satellite systems. All components are designed for indoor installation and fulfil the shielding requirements of EN 50083-2 for class A.



DiSEqC™ is a registered trademark of the European Telecommunications Satellite Organization (EUTELSAT).

LNB wiring

The connection sequences depicted here apply to all the following connection examples in this chapter.



Environmental label

An important part of Kathrein's environmental policy is to make sure that with the development of new products the environmental burden is kept as low as possible. In order to achieve this, the following points are given special importance:

- Energy efficiency in operational and stand-by modes
- Eco-friendly packaging
- Avoidance of dangerous substances
- Optimal use of resources in production processes
- Recycling and environmentally-friendly disposal



As such, products are only awarded the Kathrein environmental label that feature especially environmentally-friendly characteristics in this regard.

Planning tool

You will find a planning tool for Sat IF distribution systems at www.kathrein.com. After entering the system type, number of connections and the cable lengths, the programme will calculate the level values for the subscriber as well as create the block diagram for the system and a list of materials.

All information and tools are available for free to specialist dealers. It will only take you a few moments to register for access to the dealers portal on the Kathrein homepage under "Dealer Portal".

Test verdict



DiSEqC™ switching matrix

EXR 121 20510053



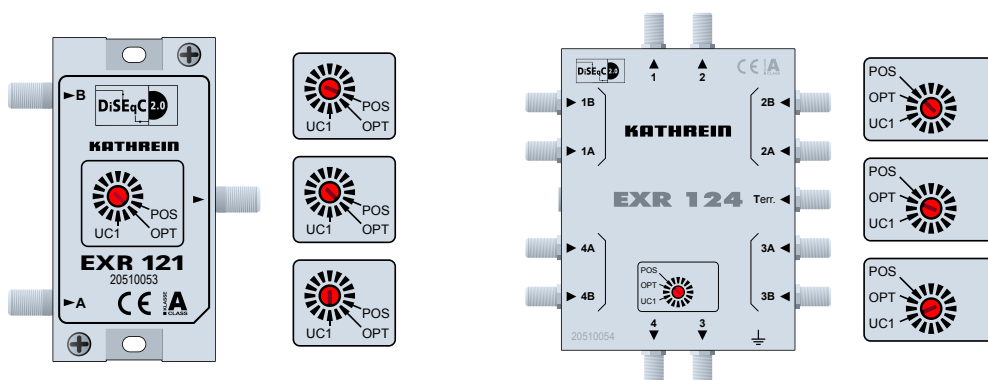
- Enables switching between input signals from two satellites (multi-feed system) or between two subscriber outlets of different multi-switches in multi-feed systems with three or four satellites
- Depending on configuration (selected using a rotary switch), switching is either effected using the DiSEqC™ commands for position A/B, option A/B or uncommitted switch 1
- Cascading enables multi-feed reception of three or four satellites
- Two inputs/one output
- Control signals (14/18 V, 0/22 kHz) and DiSEqC™ are switched through to the chosen input. The second input is voltage-free
- For indoor installation
- The terrestrial range can only be received when the receiver is switched on

EXR 124 20510054



- Enables switching between input signals from two satellites (multi-feed system) or between two subscriber outlets of different multi-switches in multi-feed systems with three or four satellites
- Depending on configuration (selected using a rotary switch), switching is either effected using the DiSEqC™ commands for position A/B, option A/B or uncommitted switch 1
- Control signals (14/18 V, 0/22 kHz) and DiSEqC™ are switched through to the chosen input. The second input is voltage-free
- For indoor installation
- 4 x 2 Sat IF inputs/one output (corresponds to 4 x EXR 121, e.g. for multi-feed reception with 2 x UAS 585)
- Terrestrial signals can be received even when the receiver is switched off
- Cascading enables multi-feed reception of three or four satellites

Switch positions

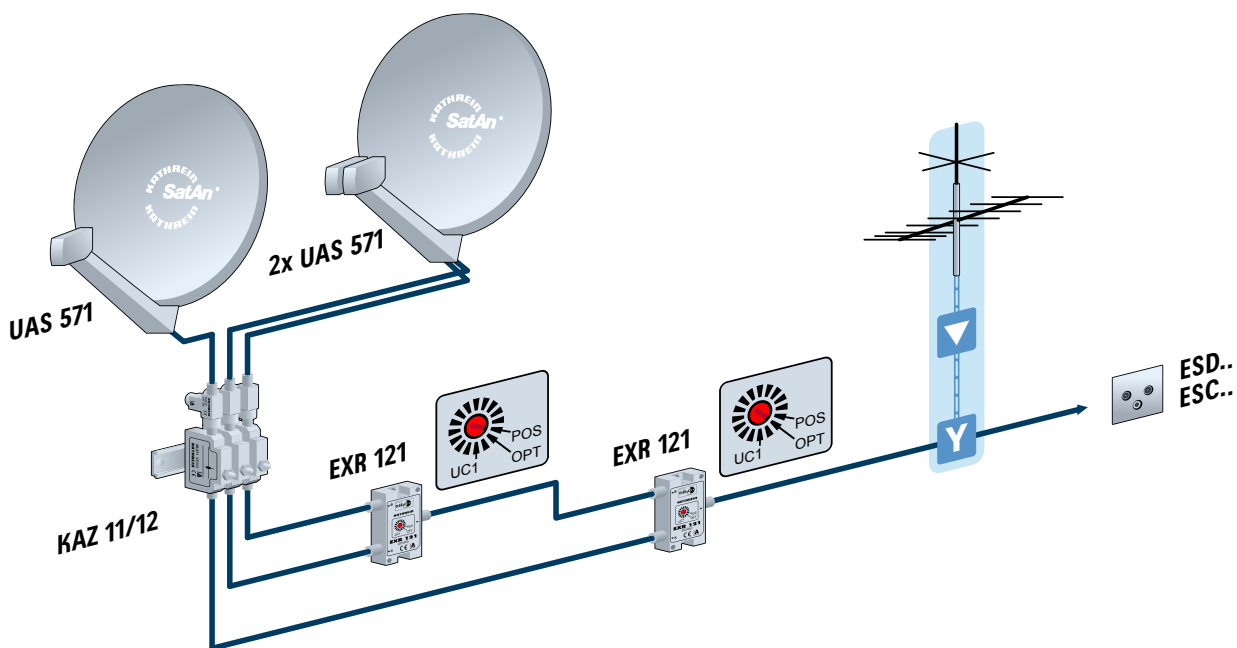


Technical data

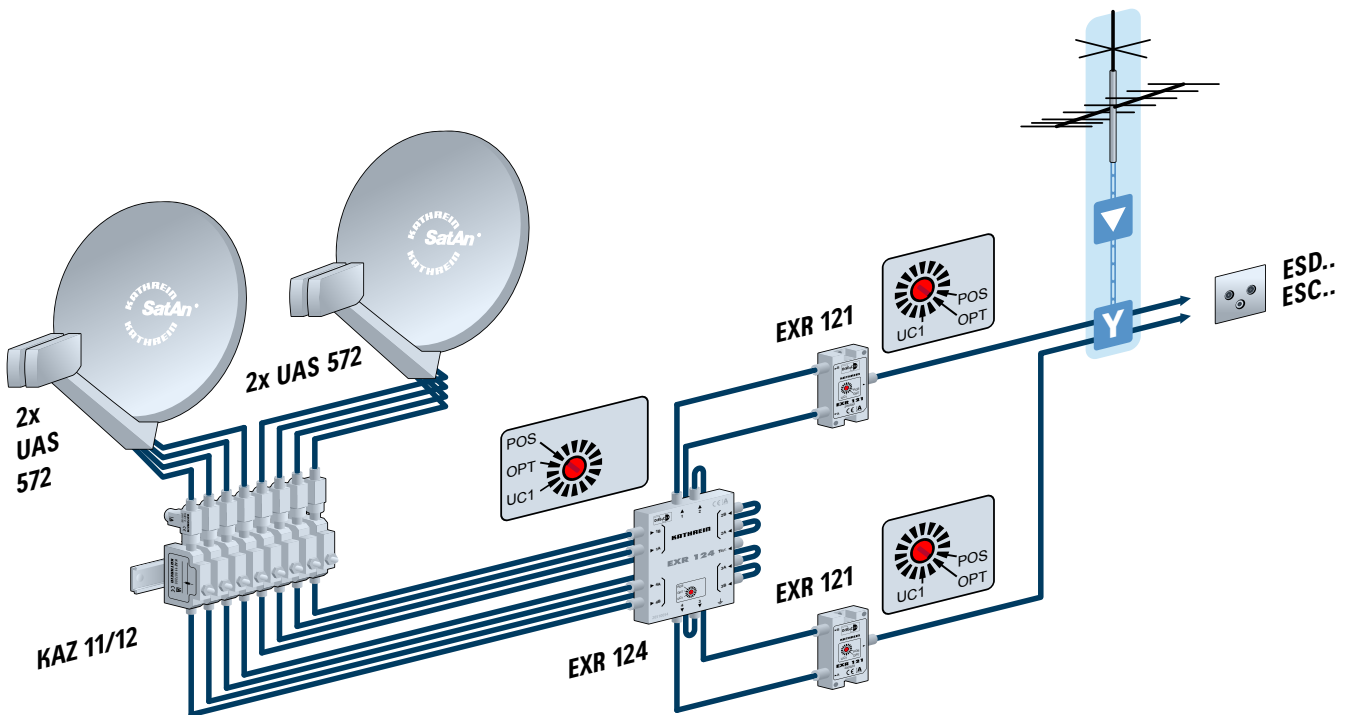
Type | Order no.			EXR 121 20510053		EXR 124 20510054	
Subscriber connections			1		4 x 1	
Inputs			2 x terrestrial	Sat-IF (A/B)	1 x terrestrial	4 x 2 x Sat-IF (1A 2A 3A 4A/ 1B 2B 3B 4B)
Frequency range		MHz	47–2150		5–862	950–2150
Through loss		dB	2		9	2
Decoupling inputs/outputs		dB	25/-		-/25	30/40
Nominal impedance		Ω	75			
Control with DiSEqC™			Configurable for DiSEqC™ commands			
Switch setting	1		Position A/B			
	2		Option A/B			
	3		"Uncommitted Switch" on/off			
Typical voltage drop (at 350-mA load)		V	0.4		0.28	
Power consumption per user		mA	Typ. 28		Typ. 31	
Max. perm. remote feed current per subscriber connection		mA	350			
Connections			F connectors			
Permissible ambient temperature		°C	-20 to +55			
Dimensions (W x H x D)		mm	35 x 74 x 21		112 x 148 x 42	
Packaging unit/weight		pc./kg	1(10)/0.4		1(10)/0.5	

Connection examples

EXR 121



EXR 124 and EXR 121



> Multi-switch

EXR 58/ECO 20510051



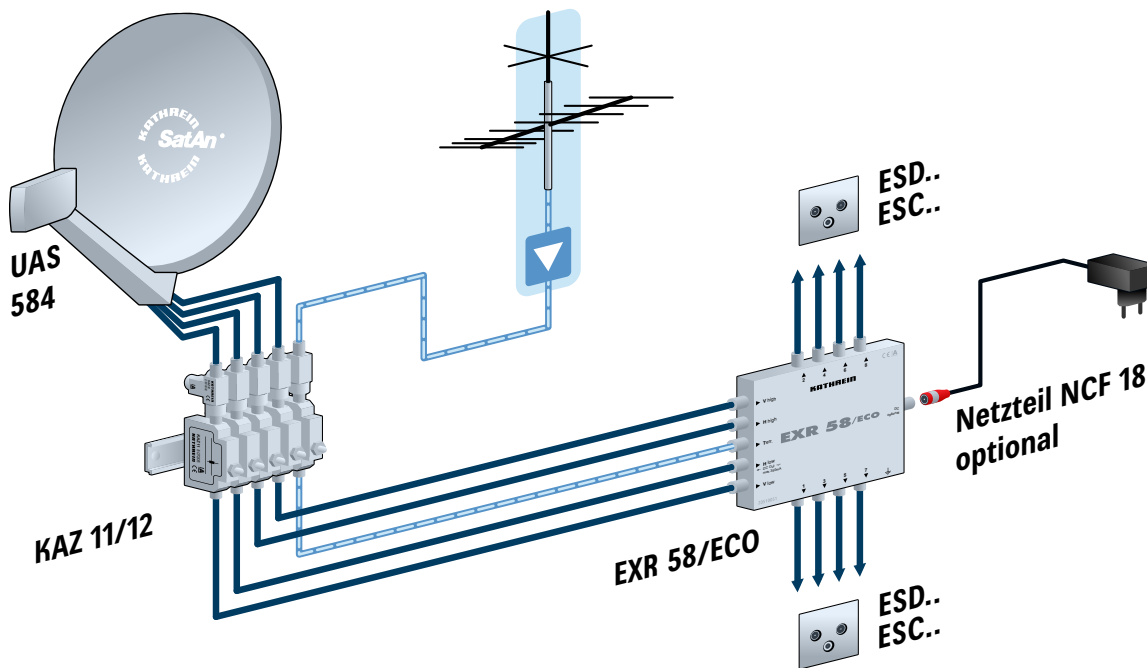
- Multi-switch for distribution of four satellite frequency planes and terrestrial signals to eight connections
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity/band (horiz./vert., low/high) by each receiver
- Switching over the coaxial cable using 14/18 V and 0/22 kHz signal frequencies
- With built-in amplifier for low connection loss in the sat band
- Built-in pre-emphasis to equalise cable attenuation
- Terrestrial signals can be received even when the satellite receiver is switched off
- Terrestrial range: 5-862 MHz
- High degree of decoupling between outputs
- LNB remote feeding can take place via the horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)
- The power supply for the LNB that is connected is provided by the receiver. When all receivers are switched off, the system requires no power
- For continuous power supply of the LNB (e.g. for cascading with loop-through multi-switches), the NCF 18 plug-in power supply unit (not included in delivery scope) can be connected to the socket labelled "DC"
- For indoor installation

Technical data

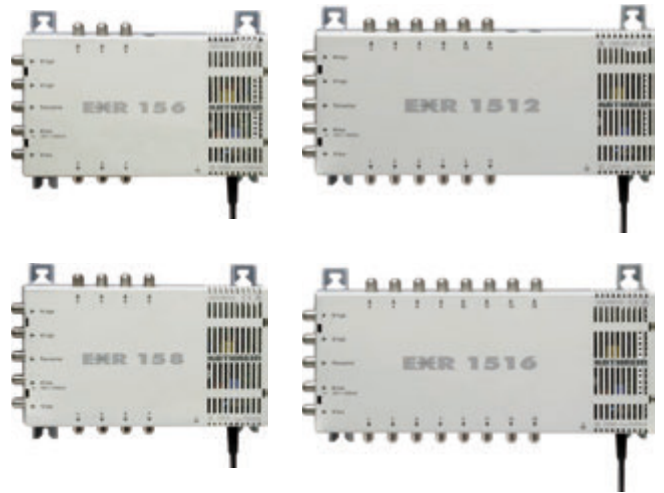
Type | Order no.		EXR 58/ECO 20510051	
Subscriber connections		8	
Inputs		1 x terrestrial	4 x Sat IF
Frequency ranges	MHz	5-862	950-2150
Attenuation ¹⁾	dB	15 → 17	5 → 0
Decoupling horiz./vert./Decoupling subscriber	dB	-/40	25/25
Max. output level ²⁾	dBμV	-	111
Vertical/horizontal input control	V	12-14.5/16-19	
Low/High band control	kHz	0/22	
Power consumption per user	mA	Typ. 25	
Max. total remote feed current ³⁾	mA	350	
Ambient temperature range	°C	-20 to +55	
Connections		F connectors	
Dimensions (W x H x D)	mm	162 x 148 x 43	
Packaging unit/weight	pc./kg	1(10)/0.49	

¹⁾ Frequency-dependent attenuation (pre-emphasis) ²⁾ According to EN 60728-3, 35-dB-IMA ³⁾ Via horizontal low input

Connection example



EXR 156 20510011
 EXR 158 20510012
 EXR 1512 20510013
 EXR 1516 20510014



- For distribution of four satellite frequency planes and terrestrial signals to 6, 8, 12 or 16 connections
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity/band (horiz./vert., low/high) by each receiver
- Switching over the coaxial cable using 14/18 V and 0/22 kHz signal frequencies
- With built-in amplifier for low connection loss in the satellite and terrestrial range
- Terrestrial signals can be received even when the satellite receiver is switched off
- High degree of decoupling between outputs
- LNB remote feeding can take place via the horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)

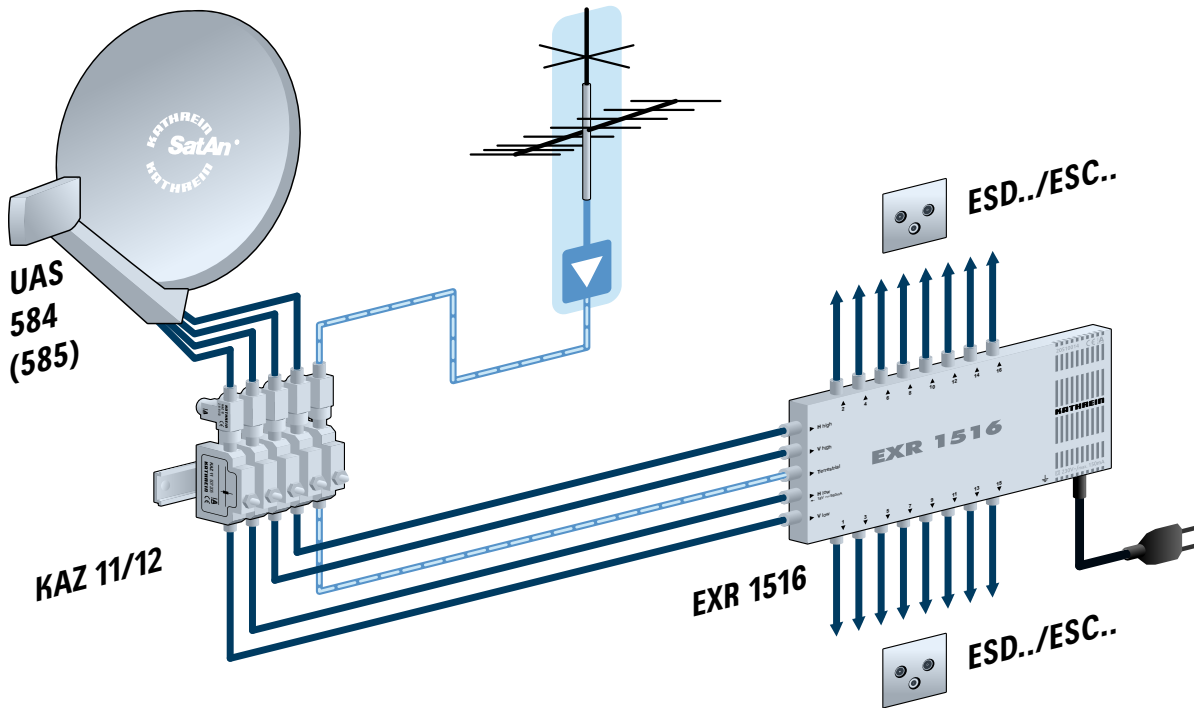
- Built-in pre-emphasis to equalise the cable attenuation
- Low power consumption due to high-efficiency, shortcircuit proof switched-mode power supply unit and power-saving concept (each multi-switch branch is powered by the receiver connected to it and is thus switched off whenever the receiver is switched off)
- For indoor installation

Technical data

Type | Order no.		EXR 156 20510011		EXR 158 20510012		EXR 1512 20510013		EXR 1516 20510014	
Subscriber connections		6		8		12		16	
Inputs		1 x terr.	4 x Sat IF	1 x terr.	4 x Sat IF	1 x terr.	4 x Sat IF	1 x terr.	4 x Sat IF
Frequency ranges	MHz	47-862	950-2150	47-862	950-2150	47-862	950-2150	47-862	950-2150
Attenuation ¹⁾	dB	4 → 0	12 → 7	4 → 0	12 → 7	8 → 4	12 → 7	8 → 4	12 → 7
Horiz./vert. decoupling	dB	-	25	-	25	-	25	-	25
Subscriber decoupling	dB	25	25	25	25	25	25	25	25
Max. output level ²⁾	dBμV	95	105	95	105	89	105	89	105
Vertical/horizontal input control	V	12-14.5/16-19							
Low/High band control	kHz	0/22							
Current consumption per subscriber	mA	< 25							
Nominal input voltage	V	230 (47-63 Hz)							
Permissible input voltage range	V	198-253							
Nominal input power at 0/150/550 mA load	W	3.4/6.3/15							
Secondary voltage ³⁾	V	18							
Max. total remote feed current ³⁾	mA	550							
Protection class/protection type		II (double insulated)/IP 30							
Permissible ambient temperature	°C	-20 to +55							
Connections		F connectors							
Dimensions (W x H x D)	mm	215 x 148 x 43				295 x 148 x 43			
Packaging unit/weight	pc./kg	1(10)/0.65				1(10)/1.0			

¹⁾ Frequency-dependent attenuation (pre-emphasis) ²⁾ Terrestrial in accordance with EN 50083-5, 60 dB XMod; SAT in accordance with EN 60728-3, 35 dB IMod
³⁾ Via input horizontal low

Connection example



- EXR 2508 20510095
- EXR 2554 20510097
- EXR 2558 20510096



- Cascadable multi-switch for splitting four satellite frequency planes and terrestrial signals to multiple receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity/band (horiz./vert., low/high) by each receiver
- Switching over the coaxial cable using 14/18 V and 0/22 kHz signal frequencies
- Built-in amplifier for low attenuation in sat band
- Built-in pre-emphasis to equalise the cable attenuation
- Terrestrial signals can be received even when the satellite receiver is switched off
- Terrestrial range: 5-862 MHz, passive
- High degree of decoupling between outputs
- Remote feed possibility via horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)
- For indoor installation

EXR 2508

- Multi-switch for eight connections, with built-in power supply unit
- Cascadable with EXR 2554/2558
- Low power consumption due to high-efficiency, short-circuit proof switched-mode power supply unit and power-saving concept (each multi-switch branch is powered by the receiver connected to it and is thus switched off whenever the receiver is switched off)
- Kathrein Power-Saving: The LNB supply is switched off as soon as there are no longer any receivers active on the EXR 2508 or in the cascade.
- This function can be deactivated, for instance if loop-through multi-switches without "Kathrein Power-Saving" as used in the cascade

EXR 2554

- Multi-switch 5 to 4, loop-through, for system extension by four connections each
- Up to eight EXR 2554/2558 multi-switches can be cascaded
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.

EXR 2558

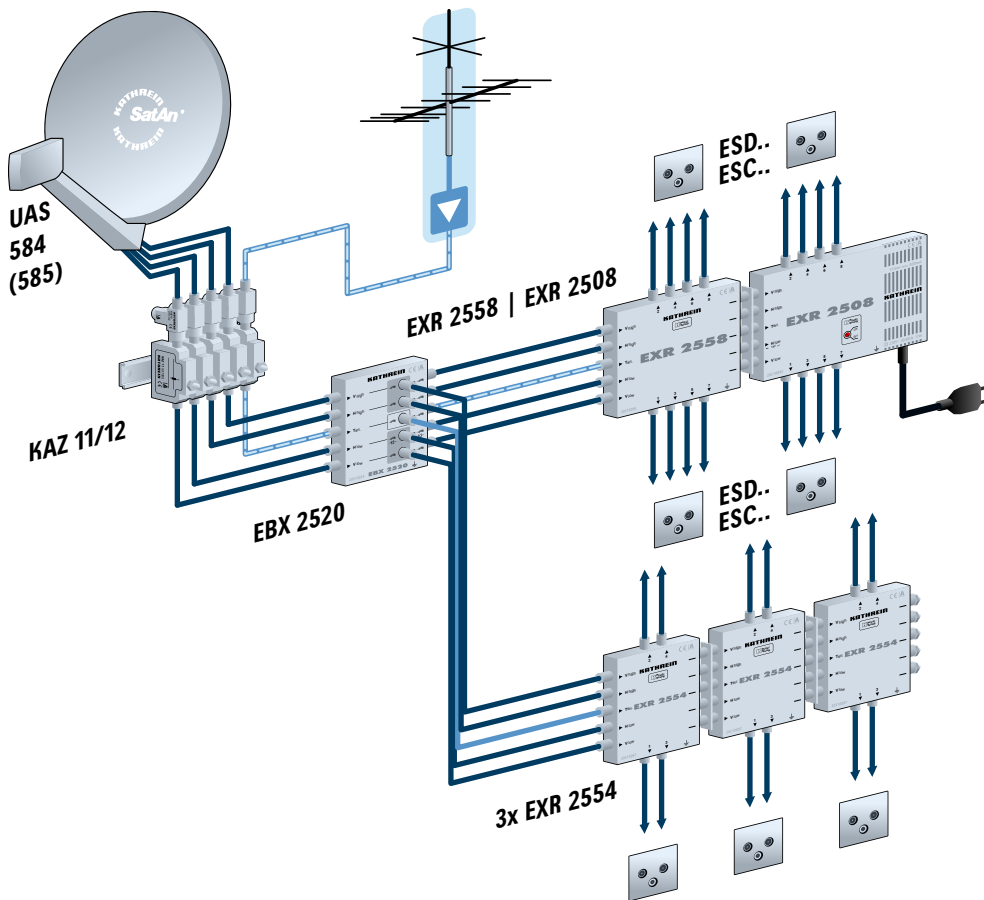
- Multi-switch 5 to 8, loop-through, for system extension by eight connections each
- Up to eight EXR 2554/2558 multi-switches can be cascaded
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.

Technical data

Type | Order no.		EXR 2508 20510095		EXR 2554 20510097		EXR 2558 20510096	
Subscriber connections		8		4		8	
Inputs		1 x terrestrial	4 x Sat IF	1 x terrestrial	4 x Sat IF	1 x terrestrial	4 x Sat IF
Frequency ranges	MHz	5-862	950-2150	5-862	950-2150	5-862	950-2150
Through loss	dB	-	-	3.5	1.0 → 2.5 ¹⁾	3.5	1.0 → 2.5 ¹⁾
Attenuation ¹⁾	dB	15 → 17	5 → 0	18 → 20	5 → 0	18 → 20	5 → 0
Horiz./vert. decoupling	dB	-	25	-	25	-	25
Subscriber decoupling	dB	40	25	40	25	40	25
Trunk decoupling	dB	-	-	-	40	-	40
Max. output level ²⁾	dBμV	-	109	-	109	-	109
Vertical/horizontal input control	V	12-14.5/16-19		12-14.5/16-19		12-14.5/16-19	
Low/High band control	kHz	0/22		0/22		0/22	
Current consumption per subscriber	mA	20		20		20	
Permissible input voltage range	V	198-253		-		-	
Nominal input power at 0/150/800 mA load	W	1.7/4.7/18		-		-	
Secondary voltage ³⁾	V	18		-		-	
Max. total remote feed current ³⁾	mA	800		-		-	
Max. permissible remote feed current per trunk	mA	-		1000		1000	
Protection class/protection type		II (double insulated)/IP 30		-/IP 30		-/IP 30	
Ambient temperature range	°C	-20 to +55		-20 to +55		-20 to +55	
Connections		F connectors		F connectors		F connectors	
Dimensions (W x H x D)	mm	215 x 148 x 43		112 x 148 x 43		160 x 148 x 43	
Packaging unit/weight	pc./kg	1(10)/0.65		1(10)/0.35		1(10)/0.45	

¹⁾ Frequency-dependent attenuation ²⁾ In accordance with EN 60728-3, 35 dB IMod ³⁾ Via horizontal low inputs

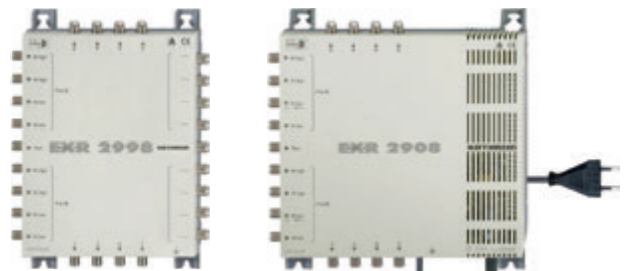
Connection example



EXR 2908 20510019
 EXR 2998 20510020



- Cascadable multi-switches for distribution of eight satellite frequency planes and terrestrial signals to many receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Facility to select horizontal/vertical, low/high, Sat position A / position B independently for each receiver using DiSEqC™ controls
- If the receiver is not DiSEqC™ controlled, switching between horizontal/vertical, low/high is on Sat position A, with Tone Burst Sat position A/position B is additionally possible
- Built-in amplifier for low attenuation in sat band
- Built-in pre-emphasis to equalise the cable attenuation
- Terrestrial signals can be received even when the satellite receiver is switched off
- LNB remote feeding can take place via the horizontal low inputs. All other inputs are voltage-free (enabling operation with UAS 585)
- For indoor installation
- Terrestrial range: 5-862 MHz, passive



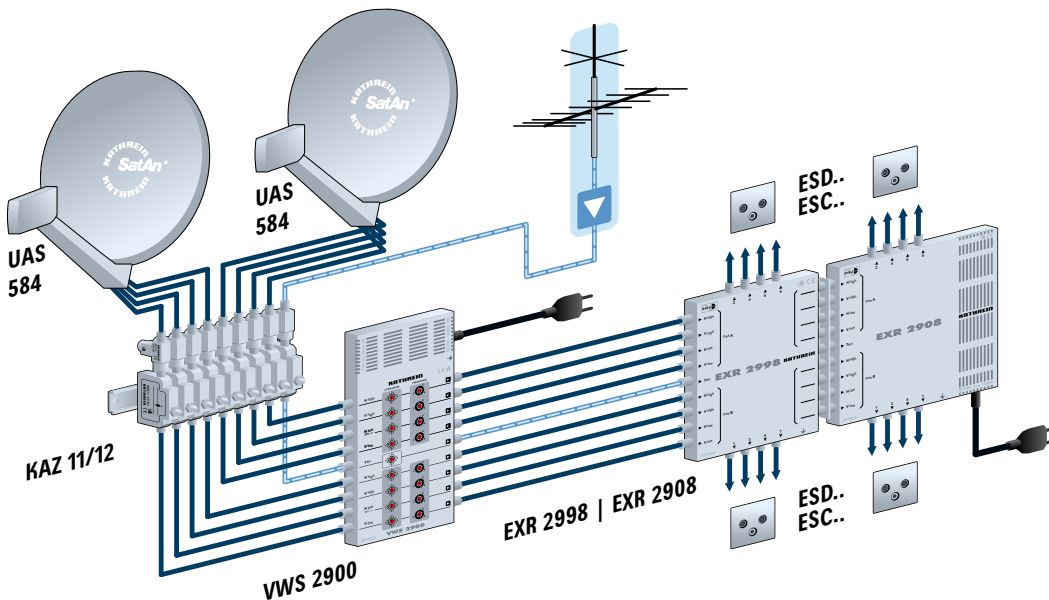
- High degree of decoupling between outputs
- EXR 2908**
- Multi-switch for eight connections, with built-in power supply unit
 - Low power consumption due to high-efficiency, short-circuit proof switched-mode power supply unit and power-saving concept (each multi-switch branch is powered by the receiver connected to it and is thus switched off whenever the receiver is switched off)
 - Cascadable with EXR 2998
- EXR 2998**
- Multi-switch loop-through for system extension with eight connections each
 - Highly cascadable (up to 40 connections)

Technical data

Type | Order no.		EXR 2908 20510019		EXR 2998 20510020	
Subscriber connections		8		8	
Inputs		1 x terrestrial	8 x Sat IF	1 x terrestrial	8 x Sat IF
Frequency ranges	MHz	5-862	950-2150	5-862	950-2150
Through loss	dB	-	-	3.5	1.0 → 2.5 ¹⁾
Attenuation ¹⁾	dB	10 → 13	5 → 0	13 → 16	5 → 0
Horiz./vert. decoupling	dB	-	25	-	25
Subscriber decoupling		25	25	25	25
Trunk decoupling	dB	-	-	-	40
Max. output level ²⁾	dBμV	-	109	-	109
Control using DiSEqC™		Vert./horiz., low/high, Pos. A/B			
Controls without DiSEqC™ with 14/18 V and 0/22 kHz with tone burst		Vert./horiz., low/high (pos. A) pos. A/B			
Current consumption per subscriber	mA	30			
Nominal input voltage	V	230 (47-63 Hz)		-	
Permissible input voltage range	V	198-253		-	
Nominal input power at 0/300/800 mA load	W	1.7/7.5/18		-	
Secondary voltage ³⁾	V	18		-	
Max. total remote feed current ³⁾	mA	800		-	
Max. permissible remote feed current per trunk	mA	-		1000	
Protection class/protection type		II (double insulated)/IP 30		-/IP 30	
Ambient temperature range	°C	-20 to +55		-20 to +55	
Connections		F connectors		F connectors	
Dimensions (W x H x D)	mm	227 x 228 x 44		172 x 228 x 44	
Packaging unit/weight	pc./kg	1(10)/1.0		1(10)/0.9	

¹⁾ Frequency-dependent attenuation ²⁾ In accordance with EN 60728-3, 35 dB IMod ³⁾ Via horizontal low inputs

Connection example

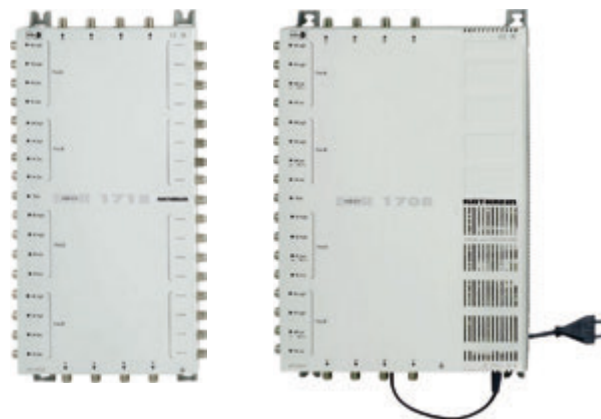


EXR 1708 20510027

EXR 1718 20510028



- Cascadable multi-switch for splitting 16 satellite frequency planes and terrestrial signals to multiple receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity horizontal/vertical, low/high, the Sat positions A/B/C/D by each receiver due to DiSEqC™ control
- If the receiver is not DiSEqC™ controlled, switching between horizontal/vertical, low/high is on Sat position A; with Tone Burst Sat position A/position B is additionally possible
- Built-in amplifier for low attenuation in sat band
- Built-in pre-emphasis to equalise cable attenuation
- Terrestrial signals are also receivable with the satellite receiver switched off
- Remote feed possibility via the inputs horizontal low. All other inputs are voltage-free (thus operation with UAS 585 possible)
- For indoor installation
- Terrestrial range: 5-862 MHz, passive
- High degree of decoupling between outputs

**EXR 1708**

- Multi-switch for eight connections, with built-in power supply unit
- Low power consumption due to high-efficiency, short-circuit proof switched-mode power supply unit and power-saving concept (each multi-switch line is powered by the receiver connected to it and is thus switched off whenever the receiver is switched off)
- Extendable with EXR 1718

EXR 1718

- Multi-switch loop-through for system extension with eight connections each
- Highly cascadable (up to 40 connections)

Technical data

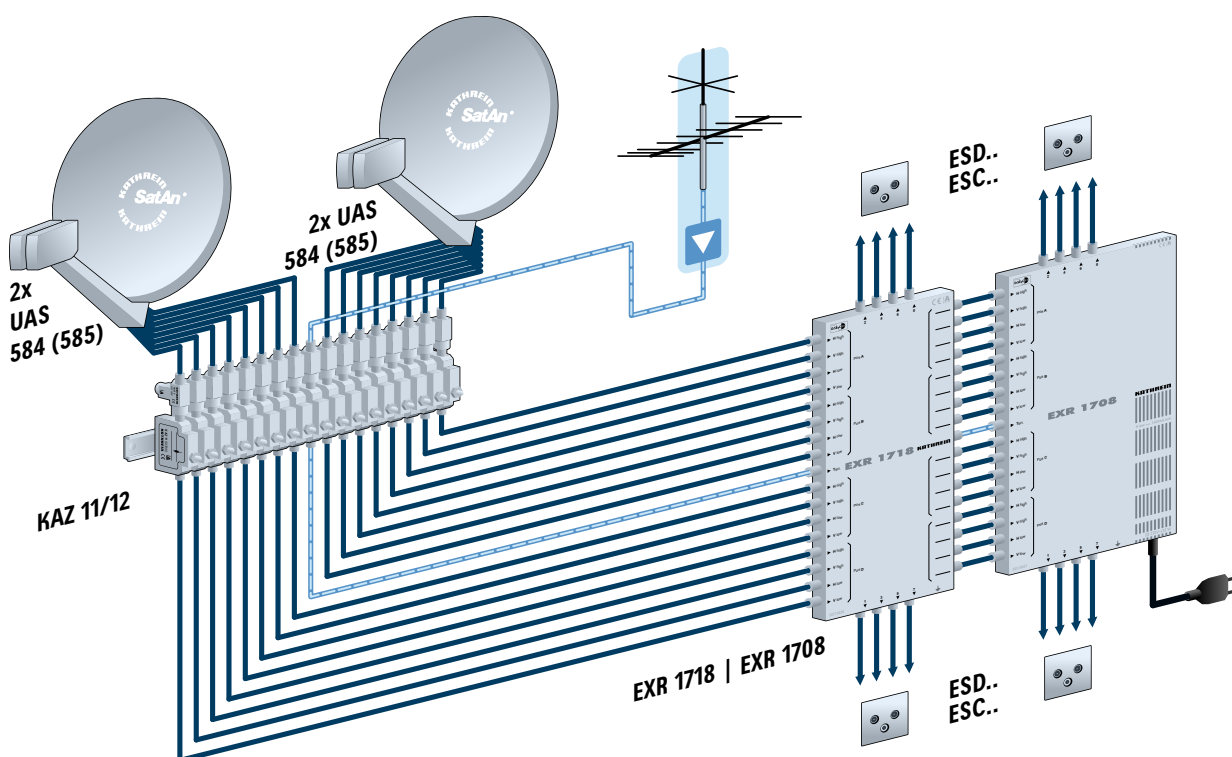
Type | Order no.		EXR 1708 20510027		EXR 1718 20510028	
Subscriber connections		8		8	
Inputs		1 x terrestrial	16 x Sat IF	1 x terrestrial	16 x Sat IF
Frequency ranges	MHz	5-862	950-2150	5-862	950-2150
Through loss	dB	–	–	4	1 → 3 ¹⁾
Attenuation ¹⁾	dB	10 → 13	5 → 0	13 → 16	5 → 0
Horiz./vert. decoupling	dB	–	25	–	25
Decoupling subscriber/decoupling trunk	dB	25/–	25/–	25/–	25/40
Max. output level ²⁾	dBμV	–	112	–	112
Control with DiSEqC™		Vert./horiz., low/high, pos. A/B/C/D			
Control without DiSEqC™ - with 14/18 V and 0/22 kHz - with Tone Burst		Vert./horiz., low/high, (pos. A) Pos. A/B			
Current consumption per subscriber	mA	30			
Nominal input voltage	V	230 (47-63 Hz)		–	
Permissible input voltage range		198-253			
Nominal input power at 0/600/1500 mA load	W	0.4/13.4/32		–	
Secondary voltage ³⁾	V	18		–	
Max. total remote feed current ³⁾	mA	1500		–	

¹⁾ Frequency-dependent attenuation ²⁾ In accordance with EN 60728-3, 35 dB IMod ³⁾ Via horizontal low inputs

Type | Order no.		EXR 1708 20510027	EXR 1718 20510028
Max. permissible remote feed current per trunk	mA	–	1000
Protection class/protection type		II (double insulated)/IP 30	-/IP 30
Ambient temperature range	°C	-20 to +55	-20 to +55
Connections		F connectors	F connectors
Dimensions (W x H x D) without F sockets	mm	249 x 388 x 45	182 x 388 x 45
Packaging unit/weight	pc./kg	1(5)/1.7	1(5)/1.6

1) Frequency-dependent attenuation 2) Acc. to EN 60728-3, 35 dB IMod 3) Via horizontal low inputs

Connection example



Multi-switch test verdicts



EXR 2916-19" 2050000001
EXR 2932-19" 2050000002



EXR 2916-19"



EXR 2932-19"



EXR 2916-19"/EXR 2932-19" rear view

- Multi-switch for distribution of eight satellite frequency planes to 16 (EXR 2916-19") or 32 (EXR 2932-19") subscribers in a 19" unit
- Ideal for combining with the UFG 810 UFO compact plus® base unit (see Page 207) in the 19" cabinet
- Facility to select horizontal/vertical, low/high, Sat position A / position B independently for each receiver using DiSEqC™-control
- If the receiver is not DiSEqC™ controlled, switching between horizontal/vertical, low/high is on Sat position A; with Tone Burst Sat position A/position B is additionally possible
- Built-in amplifier for low attenuation in the Sat band
- Built-in pre-emphasis to equalise the cable attenuation
- Loop through capability, e.g. for terrestrial signals
- High degree of decoupling between outputs
- Second DC connection for redundant power supply (NCF 18)
- Installation height: Two units for 19" cabinet or wall mounting

- LNB remote feeding via the inputs "horizontal low" with external NCF 18 power supply unit. All other inputs are voltage-free (enabling operation with UAS 585)

NCF 18

- Highly efficient, short-circuit-proof switched-mode power supply unit in accordance with the ERP guideline

Technical data (provisional)

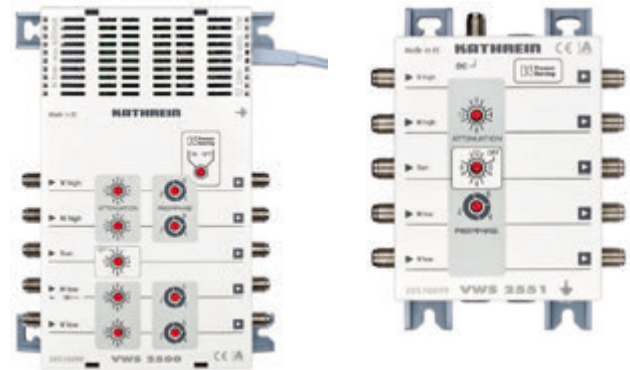
Type | Order no.		EXR 2916-19" 2050000001	EXR 2932-19" 2050000002	
Subscriber connections		16	32	
Inputs		1 x terr./8 x Sat IF		
Frequency ranges	MHz	5-862/950-2150		
Attenuation ¹⁾	Output dB	1-16 -8 → -1	1-16 -8 → -1	17-32 -10 → -8
Horiz./vert. decoupling	dB	25		
Max. output level ²⁾	dBμV	109		
Control with DiSEqC™		Vert./horiz., low/high, Pos. A/B		
Control without DiSEqC™ - with 14/18 V and 0/22 kHz - with Tone Burst		Vert./horiz., low/high, (pos. A) Pos. A/B		
Current consumption per subscriber	mA	30		
NCF 18 power supply unit				
Nominal input voltage	V	230 (47-63 Hz)		
Permissible input voltage range		207-253		
Nominal input power at 0/150/800 mA load	W	0/2.2/15.5		
Secondary voltage ³⁾	V	18		
Max. total remote feed current ³⁾	mA	800/1600 (1 or 2 NCF 18)		

¹⁾ Frequency-dependent attenuation ²⁾ In accordance with EN 60728-3, 35 dB IMod ³⁾ Via horizontal low inputs

➤ Sat distribution network amplifiers

VWS 2500 20510098

VWS 2551 20510099



The VWS 2500 is used at the input of larger multi-switch cascades for optimal signal processing or as a cascadable distribution network amplifier to equalise cable or tap/splitter losses. The VWS 2551 is used as a cascadable distribution network amplifier to increase the level and to equalise the slope in multi-switch cascades.

- Distribution network amplifiers for the Sat and terrestrial range in a Kathrein Sat IF distribution system 4 x Sat-IF
- Five amplifiers (4 x satellite IF and 1 x terrestrial range) in one single housing
- High dynamic range of amplifier units
- High decoupling between the amplifier units
- Terrestrial amplifier unit is CATV-capable due to GaAs output stage
- For indoor installation

VWS 2500

- Adjustable attenuators (1-dB steps) in each amplifier unit to equalise different input levels
- Fixed pre-equalisation in the terrestrial amplifier unit
- Adjustable pre-equalisation (2/4/6 dB) in each satellite amplifier unit
- Low power consumption based on high-efficiency short-circuit-proof switched-mode power supply unit
- LNB remote feeding can take place via the horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)

VWS 2551

- Adjustable attenuators (1 dB steps) in the sat band (all satellite branches are adjusted at the same time)
- Adjustable pre-equalisation (steps of 2/4/6 dB) in the sat band (all satellite branches are adjusted at the same time) permits optimum pre-emphasis
- Kathrein Power-Saving: In systems with devices that support Kathrein Power-Saving (KPS), the LNB supply is switched off as soon as no receiver is in operation. Where remote feed is in operation, the amplifier is also switched off
- Power supply of the VWS 2551 and LNB feeding are remote fed from the multi-switch, e.g. EXR 2508 via satellite branch "horizontal low"
- Powering of the VWS 2551 can also be carried out through the DC connection using the NCF 18 power supply unit (not included in the delivery scope)
- If the amplifier is powered via the DC connection, powering does not encompass LNB feeding

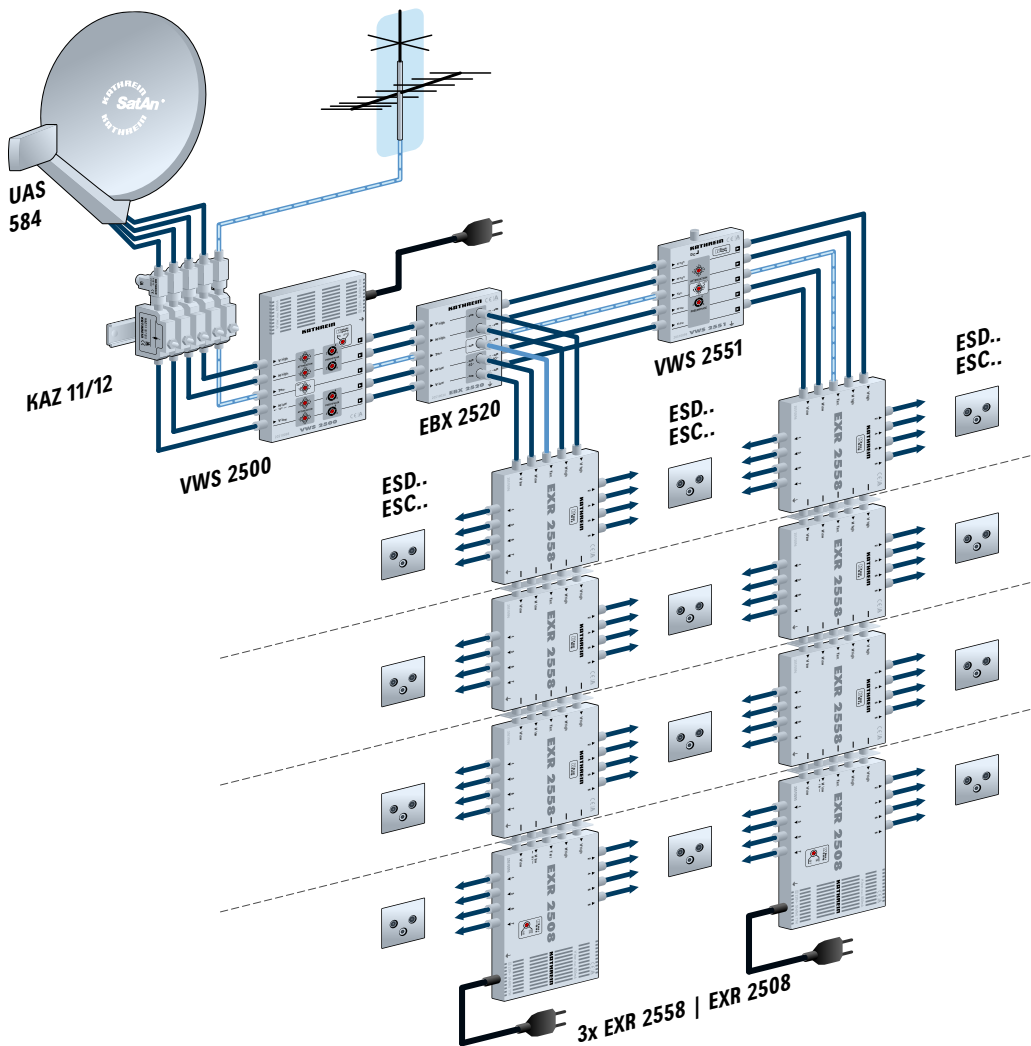
Technical data

Type | Order no.		VWS 2500 20510098		VWS 2551 20510099	
Inputs		1 x terrestrial	4 x Sat IF	1 x terrestrial	4 x Sat IF
Frequency range	MHz	47-862	950-2150	47-862	950-2150
Gain ¹⁾	dB	17 → 21	24	16	15
Adjustment range of the adjustable attenuator (1 dB steps)	dB	0-14	0-15	0-15	0-15
Equalisation setting range	dB	–	2/4/6	–	2/4/6
Max. output level (interference products 3rd order)	dBμV	113 ²⁾	115 ³⁾	108 ²⁾	112 ³⁾
Max. output level (interference products 2nd order)	dBμV	104 ⁴⁾	110 ³⁾	104 ⁴⁾	104 ³⁾

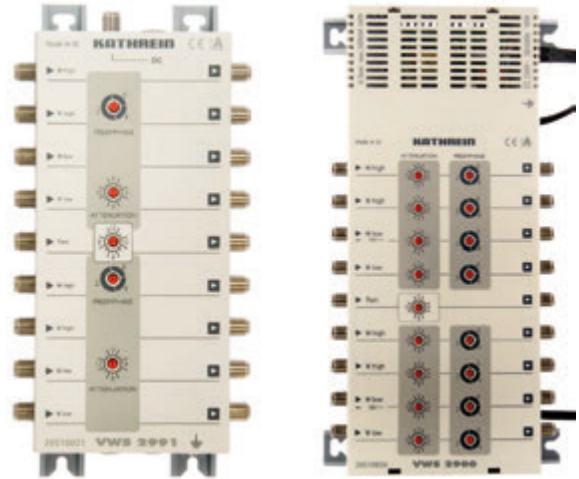
Type | Order no.		VWS 2500 20510098		VWS 2551 20510099	
Max. operating level for CATV (up to 862 MHz) ⁵⁾	dBμV	98	–	96	–
Trunk decoupling	dB	–	40	–	45
Nominal input voltage	V	230 (47-63 Hz)		–	
Permissible input voltage range	V	198-253		–	
Nominal input power at 0/150/620 mA load	W	5.4/8.1/18		–	
Secondary voltage (input horiz. low)	V	18		–	
Available remote feed current (input horiz. low)	mA	600		–	
Supply voltage	V	–		+18	
Power consumption, terrestrial on/off	mA	–/–		85/50	
Max. remote feed current (per satellite branch)	mA	–		1000	
Protection class/protection type		II (double insulated)/IP 30		-/IP 30	
Ambient temperature range	°C	-20 to +55		-20 to +55	
Connections		F connectors		F connectors	
Dimensions (W x H x D)	mm	148 x 205 x 43		112 x 148 x 43	
Packaging unit/weight	pc./kg	1(10)/0.75		1(10)/0.37	

¹⁾ Frequency-dependent gain (pre-emphasis) ²⁾ 60 dB XMod in accordance with EN 50083-5 ³⁾ 35 dB IMod in accordance with EN 60728-3
⁴⁾ 60 dB IMod in accordance with EN 60728-3 ⁵⁾ Acc. to EN 60728-3, 60 dB CTB/CSO, CENELEC channel plan

Connection example



VWS 2900 20510026
VWS 2991 20510021



The VWS 2900 is used at the input of larger multi-switch cascades for optimal signal processing or as a cascadable distribution network amplifier to equalise cable or tap/splitter losses.

The VWS 2991 is used as a cascadable distribution network amplifier to increase the level and to equalise the slope in multi-switch cascades.

- Distribution network amplifiers for the Sat and terrestrial range in a Kathrein Sat IF distribution system 8 x Sat-IF
- Nine amplifiers (8 x Sat-IF and 1 x terrestrial range) in one single housing
- High dynamic range of amplifier units
- High decoupling between the amplifier units
- Terrestrial amplifier unit is CATV-capable due to GaAs output stage
- For indoor installation

VWS 2900

- Adjustable attenuators (1-dB steps) in each amplifier unit to equalise different input levels
- Fixed pre-equalisation in the terrestrial amplifier unit
- Adjustable pre-equalisation (2/4/6 dB) in each satellite amplifier unit
- Low power consumption based on high-efficiency short-circuit-proof switched-mode power supply unit
- LNB remote feeding can take place via the horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)

VWS 2991

- Adjustable pre-equalisation (2/4/6 dB) in the sat band (all satellite branches are separately set for each satellite position simulatenously)
- Power supply of the VWS 2991 and LNB feeding are remote fed from the multi-switch, e.g. EXR 2908 via satellite branch "horizontal low"
- Powering of the VWS 2991 can also be carried out through the DC connection using the NCF 18 power supply unit (not included in the delivery scope)
- If the amplifier is powered via the DC connection, powering does not encompass LNB feeding

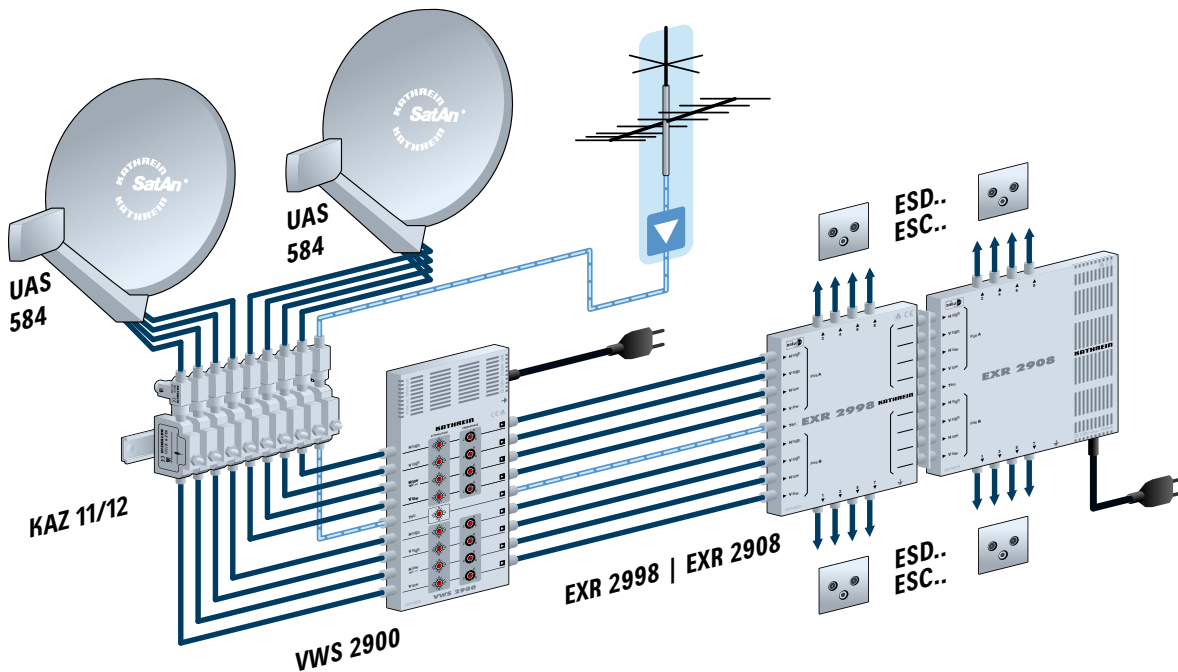
Technical data

Type | Order no.		VWS 2900 20510026		VWS 2991 20510021	
Inputs		1 x terrestrial	8 x Sat IF	1 x terrestrial	8 x Sat IF
Frequency range	MHz	47-862	950-2150	47-862	950-2150
Gain ¹⁾	dB	17 → 21	24	16	15
Adjustment range of the adjustable attenuator (1 dB steps)	dB	0-15	0-15	0-15	0-15
Equalisation setting range	dB	-	2/4/6	-	2/4/6
Max. output level (interference products 3rd order)	dBµV	113 ²⁾	115 ³⁾	108 ²⁾	112 ³⁾
Max. output level (interference products 2nd order)	dBµV	104 ⁴⁾	110 ³⁾	104 ⁴⁾	104 ³⁾

Type | Order no.		VWS 2900 20510026		VWS 2991 20510021	
Max. operating level for CATV (up to 862 MHz) ⁵⁾	dBµV	98	–	96	–
Trunk decoupling	dB	–	40	–	45
Nominal input voltage	V	230 (47-63 Hz)		–	
Permissible input voltage range	V	198-253		–	
Nominal input power at 0/300/500 mA load	W	7.5/13.6/18		–	
Secondary voltage (input horiz. low)	V	18		–	
Available remote feed current (input horiz. low)	mA	500		–	
Supply voltage	V	–		+18	
Power consumption	mA	–		120	
Max. remote feed current (per satellite branch)	mA	–		1000	
Protection class/protection type		II (double insulated)/IP 30		–/IP 30	
Ambient temperature range	°C	-20 to +55		-20 to +55	
Connections		F connectors		F connectors	
Dimensions (W x H x D)	mm	148 x 285 x 43		112 x 228 x 43	
Packaging unit/weight	pc./kg	1(10)/1.1		1(10)/0.57	

¹⁾ Frequency-dependent gain (pre-emphasis) ²⁾ 60 dB XMod in accordance with EN 50083-5 ³⁾ 35 dB IMod in accordance with EN 60728-3
⁴⁾ 60 dB IMod in accordance with EN 60728-3 ⁵⁾ Acc. to EN 60728-3, 60 dB CTB/CSO, CENELEC channel plan

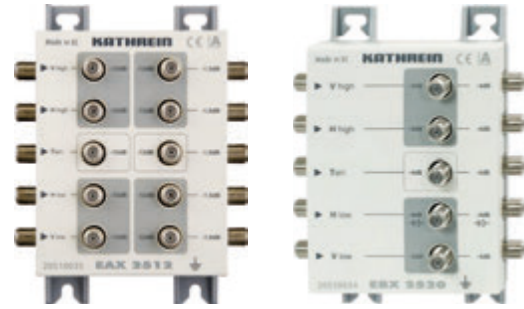
Connection example



> Sat IF tap / splitter

EAX 2512 20510035

EBX 2520 20510034



- 2-way tap and 2-way splitter for the Sat-IF distribution system (4 x Sat-IF)
- For signal splitting in large Sat-IF systems with 5-line multi-switch cascades
- For indoor installation

EAX 2512

- 2-way tap to connect, for example, two multi-switch cascades with 5 multi-switches each to a trunk line
- Five 2-way taps (4 x Sat-IF and 1 x terrestrial range) in one housing
- Remote feeding via input → trunk output (4 x Sat IF); isolating capacitors on the tap outputs
- Cascadable with another EAX 2512 or EBX 2520

EBX 2520

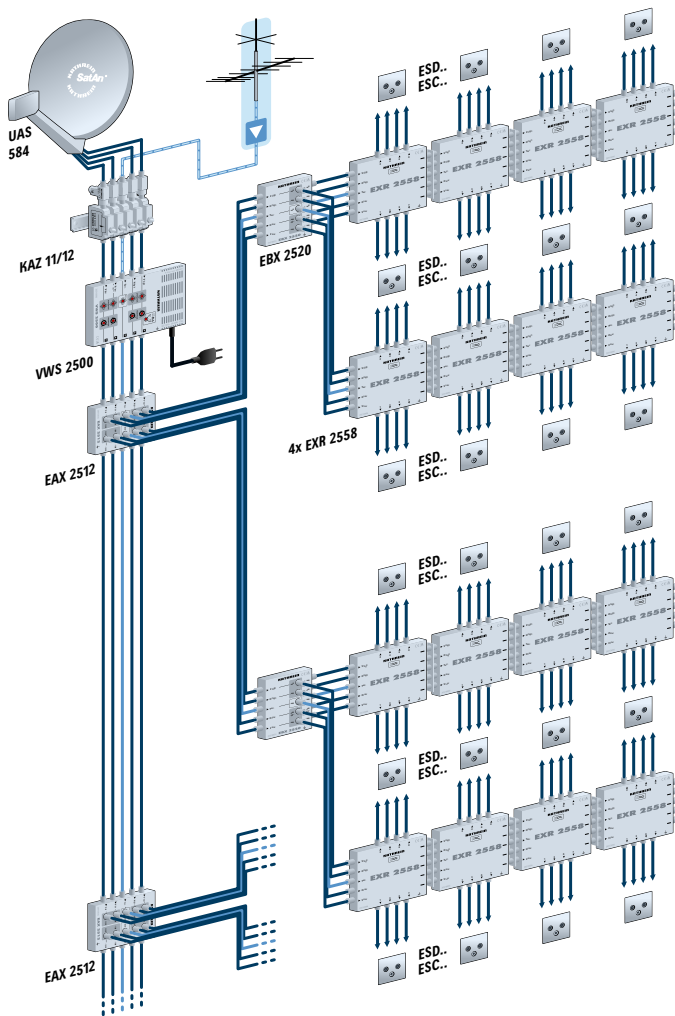
- 2-way splitter to distribute a trunk line to two 5-line multi-switch cascades
- Five 2-way splitters (4 x Sat-IF and 1 x terrestrial range) in one housing
- Remote-feed capable via input → trunk output (4 x Sat-IF) and splitter output “horizontal low” (diode decoupling to trunk output); isolating capacitors on remaining splitter outputs
- Cascadable with additional EAX 2520 or EBX 2512

Technical data

Type | Order no.		EAX 2512 20510035		EBX 2520 20510034	
Inputs		1 x terrestrial	4 x Sat IF	1 x terrestrial	4 x Sat IF
Frequency range	MHz	5-862	950–2150	5-862	950–2150
Through loss → (input → trunk output)	dB	1.5 → 2 ¹⁾	0.8 → 1.5 ¹⁾	4.0	4.0
Connection loss (input → tap/splitter output)	dB	12	13 → 11 ¹⁾	4.0	4.0
Decoupling tap/splitter outputs	dB	30	30	25	30
Trunk decoupling	dB	–	50	–	40
Max. remote feed current per satellite frequency plane	mA	1000			
Connections		F connectors			
Dimensions (W x H x D)	mm	112 x 148 x 54.5			
Packaging unit/weight	pc./kg	1(10)/0.39		1(10)/0.35	

¹⁾ Frequency-dependent attenuation

Connection example



EAX 2912 20510025
EBX 2920 20510022



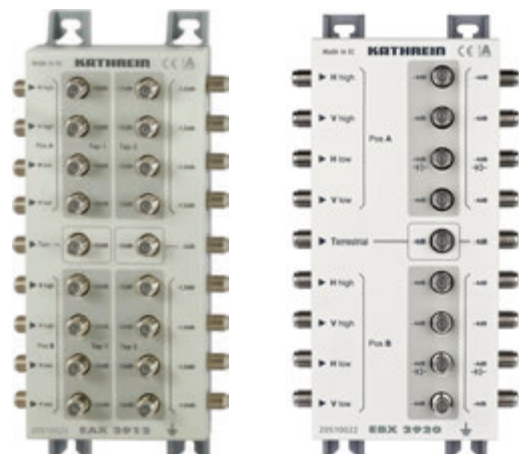
- 2-way tap and 2-way splitter for the Sat-IF distribution system (8 x Sat-IF)
- For signal splitting in large Sat-IF systems with 9-line multi-switch cascades
- For indoor installation

EAX 2912

- 2-way tap to connect two 9-line multi-switch cascades to a trunk line
- Nine 2-way taps (8 x Sat-IF and 1 x terrestrial range) in one housing
- Remote feeding via input → trunk output (8 x Sat IF); isolating capacitors on the tap outputs
- Cascadable with another EAX 2912 or EBX 2920

EBX 2920

- 2-way splitter to distribute a trunk line to two 9-line multi-switch cascades



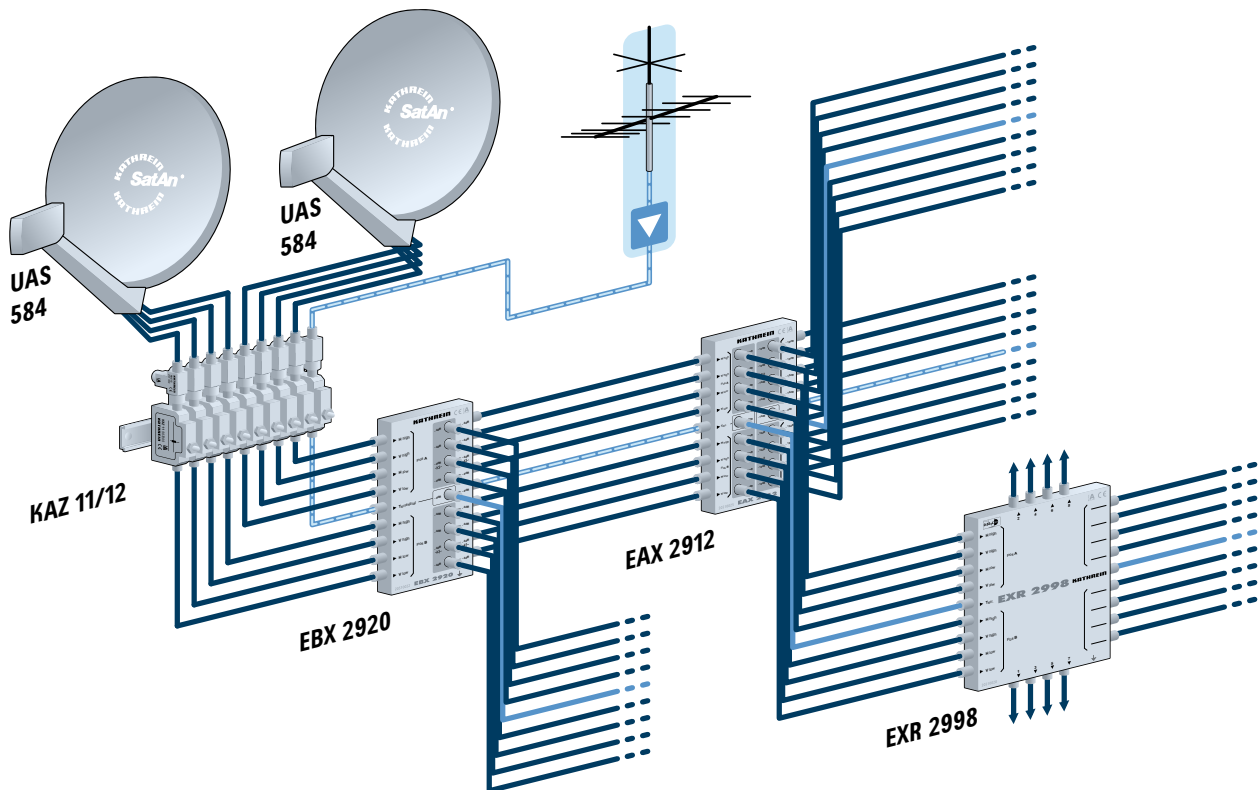
- Nine 2-way splitters (8 x Sat-IF and 1 x terrestrial range) in one housing
- Remote-feed capable via input → trunk output (8 x Sat-IF) and splitter output “horizontal low” (diode decoupling to trunk output); isolating capacitors on remaining splitter outputs
- Cascadable with additional EAX 2920 or EBX 2912

Technical data

Type | Order no.		EAX 2912 20510025		EBX 2920 20510022	
Inputs		1 x terrestrial	8 x Sat IF	1 x terrestrial	8 x Sat IF
Frequency range	MHz	5-862	950-2150	5-862	950-2150
Through loss → (input → trunk output)	dB	1.5 → 2 ¹⁾	0.8 → 1.5 ¹⁾	4.0	4.0
Connection loss (input → tap/splitter output)	dB	12	13 → 11 ¹⁾	4.0	4.0
Decoupling tap/splitter outputs	dB	30	30	25	30
Trunk decoupling	dB	-	50	-	40
Max. remote feed current per satellite frequency plane	mA	1000		1000	
Connections		F connectors		F connectors	
Dimensions (W x H x D)	mm	112 x 228 x 54.5		112 x 228 x 54.5	
Packaging unit/weight	pc./kg	1(10)/0.7		1(10)/0.6	

¹⁾ Frequency-dependent attenuation

Connection example



> Connection lines

EVL 165	20410005
EVL 340	20410030
EVL 980	20410031



EVL 165

- To connect two components with F connections
- Completely mounted with F-type quick-plugs
- Cables and plugs in black
- Frequency range: 0-2400 MHz

Technical data

Type | Order no.		EVL 165 20410005	EVL 340 20410030	EVL 980 20410031
Length	mm	165	340	980
Packaging unit/weight	pc./kg	5(50)/0.1	5(50)/0.15	5(50)/0.28

> Sat IF amplifier

VWS 04	20510057
---------------	----------



- To amplify the Sat-IF range (950-2150 MHz)
- With passive bypass for the terrestrial range (5-862 MHz)
- To amplify the signals for distribution to several receivers/ subscribers
- With integrated DC voltage bypass for LNB remote feeding (DC, 22-kHz and DiSEqC™ signal)
- Remote feeding via RF output
- For indoor installation

Technical data

Type | Order no.		VWS 04 20510057	
Reception range	MHz		
Gain	dB	-3	14-17 ¹⁾
Noise factor	dB	-	8
Max. output level 35-dB-IM2/IM3 ²⁾	dBμV	-	106
Remote power feed	V	+12 to +20	
Power consumption	mA	Typ. 28	
Remote feed current	mA	< 400	
Connections		F connector	
Dimensions	mm	74 x 46 x 21	
Packaging unit/weight	pc./kg	1/0.20	

¹⁾ The higher the frequency, the higher the gain ²⁾ Acc. to EN 60728-3

> Power supply unit

NCF 18 20510067



- High-quality switched-mode power supply unit for the Sat-IF distribution system
- Conforms to: EN 50083-2 and EN 60065
- Built-in EMC protection in F connector
- For local and remote feeding of Kathrein amplifiers, LNBS or multi-switches
- Complements the product family with Kathrein Power-Saving function
- Meets the requirements of the ErP Directive (2009/125/EC) under Regulation (EC) no. 278/2009



- Short-circuit proof, extremely efficient
- For indoor installation

Technical data

Type | Order no.		NCF 18 20510067
Nominal input voltage	V	230 (50-60 Hz)
Permissible input voltage range	V	207-253
Nominal input power at 0/200/400/600/800 mA load	W	0.15/4.7 8.8/12.6/17
Secondary voltage (short-circuit proof)	V=	18
Nominal secondary voltage	mA	Max. 800
Protection class/protection type		II (double insulated)/IP 30
DC connection		F connector
Ambient temperature range	°C	-20 to +55
Dimensions	mm	55 x 80 x 75
Packaging unit/weight	pc./kg	1(10)/0.15

> Splitter

EBC 10 272859

EBC 13 21610004

EBC 14 21610005



- Frequency range: 5-2400 MHz
- Remote feed capable: max. 24 V; 0.5 A
- Integrated decoupling diodes, current flow direction: OUT → IN
- Connections: F connectors
- Connection for potential equalisation
- Small dimensions
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation



EBC 10



EBC 13



EBC 14

Technical data

Type | Order no.			2-way	3-way	4-way
			EBC 10 272859	EBC 13 21610004	EBC 14 21610005
Through loss	5-47 MHz	dB	4	8	11
	47-862 MHz		5	8	10
	862-2150 MHz		6	10.5	11.5
	2150-2400 MHz		8	12	13.5
Decoupling	5-47 MHz	dB	10		
	47-862 MHz		20		
	862-2150 MHz		20-15		
	2150-2400 MHz		10		
Dimensions		mm	55 x 52 x 23	55 x 52 x 23	55 x 74 x 23
Packaging unit/weight		pc./kg	1 (10, 200)/0.1	1 (10, 200)/0.1	1 (10, 160)/0.1

> 5-way connector

EMU 250 20510044



- To connect two cascadable components of the Sat IF distribution system and single-cable system 4 x Sat-IF and 1 x terr. range (multi-switch loop-through of the EXR 25xx series and Sat distribution network amplifier VWS 2551)
- Frequency range: 0-2150 MHz
- Through loss: ≤ 0.3 dB
- Max. remote power feed/remote feed current: 20 V/1 A
- Packaging unit/weight (pc./kg): 1(10)/0.06

> 9-way connector

EMU 290 20510023



- To connect two cascadable components of the Sat IF distribution system and of the single-cable system 8 x Sat IF (multi-switch loop-through of the EXR 29xx series and VWS 2991 sat distribution network amplifier)
- Frequency range: 0-2150 MHz
- Through loss: ≤ 0.3 dB
- Max. remote power feed/remote feed current: 20 V/1 A
- Packaging unit/weight (pc./kg): 1(10)/0.1

IP Over Coax

➤	General information	176
➤	Multi-switch with built-in modem	177
➤	Single-cable multi-switch with built-in modem	179
➤	Modem	181
➤	High-pass filter	185
➤	Satellite single connection box	186

> General information

What is K-LAN?

Kathrein LAN system products will allow you to create a home network using the coaxial cable structure already existing in the house for your satellite reception system. The IP data packets and traffic will be distributed over the terrestrial frequency distribution cabling.

What does a K-LAN allow me to do?

The Kathrein LAN system is ideal to connect receivers, TV sets and Blu-ray players into a single network. In addition, a PC and other network-capable devices can easily be connected via a router (such as Fritz!Box).

What advantages does K-LAN offer me?

Using the existing structure of your satellite reception system significantly reduces the cost of installation – there is no need to install any new cables. Because of the outstanding transmission characteristics and the high screening factor of the coaxial cables, the IP signals are transmitted practically interference free - even over ranges of up to 700 m.

What will I need?

The EXI 01 modem is used to convert back the IP data at the subscriber outlets. If the multi-switch in your satellite reception system is not an EXI 3508, it need not be replaced – but an additional EXI 01 modem will be necessary to feed in the IP frequency range from the router into the coaxial cable network. Feeding in of any signals can be carried out at any point in the coaxial distribution system. For optimum performance we recommend using the EXI 30 outlet, which has been specially developed for the K-LAN system. This outlet offers the return path range on the satellite connection so that a modem can be remotely fed by the satellite receiver. This greatly simplifies the cabling, and means the modem does not require a power supply unit.

The same applies to the ESD 84 and ESD 32 outlets. One must ensure that the entire distribution system carrying the terrestrial frequencies (including the outlets) supports the frequency range 5-68 MHz.

Do I need any particular software to set up the system?

No software is required to install the Kathrein LAN system. Configuration is performed automatically.

Can my home network be viewed/accessed by others from outside?

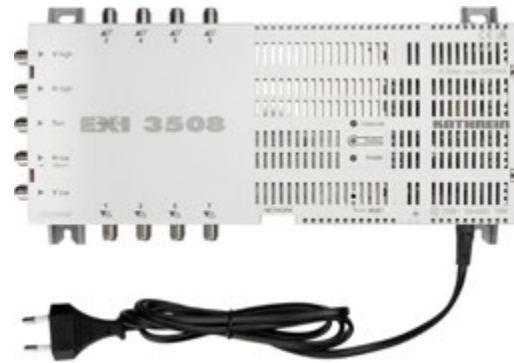
The built-in modem within the EXI 3508 multi-switch and the EXI 01 modem are each protected with a factory-set network key. Additional security is provided by the "pairing facility" of the modems, by which they agree between themselves on a secret network key. To prevent access and broadcasting in the IP frequency range via any connected terrestrial antenna, an EXI 90 high-pass filter is screwed onto the terrestrial input of the multi-switch. The high-pass filter is already incorporated in the EXI 3508 multi-switch. The home network and its outputs is delimited at this multi-switch alone, and is not accessible to others from outside.



> Multi-switch with built-in modem

EXI 3508

20510060



Multi-switch

- Cascadable multi-switch with a built-in modem for the distribution of four satellite frequency planes and terrestrial signals to up to eight receivers
- Creation of a home network using the existing terrestrial distribution of the multi-switch. The IP data is available at each subscriber outlet.

This reduces the cost of installation - no new network cables need be laid

- Built-in, highly-selective frequency diplexer for IP data
- The optimised distribution system of the EXI 3508 allows distances of > 700 m for the IP frequency range
- Built-in amplifier for low attenuation in sat band
- Built-in pre-emphasis to equalise cable attenuation
- Terrestrial signals are also receivable with the satellite receiver switched off
- Remote feed possibility via horizontal low input. All other inputs are voltage-free (enabling operation with UAS 585)
- For indoor installation

Built-in modem

- Modem for the Kathrein IP-over-coax system "K-LAN" (based on the IEEE 1901 standard)
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as Fritz!Box)
- > 500-Mbit data rate (gross) enables multiple HD streams during simultaneous data transmission between PCs. QoS*) allows services to be prioritised as desired
- High screening factor prevents interference
- 128 bit AES encryption: Secure private network connection at the touch of a button - no software required
- Existing outlets can continue to be used, providing they support the frequency range 5-68 MHz. Otherwise the use of the EXI 30 outlet specially developed for "K-LAN" is recommended**). This outlet allows remote feeding (supply) of the modem by the receiver. The IP frequency range is available at the satellite connection.
- Eco Power Mode: The modem automatically switches

to stand-by until it is "woken up" again by the network.

Consumption: 1.0 W in stand-by mode/4.2 W in operational mode

Accessories

- EXI 30 (order no. 21110024): Outlet remotely fed from the satellite connection, with optimum selection for data and HF signals
- EXI 01 free-standing modem (Order no. 20510061): For converting back the IP data at the subscriber outlets (for instance for connecting a satellite receiver using an Ethernet socket).
- EXI 90 high-pass filter (order no. 20510062): If additional multi-switches (not from EXI range) are used and the EXI 01 is used on one of these, then the high-pass filter must be screwed on the terrestrial input of the multi-switch. This isolates the downstream multi-switch in the cascade and prevents reception and emission in the IP frequency range by and from the terrestrial antenna. The high-pass filter is already incorporated in the EXI 3508

*) Quality of Service **) Alternatively, the outlets ESD 84 and ESD 32 can be used

Technical data

Type | Order no.		EXI 3508 20510060	
Multi-switch			
Subscriber connections		8	
Inputs		1 x terrestrial	4 x Sat IF
Frequency ranges	MHz	87.5-862	950-2150
Frequency range (subscribers)	MHz	2-68/87.5-862	950-2150
Attenuation ¹⁾	dB	-15 → 17	5 → 0
Horiz./vert. decoupling	dB	-	25
Subscriber decoupling	dB	28/40	25
Max. output level ²⁾	dBμV	-	110
Vertical/horizontal input control	V	12-14.5/16-19	
Low/High band control	kHz	0/22	
Current consumption per subscriber	mA	20	
Nominal input voltage	V	230 (50-60 Hz)	
Permissible input voltage range	V	207-253	
Nominal input power at 0/150/500 mA load ³⁾	W	1/4/10	
Secondary voltage ⁴⁾	V	18	
Max. total remote feed current ⁴⁾	mA	500	
Max. permissible remote feed current per trunk	mA	-	
Protection class/protection type		II (double insulated)/IP 30	
Ambient temperature range	°C	-20 to +55	
Connections		F connectors	
Dimensions (W x H x D)	mm	295 x 148 x 42.5	
Packaging unit/weight	pc./kg	1 (10)/approx. 0.7	
Built-in modem			
Frequency range IP (IEEE 1901)	MHz	2-68 ⁵⁾	
Gross data rate	Mbit	500	
Max. power consumption of the modem	mA	350	
Power consumption at max. data rate	W	Approx. 4.2	
Power consumption in stand-by	W	Approx. 1.0	
Connections		RJ 45	
Standard supported		IEEE 1901	

¹⁾ Frequency-dependent attenuation ²⁾ According to EN 60728-3, 35 dB IMA ³⁾ Modem in standby mode ⁴⁾ Via "horizontal low" input ⁵⁾ Currently used: 8-68 MHz

Single-cable multi-switch with built-in modem

EXI 3591

20510065



Multi-switch

- Cascadable single-cable multi-switch with a built-in modem for the distribution of Sat IF signals (four satellite frequency planes) and terrestrial signals to up to nine receivers
- The selected transponder is transmitted by the multi-switch on a fixed frequency (userband), controlled by the receiver with a DiSeqC™ command set conforming to EN 50494
- The multi-switch supports the extended SCD2 single-cable command set, conforming to EN 50607
- The EN 50607 extended command set allows all userbands to be addressed; the standard EN 50494 only allows addressing of userbands 1-8
- Terrestrial signals can be received even when the satellite receiver is switched off
- Each receiver is assigned a fixed subscriber frequency (userband) (a twin receiver requires two subscriber frequencies)
- Creation of a home network using the existing terrestrial distribution. The IP data is available at the subscriber outlet. This reduces the cost of installation - no new network cables need be laid
- PIN code: Protects the user frequency from being accessed by another user. This enables installation across more than one residence
- The built-in AGC (Automatic Gain Control) ensures that the Sat IF signals have a constant output level
- Built-in, highly-selective frequency diplexer for IP data
- Low power consumption due to high-efficiency, short-circuit proof switched-mode power supply unit and power-saving concept (the single-cable multi-switch is powered by the receiver connected to it and switched off whenever the receiver is switched off)
- Kathrein Power-Saving: LNB supply is switched off as soon as all receivers are inactive. This function can be deactivated if loop-through multi-switches without "Kathrein Power-Saving" are used in the cascade
- LNB remote feeding via the horizontal low input. Kathrein Power-Saving is signalled via the "vertical low" trunk. All other inputs are voltage-free
- For indoor installation

Built-in modem

- Modem for the Kathrein IP-over-coax system "K-LAN" (based on the IEEE 1901 standard)
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as Fritz!Box)
- > 500-Mbps data rate (gross) allow multiple HD streams with simultaneous data transmission between PCs. QoS^{*)} allows services to be prioritised as desired
- High screening factor prevents interference
- 128 bit AES encryption. Secure private network connection at the touch of a button - no software required
- Eco Power Mode: The modem automatically switches to stand-by until it is "woken up" again by the network. Consumption: 1.0 W in stand-by mode/4.2 W in operational mode

Accessories

- EXI 30 (order no. 21110024): Outlet remotely fed from the satellite connection, with optimum selection for data and HF signals
- EXI 01 free-standing modem (Order no. 20510061): For converting back the IP data at the subscriber outlets (for instance for connecting a satellite receiver using an Ethernet socket).
- EXI 90 high-pass filter (order no. 20510062): If additional multi-switches (not from EXI range) are used and the EXI 01 is used on one of these, then the high-pass filter must be screwed on the terrestrial input of the multi-switch. This isolates the downstream multi-switch in the cascade and prevents reception and emission in the IP frequency range by and from the terrestrial antenna. The high-pass filter is already incorporated in the EXI 3591

^{*)} Quality of Service

Technical data

Type | Order no.		EXI 3591 20510065	
Multi-switch			
Subscriber connections		9	
Inputs		1 x terrestrial	4 x Sat IF
Frequency range	MHz	87.5-862	950-2150
Connection loss (terrestrial)	dB	9	–
Sat (AGC) output level	dB μ V	–	88
Horiz./vert. decoupling	dB	–	30
Sat input level	dB μ V	55-80	
Subscriber frequency/userband:	MHz	2-68/87.5-862	
Receiver 1	Receiver 5	974/1	1382/5
Receiver 2	Receiver 6	1076/2	1484/6
Receiver 3	Receiver 7	1178/3	1586/7
Receiver 4	Receiver 8	1280/4	1688/8
	Receiver 9		1790/9
Screening factor	dB	5-300 MHz > 85 300-470 MHz > 80 470-1000 MHz > 75 1000-2400 MHz > 55	
Permissible supply voltage at the subscriber outlet	V	12-14	
Max. current consumption at the subscriber connection	mA	10	
Nominal input voltage	V	230 (47-63 Hz)	
Permissible input voltage range	V	207-253	
Nominal input power at 0/150/300 mA load ¹⁾	W	6.1/9.2/12.2	
Secondary voltage (input horiz. low)	V	18	
Max. permissible remote feed current (input horiz. Low) ²⁾	mA	300	
Protection class/protection type		II (double insulated)/IP 30	
Ambient temperature range	°C	-20 to +55	
Connections		F connectors	
Dimensions (W x H x D)	mm	295 x 148 x 42.5	
Packaging unit/weight	pc./kg	1 (10)/approx. 0.7	
Built-in modem			
Frequency range IP (IEEE 1901) ³⁾	MHz	2-68	
Gross data rate	Mbit	500	
power consumption of the modem	mA	Max. 200	
Power consumption at max. data rate	W	Approx. 4.2	
Power consumption in stand-by	W	Approx. 1.0	
Connections		RJ 45	
Standards supported		IEEE 1901	

¹⁾ All new subscriber frequencies / Userbands in operation ²⁾ About input "horizontal low" ³⁾ Of which currently used: 8-68 MHz

> Modem

EXI 01 20510061



Modem

- Modem for the Kathrein IP-over-coax system "K-LAN" (based on the IEEE 1901 standard)
- Creation of a home network using the existing terrestrial coax distribution of the satellite system. This reduces the cost of installation – no new network cables need be laid
- Ideal for the network connection of receivers, TV sets and Blu-ray players. In addition, a PC and other network-capable devices can easily be connected via a router (such as Fritz!Box)
- > 500-Mbit data rate (gross) enables multiple HD streams during simultaneous data transmission between PCs. QoS*) allows services to be prioritised as desired
- Built-in, highly selective diplexer – no interference between FM, TV and satellite signals. No additional splitters are necessary
- High screening factor prevents interference
- One input (IP & FM/TV/Sat); one output (1 x FM/TV/Sat); 1 x Ethernet RJ 45. DC is looped through
- 128 bit AES encryption: Secure private network connection at the touch of a button - no software required
- In conjunction with the optimised EXI 3508 distribution system, distances of > 700 m are achievable in the IP frequency range
- The modem can be remotely fed by the connected satellite receiver, using the port on the EXI 30 outlet. In all other cases the power is supplied by the plug-in power supply unit. The EXI 30 outlet has been specially developed for the K-LAN**)
- Eco Power Mode: The modem automatically switches to stand-by until it is "woken up" again by the network. Consumption: 0.5 W in stand-by mode 4.2 W in operational mode
- For indoor installation
- Scope of supply:
 - EXI 01
 - Plug-in power supply unit
 - Network cable (length: 1.5 m with RJ 45 plug)

Accessories

- EXI 90 high-pass filter (order no. 20510062): If the EXI 01 is operated via a multi-switch not from the EXI range the high-pass filter must be screwed on to the terrestrial input of the multi-switch. This isolates the downstream multi-switch and prevents reception and emission in the IP frequency range by and from the terrestrial antenna
- EXI 30 (order no. 21110024): Outlet remotely fed from the satellite connection, with optimum selection for data and HF signals

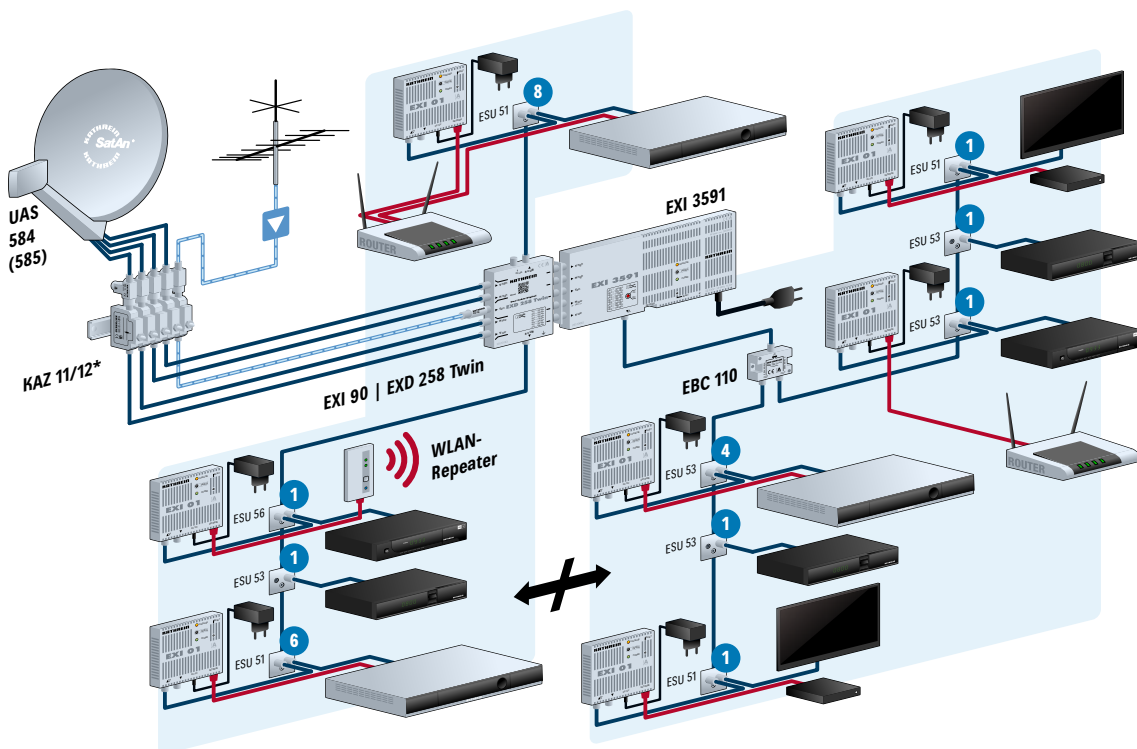
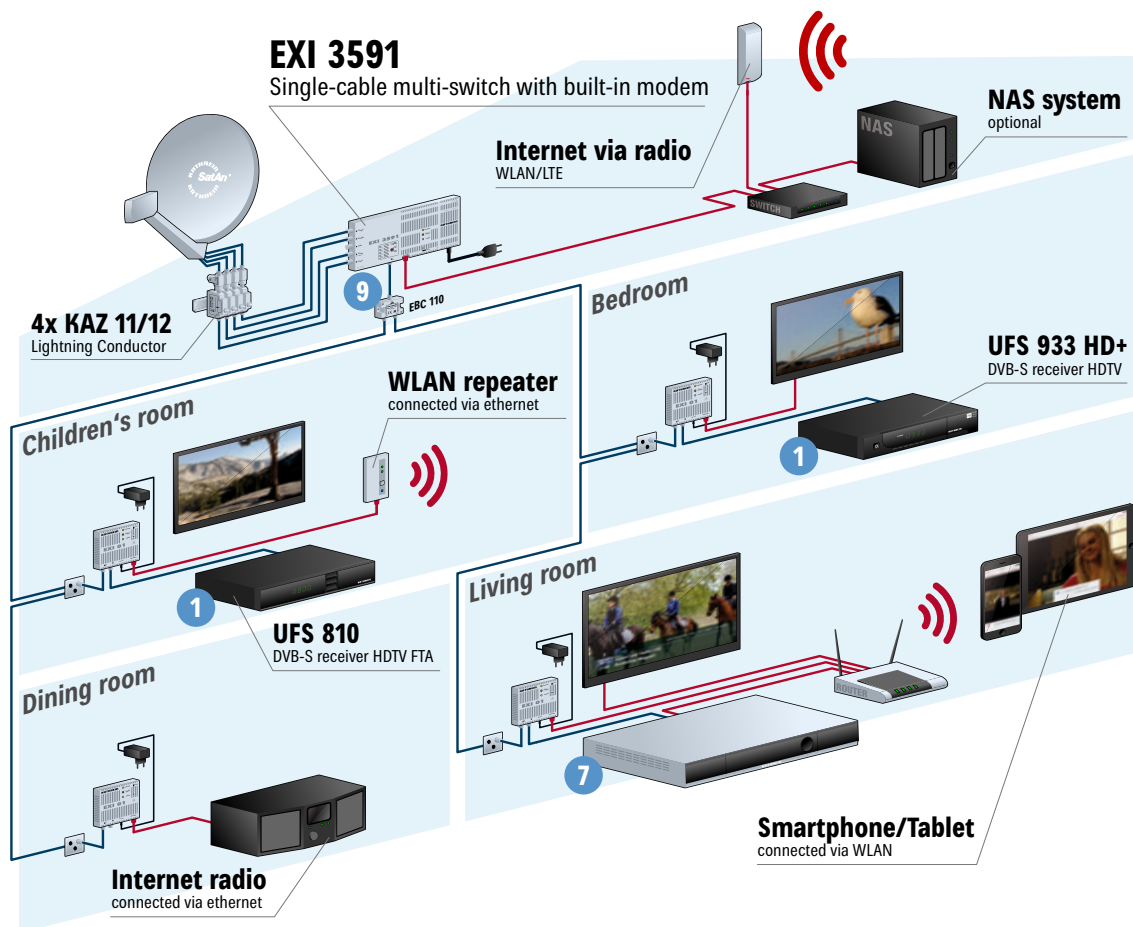
*) Quality of Service **) Alternatively, the outlets ESD 84 and ESD 32 can be used

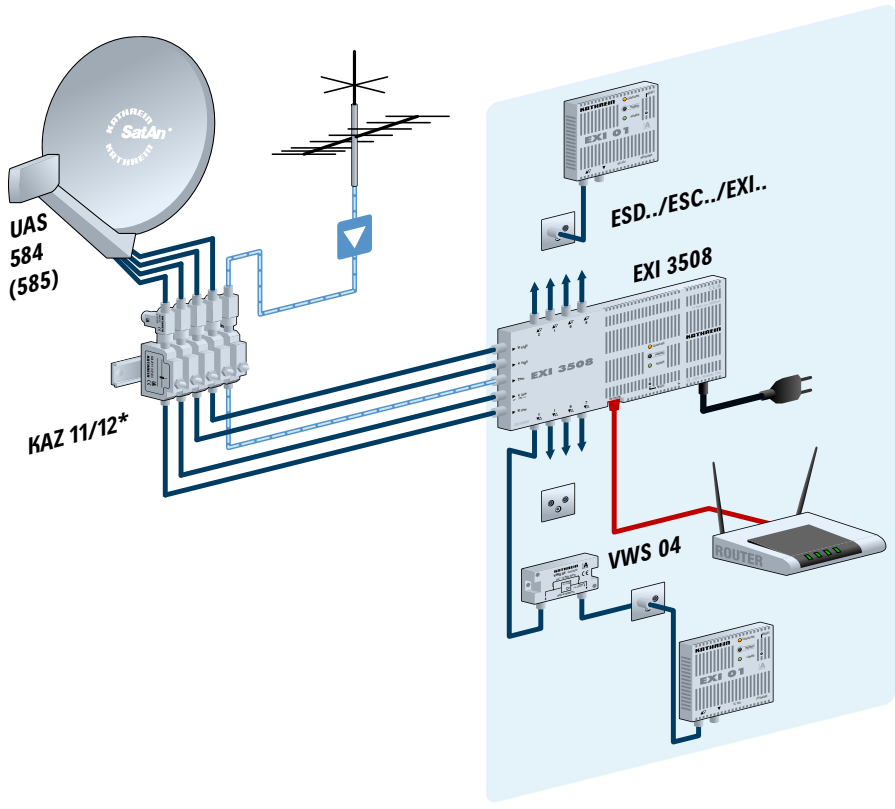
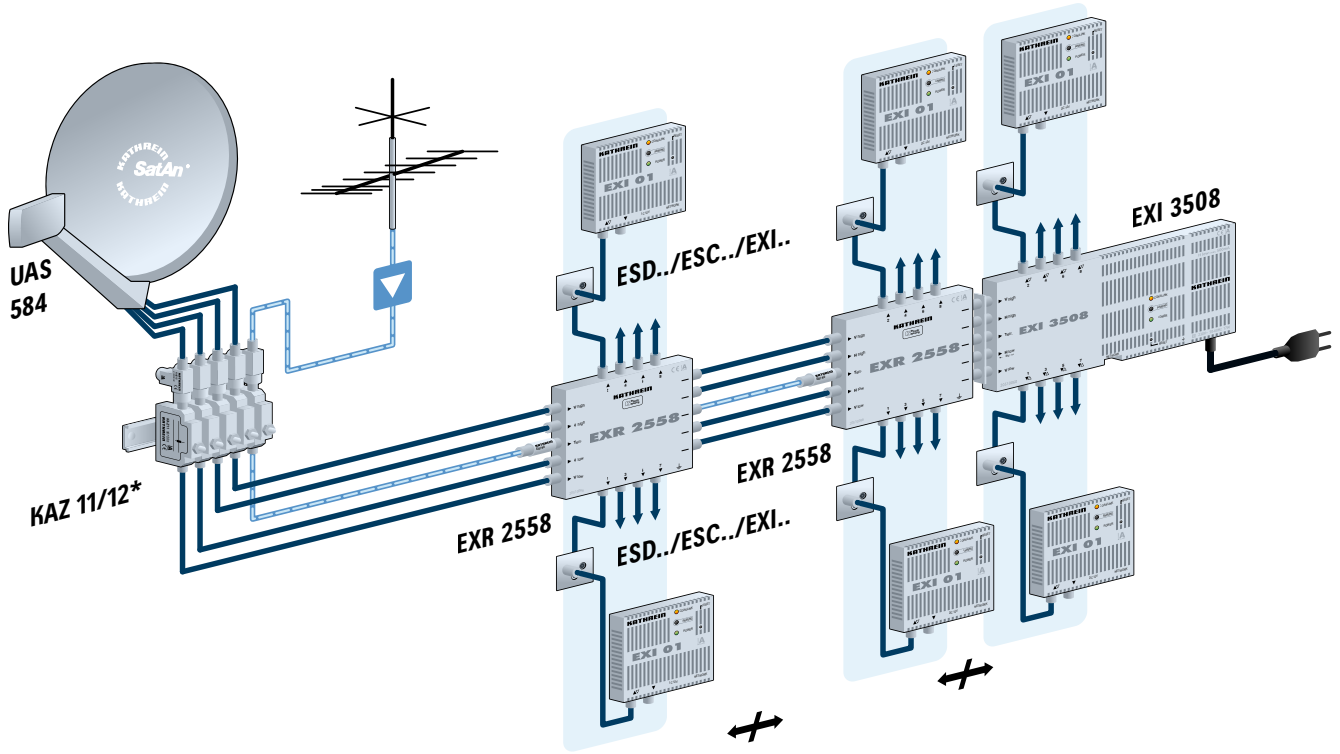
Technical data

Type | Order no.		EXI 01 20510061	
Input – output		1 x DC & IP & FM & TV & Sat	1 x DC & FM & TV & Sat
Frequency range	MHz	2–2150	87.5–2150
Frequency range IP (IEEE 1901)	MHz	2–68 ¹⁾	–
Through loss	dB	–	1
Screening factor	dB	5-300 MHz > 85 300-470 MHz > 80 470-1000 MHz > 75 1000-2150 MHz > 55	
Permissible remote power feed at the output	V	12-20	
Max. power consumption of the modem	mA	350	
Power consumption at max. data rate	W	Approx. 4.2	
Power consumption in stand-by	W	Approx. 0.5	
Permissible current consumption of the multi-switch from the receiver when remotely fed	mA	50 ²⁾	
Gross data rate	Mbps	500	
Ambient temperature range	°C	0 to +40	
Connections		F connectors / RJ 45/5.5 x 2 mm latching plug	
Standard supported		IEEE 1901	
Dimensions (W x H x D)	mm	104 x 101 x 29.5	
Packaging unit/weight	pc./kg	1 (10)/approx. 0.35	
Power supply unit			
Nominal input voltage	V	230	
Voltage secondary	V	12	
Max. output current	mA	600	
Nominal input power (300/0 mA load)	W	4.5/0.25	
In compliance with		2009/125/EC in accordance with regulations 278/2009/EC, 2006/95/EC together with the standards current at the time of delivery	

¹⁾ Currently in use: 8–68 MHz ²⁾ When the plug-in power supply unit is used, 250 mA of the receiver can be transmitted to connected subscribers

Connection examples





> High-pass filter

EXI 90

20510062

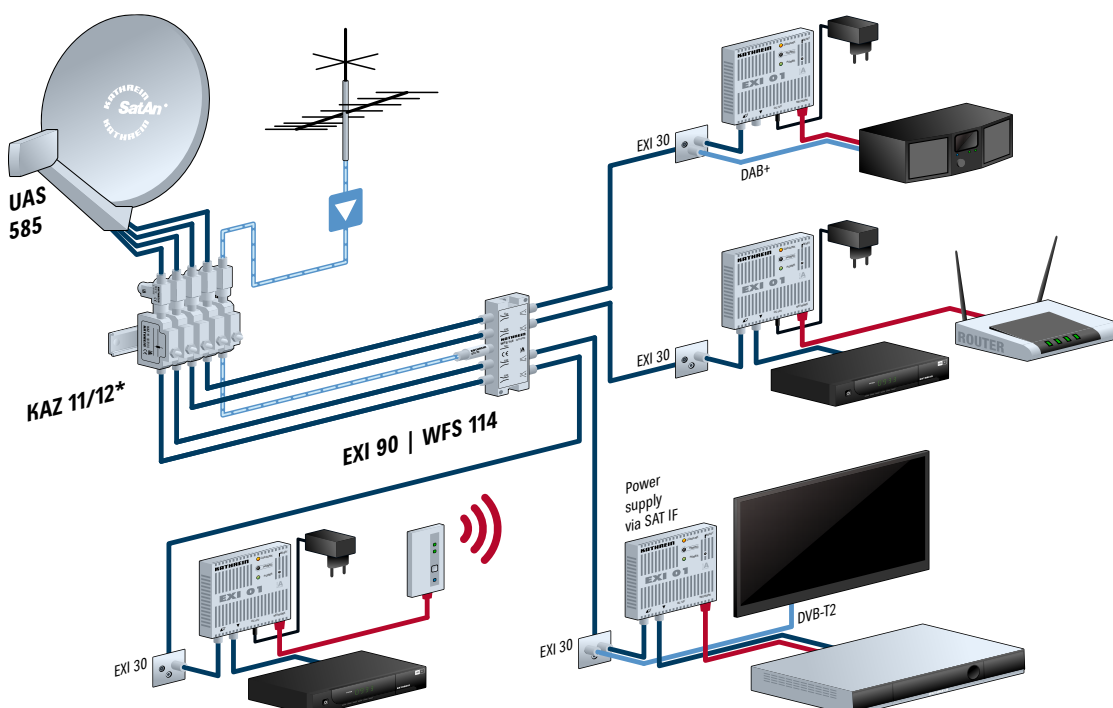


- High-pass filter to adapt Kathrein multi-switches to the Kathrein IP-over-coax system
- Plug-on filter for the terrestrial input to suppress the return path range from 2 to 68 MHz.
- Suppresses radiation of IP data to, and irradiation of IP data from the terrestrial antenna.
- For indoor installation
- When used within a cascade, the IP data networks (return IP data range) of the individual multi-switches are separated from each other. Connected modems have access to the full bandwidth of the multi-switches (no sharing with modems from other households)

Technical data

Type | Order no.		EXI 90 20510062
Input / output		1/1
Through loss frequency range	MHz	87.5-862
Trap frequency range	MHz	0-68
Through loss	dB	0.5-2
Ambient temperature range	°C	-20 to +55
Connections		F connectors
Dimensions (length x diameter)	mm	51 x 14
Packaging unit/weight	pc./kg	1(10)/0.015

Connection example



> Satellite single connection box

EXI 30 21110024

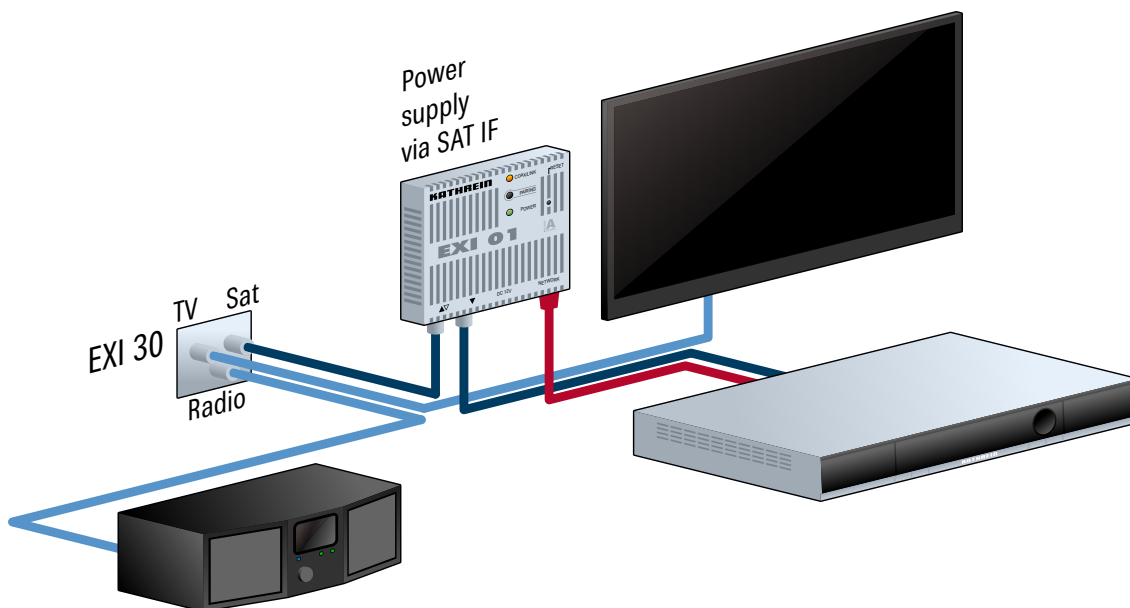


- Satellite single connection box, 3-way, for stub and star distribution systems in satellite house distribution systems.
- For the use of the Kathrein home networking technology "K-LAN" with EXI 01 and EXI 3508 – return path frequency range is available at the satellite connection and thus simplifies wiring
- Ingress noise blocking function stops irradiation of unwanted interference signals from the subscriber terminal
- Satellite connection with DC voltage passage (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal)
- TV and radio connection are selectively filtered for optimal reception parameters
- Robust die-cast housing
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Can be combined with nearly all installation programmes
- Connections:
 - TV - IEC (male)
 - Radio - IEC (female)
 - - Sat IF & modem - F (female)
- Conforms to: EN 60728-11 and EN 50083-2
- Packaging unit/weight (pc./kg): 10/1.0

Technical data

Type | Order no.	Connection	Attenuation (dB)	Frequency range (MHz)				
			0-68 Return	87.5-108 FM	118-470 VHF	470-862 UHF	950-2150 Sat-IF
EXI 30 21110024	TV: IEC (plug)	Connection loss			1.0	1.0	
	Radio: IEC (socket)			2.0			
	Sat: F (socket)		1.0				1.0

Connection example



Single Cable System

➤ General information	188
➤ Frequency assignment	189
➤ Single-cable mini-multi-switch	190
➤ Single-cable multi-switch	191
➤ Sat IF tap / splitter	199
➤ 5-way connector	200
➤ 9-way connector	200
➤ Single-cable sockets	201
➤ Programming device	204

> General information

Standard EN 50494

The single-cable standard in accordance with EN 50494 (SCR CENELEC) is used to distribute satellite TV signals. Several receivers are connected to a single output, which is not possible with the sat IF distribution system. In contrast to conventional one-cable solutions with limited transmitter selection, the complete programme spectrum is available in the SCR single-cable standard. Instead of the transmission of a complete frequency band, each receiver has a specific frequency available in the range of 950 to 2,150 MHz. The receiver communicates the polarity and transponder of the desired channel to the LNB or multi-switch using special DiSEqC™ commands. The transponder is then modulated to the frequency range of the receiver. Special DiSEqC™ switching signals are required for controlling a single-cable LNB, which is why only digital satellite receivers that support this standard can be used. The basis for this technology is the European EN 50494 standard.

In principle, all receivers that meet this standard, can be operated in a single-cable system. Conversely, these SCR receivers can also be used on all other satellite reception systems.

Standard EN 50607

The new single-cable standard in accordance with EN 50607 is an extension of the previous single-cable standard. It offers the following possibilities:

- 64 satellite polarities and 32 subscribers
- More precise frequency tuning (1 MHz instead of 4 MHz)
- Bi-directional communication

Signalling is based on the DiSEqC™ protocol with a clock frequency of 22 kHz. The data content is optimised for single-cable commands, enabling shorter transmission times.

All new Kathrein multi-switches are compatible with the EN 50494 standard.

> Frequency assignment

		Multi-switch							
		EXD 158 Twin EXD 258 Twin	EXD 1524 EXD 2524		EXD 1532 EXD 2532				EXE 1581 EXE 2581
Subscriber frequency (MHz)	Modes		8 UB	12 UB	8 UB	16 UB	24 UB	30 UB	
	UB 1	1284	1284	974	975	975	975	970	1284
	UB 2	1400	1400	1076	1025	1025	1025	1010	1400
	UB 3	1516	1516	1178	1075	1075	1075	1050	1516
	UB 4	1632	1632	1280	1125	1125	1125	1090	1632
	UB 5	1748	1748	1382	1175	1175	1175	1130	1748
	UB 6	1864	1864	1484	1225	1225	1225	1170	1864
	UB 7	1980	1980	1586	1275	1275	1275	1210	1980
	UB 8	2096	2096	1688	1325	1325	1325	1250	2096
	UB 9 ^{*)}			1790		1375	1375	1290	
	UB 10			1892		1425	1425	1330	
	UB 11			1994		1475	1475	1370	
	UB 12			2096		1525	1525	1410	
	UB 13					1575	1575	1450	
	UB 14					1625	1625	1490	
	UB 15					1675	1675	1530	
	UB 16					1725	1725	1570	
	UB 17						1775	1610	
	UB 18						1825	1650	
	UB 19						1875	1690	
	UB 20						1925	1730	
	UB 21						1975	1770	
	UB 22						2025	1810	
	UB 23						2075	1850	
	UB 24						2125	1890	
	UB 25							1930	
	UB 26							1970	
	UB 27							2010	
	UB 28							2050	
	UB 29							2090	
UB 30							2130		

^{*)} Starting from UB 9, SCD 2 is required

Single-cable mini-multi-switch

EXR 221 20510059

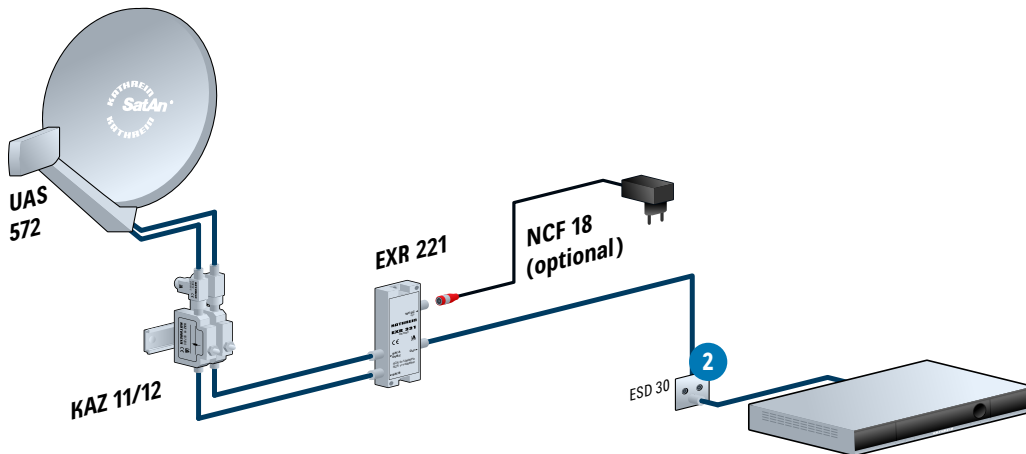


- Single-cable mini-multi-switch for distribution of digital Sat IF signals (including HDTV) and terrestrial signals via one cable to one twin receiver or two single receivers in a single-family household
- No limitation in the number of programmes – the complete range of channels of up to two satellites is transmitted
- The single-cable mini-multi-switch does not contain its own switching matrix. It is therefore driven from two free connections of a multi-switch (such as EXR 2908) or from two connections of a twin or quad feed system (such as UAS 585)
- When all receivers are switched off, the single-cable mini-multi-switch draws no current
- For transponder selection special tuner modules called SCRs (Satellite Channel Routers) are incorporated in the single-cable mini-multi-switch for conversion to the subscriber frequencies
- Each receiver is assigned a fixed subscriber frequency (a twin receiver requires two subscriber frequencies)
- Conforms to the SCR single-cable standard in accordance with EN 50494, i.e. all receivers connected to the device must also conform to this standard
- The terrestrial range 5-862 MHz can be received via the input A even when the satellite receiver is switched off
- For the operation of a feed system with more than 80 mA or multi-switches with a current drain of more than 2 x 40 mA, the NCF 18 plug-in power supply unit (not included in delivery scope) must be connected to the female connector marked "DC"
- For indoor installation

Technical data

Type Order no.		EXR 221 20510059		
Subscriber connections		1 x 2		
Inputs		1 x terrestrial	2 x Sat IF	
Frequency range	MHz	5-862	950-2150	
Connection loss (terrestrial)	dB	1	–	
Gain to the subscriber connection (Sat)	dB	–	0	
Decoupling inputs	dB	–	30	
Operating level	dBµV	–	85	
Subscriber frequency / SCR address:				
Receiver 1	Receiver 2	MHz	1284/0	1400/1
Permissible supply voltage at the subscriber outlet		V	12-14	
Remote power feed to the inputs		V	18.4	13.3
Max. remote feed current	supply from receiver	mA	80	
	supply from power supply unit		250	
Ambient temperature range		°C	-20 to +55	
Connections			F connectors	
Dimensions (W x H x D)		mm	117 x 35 x 23	
Packaging unit/weight		pc./kg	1(10)/0.2	

Connection example



> Single-cable multi-switch

EXD 158 Twin 20510142
EXD 258 Twin 20510143



- Third-generation single-cable multi-switch – digital channel-stacking switch (dCSS) with the newest Full-Band Capture technology
- Multi-tuner devices can be supplied with a multitude of userbands on one drop cable
- User-band frequencies compatible with the previous Kathrein models
- EN 50494 single-cable command set and the new, extended EN 50607 (SCD 2) command set are supported
- Terrestrial signals can be received even when the satellite receiver is switched off
- Due to the power-saving concept, the multi-switch consumes no energy from the NCF 18 if all receivers are switched off. If Kathrein Power-Saving is active, the power supply for the LNB is also turned off
- PIN code: Protects the user frequency from being accessed by another user. This enables installation across more than one residence
- LED as an installation aid and for troubleshooting
- The built-in AGC (Automatic Gain Control) ensures that the Sat IF signals have a constant output level
- The EXD 158 Twin single-cable multi-switch can be combined as desired with additional loop-through multi-switches such as EXR 2558, EXR 2554, EXD 2532 and EXD 2524
- Up to eight multi-switches can be cascaded
- For indoor installation

EXD 158 Twin

- Single-cable multi-switch with 2 x 8 userbands and external power supply unit (NCF 18) for the LNB supply
- Kathrein Power-Saving can be switched on and off using the rotary switch

NCF 18

- Highly efficient, short-circuit-proof switched-mode power supply unit in accordance with the ERP guideline

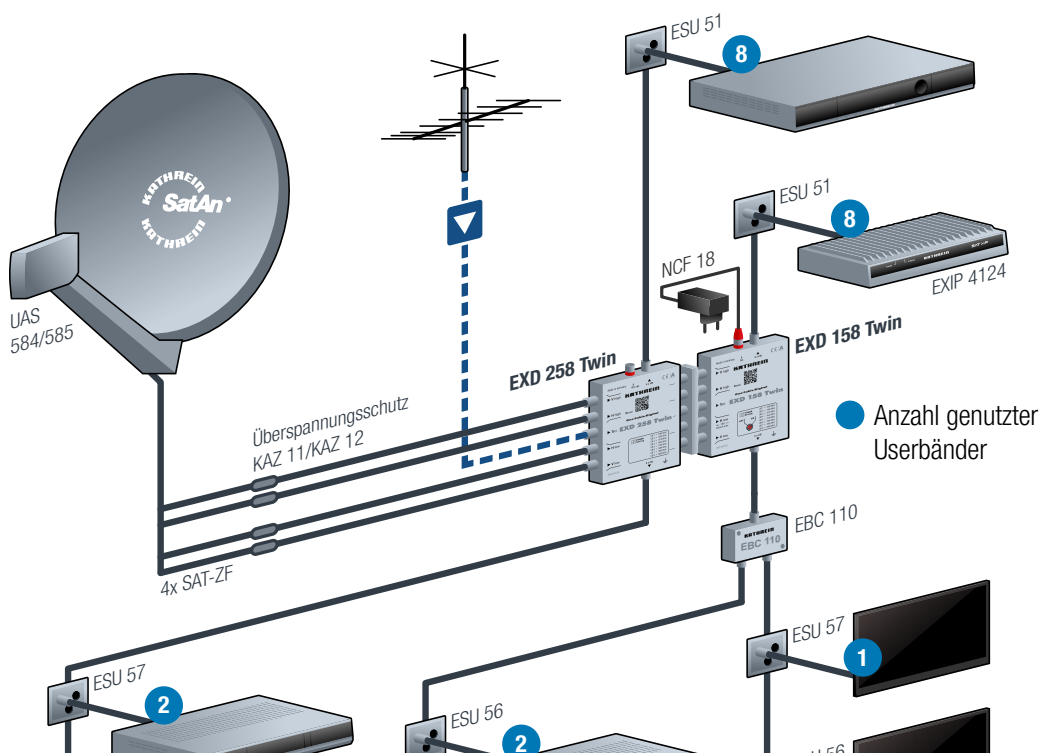
EXD 258 Twin

- Loop-through multi-switch to extend the system by adding two single-cable connections with 8 userbands each
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.
- Optional power supply of the multi-switch using the NCF 18 (**LNB is not supplied!**)

Technical data

Type Order no.		EXD 158 Twin 20510142	EXD 258 Twin 20510143
Subscriber connections		2 x 8	
Inputs		1 x terrestrial/4 x Sat IF	
Frequency range	MHz	5-862/950-2150	
Connection loss (terrestrial)	dB	11/-	
Through loss	dB	-/-	3/1.5
Sat (AGC) output level	dBµV	94	94
Horiz./vert. decoupling	dB	-/30	-/30
Trunk decoupling	dB	-/-	-/40
Sat input level	dBµV	60-90	60-90
Userband/subscriber frequency	MHz	See "Frequency assignment" on page 189.	
Permissible supply voltage at the subscriber outlet	V	12-14	
Max. current consumption at the subscriber connection	mA	20	With power supply unit 20 Without power supply unit 450
Max. supply voltage at DC connection	V	18.6	18.6
Max. permissible remote feed current (input horiz. low)	mA	500	-
Max. permissible remote feed current per trunk	mA	-	1000
Protection class		IP 30	IP 30
Ambient temperature range	°C	-20 to +55	-20 to +55
Connections		F connectors	F connectors
Dimensions (W x H x D)	mm	102.8 x 148 x 44	111.5 x 148 x 44
Packaging unit/weight	pc./kg	1(10)/0.51	1(10)/0.4

Connection example



EXD 1524 20510137

EXD 2524 20510138



- Third-generation single-cable multi-switch – digital channel-stacking switch (dCSS) with the newest Full-Band Capture technology
- Cascadable twin multi-switch. For both outputs, various configurations/numbers of userbands can be selected using the rotary switch
- User-band frequencies compatible with the previous Kathrein models
- Multi-feed by means of an easy connection of the outputs with the splitter (EBC 110)
- EN 50494 single-cable command set and the new, extended EN 50607 (SCD 2) command set are supported
- Guaranteed future due to wideband technology (broadband inputs); up to four satellite positions possible due to wideband LNBs
- The built-in AGC (Automatic Gain Control) ensures that the Sat IF signals have a constant output level and more reserve in the distribution
- Multi-tuner devices can be supplied with a multitude of userbands on one drop cable
- Terrestrial signals can be received even when the satellite receiver is switched off
- PIN code: Protects the user frequency from being accessed by another user. This enables installation across more than one residence
- Up to eight multi-switches can be cascaded
- Due to the power-saving concept, the multi-switch consumes no energy from the NCF 18 if all receivers are switched off. If Kathrein Power-Saving is active, the power supply for the LNB is also turned off.
- LED as an installation aid and for troubleshooting
- QR code for installation examples and instructions for use
- The EXD 1524 single-cable multi-switch can be combined as desired with additional loop-through multi-switches such as EXR 2558, EXR 2554, EXD 2532 and EXD 2524
- For indoor installation

EXD 1524

- Configurable single-cable multi-switch for up to 24 userbands and external power supply unit for the LNB supply
- Kathrein Power-Saving can be switched on and off using the rotary switch

NCF 18

- Highly efficient, short-circuit-proof switched-mode power supply unit in accordance with the ERP guideline

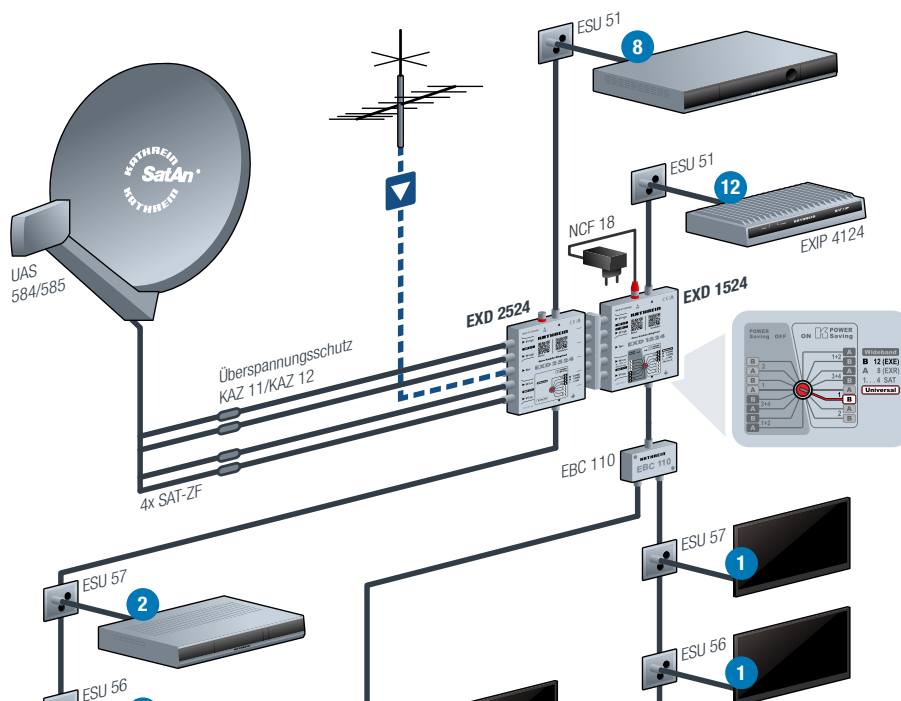
EXD 2524

- Configurable loop-through multi-switch to extend the system by adding two single-cable connections for up to 24 userbands
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.
- Optional power supply of the multi-switch using the NCF 18 (**LNB is not supplied!**)

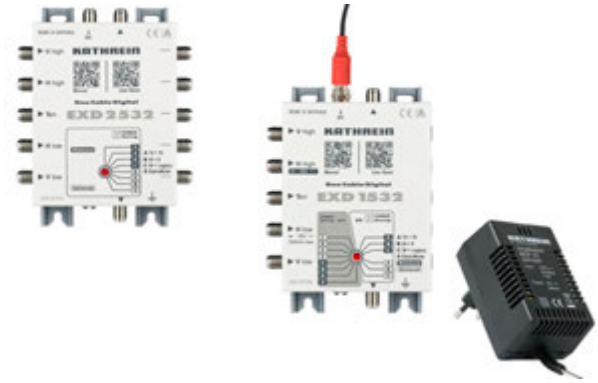
Technical data

Type		EXD 1524 20510137	EXD 2524 20510138
Order no.			
Subscriber connections		2 x 8 or 2 x 12	
Inputs		1 x terrestrial/4 x Sat IF	
Frequency range	MHz	5-862/300-2350	
Connection loss (terrestrial)	dB	11/-	
Through loss	dB	-/-	3/1.5
Sat (AGC) output level	dBµV	94	94
Horiz./vert. decoupling	dB	-/30	-/30
Trunk decoupling	dB	-/-	-/40
Sat input level	dBµV	60-90	60-90
Userband/subscriber frequency	MHz	See "Frequency assignment" on page 189.	
Permissible supply voltage at the subscriber outlet	V	12-14	
Max. current consumption at the subscriber connection	mA	20	With power supply unit 20 Without power supply unit 450
Max. supply voltage at DC connection	V	19	19
Max. permissible remote feed current (input horiz. low)	mA	500 (2x 250 for wideband)	-
Max. permissible remote feed current per trunk	mA	-	1000
Protection class		IP 30	IP 30
Ambient temperature range	°C	-20 to +55	-20 to +55
Connections		F connectors	F connectors
Dimensions (W x H x D)	mm	102.8 x 148 x 44	111.5 x 148 x 44
Packaging unit/weight	pc./kg	1(10)/0.51	1(10)/0.4

Connection example



EXD 1532 20510104
EXD 2532 20510105



- Third-generation single-cable multi-switch – digital channel-stacking switch (dCSS) with the newest Full-Band Capture technology
- Cascadable twin multi-switch. For both outputs, various configurations/numbers of userbands can be selected using the rotary switch
- 32 userbands (16 + 16) on **two** outputs for maximal operational reliability and lean distribution
- Max. 30 userbands on one output, legacy function on the second output
- Static mode: 27 transponders pre-assigned with channels, operation without DiSEqC™ possible, programming with the SWP 50 programming device (see Page 204)
- Userband editor for programming in static mode (download from www.kathrein.com)
- EN 50494 single-cable command set and the new, extended EN 50607 (SCD 2) command set are supported
- Guaranteed future due to wideband technology (broadband inputs); up to two satellite positions possible due to wideband LNBs
- The built-in AGC (Automatic Gain Control) ensures that the Sat IF signals have a constant output level and more reserve in the distribution
- Multi-tuner devices can be supplied with a multitude of userbands on one drop cable
- Terrestrial signals can be received even when the satellite receiver is switched off
- PIN code: Protects the user frequency from being accessed by another user. This enables installation across more than one residence
- Up to eight multi-switches can be cascaded
- Due to the power-saving concept, the multi-switch consumes no energy from the NCF 18 if all receivers are switched off. If Kathrein Power-Saving is active, the power supply for the LNBs is also turned off.
- LED as an installation aid and for troubleshooting
- QR code for userbands and instructions for use
- The EXD 1532 single-cable multi-switch can be combined as desired with additional loop-through multi-switches such as EXR 2558, EXR 2554, EXD 2532 and EXD 2524
- For indoor installation

EXD 1532

- Configurable single-cable multi-switch for up to 32 userbands, static mode and external power supply unit for the LNB supply
- Kathrein Power-Saving can be switched on and off using the rotary switch

NCF 18

- Highly efficient, short-circuit-proof switched-mode power supply unit in accordance with the ERP guideline

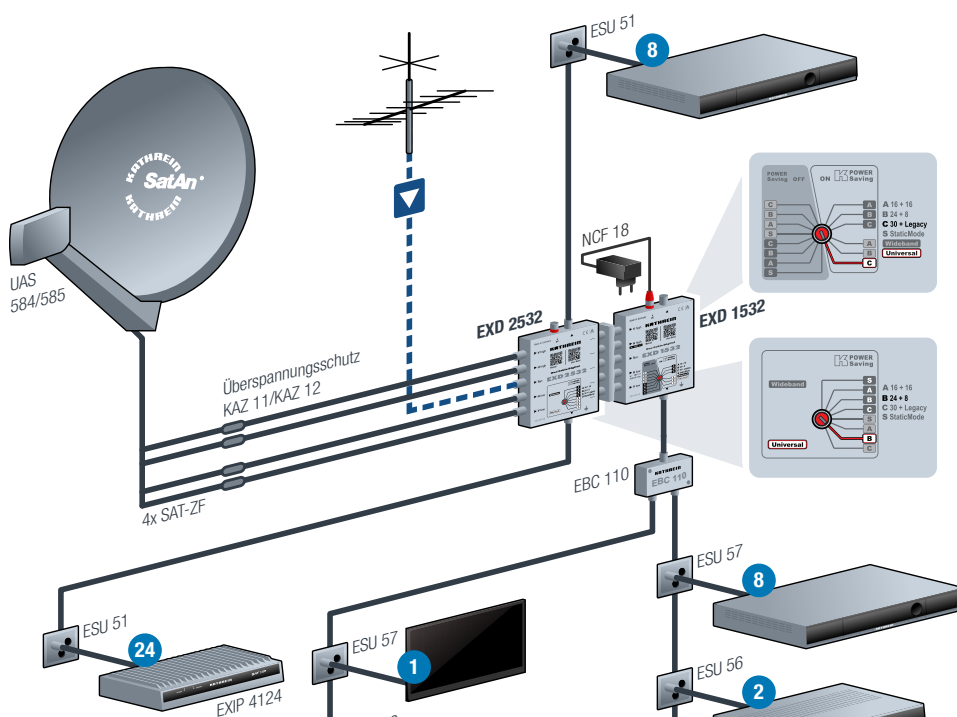
EXD 2532

- Configurable loop-through multi-switch to extend the system by two single-cable connections for up to 32 userbands or static mode
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.
- Optional power supply of the multi-switch using the NCF 18 (**LNB is not supplied!**)

Technical data

Type Order no.		EXD 1532 20510104	EXD 2532 20510105
Subscriber connections		Up to 32	
Inputs		1 x terrestrial/4 x Sat IF	
Frequency range	MHz	5-862/300-2350	
Connection loss (terrestrial)	dB	11/-	
Through loss	dB	-/-	3/1.5
Sat (AGC) output level	dBµV	94	94
Horiz./vert. decoupling	dB	-/30	-/30
Trunk decoupling	dB	-/-	-/40
Sat input level	dBµV	60-90	60-90
Userband/subscriber frequency	MHz	See "Frequency assignment" on page 189.	
Permissible supply voltage at the subscriber outlet	V	12-14	
Max. current consumption at the subscriber connection	mA	20	With power supply unit 20 Without power supply unit 450
Max. supply voltage at DC connection	V	18.6	18.6
Max. permissible remote feed current (input horiz. low)	mA	500 (2x 250 for wideband)	-
Max. permissible remote feed current per trunk	mA	-	1000
Protection class		IP 30	IP 30
Ambient temperature range	°C	-20 to +55	-20 to +55
Connections		F connectors	F connectors
Dimensions (W x H x D)	mm	102.8 x 148 x 44	111.5 x 148 x 44
Packaging unit/weight	pc./kg	1(10)/0.51	1(10)/0.4

Connection example



EXE 1581 20510146
EXE 2581 20510147



- Cascadable single-cable multi-switch for distribution of SAT IF signals (four satellite frequency planes) and terrestrial signals via a single cable to up to eight receivers
- User-band frequencies compatible with the previous Kathrein models
- EN 50494 single-cable command set and the new, extended EN 50607 (SCD 2) command set are supported
- The built-in AGC (Automatic Gain Control) ensures that the Sat IF signals have a constant output level and more reserve in the distribution
- Multi-tuner devices can be supplied with a multitude of userbands on one drop cable
- Terrestrial signals can be received even when the satellite receiver is switched off
- PIN code: Protects the user frequency from being accessed by another user. This enables installation across more than one residence
- Up to eight multi-switches can be cascaded
- Due to the power-saving concept, the multi-switch consumes no energy from the power supply unit if all receivers are switched off. If Kathrein Power-Saving is active, the power supply for the LNB is also turned off.
- QR code for the instructions for use
- The EXE 1581 single-cable multi-switch can be combined as desired with additional loop-through multi-switches such as EXR 2558, EXR 2554, EXD 2532 and EXD 2524
- For indoor installation

EXE 1581

- Single-cable multi-switch for up to eight receivers with built-in, highly efficient, short-circuit-proof switched-mode power supply unit in compliance with the ERP guideline
- Kathrein Power-Saving can be switched on and off using the rotary switch

EXE 2581

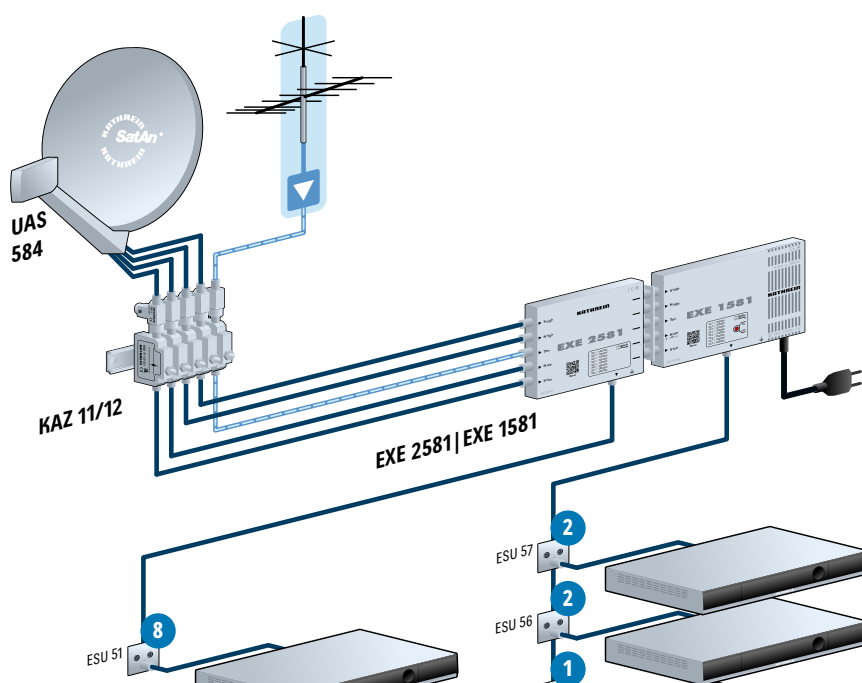
- Loop-through multi-switch for system extension by a single-cable connection with 8 userbands
- Kathrein Power-Saving: As soon as there are no longer any receivers active, a signal is generated at the last multi-switch via the "vertical low" trunk. This signal then switches the LNB power supply off.

Technical data

Type Order no.		EXE 1581 20510146	EXE 2581 20510147
Subscriber connections		1 x 8	
Inputs		1 x terrestrial/4 x Sat IF	
Frequency range	MHz	5-862/950-2150	
Connection loss (terrestrial)	dB	11/-	
Through loss	dB	-/-	3/1.5
Sat (AGC) output level	dBµV	92	92
Horiz./vert. decoupling	dB	-/35	-/35
Trunk decoupling	dB	-/-	-/40
Sat input level	dBµV	60-90	60-90
Userband/subscriber frequency	MHz	See "Frequency assignment" on page 189.	
Permissible supply voltage at the subscriber outlet	V	12-14	
Max. current consumption at the subscriber connection	mA	240	240
Max. permissible voltage at the subscriber connection	V	19	19
Nominal input voltage	V	230 (47 – 63 Hz)	-
Permissible input voltage range	V	207 – 253	-
Nominal input power at 0/150/800 mA load *)	W	0.2/4.7/18	-
Protection class/protection type		II (double insulated)/IP 30	-/IP 30
Ambient temperature range	°C	-20 to +55	-20 to +55
Connections		F connectors	F connectors
Dimensions (W x H x D)	mm	102.8 x 148 x 44	111.5 x 148 x 44
Packaging unit/weight	pc./kg	1(10)/0.51	1(10)/0.4

*) All userbands in operation

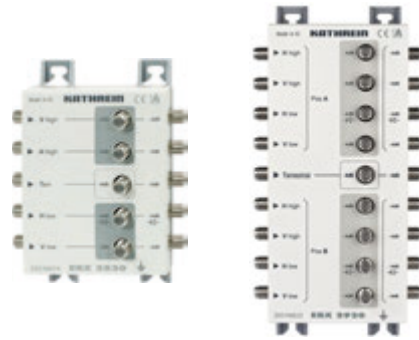
Connection example



> Sat IF tap / splitter

EBX 2520 20510034

EBX 2920 20510022



- Remote-feed capable via input → trunk output (4/8 x Sat-IF) and splitter output “horizontal low” (diode decoupling to trunk output); isolating capacitors on remaining splitter outputs
- Can be cascaded with additional EBX 2920/EBX 2520 or EAX 2912/EAX 2512
- For indoor installation

EBX 2520

- 2-way splitter (4 x Sat-IF) to distribute a trunk line to two 5-line multi-switch cascades

- Five 2-way splitters (4 x Sat-IF and 1 x terrestrial range) in one housing

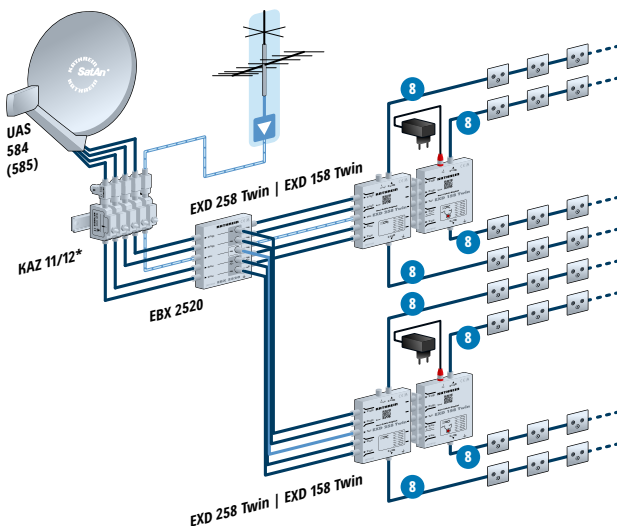
EBX 2920

- 2-way splitter (8 x Sat-IF) to distribute a trunk line to two 9-line multi-switch cascades
- Nine 2-way splitters (8 x Sat-IF and 1 x terr. range) in a single housing

Technical data

Type Order no.		EBX 2520 20510034		EBX 2920 20510022	
Inputs		1 x terrestrial	4 x Sat IF	1 x terrestrial	8 x Sat IF
Frequency range	MHz	5-862	950–2150	5-862	950–2150
Through loss → (input → trunk output)	dB	4.0	4.0	4.0	4.0
Connection loss (input → tap/splitter output)	dB	4.0	4.0	4.0	4.0
Decoupling tap/splitter outputs	dB	25	30	25	30
Trunk decoupling	dB	–	40	–	40
Max. remote feed current per satellite frequency plane	mA	1000		1000	
Connections		F connectors		F connectors	
Dimensions (W x H x D)	mm	112 x 148 x 54.5		112 x 228 x 54.5	
Packaging unit/weight	pc./kg	1(10)/0.35		1(10)/0.6	

Connection example



EBC 110 21610006
EBC 114 21610007



- Designed especially for use in single-cable systems
- Frequency range: 5-2400 MHz
- Without decoupling diodes, thus low voltage drop
- Remote feed capable: max. 24 V; 0.5 A
- Connections: F connectors

- Connection for potential equalisation
- Small dimensions
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation

Technical data

Type Order no.			2-way	4-way
			EBC 110 21610006	EBC 114 21610007
Through loss	5-10 MHz	dB	4	8
	10-862 MHz		5	9
	862-2150 MHz		6	11.5
	2150-2400 MHz		8	13
Decoupling	5-10 MHz	dB	10	10
	10-862 MHz		20	20
	862-2150 MHz		18	18
	2150-2400 MHz		16	16
Dimensions		mm	55 x 52 x 23	55 x 74 x 23
Packaging unit/weight		pc./kg	1 (10, 200)/0.1	1 (10, 160)/0.1



Feed-in DC voltage is present on all connections. Only to be used in association with ESU 33 ... 37. Unused outputs must be terminated with EMK 05 terminating resistor



5-way connector

EMU 250 20510044



- To connect two cascadable components of the Sat IF distribution system and single-cable system 4 x Sat-IF and 1 x terr. range (multi-switch loop-through of the EXR 25xx series and Sat distribution network amplifier VWS 2551)
- Frequency range: 0-2150 MHz

- Through loss: ≤ 0.3 dB
- Max. remote power feed/remote feed current: 20 V/1 A
- Packaging unit/weight (pc./kg): 1(10)/0.06



9-way connector

EMU 290 20510023



- To connect two cascadable components of the Sat IF distribution system and of the single-cable system 8 x Sat IF (multi-switch loop-through of the EXR 29xx series and VWS 2991 sat distribution network amplifier)
- Frequency range: 0-2150 MHz

- Through loss: ≤ 0.3 dB
- Max. remote power feed/remote feed current: 20 V/1 A
- Packaging unit/weight (pc./kg): 1(10)/0.1

> Single-cable sockets

ESU 33	21110012
ESU 34	21110011
ESU 36	21110022
ESU 37	21110023



- For single-cable systems in accordance with EN 50494 and EN 50607
- With DC voltage passage to trunk line via satellite connection (max. 20 V/400 mA, 22-kHz and DiSEqC™ signal)
- Protection of the system function in case of receiver malfunction: The connected receiver is switched off if it is not equipped with the DiSEqC™ set of single-cable commands as per EN 50494 (voltage from the satellite connection to input is cut off at +18 V after approx. 400 ms)
- Overload protection by electronic cut-out and decoupling diodes
- Can be combined with nearly all installation programmes
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Packaging unit/weight (pc./kg): 10(50)/1.0

ESU 33

- Directional coupler outlets, 3-way, for loop-through systems in single-cable systems conforming to EN 50494 or EN 50607. With DC voltage passage to trunk line via satellite connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal)

ESU 34

- Single outlet, 3-way, for stub or star distribution systems in single-cable systems conforming to EN 50494 or EN 50607. With DC voltage feed through via satellite connection (max. 24 V/400 mA, 22-kHz and DiSEqC™ signal).

ESU 36, ESU 37

- Directional coupler outlets, 3-way, for loop-through systems in single-cable systems conforming to EN 50494 and EN 50607
- Available with graduated connection losses for optimal system design with equalised useful levels on subscriber connections:
ESU 33: 10 dB; ESU 36: 14 dB; ESU 37: 17 dB

Technical data

Type | Order no.		ESU 33 21110012			ESU 36 21110022			ESU 37 21110023			ESU 34 21110011		
Connection		TV	Radio	Sat-IF	TV	Radio	Sat-IF	TV	Radio	Sat-IF	TV	Radio	Sat-IF
Frequency range/ connection loss [MHz/ dB]	47-68 B I	10			14			17			1.0		
	87.5-108 FM		11			15			18			1.0	
	118-470 VHF	10			14			17			1.0		
	470-862 UHF	10			14			17			1.0		
	950-2150 Sat-IF			10			14			17			1.0
Through loss [dB]		VHF: 1.0 UHF: 1.0 Sat-IF: 1.9			VHF: 0.7 UHF: 0.8 Sat-IF: 1.5			VHF: 0.7 UHF: 0.8 Sat-IF: 1.5			-		
Interal decoupling ¹⁾ [dB]		VHF/UHF: > 42 Sat-IF: > 32			VHF/UHF: > 42 Sat-IF: > 32			VHF/UHF: > 42 Sat-IF: > 32			-		

¹⁾ Between two subscribers

- ESU 54** 21110027
- ESU 51** 21110061
- ESU 53** 21110026
- ESU 56** 21110028
- ESU 57** 21110029



- For single-cable systems in accordance with EN 50494 and EN 50607
- Basic functions in delivery status:
 - **Delivery status corresponds to ESU 3x antenna outlets (no programming necessary)**
 - Switch-off of connected receiver if it does not use the single-cable DiSEqC™ command set in accordance with EN 50494 or EN 50607
 - Configured for single-cable systems
 - All userbands (UB1 ... UB32) are enabled
 - LED display switched off
- Configurable functions using the SWP 50 programming device:
 - Disable individual userbands
 - operation in Legacy mode (no switch-off at 18 V constant signal for standard multi-switch system)
 - Configurable LED for displaying error messages
 - Functions can be extended
- Return path compatible for systems with cable connection (CATV modem) or in IP-over-coax systems, e.g. with KLAN modem (EXI 01)
- Monitoring of DiSEqC™ signalling by microcontroller
- Connections:
 - TV – IEC connector (m) (IEC 61169-2)
 - Radio – IEC connector (f) (IEC 61169-2)
 - SAT – F socket (IEC 61169-24)

- With DC voltage passage to trunk line via satellite connection (max. 20 V/400 mA, 22-kHz and DiSEqC™ signal)
- Overload protection by electronic cut-out and decoupling diodes
- Can be combined with nearly all installation programmes
- With screw and claw fastening, suitable for flush-mounted boxes with Ø 55-65 mm
- Packaging unit/weight (pc./kg): 10(50)/1.0

Technical data

Type | Order no.		ESU 54 21110027			ESU 51 21110061			ESU 53 21110026			ESU 56 21110028			ESU 57 21110029		
Connection		TV	R	Sat	TV	R	Sat	TV	R	Sat	TV	R	Sat	TV	R	Sat
Frequency range/ connection loss [MHz/ dB]	5-68 B I	1.0			8.0			10			14			17		
	87.5-108 FM		2.0			9.0			11			15			18	
	118-470 VHF	1.0			8.0			10			14			17		
	470-862 UHF	1.0			8.0			10			14			17		
	950-2150 Sat-IF			1.0			8.0			10			14			17
Frequency range/ through loss [MHz/dB]	5-10									1.5			1.5			1.5
	10-862		-			-				1.1			1.1			1.1
	862-2150									1.9			1.9			1.9
Frequency range/ decoupling ¹⁾ [MHz/dB]	5-862									≥ 42			≥ 42			≥ 42
	950-2150									≥ 32			≥ 32			≥ 32

¹⁾ Between two subscribers

ESU 53, ESU 56, ESU 57

- Directional coupler outlet, 3-way, for loop-through systems in single-cable systems in compliance with EN 50494 or EN 50607, or for stub and star distribution systems.
- Available with graduated connection losses for optimal system design with equalised useful levels on subscriber connections: ESU 53: 10 dB; ESU 56: 14 dB; ESU 57: 17 dB

ESU 54

- Single outlet, 3-way, for stub or star distribution systems in single-cable systems conforming to EN 50494 or EN 50607.

ESU 51

- Terminated end outlet, 3-way, for loop-through systems in single-cable systems in compliance with EN 50494 and EN 50607, or for stub and star distribution systems.

Further information

The programmable single-cable sockets of the ESU 50 series ensure interference-free reception in single-cable satellite reception systems.

By means of these single-cable sockets it is possible to program the userbands. The single-cable sockets contain a microcontroller that monitors the signalling inside single-cable systems.

User ID checks ensure that only the enabled userbands are transmitted from the end device to the multi-switch via the outlet.

Together with the "Kathrein ESU" app, the SWP 50 programming device (see "Programming device" on page 204) enables the configuration of the ESU 50 series single-cable sockets from Kathrein.

The configuration of the single-cable sockets ensures that connected devices can only use the respectively enabled userbands. If an end device is configured incorrectly, is incompatible with a single-cable system or in first installation mode, it will not affect the devices connected to other programmed outlets. This enables the entire single-cable satellite system to operate permanently across several residences with failure-free operation.

Please use the "Kathrein ESU" app for configuration. It is available free of charge for the Android, iOS and Windows operating systems. This app allows you to disable and enable userbands quickly and intuitively. Furthermore, you can use a PIN code to protect the configuration of each outlet against unauthorised modifications.

> Programming device

SWP 50 21110025



The SWP 50 programming device allows you to set and configure the programmable single-cable sockets in the ESU 5 Series and the static mode of the EXD 1532/EXD 2532 single-cable multi-switches.

The programming device is used to configure the userbands in the single-cable sockets. This ensures that the subscribers in a single-cable system do not interfere with each other (installation across several apartments).

The programming device can be accessed via tablet, smartphone or a PC with Windows OS.



- Wi-Fi standards in accordance with IEEE 802.11b/g/n
- WiFi range up to 15 m (in the appropriate environment)
- Rechargeable battery charging via micro USB or NCF 18 plug-in power supply unit
- Rechargeable battery and charging status displayed by LED
- Power supply from lithium-ion rechargeable battery
- Programming via USB or WiFi
- restore of the factory settings is possible
- Compatible with the “Kathrein ESU” app
- Compatible programmable single-cable sockets: ESU 51, ESU 53, ESU 54, ESU 56 and ESU 57
- Compatible single-cable multi-switch: EXD 1532/EXD 2532
- Scope of supply
 - Programming device SWP 50
 - High-quality coaxial cable F-Quick/F-Quick
 - USB charging and data cable
 - Sturdy transport cases

Technical data

Type | Order no.		SWP 50 21110025
USB input voltage (min./typ./max.)	V	4.75/5.0/5.25
F socket input voltage (min./max.)	V	14.0/20.0
USB charging current	mA	450
F-type plug-in socket charging current at 14 V	mA	300
F-type plug-in socket charging current at 18 V	mA	250
Charging time (typ./max.)	h	2/3
WLAN standard		IEEE 802.11b/g/n
Encryption		Open security, WPA, WPA2
WLAN SSID		SWP 50
Rechargeable battery		Built-in lithium-ion rechargeable battery 3.7 V typ. 960 mAh / 3.55 Wh (IICP5/37/53)
Permissible ambient temperature	°C	+5 to +40
Dimensions (W x H x D)	mm	98 x 52 x 27
Packaging unit/weight	pc./kg	1/0.070

UFOcompact plus® Signal Processing System

➤ System description	206
➤ Module carrier	207
➤ Centrl control software	208
➤ IP streamer multi-DVB/DVB-S(2) – DVB-IPTV	208
➤ Transmodulators	211
➤ 6-way CI module	224
➤ HDMI encoder MPEG-4 AVC/H.264 HD/SD	226
➤ HDMI encoder MPEG-4 AVC/H.264 HD/SD	228
➤ Channel unit adapter for UFOcompact plus®	230
➤ Quad DVB transcoder QPSK-PAL	231
➤ 8-way DVB transcoder DVB-S - FM	232
➤ Amplifier for UFOcompact plus®	233
➤ Power supply unit for UFOcompact plus®	234
➤ Central control module	235
➤ Connection example	236

> System description



**UFO
compact
plus**

The UFOcompact plus® is a headend system that represents a unique combination of innovation and tradition. It provides the user with the technological basis for current and future challenges in signal processing.

Functions that were previously completely implemented in special devices can now be mapped efficiently and cost-effectively in the overall system, such as: decoding or recoding of the transport streams of transmodulator modules in combination with the UFZ 896 6-way CI module. The durable aluminium die-cast housings provide excellent thermal properties. All UFOcompact plus® modules are characterised by extremely low energy consumption.

Features

- Modular, expandable, future-proof headend system
- Reception of DVB standards (DVB-S/-S2/-T/-T2/-C/-IPTV) and HDMI signals
- Transmodulation to DVB-C/-T/-IPTV
- IP streamer
- Re-multiplex
- Flexible serial or parallel decoding and recoding
- EDGE-QAM/COFDM
- Monitoring (SNMP)
- NIT generation and adjustments/modification options
- LCN wizard, support of multiple LCN standards (NorDig, IEC 62216 and FRAN SAT PRO)
- High level of energy efficiency

> Module carrier

UFG 810 20610122



Module carrier with ten insert positions.

Including power supply unit (UFN 800), backplane, central control module (UFX 800), extractor fan unit, passive output coupler and cover.

- Ten hot-plug insert positions for UFOcompact plus® modules
- Three dedicated hot-plug system insertion positions for a power supply unit (UFN 800), control module (UFX 800) and extensions (UVO 830 etc.)
- UFO®compact series modules can be installed and operated over the UFZ 800 adapter
- Module power supply and communication over high speed backplane
- Secure heat dissipation is ensured using two energy saving, monitored extractor fans and optimised air ducting over the module's cooling elements
- Installation height: Nine RUs for wall mounting or 19" racks
- Generous free space at the bottom of the module carrier for insertion of the external leads and adapter
- Completely preassembled with power supply unit (UFN 800), output coupler and control module (UFX 800)

Technical data

Type | Order no.		UFG 810 20610122
Type of mounting		Installation in 19" rack and wall mounting
Number of insert positions		Ten modules, one power supply unit (UFN 800 pre-assembled), two function modules (UFX 800 pre-assembled, and an additional one)
Power supply unit (UFN 800, 20610121)		
Power supply voltage	V/Hz	230 ±10%/50–60
Max. power consumption	W	437
Secondary voltage / max. permissible current	V/A	12.3/32.5
Signalling	LED	Green (normal operation) Red (under voltage or overcurrent) Red flashing (over voltage)
Output data		
Connection loss	dB	Typ. 15
General information		
Fan		2
Dimensions (H x W x D)	mm	399 x 483 x 266
Ambient temperature range	°C	-20 to +50
Weight	kg	15.5

> Centrl control software

USW 800 20610125



The software USW 800 is required for operation of a UFOcompact plus®, UFO nano or UFO mini signal processing system. It can be downloaded free of charge from the Kathrein website.

- For central control and high-performance setting of all parameters of the UFOcompact plus® modules and UFO® channel units used in the UFOcompact plus® signal processing system
- User-friendly user interface for easy system set-up thanks to assistants (e.g. NIT/LCN) and tool tips
- Easy remote access over TCP/IP connection
- Simplified programming of channel units due to use of
 - updatable channel lists and configuration templates
 - Supports central software update for all UFO products
 - Offline configuration and favourite lists for efficient management of large systems (e.g. in the hospitality sector)
 - Transmission of stored configurations and channel lists in other systems

> IP streamer multi-DVB/DVB-S(2) – DVB-IPTV

UFO 844 20610138
UFO 848 206000002



- Flexible baseband data exchange with neighbouring modules e.g. UFZ 896 for decoding
- Comprehensive baseband signal processing with e.g. extended channel filter functionality
- Supports UDP and RTP transmission protocol

UFO 844

- 4-way IP streamer multi-DVB – DVB-IPTV
- IP streamer with 4-way multi-standard frontend DVB-S2/T2/C
- Converts multi-standard input signals into 4 x MPTS or 32 x SPTS
- Four Sat- IF/terr./cable inputs with DiSEqC™ 1.0 functionality for Sat multi-switches; can be flexibly switched to any of the four frontends
- High energy efficiency, power consumption: Typ. 10 W an 12 V

UFO 848

- 8-way IP streamer DVB-S(2) – DVB-IPTV
- IP streamer with 4-way DVB-S(2) frontend
- Converts DVB-S(2) input signals into 8 x MPTS or 64 x SPTS
- Four Sat IF inputs with DiSEqC™ 1.0 functionality for Sat multi-switches; can be flexibly switched to any of the four frontends
- High energy efficiency, power consumption: Typ. 21 W an 12 V

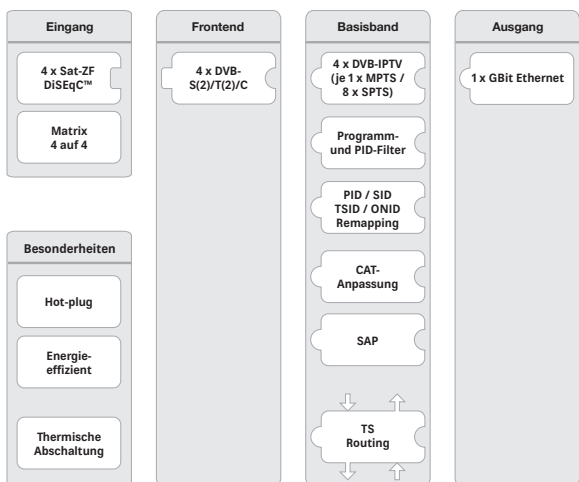
Technical data

Type | Order no.		UFO 844 20610138	UFO 848 2060000002
Inputs (4 x F connector, 75 Ω)			
Sat-IF/terr./cable input		•/•/•	•/-/-
Decoupling	dB	> 25	
Return loss	dB	Typ. 10	
DiSEqC™1.0		Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)	
Switching levels	V/kHz	14/18, 0/22	
Remote feed current	mA	Max. 60 (per input)	
Frontend			
DVB-S/-S2/-T/-T2/-C (4 x)		•/•/•/•/•	•/•/-/-/-
Frequency grid	MHz	1	
Input level range	dBμV	60-100	60-110
Permissible level difference	dB	20	12
Demodulation DVB-S			
Standard		EN 300 421	
Frequency range	MHz	950–2150	
Input symbol rate QPSK	MS/s	1-45	
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 7/8	
Roll off	%	20/25/35	35
AFC regulation range	MHz	± 5	
Demodulation DVB-S2			
Standard		EN 302 307, TR 102-376	
Input symbol rate QPSK	MS/s	1-45	
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Input symbol rate 8PSK	MS/s	1-45	1-31.5
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Roll off	%	20/25/35	
Demodulation DVB-T (COFDM)			
Standard		EN 300744, NorDig Unified 2.2.1, D-Book 7.0, Supports all C.R, G.I, LP and HP streams	–
Frequency range	MHz	42-870	–
Guard interval		1/4, 1/8, 1/16, 1/32	–
FEC		1/2, 2/3, 3/4, 5/6, 7/8	–
FFT mode		2k, 8k	–
Demodulation DVB-T (COFDM)			
Bandwidth	MHz	6, 7, 8	–
Constellation		QPSK, 16 QAM, 64 QAM	–
Demodulation DVB-T2 (COFDM)			
Standard		EN 302755-V1.31, DVB-T2 Lite compliant, Single and multiple PLP Support, NorDig Unified 2.2.1, D-Book 7.0	–
Guard interval		1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	–

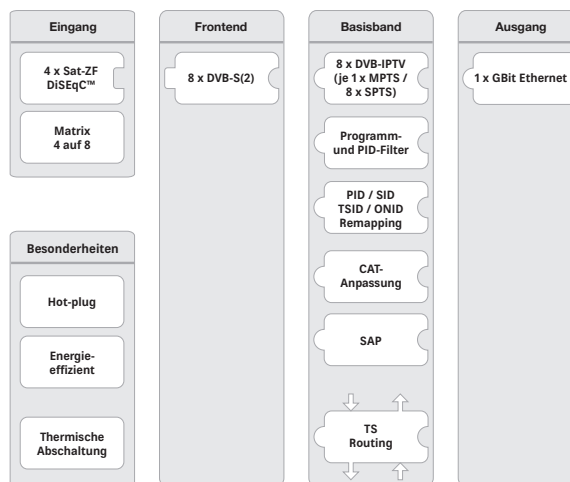
Technical data

Type | Order no.		UFO 844 20610138	UFO 848 206000002
FEC		1/2, 3/5, 2/3, 3/4, 4/5, 5/6	–
FFT mode		1k, 2k, 4k, 8k, 16k, 32k	–
Bandwidth	MHz	1.7/5/6/7/8	–
Constellation		QPSK, 16 QAM, 64 QAM, 256 QAM	–
Demodulation DVB-C			
Standard		EN 300429/ITU J.83 Annex A/C	–
Frequency range	MHz	42-862	–
Input symbol rate	MS/s	1-7.2	–
Constellation		4/16/32/64/128/256 QAM	–
MPEG-TS processor			
Programme filter/PID filter (MPTS)			• / •
PSI/SI processing		PCR correction, CAT, PID, SID, TSID, ONID remapping	
Stuffing (MPTS)		Automatic	
IP Stream			
Output		1 GB Ethernet, 1000BaseT	
Minutes of the Meeting		UDP/RTP, IPv4, SAP	
Transmission method		Unicast/Multicast	
Transport stream		32 x SPTS/4 x MPTS	64 x SPTS/8 x MPTS
Max. output data rate per MPTS	Mbps	60	1-100
IP services		ARP, Ping	
System data			
Power consumption	W	Typ. 10 (at 12 V)	Typ. 21 (at 12 V)
Temperature range	°C	-20 to +50	-5 to +50
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	

UFO 844 overview of functions



UFO 848 overview of functions



> Transmodulators

8-way transmodulator DVB-IPTV – DVB-C (J.83A)/DVB-T (COFDM)

UFO 828 20610142
UFO 858 20610143



- 8-way transmodulator DVB-IPTV – DVB-C (J.83A)/DVB-T (COFDM)
- Converts DVB-IPTV inputs to eight output channels DVB-C or DVB-T:
 - UFO 828: Edge QAM (eight output channels in DVB-C (J.83A))
 - UFO 858: EDGE COFDM (eight output channels in DVB-T)
- Input: 1 GB Ethernet, 8 x MPTS or SPTS
- Flexible baseband data exchange with adjacent modules e.g. UFZ 896 for decoding
- Excellent technical data (MER ≥ 45 dB) with direct implementation as FPGA solution
- Comprehensive baseband signal processing with e.g. extended channel filter functionality

- Manually editable SID
- Supports UDP and RTP transmission protocol
- High energy efficiency, power consumption: Typ. 16/18 W at 12 V

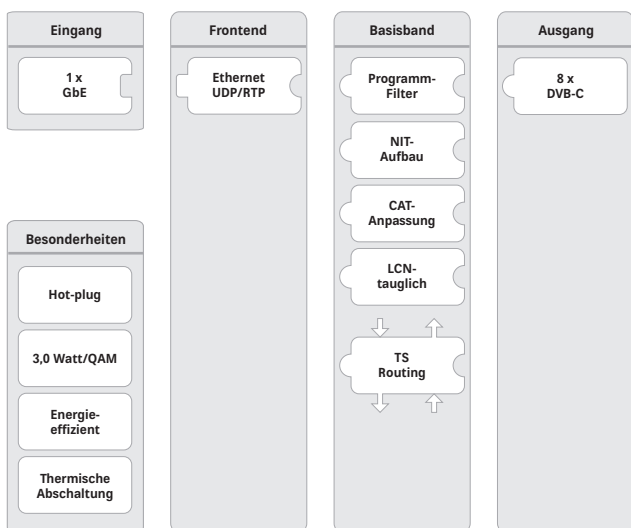
Technical data

Type | Order no.		UFO 858 20610143	UFO 828 20610142
Input			
IP		1 GB Ethernet, 1000BaseT	
Protocols		UDP/RTP	
Transmission method		Unicast/Multicast	
Max. input data rate per transport stream	Mbps	80	
TS inputs		8 x MPTS/SPTS	
IP services		IPv4, ARP, Ping, SAP, IGMP	
MPEG-TS processor			
Programme filter/PID-filter			
Manually editable SID		For channel list creation	
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT	
Stuffing		Automatic	
QAM modulator			
Output channels		8 x DVB-T, 2k mode	8 x DVB-C (J.83A)
Constellation		QPSK, 16/64 QAM	16/32/64/128/256 QAM
Symbol rate	MS/s	–	2.25-7.25
Guard interval		1/4, 1/8, 1/16, 1/32	–

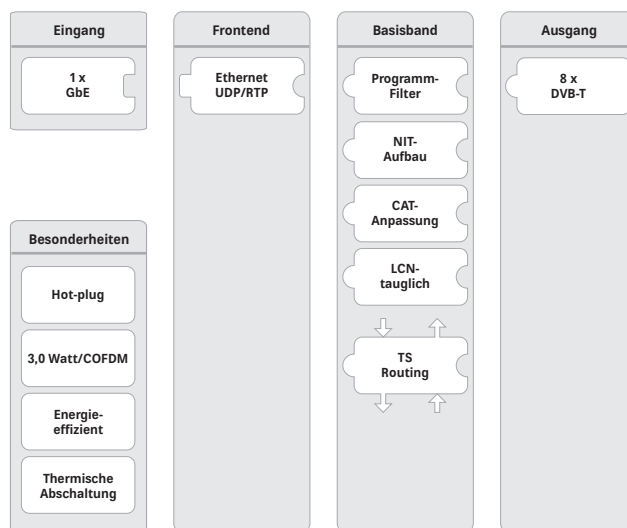
Technical data

Type | Order no.		UFO 858 20610143	UFO 828 20610142
Code rate		1/2, 2/3, 3/4, 5/6, 7/8	–
Roll off	%	–	15
RF output			
Output		1 x F connector, 75 Ω	
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)	
Frequency range (channel list)	MHz	47–86/110–862 (setting via channel list)	
Return loss	dB	14 (47 MHz) –1.5 dB/oct.	
Output level	dBμV	97	
Output level setting range	dB	-20 (in 0.5 dB steps)	
RF output			
Level stability	dB	± 0.8	
Frequency stability	ppm	35	
MER	dB	≥ 44	
Shoulder attenuation	dB	≥ 60 (at normal level)	
Spurious emissions	dB	≥ 60	
System data			
Power consumption	W	Typ. 18 (at 12 V)	Typ. 16 (at 12 V)
Temperature range	°C	-20 to +50	
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	

UFO 828 overview of functions



UFO 858 overview of functions



4-way/6-way transmodulator DVB-S(2)/-T(2)/-C – DVB-C (J.83A)/DVB-T

UFO 836 20610132
UFO 876 20610133



- 4-way/6-way transmodulator DVB-S2/-T2/-C – DVB-C (J.83A)/ DVB-T
- Transmodulator with 4-way multi-standard frontend and max. six output channels conforming to DVB-T:
 - UFO 876: Six output channels in DVB-C (J.83A)
 - UFO 836: Six output channels in DVB-T
- Flexible baseband data exchange with adjacent modules e.g. UFZ 896 for decoding
- Excellent technical data (MER ≥ 45 dB) with direct implementation as FPGA solution
- Four Sat-IF/terr./cable inputs with DiSEqC™1.0 functionality for Sat multi-switches; can be flexibly switched to any of the four frontends
- Comprehensive baseband signal processing with e.g. extended channel filter functionality
- Transponder splitting at high transmission rates
- High energy efficiency, power consumption: Typ. 16/18 W at 12 V

Technical data

Type | Order no.		UFO 836 20610132	UFO 876 20610133
Inputs			
Sat-IF/terr./cable input		4 x F connector, 75 Ω	
Decoupling	dB	> 25	
Return loss	dB	Typ. 10	
DiSEqC™1.0		Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)	
Switching levels	V/kHz	14/18, 0/22	
Remote feed current	mA	Max. 60 (per input)	
Frontend			
DVB-S/S2/T/T2/C		4 x	
Frequency grid	MHz	1	
Input level range	dBμV	60-100	
Permissible level difference	dB	20	
Demodulation DVB-S			
Standard		EN 300 421	
Frequency range	MHz	950–2150	
Input symbol rate QPSK	MS/s	1-45	
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 7/8	

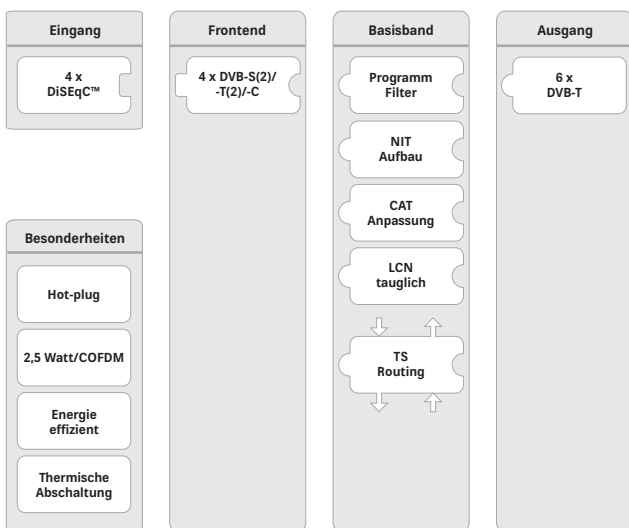
Technical data

Type | Order no.		UFO 836 20610132	UFO 876 20610133
Roll off	%	20/25/35	
AFC regulation range	MHz	± 5	
Demodulation DVB-S2			
Standard		EN 302 307, TR 102-376	
Input symbol rate QPSK	MS/s	1-45	
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Input symbol rate 8PSK	MS/s	1-45	
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Roll off	%	20/25/35	
Demodulation DVB-T (COFDM)			
Standard		EN 300744, NorDig Unified 2.2.1, D-Book 7.0, supports all C.R, G.I, LP and HP streams	
Frequency range	MHz	42-870	
Guard interval		1/4, 1/8, 1/16, 1/32	
FEC		1/2, 2/3, 3/4, 5/6, 7/8	
FFT mode		2k, 8k	
Bandwidth	MHz	6, 7, 8	
Constellation		QPSK, 16 QAM, 64 QAM	
Demodulation DVB-T2 (COFDM)			
Standard		EN 302755-V1.31, DVB-T2 Lite compliant, Single and multiple PLP Support, NorDig Unified 2.2.1, D-Book 7.0	
Guard interval		1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	
FEC		1/2, 3/5, 2/3, 3/4, 4/5, 5/6	
FFT mode		1k, 2k, 4k, 8k, 16k, 32k	
Bandwidth	MHz	1.7/5/6/7/8	
Constellation		QPSK, 16 QAM, 64 QAM, 256 QAM	
Demodulation DVB-C			
Standard		EN 300429/ITU J.83 Annex A/C	
Frequency range	MHz	42-862	
Input symbol rate	MS/s	1-7.2	
Constellation		4/16/32/64/128/256 QAM	
MPEG-TS processor			
Programme filter/PID-filter		• / •	
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT	
Stuffing		Automatic	
Modulator			
Output channels		6 x DVB-T, 2k mode	6 x DVB-C (J.83A)
Constellation		QPSK, 16/64 QAM	16/32/64/128/256 QAM
Symbol rate	MS/s	–	2.25-7.25
Guard interval		1/4, 1/8, 1/16, 1/32	–

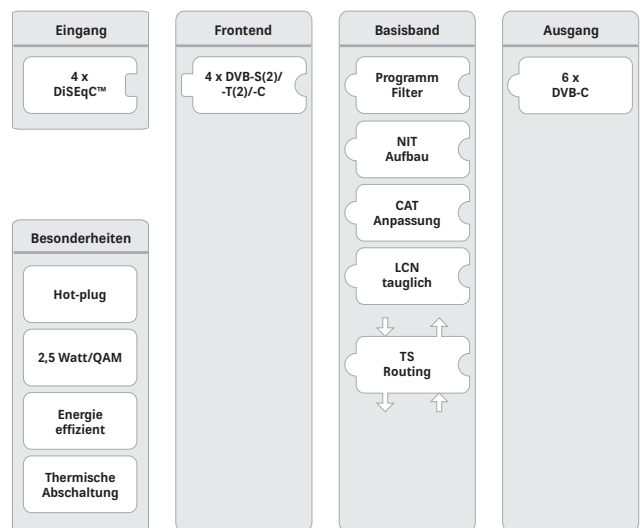
Technical data

Type | Order no.		UFO 836 20610132	UFO 876 20610133
Code rate		1/2, 2/3, 3/4, 5/6, 7/8	–
Roll off	%	–	15
RF output			
Output		1 x F connector, 75 Ω	
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)	
Frequency range (channel list)	MHz	47-96/114-858 (setting via channel list)	
Return loss	dB	14 (47 MHz) –1.5 dB/oct.	
Output level	dBμV	97	
Output level setting range	dB	–20 (in 0.5 dB steps)	
Level stability	dB	± 0.8	
Frequency stability	ppm	35	
MER	dB	≥ 44	≥ 45
Shoulder attenuation	dB	≥ 60 (at normal level)	
Spurious emissions	dB	≥ 60	
System data			
Power consumption	W	Typ. 18 (at 12 V)	Typ. 14 (at 12 V)
Temperature range	°C	–20 to +50	
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	

UFO 836 overview of functions



UFO 876 overview of functions



4-way/6-way transmodulator DVB-S(2)/-T(2)/-C – DVB-C (J.83A)/DVB-T

UFO 836/MX 20610144
UFO 876/MX 20610145



- 4-way/6-way transmodulator/multiplexer DVB-S(2)/-T(2)/-C – DVB-C (J.83A)/DVB-T
- Transmodulator with 4-way multi-standard frontend and max. six output channels conforming to DVB-T:
 - UFO 836/MX: Six output channels in DVB-T
 - UFO 876/MX: Six output channels in DVB-C (J.83A)
- 3-in-1 MUX for each output channel
 - Enables for each output channel multiplexing of three freely selectable input transport streams (frontend or neighbouring modules)
 - PSI / SI MUX provides completely new structure of the PAT, SDT, EIT etc.
- Flexible baseband data exchange with adjacent modules e.g. UFZ 896 for decoding
- Excellent technical data (MER \geq 45 dB) with direct implementation as FPGA solution
- Four Sat-IF/terr./cable inputs with DiSEqC™ 1.0 functionality for Sat multi-switches; can be flexibly switched to any of the four frontends
- Comprehensive baseband signal processing with e.g. extended channel filter functionality
 - Manually editable SID enables:
 - Generation of a channel list (for receivers without LCN)
 - The replacement of channels without a renewed channel search in the receivers
 - High energy efficiency, power consumption: Typ. 19 W an 12 V

Technical data

Type | Order no.		UFO 836/MX 20610144	UFO 876/MX 20610145
Inputs			
Sat-IF/terr./cable input		4 x F connector, 75 Ω	
Decoupling	dB	> 25	> 25
Return loss	dB	Typ. 10	
DiSEqC™1.0		Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)	
Switching levels	V/kHz	14/18, 0/22	
Remote feed current	mA	Max. 60 (per input)	
Frontend			
DVB-S/S2/T/T2/C		4 x	
Frequency grid	MHz	1	
Input level range	dB μ V	60-100	
Permissible level difference	dB	20	
Demodulation DVB-S			
Standard		EN 300 421	

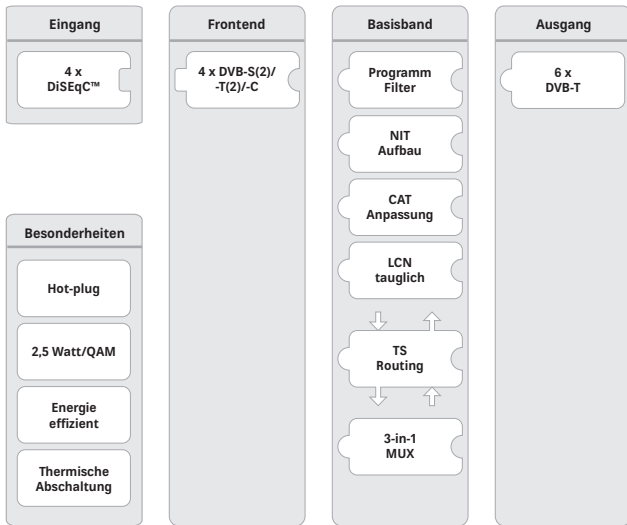
Technical data

Type | Order no.		UFO 836/MX 20610144	UFO 876/MX 20610145
Frequency range	MHz	950–2150	
Input symbol rate QPSK	MS/s	1-45	
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 7/8	
AFC regulation range	MHz	± 5	
Roll off	%	20/25/35	
Demodulation DVB-S2			
Standard		EN 302 307, TR 102-376	
Input symbol rate QPSK	MS/s	1-45	
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Input symbol rate 8PSK	MS/s	1-45	
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Roll off	%	20/25/35	
Frequency range	MHz	42-870	
Guard interval		1/4, 1/8, 1/16, 1/32	
Standard		EN 300744, NorDig Unified 2.2.1, D-Book 7.0, Supports all C.R, G.I, LP and HP streams	
Demodulation DVB-T (COFDM)			
FEC		1/2, 2/3, 3/4, 5/6, 7/8	
FFT mode		2k, 8k	
Bandwidth	MHz	6, 7, 8	
Constellation		QPSK, 16 QAM, 64 QAM	
Demodulation DVB-T2 (COFDM)			
Standard		EN 302755-V1.31, DVB-T2 Lite compliant, single and multiple PLP support, NorDig Unified 2.2.1, D-Book 7.0	
Guard interval		1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	
FEC		1/2, 3/5, 2/3, 3/4, 4/5, 5/6	
FFT mode		1k, 2k, 4k, 8k, 16k, 32k	
Bandwidth	MHz	1.7/5/6/7/8	
Constellation		QPSK, 16 QAM, 64 QAM, 256 QAM	
Demodulation DVB-C			
Standard		EN 300429/ITU J.83 Annex A/C	
Frequency range	MHz	42-862	
Input symbol rate	MS/s	1-7.2	
Constellation		4/16/32/64/128/256 QAM	
MPEG-TS processor			
Programme filter/PID-filter		• / •	
Conflict management		SID and PID conflicts are automatically solved	
Manually editable SID		For programme list creation and programme exchange	
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT	

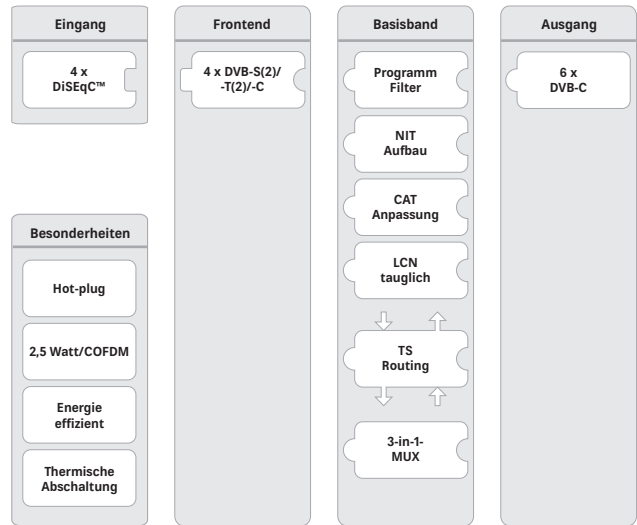
Technical data

Type | Order no.		UFO 836/MX 20610144	UFO 876/MX 20610145
Stuffing		Automatic	
Multiplex			
3-in-1 MUX		3 freely selectable input transport streams (frontend or neighbouring modules) per output channel	
PSI-/SI-Mux		PAT, SDT, EIT etc. are fully regenerated	
Modulator			
Output channels		6 x DVB-T, 2k mode	6 x DVB-C (J.83A)
Constellation		QPSK, 16/64 QAM	16/32/64/128/256 QAM
Symbol rate	MS/s	–	2.25-7.25
Guard interval		1/4, 1/8, 1/16, 1/32	–
Code rate		1/2, 2/3, 3/4, 5/6, 7/8	–
Roll off	%	–	15
RF output			
Output		1 x F connector, 75 Ω	
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)	
Frequency range (channel list)	MHz	47-96/110-858 (setting via channel list)	
Return loss	dB	14 (47 MHz) –1.5 dB/oct.	
Output level	dBμV	97	
Output level setting range	dB	-20 (in 0.5 dB steps)	
Level stability	dB	± 0.8	
Frequency stability	ppm	35	
MER	dB	≥ 44	
Shoulder attenuation	dB	≥ 60 (at normal level)	
Spurious emissions	dB	≥ 60	
System data			
Power consumption	W	Typ. 19 (at 12 V)	
Temperature range	°C	-20 to +50	
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	

UFO 836/MX overview of functions



UFO 876/MX overview of functions



4-way/8-way transmodulator DVB-S(2) - DVB-C (J.83A)

UFO 878 20610127

UFO 874 20610128



- 8-way (UFO 878) or 4-way (UFO 874) transmodulator DVB-S (2) - DVB-C (QPSK/8PSK - QAM)
- Flexible baseband data exchange with neighbouring modules e.g. UFZ 896 for decoding
- Excellent technical data (MER ≥ 45 dB) with direct implementation as FPGA solution
- Four Sat IF inputs with DiSEqC™1.0 functionality for sat multi-switches; can be flexibly switched to any of the four or eight frontends
- Comprehensive baseband signal processing with e.g. extended channel filter functionality
- Four or eight DVB-C-compliant output channels (J.83A)
- Supports remapping
- High energy efficiency, power consumption: Typ. 14/24 W at 12 V

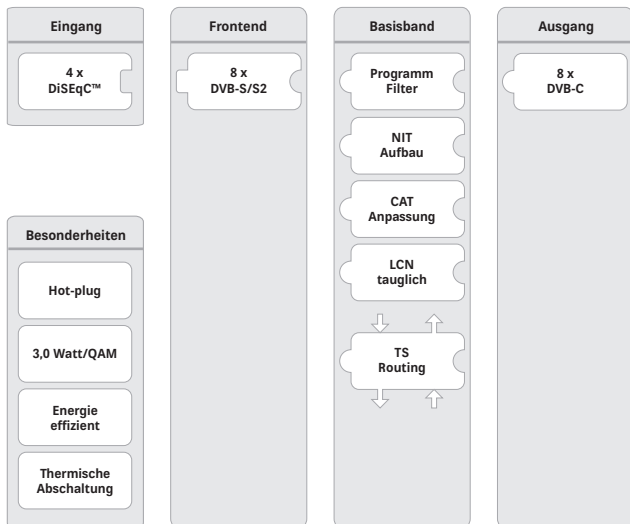
Technical data

Type | Order no.		UFO 878 20610127	UFO 874 20610128
Inputs			
Sat IF input		4 x F connector, 75 Ω	
Frequency range	MHz	950–2150	
Decoupling	dB	> 25	
Return loss	dB	Typ. 10	
DiSEqC™1.0		Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)	
Switching levels	V/kHz	14/18, 0/22	
Remote feed current	mA	Max. 60 (per input)	
Frontend			
DVB-S2		8 x	4 x
Frequency grid	MHz	1 (950-2150 MHz)	
AFC regulation range	MHz	±3 (symbol rate < 10 Ms/s) ±5 (symbol rate > 10 Ms/s) (950–2150 MHz)	
Input level range	dBμV	60-110	
Permissible level difference	dB	12	
Demodulation DVB-S			
Standard		EN 300 421 (1)	
Input symbol rate QPSK	MS/s	1-45	
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 6/7, 7/8	
Roll off	%	35	
Demodulation DVB-S2			
Standard		EN 302 307 (2)	
Input symbol rate QPSK	MS/s	2-47	
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Input symbol rate 8PSK	MS/s	2-31.5	
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Roll off	%	20/25/35	
System interfaces			
Data interface	Mbps net	800	
Control interface	Mbps	12	
TS routing to backplane		Max. 2 x 16 transport streams (right and left)	
MPEG-TS processor			
Programme filter/PID-filter		● / ●	
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT	
Stuffing		Automatic	
QAM modulator			
Output channels		8 x DVB-C (J.83A)	4 x DVB-C (J.83A)
QAM constellation	QAM	16, 32, 64, 128, 256	
Symbol rate	MS/s	2.25-7.25	
Roll off	%	15	

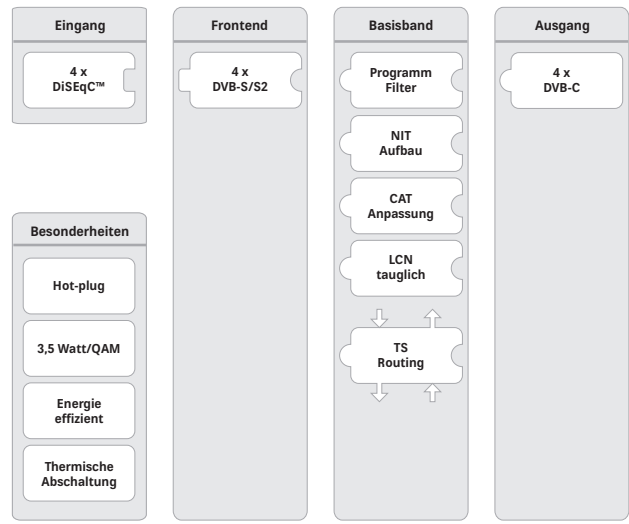
Technical data

Type | Order no.		UFO 878 20610127	UFO 874 20610128
RF output			
DVB-C output		1 x F connector, 75 Ω	
Frequency range	MHz	47–1006 (fine-tuning in 125-kHz steps)	
Frequency range (channel list)	MHz	47–86/110–862 (setting via channel list)	
Return loss	dB	14 (47 MHz) –1.5 dB/oct.	
Output level	dBμV	97	
Output level setting range	dB	-20 (in 0.5 dB steps)	
Level stability	dB	± 0.8	
Frequency stability	ppm	35	
MER	dB	≥ 45	
Shoulder attenuation	dB	≥ 60 (at normal level)	
Spurious emissions	dB	≥ 60	
System data			
Power consumption	W	Typ. 24 (at 12 V)	Typ. 14 (at 12 V)
Temperature range	°C	-20 to +50	
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	

UFO 878 overview of functions



UFO 874 overview of functions



4-way transmodulator DVB-S(2) – DVB-T**UFO 834** 20610131

- 4-way transmodulator DVB-S(2) – DVB-T (QPSK/8PSK – COFDM)
- Flexible baseband data exchange with adjacent modules e.g. UFZ 896 for decoding
- Excellent technical data (MER \geq 45 dB) with direct implementation as FPGA solution
- Four inputs with DiSEqC™1.0 functionality for Sat multi-switches; can be flexibly switched to any of the four frontends
- Comprehensive baseband signal processing with e.g. extended channel filter functionality
- Four DVB-T-compliant output channels, 47-862 MHz, 2k mode
- High energy efficiency, power consumption: Typ. 14 W on 12 V

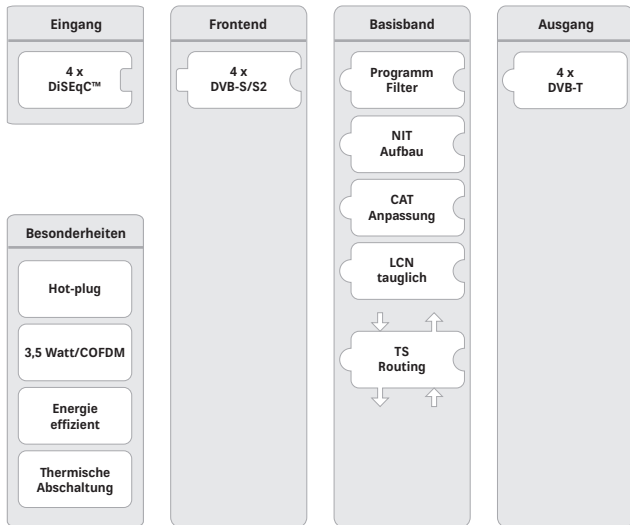
Technical data

Type | Order no.		UFO 834 20610131
Inputs		
Sat IF input		4 x F connector, 75 Ω
Frequency range	MHz	950–2150
Decoupling	dB	> 25
Return loss	dB	Typ. 10
DiSEqC™1.0		Vert./horiz., low/high
Switching levels	V/kHz	14/18, 0/22
Remote feed current	mA	Max. 60 (per input)
Frontend		
DVB-S2		4 x
Frequency grid	MHz	1 (950-2150 MHz)
AFC regulation range	MHz	\pm 3 (symbol rate < 10 Ms/s) \pm 5 (symbol rate > 10 Ms/s) (950–2150 MHz)
Input level range	dB μ V	60-110
Permissible level difference	dB	12
Demodulation		
Demodulation DVB-S		EN 300 421 (1)
Input data rate QPSK	MS/s	2-45
Code rate (Viterbi)		1/2, 2/3, 3/4, 4/5, 5/6, 7/8
Roll off	%	35

Technical data

Type | Order no.		UFO 834 20610131
Demodulation DVB-S2		EN 302 307 (2)
Input data rate QPSK	MS/s	1-34
Code rate (LDPC)		1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Input data rate 8PSK	MS/s	1-28.9
Code rate (LDPC)		3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Roll off	%	20/25/35
System interfaces		
Data interface	Mbps net	800
Control interface	Mbps	12
System interfaces		
TS routing to backplane		Max. 2 x 16 transport streams (right and left)
MPEG-TS processor		
Programme filter/PID-filter		• / •
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT
Stuffing		Automatic
COFDM Modulator		
Output channels		4 x DVB-T, 2k mode
COFDM constellation	QAM	QPSK, 16 QAM, 64 QAM
Guard interval	MS/s	1/4, 1/8, 1/16, 1/32
Code rate	%	1/2, 2/3, 3/4, 5/6, 7/8
RF output		
DVB-T output		1 x F connector, 75 Ω
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)
Frequency range (channel list)	MHz	47–86/110–862 (setting via channel list)
Return loss	dB	14 (47 MHz) –1.5 dB/oct.
Output level	dBμV	97
Output level setting range	dB	-20 (in 0.5 dB steps)
Level stability	dB	± 0.8
Frequency stability	ppm	35
MER	dB	≥ 45
Shoulder attenuation	dB	≥ 60 (at normal level)
Spurious emissions	dB	≥ 60
System data		
Power consumption	W	Typ. 14 (at 12 V)
Temperature range	°C	-20 to +50
Protective shut-down	°C	> 70
Dimensions (H x W x D)	mm	265 x 36 x 220
Weight	kg	1.16

UFO 834 overview of functions



> 6-way CI module

UFZ 896 20610129



- Six CI slots for holding one CAM module each to decrypt and encrypt transport streams
- Flexible baseband data exchange with adjacent modules, e.g. UFO 878
- Flexible serial interconnection of up to three CAMs and assignment to input transport streams to increase decoding capacity
- Flexible parallel operation of up to three CAMs with automatic switching in case of fault occurrence to increase decoding reliability (redundancy)
- Decoding status monitoring and automatic reconfiguration in case of fault occurrence
- Each CAM can be individually reset and restarted (Power ON reset) or permanently activated/deactivated
- CAM software update and CAM info



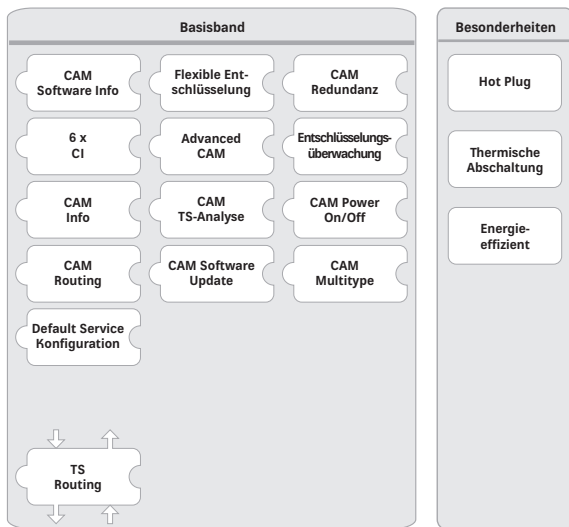
Technical data

Type | Order no.		UFZ 896 20610129	Comments
User interfaces			
6 CAM insert positions		PCMCIA interface	(in accordance with EN 50221)
Supported CAM types		5-V-CAM	(3.3-V CAMs are not supported)
System interfaces			
Data interface	Mbps	800 (net)	To neighbouring modules
Control interface	Mbps	12	Central control unit (UFX 800)
TS routing to backplane		Max. 2 x 16 transport streams (right and left)	In conjunction with UFOcompact Plus® modules, for example UFO 878, configuration via USW 800
Function and option			
MPEG-TS routing		Free allocation of up to 6 CAMs	In conjunction with the operation modes, can be operated in series or parallel
		Serial connection of up to 3 CAMs	For one MPEG TS to increase decoding capacity
		Parallel operation of up to 3 CAMs	Automatic switching in case of error in a CAM, redundancy
Decoding functions		Specific decoding configuration	Decoding/no decoding for each service or each PID
		Default configuration	Decoding/no decoding for all unconfigured services
		Decoding monitoring	Resending of CA PMTs or CAM reset if decoding fails
SI data processing		ES status monitoring and SI data analysis in front of and behind each CAM	Automatic reconfiguration in case of error
		Advanced configuration functions	PMT List Mode, Update Mode, CA PMT optimisation
		Extraction of information on service and elementary currents from SI tables	For display in USW 800
		Removal of encryption information (tables, descriptors, etc.)	Following successful decoding
Function and option			
CAM options and information		Supports decoding, encryption and processing CAMs	
		Displays status and names	For each CAM inserted
		Memo function	Can be edited individually for each CAM
		Power On/Off	Each inserted CAM can be individually activated/deactivated
		Mode for CAM software update	
CAM status detection		Slot empty, CAM inserted, CAM ready	
		CAM name	
System data			
Power consumption	W	< 2.5	Without CAM
Power consumption	W	Typ. < 10	With 6 CAMs, each 1.25 W
Current drain per CAM	A	Max. 0.5	

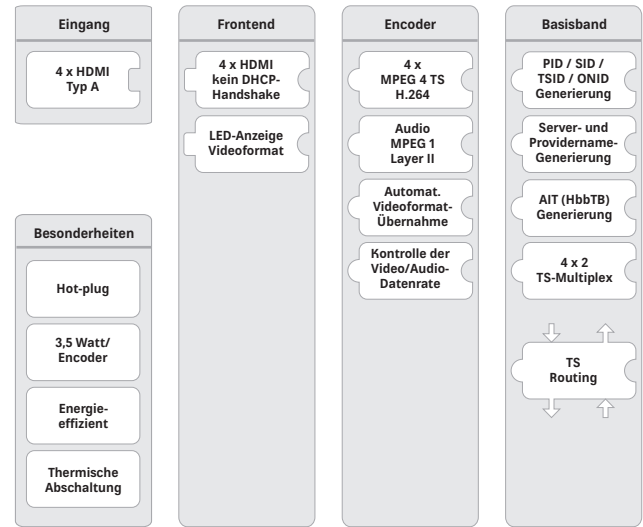
Technical data

Type | Order no.		UFZ 896 20610129	Comments
EMC	dBpW	Max. 20	EN 50083-2, A1
Temperature range	°C	-20 to +50	
Protective shut-down	°C	> 70	In case of excess temperature
Dimensions (H x W x D)	mm	265 x 36 x 220	
Weight	kg	1.1	Without CAMs

UFZ 896 overview of functions



UFZ 894 overview of functions



> HDMI encoder MPEG-4 AVC/H.264 HD/SD

UFZ 894 20610151



The HDMI encoder module UFZ 894 converts up to four HD or SD video signals into H.264/MPEG-1 layer 2 compressed streams and feeds these to a neighbouring module, (e.g. a transmodulator or IP streamer), via the UFOcompact plus® backplane for further processing. In addition, the HDMI encoder is equipped with two built-in multiplexers, which makes effective channel utilisation in the cable network possible.

- 4 HDMI inputs
- supported video formats: SD = 576/50i, HD = 720/50p, 1080/50i and 1080/50p
- Two built-in multiplexer units make a fully flexible 4-to-2 multiplex of the encoded signals possible
- Transmission of the encoded signals to transmodulator,

- IP streamer and encryption modules via backplane
- Exceptional image quality and guaranteed future due to an FPGA-based encoder solution

Technical data

Type | Order no.		UFX 894 20610151
User interfaces		
Signal input		4 x HDMI socket
Status indication		4 x status LED encoder function, 1 x status LED entire device
Encoder data video		
Video standard		MPEG-4 H.264/AVC (ISO/IEC14496-10)
H.264 profile		High profile
H.264 level		Level 3.0/3.2/4.0
Video formats		1920 x 1080/50p (HD) 1920 x 1080/50i (HD) 1280 x 720/50p (HD) 720 x 576/50i (SD)
Bitrate	Mbps	2–25 (SD & HD), adjustable for each encoded video
Encoder data audio		
Audio standard		MPEG 1 layer II (ISO/IEC 11172-3)
Sampling frequency	KHz	48
Bitrate	kbps	64, 96, 128, 192, 256, 320, 386, adjustable
Audio mode		Mono/stereo/2-tone, adjustable
Transport stream		
Adjustable parameters		Service and provider name, TS-ID, ON-ID, service ID, PMT PID, video PID, audio PID, PCR PID
Backplane interface		Transmission of transport streams to neighbouring modules after multiplex
Multiplexer		4 to 2 in each combination; 4:0/3:1/2:2/1:3/0:4
System data		
Power consumption	W	Typ. < 16
Temperature range	°C	-20 ... +50
Protective shut-down	°C	> 70
Dimensions (H x W x D)	mm	265 x 36 x 220
Weight	kg	1.1

> HDMI encoder MPEG-4 AVC/H.264 HD/SD

UFX 100 20610147



- HDMI encoder MPEG-4 AVC/H.264 HD/SD
- Inputs: HDMI / YPbPr / S-Video / AV
- Implementation of different signal sources, e.g. set-top boxes, cameras, DVD players, Blu-ray players
- Recording and playback of transport streams (TS players) via USB stick / hard disk
 - Allows the playing of own content such as videos, menus, hotel deals, promotional trailer, info movies
 - Generation of TS content with the software "TS Creator", available for free on "www.kathrein.com"
- Setting options: web management (Ethernet) and direct device operation
- Device has an LCN function
- RF output: DVB-C/-T/ISDB-T

Technical data

Type | Order no.		UFX 100 20610147
HDMI input		
Video		
Encoding		MPEG-4 AVC/H.264
H.264 profile		High profile, main profile
H.264 level		Level 3.0 / 3.1 / 3.2 / 4.0 / 4.1 / 4.2
Resolution		1920 x 1080/60p/50p/60i/50i | 1280 x 720/60p/50p
Bitrate	Mbps	1-19.5
Audio		
Encoding		MPEG1-Layer II, MPEG2-AAC, MPEG4-AAC
Sampling frequency	KHz	48
Bitrate		MPEG-1, Layer II: 64, 96, 128, 192, 256, 320, 384 kbps MPEG-2-AAC: 128, 192, 256, 320, 384 kbps MPEG-4-AAC: 64, 96, 128, 192, 256 kbps
YPbPr, CVBS, S-Video Input		
Video		
Encoding		MPEG-4 AVC/H.264
Resolution		CVBS: 720 x 576/50i (PAL), 720 x 480/60i (NTSC) YPbPr: 1920 x 1080/60i/50i, 1280 x 720/60p/50p
Bitrate	Mbps	1-19.5
Audio		
Encoding		MPEG-1 Layer II, MPEG-2 AAC, MPEG-4 AAC
Sampling frequency	KHz	48
Bitrate		MPEG-1, Layer II: 64, 96, 128, 192, 256, 320, 384 kbps MPEG-2-AAC: 128, 192, 256, 320, 384 kbps MPEG-4-AAC: 64, 96, 128, 192, 256 kbps
Modulator		
Frequency range	MHz	30-1000

Technical data

Type | Order no.		UFX 100 20610147
Output level	dB μ V	Typ. 73-93
Throughput loss RF IN / RF OUT	dB	10
DVB-C		
Standard		EN 300429/ITU J.83 Annex A/B/C
Constellation	QAM	J.83A: 16/32/64/128/256; J.83B: 64/256; J.83C: 64/256
Bandwidth	MHz	J.83A: 8; J.83B: 6; J.83C: 6
Symbol rate	MS/s	5-9
MER	dB	≥ 40
DVB-T (COFDM)		
Standard		EN 300 744
Guard interval		1/4, 1/8, 1/16, 1/32
FEC		1/2, 2/3, 3/4, 5/6, 7/8
FFT Mode		2k/8k
Bandwidth	MHz	6, 7, 8
Constellation		QPSK, 16/64 QAM
MER	dB	≥ 40
ISDB-T		
Standard		ARIB STD-B31
Guard interval		1/4, 1/8, 1/16, 1/32
FFT Mode		2k, 4k, 8k
Bandwidth	MHz	6
Constellation		DQPSK, QPSK, 16 QAM, 64 QAM
MER	dB	≥ 42
Connections		
RF input/output		F connector
LAN Ethernet		RJ 45, 100 Mbps
USB		Type A, USB 2.0/3.0 (FAT32)
VGA		Connection Adapter Cable for: YPbPr, S-Video, AV
External power supply unit		
Input voltage range	V	100-240
Output voltage	V	12
Output current	A	2
General information		
Temperature range	°C	0 to +40
Power consumption	W	Max. 11.5
Dimensions (H x W x D)	mm	183 x 110 x 45
Weight	kg	1
Scope of supply		Manual at "www.kathrein.com", for power supply unit, HDMI cable, YPbPr/S-Video/AV-VGA adapter, earth conductor

> Channel unit adapter for UFOcompact plus®

UFZ 800 20610124



- Channel unit adapter to enable use of UFO® compact modules in the UFOcompact plus® signal processing systems:
 - Power supply and control over the backplane
 - Central controlling via UFX 800 and USW 800 allows all previous functions to be used
 - The perfect means to continue using existing material and initiate installation conversions
- Adapter is delivered with the required connection leads for UFO® compact modules as well as fixing material and RF connection cable for the output coupler

Technical data

Type | Order no.		UFZ 800 20610124
Communication		USB-UART Bridge
Data rate	kBaud	Max. 115
Power rating		UFO®compact channel units
5-V lead	A	3
12-V lead	A	2
31-V lead	mA	Typ. 11
Interfaces		
Backplane		Connector (f), 40-pin
Power supply		8-core cable and plug
Communication		6-pin mini-DIN connector
System data		
Power consumption	W	< 1
EMC	dBpW	Max. 20 (EN 50083-2, A1)
Temperature range	°C	-20 to +50
Dimensions (H x W x D, without cable)	mm	122 x 43 x 23
Weight (with cables)	kg	0.15

➤ Quad DVB transcoder QPSK-PAL

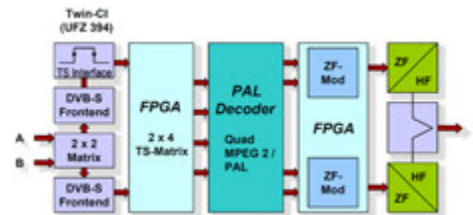
UFO 395 20610101



- DVB-S channel unit for installation into the UFO®UFG 3xx compact module carrier/extension module carrier or UFG 4xx modular carriers
- Converts four TV or radio channels from any two transponders into four analogue PAL TV programmes (two separate front ends, four output channels 2 x 2 mandatory adjacent channels)
- Various channel combinations are possible (4/0, 3/1, 2/2, 1/3, 0/4 ...)
- TV standards: B/G, D/K or I
- Two inputs A/B, settable via the central controller (e.g. for H/V switching)
- DiSEqC™ to control external DiSEqC™ multi-switch (one can only use DiSEqC™ matrices with eight Sat IF inputs (two satellites))
- All essential transmission parameters can be set via the central control unit
- Direct selection of TV or radio channels from received transponder using text on controller display
- The UFZ 800 channel unit adapter is required for operation in the UFG 810 modular carrier
- Wide-screen signalling (WSS) so that broadcasts transmitted in 16:9 format are correctly displayed on wide-screen TV sets (control with software version V 9.10 is required)
- The 2 output channel pairs are fixed adjacent channels
- The levels of both adjacent channel pairs can be set and switched off individually via the controller.
- Videotext and VPS generation
- Videotext deactivation



PAL



- Audio modes: Mono, stereo, dual/2-channel, dual-A, dual-B (if two different audio signals are transmitted in one audio PID)
- Black screen video signal to transmit a radio programme on a TV channel (possible in both channels; satellite signal required for black-screen signal generation)
- Software can be updated via a controller interface
- Extendable using a UFZ 394 Common Interface retrofit kit to add two CA modules
- Required software version
 - the central control unit: V 9.50 and higher
 - the USW 30 software: V 3.6 and higher
- Ambient temperature range when used in:
 - modular carrier with fan (UFG 412): -20 to +50 °C
 - Module carrier/extension module carrier without fan (UFG 3xx): -20 to +40 °C
- Dimensions (W x H x D) in mm: 265 x 27 x 170
- Packaging unit/weight (pc./kg): 1/0.7

Technical data

Type | Order no.		UFO 395 20610101
Frequency range	MHz	2 x input 950–2150 ¹⁾ / 4 x output 47–100/110–862 ²⁾
Input level	dBµV	50-85
Input data rate	Ms/s	2-45
Signal-to-noise ratio ³⁾ S/N weighted	dB	60
Max. output level/setting range	dBµV	95/85-95
Image/audio carrier level spacing T1/T2	dB	13/20
Power consumption without/with UFZ 394	V/mA/mA	5/900/1300, 12.5/750/800, 31/9/9

¹⁾ Adjustable in 1-MHz increments and fine tuned by AFC ²⁾ Adjustable in 7/8-MHz channel grid, fine adjustment with 50-kHz spacing ³⁾ Own contribution of the channel unit

8-way DVB transcoder DVB-S - FM

UFO 313 20610076



- DVB radio channel unit for installation into the UFO®UFG 3xx compact module carrier/extension module carrier or UFG 4xx modular carriers
- Converts eight DVB-S radio channels from up to two transponders into eight standard FM stereo radio programmes
- Various channel combinations are possible (8/0, 7/1, 6/2, 5/3, 4/4 ...)
- Two inputs A/B, settable via the central controller (e.g. for H/V switching)
- DiSEqC™ for controlling external multi-switches
- All essential transmission parameters can be set via the central control unit
- The output channels can be set separately
- RDS function, automatic or manual
- Direct selection of TV or radio channels from received transponder using text on controller display
- Audio modes: Mono, Stereo
- The UFZ 800 channel unit adapter is required for operation in the UFG 810 modular carrier
- The levels of the two output channels can be individually adjusted and switched off via the controller.



- RDS function for channel name display in RDS suitable FM receivers (standard-conforming extraction from data stream or manual entry)
- Software can be updated via a controller interface
- Required central controller software version: V 9.50 and higher
- Dimensions (W x H x D) in mm: 265 x 27 x 170
- Packaging unit/weight (pc./kg): 1/0.7

Technical data

Type | Order no.		UFO 313 20610076
Frequency range		2 x input 950–2150 / 8 x output 87.5–108
Input level	dBµV	50-85
Input data rate	Ms/s	60
Sum distortion attenuation	dB	60
Unweighted signal-to-noise ratio	dB	65
Crosstalk attenuation	dB	40
Max. output level/setting range	dBµV	91/71-91
Power consumption	V/mA	5/1100, 12.5/450, 31/10

> Amplifier for UFOcompact plus®

UVO 830 20610130



The amplifier can be inserted directly into the UFG 810 module carrier (Order no. 20610122).

- Setting over central control module UFX 800 in conjunction with USW 800 software
- Level and slope can be set in combination (four suitable pre-emphases)
- Test socket for the uninterrupted measurement of the output channels on the UFOcompact plus® base unit
- Lightning protection (1.2/50 μ s, 2 kV) on the output side
- Excellent dynamic range under high channel assignment

Technical data

Type | Order no.		UVO 830 20610130
Input		
Input socket		1 x F connector, 75 Ω
Frequency range	MHz	47-1006
Test output		
Test socket		1 x F connector, 75 Ω
Level relative to the output	dB	-25
Output		
Output socket		1 x F connector, 75 Ω
Max. output level (at 862 MHz)	dB μ V	113
Max. output level (at 1006 MHz)	dB μ V	112
System data		
Gain	dB	Max. 30
Adjustable pre-emphases	dB	6, 9, 12, 15
Power consumption	W	Typ. 14.2
Temperature range	$^{\circ}$ C	-20 to +50
Dimensions (H x W x D)	mm	110.5 x 38.5 x 207
Weight	kg	0.3

> Power supply unit for UFOcompact plus®

UFN 800 20610121



- Power supply unit for use in UFOcompact plus®-module carriers (included in the scope of delivery of UFG 810 module carrier, order no. 20610122)
- High efficiency: > 92 %
- Easily exchangeable due to frontal insertion into UFOcompact plus® module carriers
- Redundancy-capable
- Automatic overtemperature switch-off
- Low inrush current (low peak inrush current): < 20 A
- Status display via frontal LEDs

Technical data

Type | Order no.		UFN 800 20610121
Input		
Nominal input voltage	V	230 ± 10 %
Mains frequency	Hz	50-60
Input power	W	Max. 437
Nominal input current	A	< 1.9
Transient current limitation	A	≤ 20
Efficiency	%	Typ. > 92
Power Factor Correction		EN 61000-3-2
Output		
Output power	W	400
Output voltage/current	V/A	12.3/0.5–32.5
Output current limitation	A	36.5 < I _{sec} < 38.5 (short-circuit proof)
Over-voltage protection	V	> 14
Interference voltages	mV _{ss}	≤ 250 (50 Hz to 1 MHz)
Redundancy		Parallel circuit of several power supply units possible
Monitoring		
Temperature sensor		Query current indoor temperature via software USW 800
Module carrier fan units		Function/error status request via software USW 800
Remote control		Reset and start over software USW 800
Signalling (LED)		
Green		Normal operation (output voltage 11.3–14 V)
Red		Under voltage (output voltage < 10.6 V)
Red (flashing)		Over voltage (output voltage > 14 V)
Red		Overcurrent (output current > 35.5 A)

Type | Order no.		UFN 800 20610121
Safety (VDE approved)		
Protection class		1
Excess temperature switch-off		Automatic
System data		
Mains connection		Inlet connector for non-heating apparatus
Temperature range	°C	-20–+50
Dimensions (H x W x D)	mm	166 x 78 x 230
Weight	kg	1.6

> Central control module

UFX 800 20610123

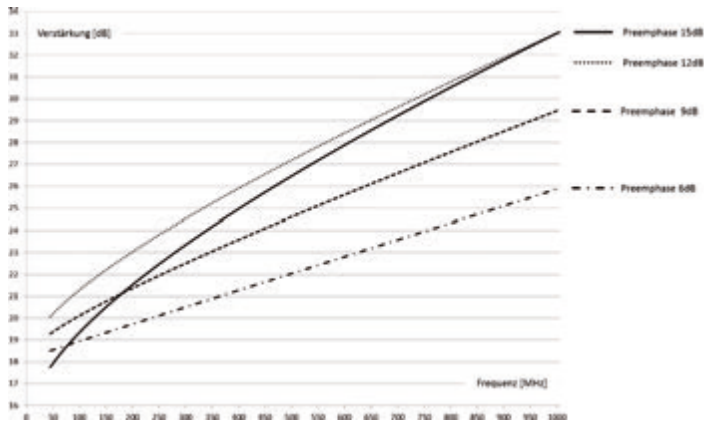


- Central control module for control of all channel units of the UFOcompact plus® signal processing system in conjunction with USW 800 software (included in the delivery scope of the UFG 810 module carrier, Order no. 20610122)
- Two fast Ethernet ports for management and for cascading of multiple systems without an external switch
- Flexible IP configuration (IPV 4/IPV 6, DHCP, zero-configuration networking)
- Two USB connections (e.g. for software updates)
- Management interface with high performance due to parallel communication; also to inserted UFO® compact modules
- Flexible IP configuration (IPV 4/IPV 6, DHCP, zero-configuration networking)
- Power-on reset for UFOcompact plus® series modules
- Remote software update for modules and channel units

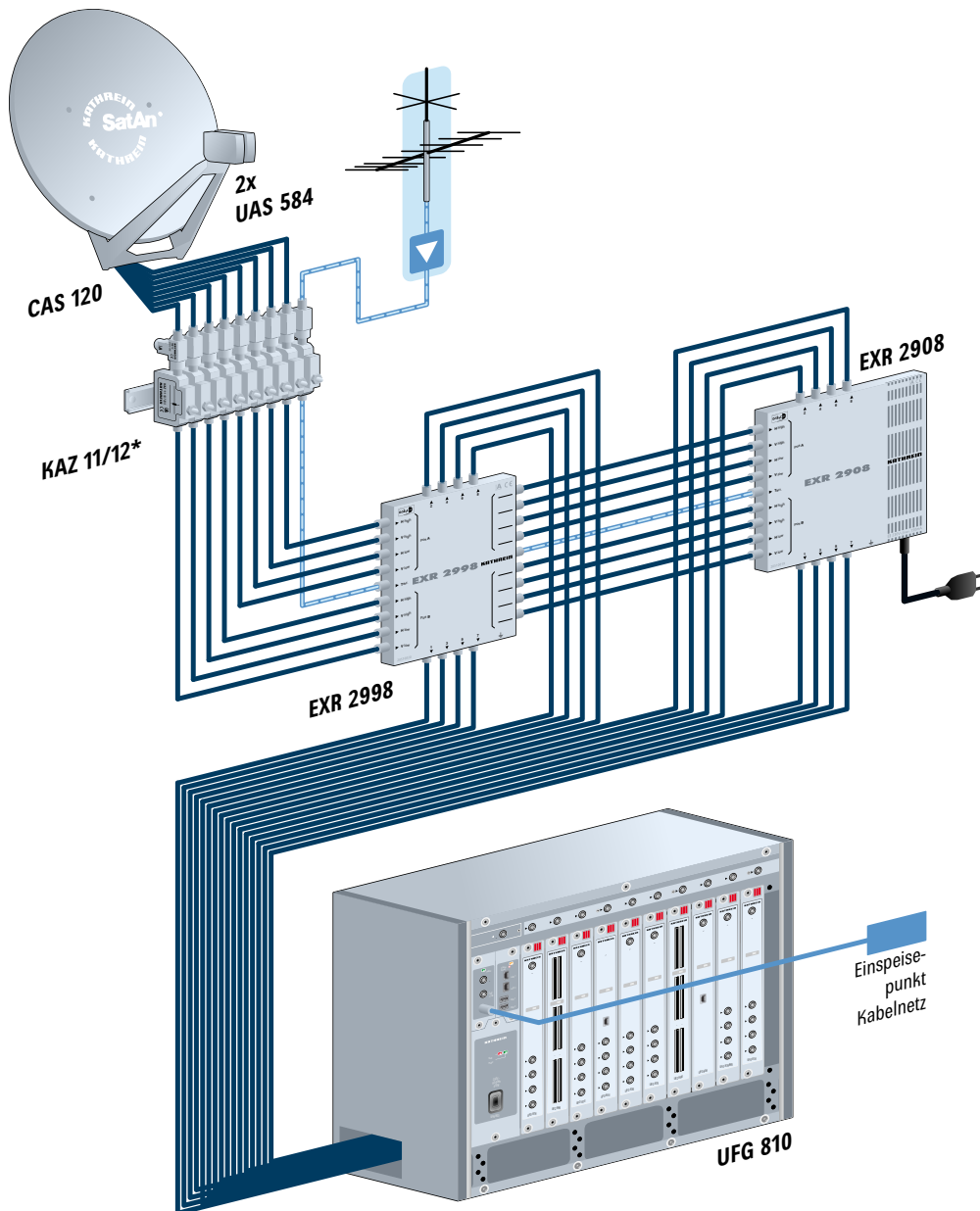
Technical data

Type | Order no.		UFX 800 | 20610123
System interfaces		
Control interface	Mbps	12
Fast Ethernet		2 x RJ 45
USB		2 x Host (Type A)
Reset		Button
System data		
Power consumption	W	Typ. 4
Temperature range	°C	-20 to +50
Dimensions (H x W x D)	mm	110.5 x 38.5 x 207
Weight	kg	0.3

Frequency response of UVO 830



> Connection example



UFOmini Signal Processing System

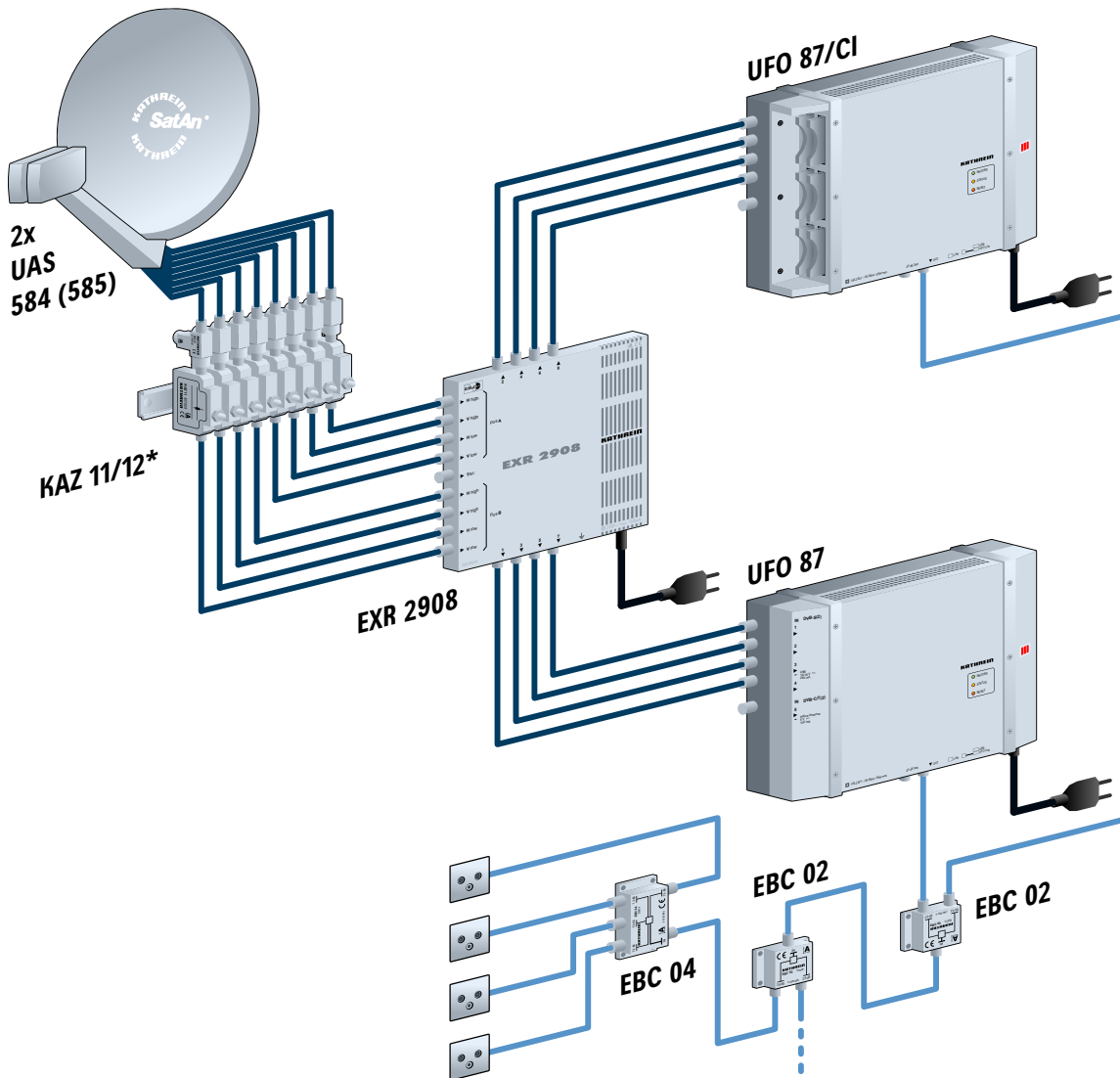
➤ System description	238
➤ Headend 8-way DVB-S(2)/-T(2)/-C – DVB-C/-T	239
➤ Headend 18-way DVB-S(2)/-T(2)/-C – DVB-C	242
➤ Overview of functions	245

> System description

The UFOmini headend family features eight multi-standard frontends for the combined reception of DVB-S, S2, T, T2 and C signals. The standalone headunit in a compact design also offers a flexible 6-way decoding option (CI) and eight flexibly adjustable output channels in DVB-C or DVB-T. Further features of the UFOmini include high energy efficiency and remote configuration. Extensive baseband signal processing with programme filter functionality, NIT, support of different LCN standards and flexible decryption capability provide various applications. The combinable components of the UFOmini are:

- UFO 83: Eight output channels in DVB-T
- UFO 87: Eight output channels in DVB-C
- UFO 87-18: 18 output channels in DVB-C
- UFO 83/CI: Eight output channels in DVB-T with six CI slots
- UFO 87/CI: Eight output channels in DVB-C with six CI slots
- UFO 87-18/CI: 18 output channels in DVB-C with six CI slots

Connection example for UFOmini with DiSEqC™ control



Headend 8-way DVB-S(2)/-T(2)/-C – DVB-C/-T

UFO 83	20610134
UFO 87	20610135
UFO 83/CI	20610136
UFO 87/CI	20610137



UFOmini



UFO 83, UFO 87, UFO 83/CI, UFO 87/CI



UFO 83/CI, UFO 87/CI

The UFOmini headend family allows the combined reception of DVB-S(2)/DVB-T(2)/DVB-C signals using the latest triple-tuner technology. The standalone headunit in a compact design also offers a flexible 6-way decrypting capability (CI) and eight flexibly adjustable output channels in DVB-C or DVB-T.

- Standalone headunit with 8-way multi-standard frontend DVB-S(2)/T(2)/C, 6-way decoding (CI) and eight DVB-compliant output channels (flexibly adjustable):
 - UFO 83: Eight output channels in DVB-T
 - UFO 87: Eight output channels in DVB-C
 - UFO 83/CI: Eight output channels in DVB-T with six CI slots
 - UFO 87/CI: Eight output channels in DVB-C with six CI slots
- Outstanding output values due to direct implementation as FPGA solution
- High level of energy efficiency
- Four Sat IF inputs with DiSEqC™ 1.0 functionality for Sat multi-switches and terrestrial/cable input flexibly distributed to eight multi-standard frontends
- All transmission parameters can be set using the USW 800 management program
- Remote service and configuration
- Extensive baseband signal processing with e.g. channel filter functionality, NIT, LCN
- Cascadable (16-way multi-standard frontend, 12-way decoding (CI) and 16 x QAM/COFDM by UFO
- No fan, therefore noise and maintenance-free device design

Technical data

Type | Order no.		UFO 83 20610134	UFO 87 20610135	UFO 83/CI 20610136	UFO 87/CI 20610137
Inputs					
Sat IF input			4 x F connector, 75 Ω		
Terrestrial/cable input			1 x F connector, 75 Ω		
Decoupling	dB		> 25		
Return loss	dB		Typ. 10		
DiSEqC™1.0			Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)		
Switching levels	V/kHz		14/18, 0/22		
Remote feed current for LNB	mA		Max. 250 (at F socket no. 3), max. 60 (on F socket no. 1, 2, 4)		
Remote feed current for active Antenna (5 V)	mA		100 (on F socket no. 5)		
Frontend					
DVB-S/S2/T/T2/C			8x		
Frequency grid	MHz		1		
Input level range	dBμV		60-100		
Permissible level difference	dB		20		
Demodulation DVB-S					
Standard			EN 300 421		
Frequency range	MHz		950–2150		

Technical data

Type | Order no.		UFO 83 20610134	UFO 87 20610135	UFO 83/CI 20610136	UFO 87/CI 20610137
Input symbol rate QPSK	MS/s	1-45			
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 7/8			
Roll off	%	35			
AFC regulation range	MHz	± 5			
Demodulation DVB-S2					
Standard		EN 302 307, TR 102-376			
Input symbol rate QPSK	MS/s	1-45			
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10			
Input symbol rate 8PSK	MS/s	1-45			
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10			
Roll off	%	20/25/35			
Demodulation DVB-T (COFDM)					
Standard		EN 300744, NorDig Unified 2.2.1, D-Book 7.0, supports all C.R, G.I, LP and HP streams			
Frequency range	MHz	42-870			
Guard interval		1/4, 1/8, 1/16, 1/32			
FEC		1/2, 2/3, 3/4, 5/6, 7/8			
FFT mode		2k, 8k			
Bandwidth	MHz	6, 7, 8			
Constellation		QPSK, 16 QAM, 64 QAM			
Demodulation DVB-T2 (COFDM)					
Standard		EN 302755-V1.31, DVB-T2 Lite compliant, single and multiple PLP support, NorDig Unified 2.2.1, D-Book 7.0			
Guard interval		1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4			
FEC		1/2, 3/5, 2/3, 3/4, 4/5, 5/6			
FFT mode		1k, 2k, 4k, 8k, 16k, 32k			
Bandwidth	MHz	1.7/5/6/7/8			
Constellation		QPSK, 16 QAM, 64 QAM, 256 QAM			
Demodulation DVB-C					
Standard		EN 300 429/ITU J.83 Annex A/C			
Frequency range	MHz	42-1002			
Input symbol rate	MS/s	1-7.2			
Constellation	QAM	4/16/32/64/128/256			
MPEG-TS processor					
Programme filter					
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT			
LCN data		NorDig Descriptor V1, IEC 62216, FRANSAT PRO	NorDig Descriptor V1	NorDig Descriptor V1, IEC 62216, FRANSAT PRO	NorDig Descriptor V1
Stuffing		Automatic			

Technical data

Type | Order no.		UFO 83 20610134	UFO 87 20610135	UFO 83/CI 20610136	UFO 87/CI 20610137
Decoding					
6 CAM insert positions			–		PCMCIA interface
TS routing CAM			–		Individual and serial decoding
Modulator					
Output channels		8 x DVB-T, 2k mode	8 x DVB-C (J.83A)	8 x DVB-T, 2k mode	8 x DVB-C (J.83A)
Constellation		QPSK, 16/64 QAM	16/32/64/128/256 QAM	QPSK, 16/64 QAM	16/32/64/128/256 QAM
Symbol rate	MS/s	–	2.25-7.25	–	2.25-7.25
Guard interval		1/4, 1/8, 1/16, 1/32	–	1/4, 1/8, 1/16, 1/32	–
Code rate		1/2, 2/3, 3/4, 5/6, 7/8	–	1/2, 2/3, 3/4, 5/6, 7/8	–
Roll off	%	–	15	–	15
RF output					
Output		1 x F connector, 75 Ω			
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)			
Frequency range (channel list)	MHz	47–86/110–862 (setting via channel list)			
Return loss	dB	14 (47 MHz) –1.5 dB/oct.			
Output level	dBμV	105	110	105	110
Pre-emphasis	dB	8			
Output level setting range	dB	–20 (in 0.5 dB steps)			
Level stability	dB	± 0.8			
Frequency stability	ppm	35			
MER	dB	Typ. 40	Typ. 45	Typ. 40	Typ. 45
Shoulder attenuation	dB	≥ 60 (at normal level)			
Spurious emissions	dB	≥ 60			
Test output					
Test socket		1 x F connector, 75 Ω			
Level relative to the output	dB	25			
System data					
Power consumption	W	34–38 *)	33-37 *)	38-47 *)	37-46 *)
Temperature range	°C	0–+45	0–+45	0–+45	0–+45
Power supply voltage	V	100-240	100-240	100-240	100-240
Protective shut-down	°C	> 70	> 70	> 70	> 70
Dimensions (H x W x D)	mm	97 x 350 x 244	97 x 350 x 244	97 x 350 x 244	97 x 350 x 244
Weight	kg	Approx. 4	Approx. 4	Approx. 4.5	Approx. 4.5

*) The power consumption depends on the input and output configuration
(Specification without LNB supply or remote feeding for active antennas)

Test verdicts



> Headend 18-way DVB-S(2)/-T(2)/-C – DVB-C

UFO 87-18 2060000003

UFO 87-18/CI 2060000004



UFOmini



UFO 87-18

The UFOmini headend family allows the combined reception of DVB-S(2)/DVB-T(2)/DVB-C signals using the latest triple-tuner technology. The standalone headunit in a compact design also offers a flexible 6-way decoding option (CI) and 18 flexibly adjustable output channels in DVB-C.

- Standalone headunit with 16-way DVB-S(2) and 2-way multi-standard DVB-S(2)/-T(2)/-C frontend, 6-way decoding (CI) and 18 DVB-compliant output channels (flexibly adjustable):
 - UFO 87-18: 18 output channels in DVB-C
 - UFO 87-18/CI: 18 output channels in DVB-C with six CI slots
- Outstanding output values due to direct implementation as FPGA solution
- High level of energy efficiency
- Eight Sat IF inputs with DiSEqC™1.0 functionality for Sat multi-switches and terrestrial/cable input flexibly distributed to eight multi-standard frontends
- All transmission parameters can be set using the USW 800 management program
- Remote service and configuration
- Extensive baseband signal processing with e.g. channel filter functionality, NIT, LCN
- 4-way cascading by means of UFO link possible
- No fan, therefore noise and maintenance-free device design

Technical data (provisional)

Type | Order no.		UFO 87-18 2060000003	UFO 87-18/CI 2060000004
Inputs			
Sat IF input		8 x F connector, 75 Ω	
Sat/terr./cable input		1 x F connector, 75 Ω	
Decoupling	dB	> 25	
Return loss	dB	Typ. 10	
DiSEqC™1.0		Vert./Horiz., Low/High; Sat. pos. (A/B/C/D)	
Switching levels	V/kHz	14/18, 0/22	
Remote feed current for LNB	mA	Max. 250 (at F socket no. 3 and 7), max. 60 (on F socket no. 1, 2, 4, 5, 6, 8)	
Remote feed current for active Antenna (5 V)	mA	100 (on F socket no. 9)	
Frontend			
DVB-S/-S2/		16x	
DVB-S/S2/T/T2/C		2x	
Frequency grid	MHz	1	
Input level range	dBμV	60-100	
Permissible level difference	dB	20	
Demodulation DVB-S			
Standard		EN 300 421	
Frequency range	MHz	950–2150	

Technical data

Type | Order no.		UFO 87-18 2060000003	UFO 87-18/CI 2060000004
Input symbol rate QPSK	MS/s	1-45	
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 7/8	
Roll off	%	20, 25, 35	
AFC regulation range	MHz	± 5	
Demodulation DVB-S2			
Standard		EN 302 307, TR 102-376	
Input symbol rate QPSK	MS/s	1-45	
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10	
Input symbol rate 8PSK	MS/s	1-45	
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10	
Roll off	%	20/25/35	
Demodulation DVB-T (COFDM)			
Standard		EN 300744, NorDig Unified 2.2.1, D-Book 7.0, supports all C.R, G.I, LP and HP streams	
Frequency range	MHz	47-862	
Guard interval		1/4, 1/8, 1/16, 1/32	
FEC		1/2, 2/3, 3/4, 5/6, 7/8	
FFT mode		2k, 8k	
Bandwidth	MHz	6, 7, 8	
Constellation		QPSK, 16 QAM, 64 QAM	
Demodulation DVB-T2 (COFDM)			
Standard		EN 302755-V1.31, DVB-T2 Lite compliant, Single and multiple PLP Support, NorDig Unified 2.2.1, D-Book 7.0	
Guard interval		1/128, 1/32, 1/16, 19/256, 1/8, 19/128, 1/4	
FEC		1/2, 3/5, 2/3, 3/4, 4/5, 5/6	
FFT mode		1k, 2k, 4k, 8k, 16k, 32k	
Bandwidth	MHz	1.7/5/6/7/8	
Constellation		QPSK, 16 QAM, 64 QAM, 256 QAM	
Demodulation DVB-C			
Standard		EN 300 429/ITU J.83 Annex A/C	
Frequency range	MHz	47-862	
Input symbol rate	MS/s	1-7.2	
Constellation	QAM	4/16/32/64/128/256	
MPEG-TS processor			
Programme filter		•	
PSI/SI processing		Cable NIT, LCN, PCR correction, CAT	
LCN data		NorDig Descriptor V1	
Stuffing		Automatic	
Decoding			
6 CAM insert positions		–	PCMCIA interface
TS routing CAM		–	Individual and serial decoding

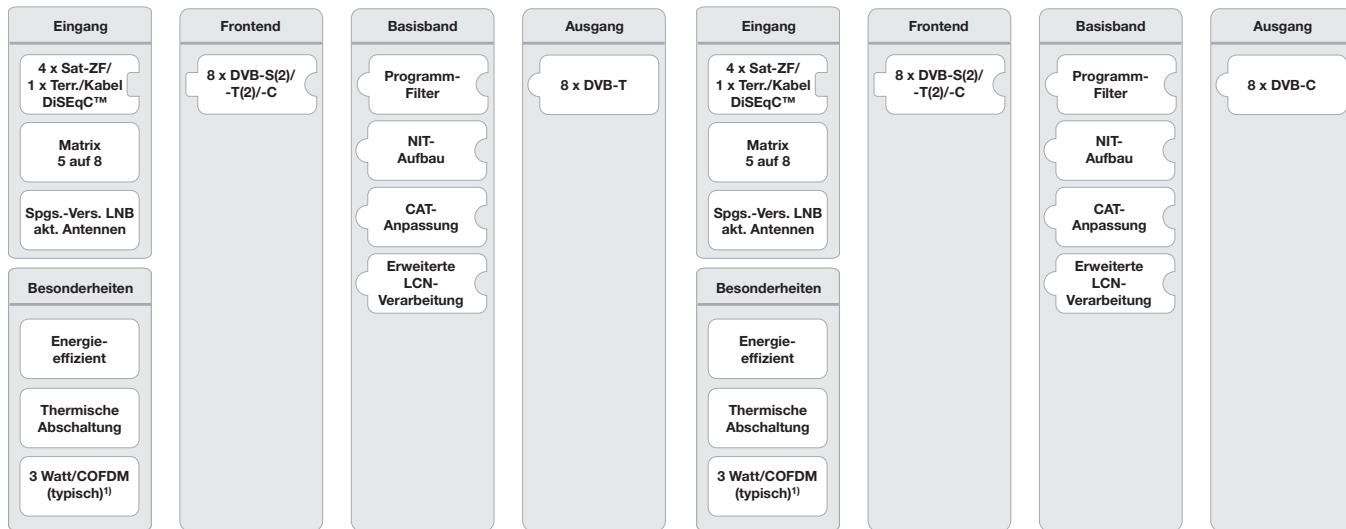
Technical data

Type | Order no.		UFO 87-18 2060000003	UFO 87-18/CI 2060000004
Modulator			
Output channels		18 x DVB-C (J.83A)	
Constellation		16/32/64/128/256 QAM	
Symbol rate	MS/s	2.25-7.25	
Roll off	%	15	
RF output			
Output		1 x F connector, 75 Ω	
Frequency range	MHz	47–1006 (fine tuning in 125-kHz steps)	
Frequency range (channel list)	MHz	47–86/110–862 (setting via channel list)	
Return loss	dB	14 (47 MHz) –1.5 dB/oct.	
Output level	dBμV	107	
Output level setting range	dB	-20 (in 0.5 dB steps)	
Level stability	dB	± 0.5	
Frequency stability	ppm	35	
MER	dB	≥ 45	
Shoulder attenuation	dB	≥ 60 (at normal level)	
Spurious emissions	dB	≥ 60	
Test output			
Test socket		1 x F connector, 75 Ω	
Level relative to the output	dB	25	
System data			
Power consumption	W	32-35 *)	35-39 *)
Temperature range	°C	0 to +45	
Power supply voltage	V	100-240	
Protective shut-down	°C	> 70	
Dimensions (H x W x D)	mm	97 x 350 x 244	
Weight	kg	Approx. 4	Approx. 4.5

*)The power consumption is dependent on the input and output configuration (data without LNB supply or remote feeding for active antennas)

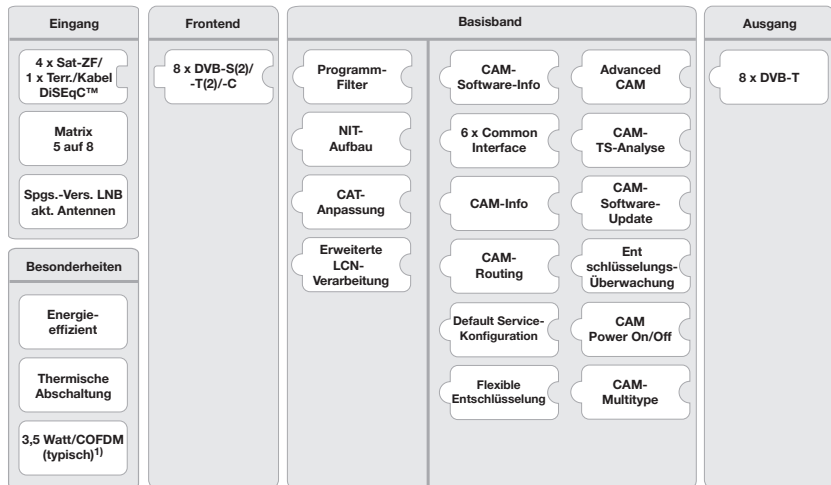
Overview of functions

UFO 83

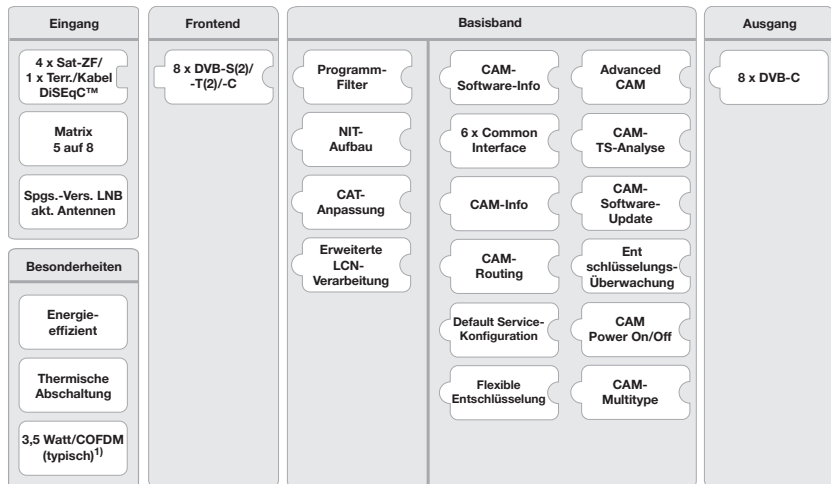


UFO 87

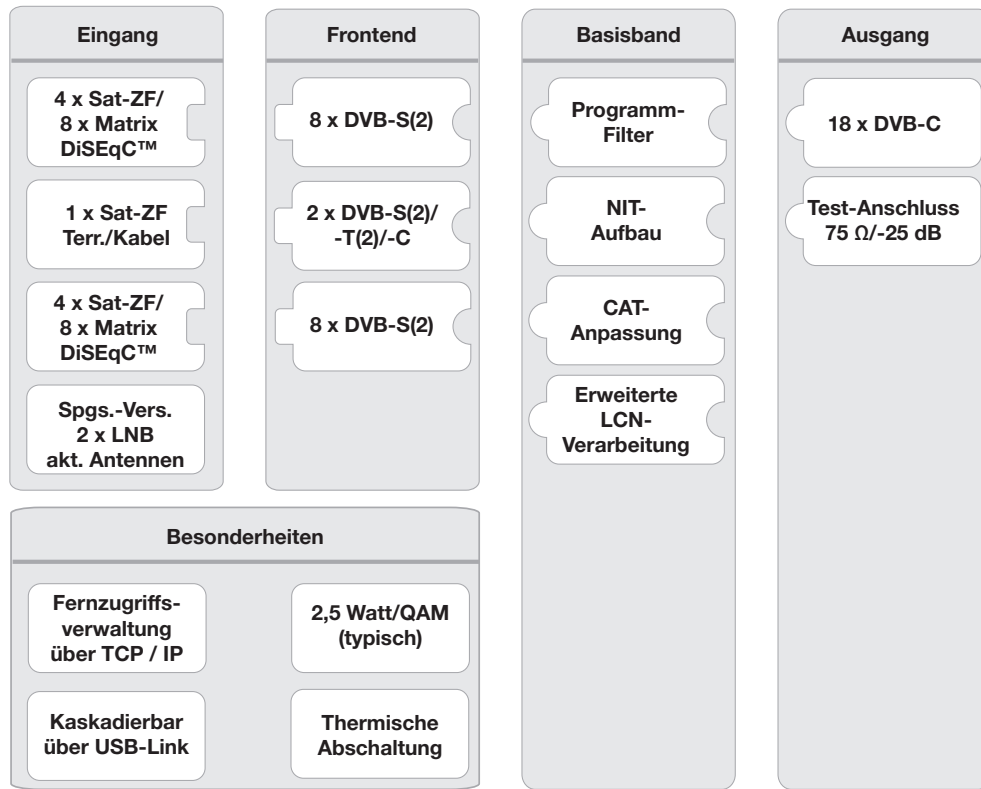
UFO 83/CI



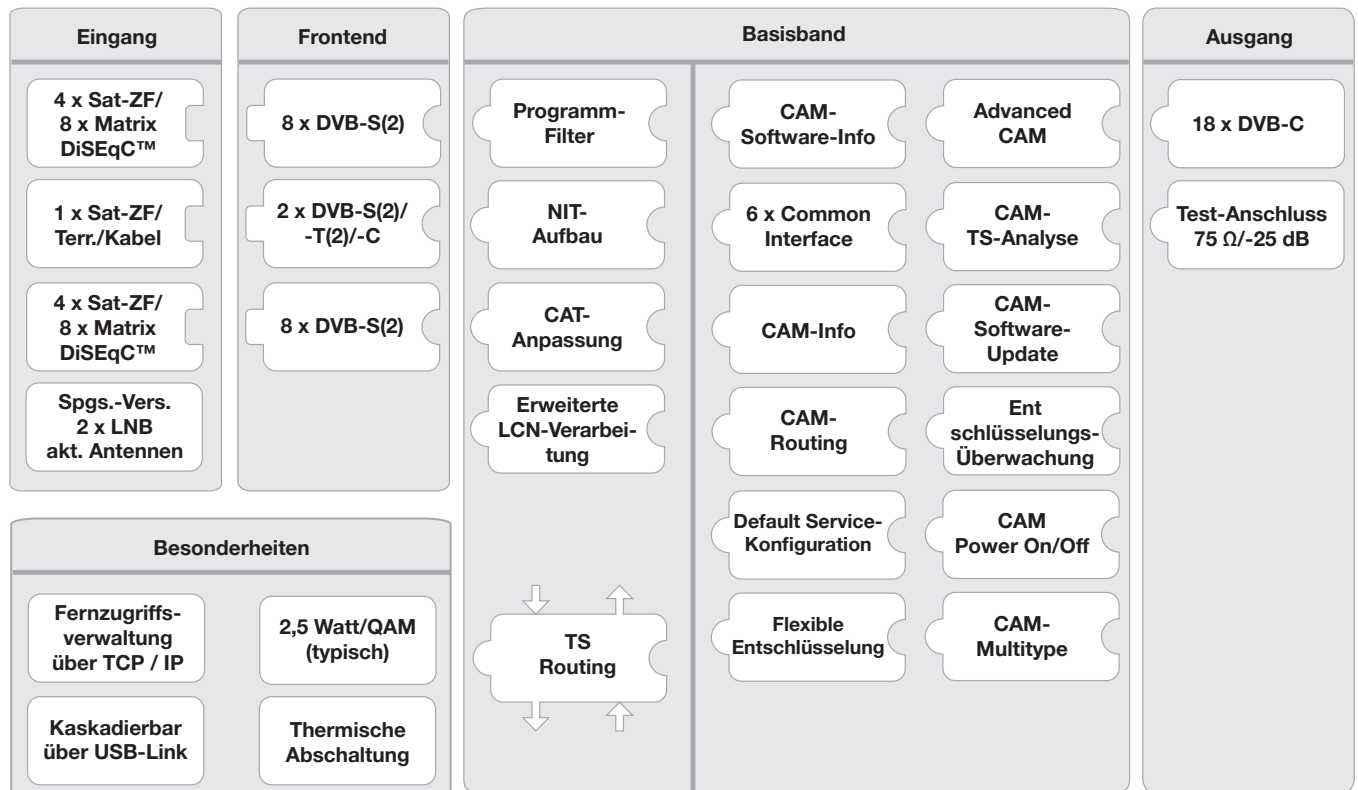
UFO 87/CI



UFO 87-18



UFO 87-18/CI



UFO nano Signal Processing System

➤ System description	248
➤ Headend 8-way DVB-S(2) – DVB-C (J.83A)	248

> System description

UFO nano is a reasonably priced, technically mature standalone headunit offering a great number of advantages particularly when modernising existing properties. Easy programming by way of channel packets and a preadjusted station list allow very fast installation and commissioning. UFO nano allows transmodulation (FTA) of 8 x DVB-S/S2 to 8 x QAM. The typical power consumption of 20 W makes the headend with built-in power supply unit extremely energy efficient.

The headend is delivered pre-programmed, which allows operation without further configuration. After installation and connection, the most important German-language TV and radio channels are immediately available over Astra 19.2° east. The headend is primarily used in smaller hotels and guest houses.

> Headend 8-way DVB-S(2) – DVB-C (J.83A)

UFO 30 20610146



UFO nano



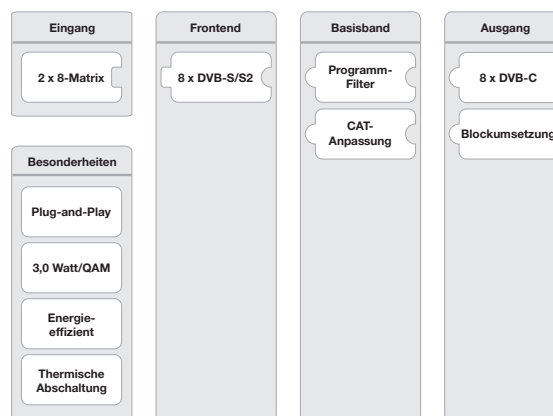
- Standalone headunit with a built-in power supply unit
- Converts eight QPSK/8PSK modulated DVB-S2 signals into eight adjacent QAM-modulated DVB-C output signals
- TV and radio channels pre-programmed
- Outstanding output values due to direct implementation as FPGA solution
- High energy efficiency, power consumption: Typ. 20 W
- Two Sat IF inputs A/B configurable
- All the transmission parameters can be set with the USW 30 management program
- To change the default configuration, the UFZ 30 programming cable (order no. 20410058) is additionally

required (not included in the delivery scope)

- Fanless design for wall mounting (no noise)
- MPEG transport stream processor:
 - To set a constant output data rate (stuffing) with PCR correction

- With programme filter to remove individual TV and radio channels

UFO 30 overview of functions



Technical data

Type | Order no.	UFO 30 20610146	
Inputs		
Sat IF input		2 x F connector, 75 Ω
Frequency range	MHz	950–2150
Decoupling	dB	Min. 25
Return loss	dB	Typ. 6
Frontend		
DVB-S2		8x
Frequency grid	MHz	1 (950-2150 MHz)

AFC regulation range	MHz	± 3 (symbol rate < 10 Ms/s); ± 5 (symbol rate > 10 Ms/s) (950–2150 MHz)
Input level range	dB μ V	60-110
Permissible level difference	dB	12
Demodulation DVB-S		
Standard		EN 300 421 (1)
Input symbol rate QPSK	MS/s	2-45
Code rate (Viterbi)		1/2, 2/3, 3/4, 5/6, 6/7, 7/8
Roll off	%	35
Demodulation DVB-S2		
Standard		EN 302 307 (2)
Input symbol rate QPSK	MS/s	1-34
Code rate (LDPC)		1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Input symbol rate 8PSK	MS/s	1-28.9
Code rate (LDPC)		3/5, 2/3, 3/4, 5/6, 8/9, 9/10
Roll off	%	20/25/35
MPEG-TS processor		
Programme filter/PID-filter		
PSI/SI processing		PCR correction
Stuffing		Automatic
QAM modulator		
Output channels		8 x DVB-C (J.83A) as adjacent channels
QAM constellation	QAM	16, 32, 64, 128, 256
Symbol rate	MS/s	2.25-7.25
Roll off	%	15
RF output		
DVB-C output		
Frequency range	MHz	47–1006 (fine-tuning in 250-kHz steps)
Frequency range (channel list)	MHz	110–1006 (setting via channel list)
Return loss	dB	14 (47 MHz) –1.5 dB/oct.
Output level	dB μ V	91
Output level setting range	dB	-20 (in 0.5 dB steps)
Level stability	dB	Typ. ± 0.5
Frequency stability	ppm	Typ. 35
MER	dB	Typ. ≥ 45
Shoulder attenuation	dB	≥ 60 (at normal level)
Spurious emissions	dB	≥ 60
System data		
Power consumption	W	Typ. 25
Temperature range	°C	0–+40
Power supply voltage	V	230 \pm 10 %
Dimensions (H x W x D)	mm	282 x 240 x 60
Weight	kg	2.5

Setup instructions

The plug-and-play condition on delivery allows the operation of the UFO nano headend without any further configuration. After installation and connection, 78 TV and 9 radio channels are immediately available (via Astra 19.2° east, transponder allocation as of Q2/2018; see table below).

The default configuration can be changed using the USW 30

control program. For programming the headend must be connected with the programming cable UFZ 30, order no. 20410058 (not supplied with the unit) and a PC with a USB connection.

Channel	Input	Transponder/Programme	SD/HD	Band	Polarisation	Transp.-frequency	Sat IF/MHz	SR	Standard	CR	Output channel	Symbol rate	Output level	QAM
1	A	Das Erste, BR, HR, SWR, WDR	SD	High	Horizontal	11836	1236	27500	DVB-S	3/4	S21	6.9	-2	64
2	A	ZDF, 3sat, KIKA, ZDFinfo, ZDF neo	SD	High	Horizontal	11954	1354	27500	DVB-S	3/4	S22	6.9	-2	64
3	A	MDR, NDR, RBB, SWR	SD	High	Horizontal	12110	1510	27500	DVB-S	3/4	S23	6.9	-2	64
4	A	RTL, N-TV, RTL2, Toggo Plus, Nitro, Vox	SD	High	Horizontal	12188	1588	27500	DVB-S	3/4	S24	6.9	-2	64
5	A	Pro Sieben, Sat1, Kabel eins, Sat1 Gold	SD	High	Horizontal	12545	1945	22000	DVB-S	5/6	S25	6.9	-2	64
6	A	Anixe, N24 Doku, 1-2-3 TV, TLC Germany, Sixx Deutschland	SD	High	Horizontal	12460	1860	27500	DVB-S	3/4	S26	6.9	-2	64
7	B	Nick Jr Europe, Nickelodeon...	SD	High	Vertical	11973	1373	27500	DVB-S	3/4	S27	6.9	-2	64
8	B	Sport1, DMAX, HSE24, SonnenklarTV, Astro TV...	SD	High	Vertical	12480	1880	27500	DVB-S	3/4	S28	6.9	-2	64

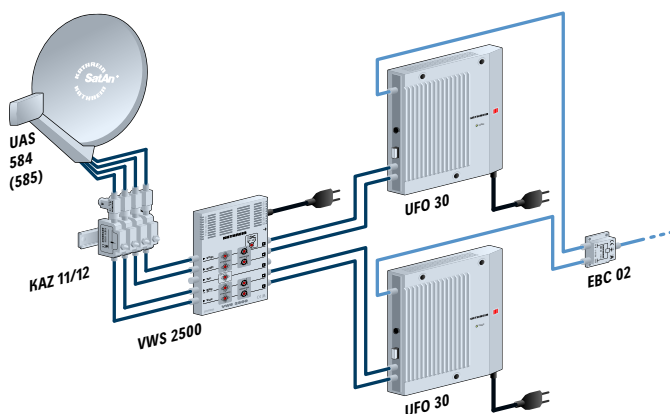
Delivery status UFO 30, transponder Astra 19.2° east and output channel assignment

The settings and numerical values shown below are examples that do not necessarily correspond with the delivery status. For the operation of two UFO nano units or reception of other satellites, more pre-set configurations are available. These can be downloaded free of charge from the Kathrein homepage "www.kathrein.com".

When operating two UFO nano units, make sure that the respective output channel blocks do not overlap. The output

signals of the two headend units can then be combined with distributors of the EBC series (reverse operation). The power supply of the LNB (remote feeding) must be done with external components. It is recommended to use the VWS 2500 Sat-IF distribution network amplifier. Using the VWS 2500 also ensures an individual amplification and slope range setting. For LNB supply, a remote feed diplexer (e.g. WFS 31) and a power supply unit (e.g. NCF 18) can also be used.

Connection example



Accessories for the Distribution Network

➤ General information	252
➤ Tap, threaded	253
➤ Tap with F connectors	254
➤ Taps for star distribution	256
➤ Splitter	258
➤ Over-voltage protection	260
➤ Equaliser	265
➤ Adjustable attenuator	265
➤ TV T-connector	266
➤ Low-pass filter	266
➤ Diplexers	267
➤ Variable attenuators	269
➤ Receiver connection cables (straight)	270

> General information

Taps and splitters

Indoor installation

With terminal connection or F connector connection

Antenna outlets

Die-cast chassis with accessories for all installation types

	Taps/splitters	Outlets
<p>Through loss</p> <p>Attenuation between input E and output A. With splitters between input E and outputs A.</p>		
<p>Tap loss or connection loss</p> <p>Attenuation between input E and tap-off Ab or radio or TV connection.</p>		
<p>Directional attenuation</p> <p>Attenuation between output A and tap-off Ab or radio or TV connection.</p>		
<p>Decoupling</p> <p>Attenuation between two tap-offs Ab. For splitters between outputs A. For outlets between two subscribers.</p>		
<p>Return loss</p> <p>Attenuation of a reflected signal R compared with the signal in the forward direction V.</p>		

The data provided for the individual products only applies if all outputs are terminated.

Unused outputs must be closed with terminating resistors (see Page 108).

> Tap, threaded

1-way

EAC 12 272327

EAC 16 272328

EAC 22 272329



EAC 12

- Impedance: 75 Ω
- Complies with: EN 60728-11 and EN 50083-2
- For indoor installation
- Due to the wide frequency range of 0.15–2150 MHz, suitable for house networks, community networks, broadband house distribution systems and satellite reception systems

2-way

EAD 21 272307



EAD 21

- Impedance: 75 Ω
- Complies with: EN 60728-11 and EN 50083-2
- For indoor installation
- Due to the wide frequency range of 0.15-2150 MHz, suitable for house networks, community networks, broadband house distribution systems and satellite reception systems

Technical data

Type | Order no.		EAC 12 272327	EAC 16 272328	EAC 22 272329	EAD 21 272307
Frequency range	MHz	0.15-2150 ¹⁾	0.15-2150 ¹⁾	0.15–2150	0.15–2150
Tap attenuation	dB	10.5	13.5	20	20
Through loss	0.15-47 MHz	1.5	1.5	0.8	1.5
	47-862 MHz	1.1	0.7	0.8	1.8
	862-2150 MHz	1.8	1.4	1.0	2.2
Directional attenuation (Output → tap)	47-2150 MHz	≥ 28.5 ²⁾	≥ 31.5 ²⁾	–	–
	Minimal value	20.5	23.5	–	–
Decoupling	47-862 MHz	–	–	–	≥ 38
	862-2150 MHz	–	–	–	≥ 30
Clamp-connection	mm Ø	Inner conductor: 0.4-1.6 – Outer conductor: 4.5-5.8 (7.9)			
Dimensions (W x H x D)	mm	88.5 x 75 x 30			115 x 75 x 30
Packaging unit/weight	pc./kg	1(100)/0.20			1(50)/0.30

¹⁾ EAC 12/EAC 16: Data deviation in LMK range ²⁾ Relative to 40 MHz, -1.5 dB/Octave

Tap with F connectors

1-way

EAC 01/G 21610089

EAC 02/G 21610090

EAC 03/G 21610091

EAC 04/G 21610092



EAC 01/G

- Impedance: 75 Ω
- Frequency range: 5-1218 MHz (i.e. return path and UHF compatible)
- Solid housing made of tin-plated zinc injection moulding
- Isolating capacitors on inputs and outputs
- Conforms to: EN 60728-11 and EN 50083-2
- Class A (+10 dB) based on DIN 50083-2
- Vodafone/KDG approval
- Connections: F connectors
- For indoor installation

Technical data

Type | Order no.			EAC 01/G 21610089	EAC 02/G 21610090	EAC 03/G 21610091	EAC 04/G 21610092
Tap attenuation, typ.	5-1218 MHz	dB	8.5	12	16	20.5
Through loss, typ.	5-470 MHz	dB	1.3	0.8	0.5	0.4
	470-862 MHz		1.6	1.0	0.7	0.6
	862-1006 MHz		1.8	1.1	0.9	0.9
	1006-1218 MHz		2.0	1.1	0.9	0.9
Directional attenuation	5-10 MHz	dB	≥ 24	≥ 28	≥ 34	≥ 38
	10-40 MHz		≥ 30	≥ 32	≥ 36	≥ 40
	40-950 MHz ¹⁾		≥ 30	≥ 32	≥ 36	≥ 40
	950-1218 MHz		≥ 22	≥ 24	≥ 22	≥ 29
Return loss	5-94 MHz	dB	≥ 18.0			
	94-188 MHz		≥ 16.5			
	188-376 MHz		≥ 15.0			
	376-752 MHz		≥ 13.5			
	752-1218 MHz		≥ 12.0			
Dimensions (W x H x D)		mm	51.6 x 52.5 x 23.5			
Packaging unit/weight		pc./kg	1 (10, 200)/0.045			

¹⁾ At 40 MHz, -1.5 dB/Octave

2-way

- EAD 01/G** 21610093
- EAD 02/G** 21610094
- EAD 03/G** 21610095
- EAD 04/G** 21610096



EAD 01/G

- Impedance: 75 Ω
- Frequency range: 5-1218 MHz (i.e. return path and UHF compatible)
- Solid housing made of tin-plated zinc injection moulding
- Isolating capacitors on inputs and outputs
- Conforms to: EN 60728-11 and EN 50083-2
- Class A (+10 dB) based on DIN 50083-2
- Vodafone/KDG approval
- Connections: F connectors
- For indoor installation

Technical data

Type | Order no.			EAD 01/G 21610093	EAD 02/G 21610094	EAD 03/G 21610095	EAD 04/G 21610096
Tap attenuation, typ.	5-1218 MHz	dB	8.5	13	16.5	20.5
Through loss, typ.	5-470 MHz	dB	2.8	1.2	0.8	0.8
	470-1006 MHz		3.3	1.5	1.1	1.0
	1006-1218 MHz		4.0	1.8	1.5	1.5
Directional attenuation	5-10 MHz	dB	≥ 25	≥ 28	≥ 34	≥ 36
	10-40 MHz		≥ 28	≥ 30	≥ 34	≥ 36
	40-950 MHz ¹⁾		≥ 28	≥ 30	≥ 34	≥ 36
	950-1218 MHz		≥ 20	≥ 20	≥ 25	≥ 26
Return loss	5-94 MHz	dB	≥ 18.0			
	94-188 MHz		≥ 16.5			
	188-376 MHz		≥ 15.0			
	376-752 MHz		≥ 13.5			
	752-1218 MHz		≥ 12.0			
Dimensions (W x H x D)	mm	73.6 x 52.5 x 23.5				
Packaging unit/weight	pc./kg	1 (10, 200)/0.06				

¹⁾ At 40 MHz, -1.5 dB/Octave

> Taps for star distribution

EAX 24/U 21610100

EAX 26/U 21610101

EAX 28/U 21610102



- Impedance: 75 Ω
- Frequency range: 5-1200 MHz (i.e. return path and UHF compatible)
- Isolating capacitors on inputs and outputs
- Unoccupied tap outputs are to be terminated with EMK 03 terminating resistors in systems with return path use
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation



EAX 24/U



EAX 26/U

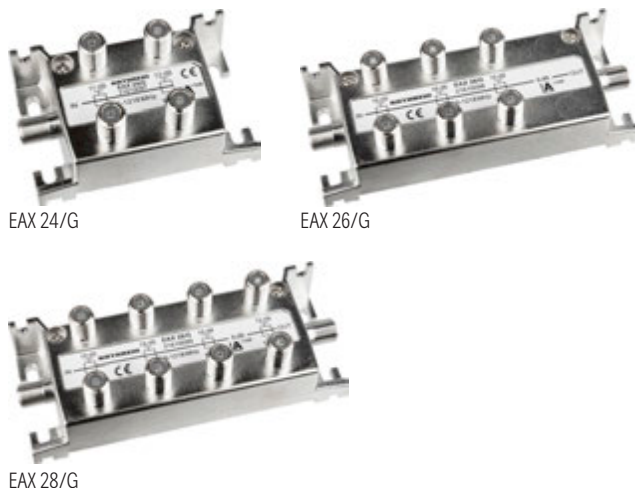


EAX 28/U

Technical data

			4-way	6-way	8-way
Type | Order no.			EAX 24/U 21610100	EAX 26/U 21610101	EAX 28/U 21610102
Tap loss		dB	12.5/13.5/14.5/15	12.5/13.5/14.5/ 15.5/16.5/17	12.5/13.5/14.5/ 15/16/17/18/19
Through loss	5-40 MHz	dB	4.8	6.6	6.6
	40-862 MHz		4.6	6.4	6.4
	862-1006 MHz		5.1	7	7
	1006-1200 MHz		5.8	8	8
Decoupling (Out-Tap)	5-40 MHz	dB	30	30	30
	40-470 MHz		30	30	30
	470-862 MHz		26	26	26
	862-1006 MHz		26	26	26
	1006-1200 MHz		20	20	20
Decoupling (Tap-Tap)	5-40 MHz	dB	42	40	40
	40-470 MHz		42	42	42
	470-862 MHz		36	36	36
	862-1006 MHz		32	32	32
	1006-1200 MHz		32	32	32
Return Loss (Tap)	5-10 MHz	dB	18	18	18
	10-40 MHz		20	20	20
	40-470 MHz		20	18	16
	470-862 MHz		18	16	16
	862-1006 MHz		16	16	16
	1006-1200 MHz		10	10	10
Dimensions (W x H x D)	mm		79 x 44 x 36	122 x 44 x 36	122 x 44 x 36
Packaging unit/weight	pc./kg		1 (10, 50)/0.095	1 (10, 50)/0.190	1 (10, 50)/0.195

EAX 24/G 21610097
EAX 26/G 21610098
EAX 28/G 21610099



- Impedance: 75 Ω
- Frequency range: 5-1218 MHz (i.e. return path and UHF compatible)
- Isolating capacitors on inputs and outputs
- Unoccupied tap outputs are to be terminated with EMK 03 terminating resistors in systems with return path use
- Conforms to: EN 60728-11 and EN 50083-2
- Connections: F connectors
- For indoor installation
- Class A (+10 dB) based on DIN 50083-2
- Vodafone/KDG approval

Technical data

			4-way	6-way	8-way
Type | Order no.			EAX 24/G 21610097	EAX 26/G 21610098	EAX 28/G 21610099
Tap attenuation, typ. (4-way - 1 & 2/2 & 3)	5-1006 MHz	dB	11	15.5	17.5
	1006-1218 MHz		12	15.0	18.0
Through loss, typ.	5-862 MHz	dB	–	6.0	7.0
	862-1006 MHz		–	6.4	7.2
	1006-1218 MHz		–	6.9	8.0
Directional attenuation	5-10 MHz	dB	–	≥ 26	≥ 26
	10-470 MHz		–	≥ 30	≥ 30
	470-950 MHz		–	≥ 26	≥ 26
	950-1218 MHz		–	≥ 23	≥ 22
Decoupling	5-862 MHz	dB	≥ 32		
	862-950 MHz		≥ 30		
	950-1218 MHz		≥ 20		
Return loss	5-94 MHz	dB	≥ 18.0		
	94-188 MHz		≥ 16.5		
	188-376 MHz		≥ 15.0		
	376-752 MHz		≥ 13.5		
	752-1218 MHz		≥ 12.0		
Dimensions		mm	74 x 44 x 36	118 x 44 x 36	118 x 44 x 36
Packaging unit/weight		pc./kg	1 (10, 50)/0.125	1 (10, 50)/0.185	1 (10, 50)/0.2

> Splitter

- EBC 10** 272859
- EBC 13** 21610004
- EBC 14** 21610005



EBC 10



EBC 13



EBC 14

- Frequency range: 5-2400 MHz
- Remote feed capable: max. 24 V; 0.5 A
- Integrated decoupling diodes, current flow direction: OUT → IN
- Connections: F connectors
- Connection for potential equalisation
- Small dimensions
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation

Technical data

Type | Order no.			2-way	3-way	4-way
			EBC 10 272859	EBC 13 21610004	EBC 14 21610005
Distribution loss, typ.	5-47 MHz	dB	4	8	11
	47-862 MHz		5	8	10
	862-2150 MHz		6	10.5	11.5
	2150-2400 MHz		8	12	13.5
Decoupling	5-47 MHz	dB		10	
	47-862 MHz			20	
	862-2150 MHz			20-15	
	2150-2400 MHz			10	
Return loss	5-47 MHz	dB	≥ 10	≥ 10	≥ 8
	47-2400 MHz ¹⁾		≥ 14	≥ 14	≥ 14
Dimensions (W x H x D)		mm	52 x 55 x 23	52 x 55 x 23	74 x 55 x 23
Packaging unit/weight		pc./kg	1 (10, 200)/0.076	1 (10, 200)/0.08	1 (10, 160)/0.097

¹⁾ At 40 MHz, -1.5 dB/Octave

- EBC 02/G** 21610084
- EBC 03/G** 21610085
- EBC 04/G** 21610086
- EBC 06/G** 21610087
- EBC 08/G** 21610088



EBC 02/G



EBC 06/G



EBC 03/G



EBC 08/G



EBC 04/G

- Impedance: 75 Ω
- Frequency range: 5-1218 MHz (i.e. return path and UHF compatible)
- Isolating capacitors on inputs and outputs
- Connections: F connectors
- Connection for potential equalisation
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation
- Class A (+10 dB) based on DIN 50083-2
- Vodafone/KDG approval

Technical data

			2-way	3-way	4-way	6-way	8-way	
Type | Order no.			EBC 02/G 21610084	EBC 03/G 21610085	EBC 04/G 21610086	EBC 06/G 21610087	EBC 08/G 21610088	
Distribution loss	5-470 MHz	dB	< 3.9	< 6.0	< 8.0 / typ. 7.5	< 10.5 / typ. 10	< 12.0 / typ. 11	
	470-1006 MHz		< 4.4	< 6.7	< 8.5	< 11.4 / typ. 10	< 12.5 / typ. 11	
	1006-1218 MHz		< 5.1	< 8.0	< 9.5	< 12.0	< 14.0	
Decoupling	5-10 MHz	dB	≥ 22	≥ 20	≥ 22	≥ 20	≥ 20	
	10-950 MHz		≥ 22	≥ 22	≥ 22	≥ 22	≥ 22	
	950-1218 MHz ¹⁾		≥ 14	≥ 14	≥ 14	≥ 14	≥ 14	
Return loss	5-94 MHz	dB						≥ 18.0
	94-188 MHz							≥ 16.5
	188-376 MHz							≥ 15.0
	376-752 MHz							≥ 13.5
	752-1218 MHz							≥ 12.0
Dimensions (W x H x D)	mm	52 x 50 x 25	74 x 50 x 25	74 x 50 x 25	122 x 44 x 36	122 x 44 x 36		
Packaging unit/weight	pc./kg	1(10, 200)/0.08	1(10, 200)/0.1	1(10, 200)/0.1	1(10, 50)/0.31	1(10, 50)/0.35		

¹⁾ At 40 MHz, -1.5 dB/Octave

EBC 110 21610006

EBC 114 21610007



- Designed especially for use in single-cable systems
- Frequency range: 5-2400 MHz
- Without decoupling diodes, thus low voltage drop
- Remote feed capable: max. 24 V; 0.5 A
- Connections: F connectors
- Connection for potential equalisation
- Small dimensions
- Conforms to: EN 60728-11 and EN 50083-2
- For indoor installation

Technical data

			2-way	4-way
Type	Order no.		EBC 110 21610006	EBC 114 21610007
Through loss	5-10 MHz	dB	4	8
	10-862 MHz		5	9
	862-2150 MHz		6	11.5
	2150-2400 MHz		8	13
Decoupling	5-10 MHz	dB	10	10
	10-862 MHz		20	20
	862-2150 MHz		18	18
	2150-2400 MHz		16	16
Dimensions (W x H x D)	mm	52 x 55x 23	74 x 55 x 23	
Packaging unit/weight	pc./kg	1 (10, 200)/0.1	1 (10, 160)/0.1	



Feed-in DC voltage is present on all connections. Only to be used in association with ESU 33 ... 37. Unused outputs must be terminated with EMK 05 terminating resistor

> Over-voltage protection

KAZ 11 507205



- To protect the system components in antenna reception and distribution systems against transient overvoltages
 - Fine protection, must be installed as close to the object to be protected as possible
 - Reduces overvoltages between inner conductor and outer conductor to safe values
 - For satellite, broadband and terrestrial reception and distribution systems
 - Passage for 22-kHz and DiSEqC™ signals
- Conforms to: EN 61643-21
 - Impedance: 75 Ω
 - For indoor installation

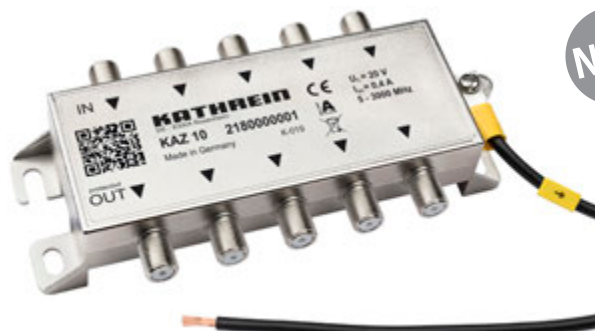
Technical data

Type | Order no.		KAZ 11 507205		
Transmission range	MHz	5-862	862-2400	2400-3000
Through loss (typ.)	dB	1.2	1.4	2.0
Connection loss test socket (typ.) ¹⁾	dB	20	20	–
Nominal impedance	Ω	75		
Remote power feed (max.)	V	24		
Remote feed current (max.) ³⁾	A	2		
Permissible ambient temperature	°C	-40 to +80		
Connections		F sockets		
Dimensions (W x H x D)	mm	90 x 76 x 36		
Packaging unit/weight	pc./kg	1(20)/0.24		

¹⁾ To the output ²⁾ To meet the class-A requirements, the test socket must be terminated with the terminating resistor supplied after measurement has been performed

³⁾ Both in nominal operation and in disturbed operation

KAZ 10 2180000001



- To protect system components in SAT, broadband and DVB-T reception and distribution systems
- Deployment of KAZ 10 increases the surge discharge capability of KAZ 11 and KAZ 12
- Fulfils categories C2/C3/B2/D1 in accordance with EN 61643-21
- Remote feeding for DC voltages from 0 ... +20 V / max. 0.4 A
- Passage for 22-kHz and DiSEqC™ signals
- Impedance: 75 Ω
- For indoor installation only

Technical data

Type | Order no.		KAZ 10 2180000001	
Transmission range	MHz	47 - 2400	2400 - 3000
Through loss	dB	1.2	2.0
Nominal impedance	Ω	75	
Screening factor	dB	5–300 MHz ≥ 85; 300–470 MHz ≥ 80; 470–950 MHz ≥ 75; 950–3000 MHz ≥ 55	
Remote power feed (max.)	U _{DC}	+20 V =	
Remote feed current ¹⁾ (max.)	I _{DC}	0.4 A	
Temperature range	°C	-20 to +55	
Connection		F socket in accordance with EN 61169-24	
Lightning surge category D1 (10/350 μs)	kA	Inner/outer conductor: 0.5 Outer conductor/grounding connection: 5	
Nominal discharge surge current (8/20 μs)	kA	Inner/outer conductor: 2.5 Outer conductor/grounding connection: 10	
Protection level at 2 kA / 4 kV (8/20 μs) Category C2	V	≤ 500	
Protection level at 100 A Category C3	V	≤ 120	
Response time	ns	≤ 1	
DC resistance (Input / output per path)	Ω	3.3	
Housing protection class		IP 40	
Tested categories in accordance with EN 61643-21		C2/C3/B2/D1	
Dimensions (W x H x D)	mm	145 x 72 x 32	
Packaging unit/weight	pc./kg	1 (35) / 0.22	

¹⁾ It must be ensured that both in normal and in faulty operation the remote feed current does not exceed 400 mA.

KAZ 12 21810002

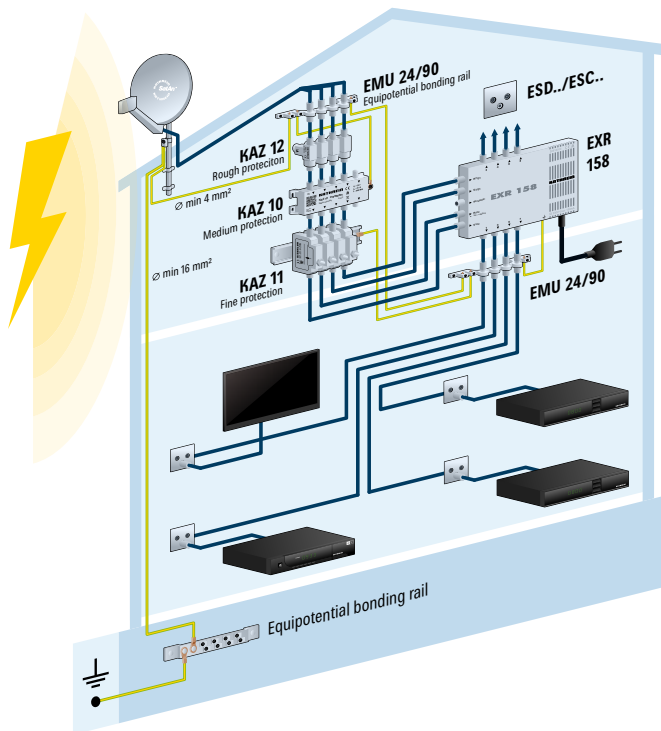


- To protect system components in SAT, broadband and DVB-T reception and distribution systems
- Coarse protection, install as close to the house transfer point as possible
- Installing the KAZ 12 increases the surge discharge capability of the KAZ 11
- Installation in accordance with the lightning arrester zone concept on interfaces LPZ 0A-1 and higher
- Passage for 22-kHz and DiSEqC™ signals
- Fulfils categories A2/C2/C3/B2/D1 in accordance with EN 61643-21
- Includes gas discharge conductor. These are the classic over-voltage protection elements used in coaxial networks
- Accessories included: 1 x EMU 21 earth connection block, 2 x EMK 01 F connectors
- For indoor installation

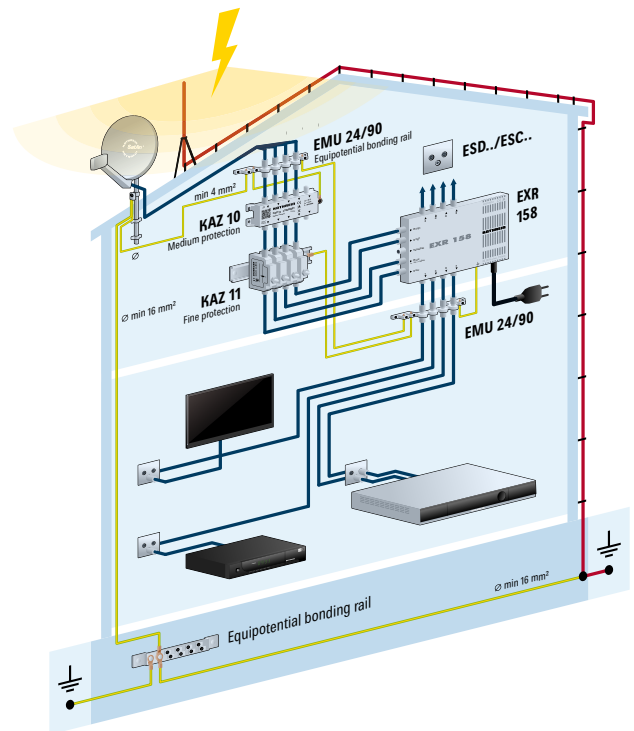
Technical data

Type | Order no.		KAZ 12 21810002
Transmission range	MHz	0-2400
Through loss	dB	0.5
Screening factor	dB	5-300 MHz > 85 300-470 MHz > 80 470-1000 MHz > 75 1000-2400 MHz > 55
Nominal voltage	V	60
Nominal load current (max. allowable remote feed current)	A	2
Lightning surge category D1 (10/350 µs)	kA	Inner/outer conductor: 2.5 - outer conductor/grounding connection: 5
Nominal discharge surge current (8/20 µs)	kA	Inner/outer conductor: 10 - outer conductor/grounding connection: 10
AC load capacity category A2	A	10
Protection level at 10 kA (8/20 µs) category C2	V	≤ 700
Protection level at 1 kV/µs category C3	V	≤ 600
Protection level at 6 kV (10/700 µs) category B2	V	≤ 600
Protection level at 2.5 kA (10/350 µs) category D1	V	≤ 700
Response time	ns	≤ 100
DC resistance (input/output)	mΩ	120
Max. allowable ambient temperature	°C	-40 to +80
Housing protection class		IP 30
Tested categories in accordance with EN 61643-21		A2/C2/C3/B2/D1
RF connections		Input: F connector (socket) Output: F connector (plug)
Weight	kg	0.1

Connection examples



Internal lightning protection



External lightning protection

Is over-voltage protection mandatory? (DIN VDE 0100-443)¹

Over-voltage protection is mandatory for electrical installation companies that install their electrical systems in accordance with current VDE standards. Standard DIN VDE 0100-443 requires: Over-voltage protection must be provided if the consequences of over-voltage have an impact on:

1. Human life, for example, equipment for safety purposes or in the medical field
2. Public devices, for example, in case of failure of public infrastructure
3. Commercial or industrial plants, for example, hotels, banks, production facilities
4. Collections of persons, for example, in cinemas, schools, airports, city halls, fairs, kindergartens
5. Individuals, for example, in residential or office buildings.
This covers practically all electrical devices that have a plug.

¹ Source: DIN VDE 0100-443 section 4, as at October 2016

Who is obligated to install an over-voltage protection system?

The VDE standard DIN VDE 0100-443 applies to all electrical installers, switchgear manufacturers and all installers of low-voltage and antenna systems whose electrical system in Germany is connected to the public electricity grid. Regardless of whether the switchgear is a control cabinet or a small antenna distribution system: Standard DIN VDE 0100-443 applies to all electrical systems.

Recommended use of over-voltage protection systems

Safety requirements	High	Medium	Low
Type	Power plants, hospitals, nursing homes, public buildings with a large number of visitors, etc.	Single-family/multi-dwelling units in medium to high-density areas	Individual residential units, Single-family houses in high density areas
	and	or	or
Building environment	freestanding buildings, buildings in mountain areas, buildings near high voltage equipment/masts	buildings in medium to high-density areas, buildings of approximately the same height	buildings in high-density areas surrounded by much higher buildings umgeben
	and	or	or
Lightning protection	building with internal lightning protection/lightning conductor, with overhead line supply	building with connection by overhead line from the supply transformer or with external lightning protection system	building in high-density area with cable supply via underground installation

Use of protection systems			
High protection	KAZ 12 + KAZ 10 + KAZ 11	KAZ 12 + KAZ 10 + KAZ 11	KAZ 12 + KAZ 11
Medium protection	–	KAZ 12 + KAZ 11	KAZ 10 + KAZ 11
Simple protection	–	–	KAZ 10

The over-voltage protection is part of the lightning protection potential equalisation. Over-voltage protection is achieved with over-voltage protection devices such as KAZ xx. These devices are designed to limit over-voltages and to dissipate lightning currents. These over-voltage protection devices are installed in-house to protect electrical and electronic equipment and devices from over-voltage. Normally, over-voltage protection devices are used for the power supply lines and for all types of telecommunication, coaxial and data lines.

> Equaliser

ERZ 60 272783



- For indoor installation

Technical data

Type | Order no.		ERZ 60 272783
Frequency range	MHz	950-2400
Equaliser value	dB	10
Basic loss	dB	1 at 2,400 MHz
Max. remote feed current	V/mA	24/500
Dimensions	mm	51 x 38 x 18
Connections		F-type connector (m)/F socket
Packaging unit/weight	pc./kg	1(10)/0.04

> Adjustable attenuator

ERE 01 274854

ERE 02 274855



- To adapt the levels in Sat reception systems
- Frequency range: 0-2400 MHz
- DC bypass for LNB remote feeding
- Connections: F socket/F-type connector (m)

Technical data

Type | Order no.		ERE 01 274854	ERE 02 274855
Attenuation	dB	6	12
Remote feeding		max. 24 V; 1 A	
Packaging unit/weight	pc./kg	1(20)/0.07	

> TV T-connector

EBI 24 273282



- For outlets with IEC connector (m)

Technical data

Type | Order no.		EBI 24 273282	
Frequency range	MHz	5-862	
Distribution loss	dB	3.5	
Decoupling attenuation 5-47 MHz	dB	10	
Decoupling attenuation 47-862 MHz	dB	20	
Connections		Input: IEC connector (f) - outputs: IEC connector (m)	
Packaging unit/weight	pc./kg	1(20)/0.03	

> Low-pass filter

EFS 790 21210026



Low-pass filter to suppress LTE frequencies

- Only for indoor use

Technical data

Type | Order no.		EFS 790 21210026		
Frequency range	MHz	5-700	701-790	822-1000
Through loss	dB	Typ. 1	Typ. 3	-
Stop-band attenuation	dB	-	-	Typ. 50
Return loss	dB	Typ. 16	Typ. 16	-
Screening factor	dB	47-300 MHz ≥ 85 300-470 MHz ≥ 80 470-862 MHz ≥ 75 950-1000 MHz ≥ 55		
Connections		F socket/F-type connector (m)		
Impedance	Ω	75		
Remote power feed (DC)	V	Max. 24		
Remote feed current (DC)	A	Max. 0.5		

> Diplexers

Remote feed diplexers

WFS 28	21210025
WFS 31	21210022
WFS 33	21210023



WFS 28



WFS 31

- Impedance: 75 Ω
- Output is capacitively isolated
- For indoor installation

WFS 28

- For remote feeding of BZD 30/BZD 40 DVB-T antennas, VCA/VCB 20/28 compact amplifiers, VCP 27/35/45/55/66 low noise preamplifiers and, UAS 584 feed system – in conjunction with NCF 18 switched-mode power supply unit (not included in the scope of delivery)
- Remote feeding diplexer with adjustable output voltages: 5/12/14/18 Volt



WFS 33

WFS 31

- Remote feeding diplexer with F connections
- For remote feeding the UAS 584 universal quatro feed system, e.g. for use with UFG 404/UFG 406 in association with NCF 18 switched-mode power supply unit (not included in the scope of delivery)

WFS 33

- 3-way remote power switch with F connections
- For remote feeding of up to three UAS 584 universal quatro feed systems, e.g. when used with the UFO® compact UFG 4xx module carriers in conjunction with the NCF 18 switched-mode power supply unit (not included in the scope of delivery)

Technical data

Type | Order no.			WFS 28 21210025	WFS 31 21210022	WFS 33 21210023
Frequency range		MHz	5–2150	5–2400	5–2400
Remote power feed, DC		V	Max. 18	18	18
Remote feed current DC		mA	Max. 400	Max. 700	Max. 700
Nominal impedance		Ω	75	75	75
Through loss	VHF/UHF	dB	0.4	0.4	0.4
	Sat-IF	dB	1.0	1.0	1.0
Connections			F connectors	F connectors	F connectors
Dimensions		mm	35 x 74 x 21	52 x 25 x 50	118 x 36 x 43
Packaging unit/weight		pc./kg	1(10)/0.09	1 (10, 200)/0.08	1 (10, 200)/0.2

Feed-in diplexer**WFS 55** 21210028

- To operate a multi-switch cascade on an existing OEC 44 optical receiver
 - For operation of a multi-switch on a universal quad LNB
 - For supplying an active DVB-T antenna with supply voltage from a multi-switch
 - 5-way feed-in diplexer with F connections
 - For indoor installation
- From 18 V on "horizontal low" input it generates:
 - 14 volt at the output "vertical low"
 - 18 volt at the output "horizontal low"
 - 14 volt at 22 kHz at the output "vertical high"
 - 18 volt at 22 kHz at the output "horizontal high"
 - 5 volt at the input "terrestrial"

Technical data

Type | Order no.		WFS 55 21210028
Frequency range terrestrial / satellite	MHz	5-862/950-2150
Remote power feed Sat DC	V	"Vertical low" and "Vertical high": 14 "Horizontal low" and "Horizontal high": 18
Beat frequency	kHz	"Vertical high": 22 – "Horizontal high": 22
Remote power feed terrestrial DC	V	5
Remote feed current Sat	mA	Max. "Vertical low" and "Vertical high": 200 "Horizontal low": 1000 – "Horizontal high": 500
Remote feed current terrestrial	mA	Typ. 50/max. 80
Nominal impedance	Ω	75
through loss terrestrial/sat	dB	Typ. 0.4/typ. 0.4
Connections		F connectors
Temperature range	°C	-20 to +55
Dimensions	mm	117 x 35 x 23
Packaging unit/weight	pc./kg	1(10)/0.2

Feed-in diplexer, terrestrial and 4 x Sat
WFS 114 20510056


- To feed in terrestrial signals (5-862 MHz) in systems equipped with the switchable UAS 585 quatro feed system
- For indoor installation

Technical data

Type | Order no.		WFS 114 20510056	
Frequency range	MHz	5-862	950-2150
Inputs		1 x terrestrial	4 x Sat IF
DC voltage passage		No	Yes
Through loss	dB	11	2.5
Stop-band attenuation	dB	35	35
RF connections		F connectors	
Remote feeding		Max. 21 V/0.4 A, 22 kHz and DiSEqC™	
Dimensions	mm	117 x 35 x 23	
Packaging unit/weight	pc./kg	1(10)/0.2	

> Variable attenuators
ERD 21 272868

ERD 23 272869

Technical data

Type | Order no.		ERD 21 272868	ERD 23 272869
Frequency range	MHz	0.15-2400	47-2400
Through loss	0.15-862 MHz	0.5	0.5
	950-2150 MHz	2.5	1.5
	2150-2400 MHz	4.5	2.0
Setting range	dB	0.5-20	0.5-10
Remote feeding	V/mA	–	24/500
Connections		IEC, 2.4/9.5	F connector
Dimensions (W x H x D)	mm	51 x 38 x 18	53 x 38 x 18
Packaging unit/weight	pc./kg	1(10)/0.07	1(10)/0.06

Receiver connection cables (straight)

ETG 15 274779

ETG 30 274778



ETG 30

- To connect a satellite receiver to an antenna outlet equipped with an F connection
- Completely mounted with F-type quick-plugs
- Cables and plugs are white
- Frequency range: 0-2400 MHz

Technical data

Type | Order no.		ETG 15 274779	ETG 30 274778
Length	m	1.5	3.0
Packaging unit/weight	pc./kg	1(50)/0.1	1(50)/0.18

ETH 1500 20410042

ETH 3000 20410046

ETH 5000 20410050



- High-quality receiver connection cables for use as a TV connection cables or in multimedia networks
- Screening factor 105 dB, class A+
- Completely mounted including straight IEC connector (m) and IEC connector (f)
- Frequency range: 5-2400 MHz

Technical data

Type | Order no.		ETH 1500 20410042	ETH 3000 20410046	ETH 5000 20410050
Length	m	1.5	3.0	5.0
Centre conductor	mm		0.8 Cu	
Insulation	mm		3.55 PE	
Outer conductor			2 x Al-foil 1 x CuSn mesh	
External sheathing	mm		5 white	
Bending radius single/multiple	mm		30	
Screening attenuation	30-1006 MHz		> 105	
	1006-2000 MHz	dB	> 95	
	2000-2400 MHz		> 85	
Coupling resistance	5-12 MHz	mΩ/M	< 2.5	
	12-300 MHz		< 0.9	
IEC connector (m)/socket (outer/inner conductor)		Brass (white bronze coating) colour coding with blue ring		
Packaging unit/weight	pc./kg	1(200)/0.05	1(150)/0.09	1(59)/0.143

Meters

- **Signal meter for Sat/TV/DAB+/FM/optical** **272**
- **Signal meter Sat/TV/FM/IPTV/ASI/TS/optical** **275**
- **Signal Meter Sat/TV** **278**
- **Further information** **280**

➤ Signal meter for Sat/TV/DAB+/FM/optical

MSK 140/OHD 2170000002



The MSK 140/OHD is a portable multi-standard selective signal meter designed for DVB-S/S2/S2X, DVB-C, DVB-T/T2, analogue TV, DAB+ and FM radio including the return path. The MSK 140/OHD also has an optical measuring input.

The frequency range for DVB-C/T2 has been expanded to 1250 MHz for future use in cable networks.

Playback of analogue and digital TV signals in MPEG-2, MPEG-4 (HEVC/H.265) is possible in the highest quality with a high-quality 9" touch TFT colour screen. Measurement results can be saved on a USB stick.



Actual product not shown

- 9" touch TFT colour display (800 x 480 pixels), splash-proof
 - Level measurement of analogue and digital radio and TV signals (DVB-S/-S2/S2x, DVB-C, DVB-H/-T/-T2, TV, DAB+, FM) including the return path
 - Image representation of digital TV signals in accordance with codec H.265/HEVC
 - BER/MER measurement and display
 - Constellation diagram display
 - Spectrum display
 - Return path measurement
 - Data rate measurement of the services in the DVB transport stream
 - Wideband LNB support
 - Sat finder function (Sat-Expert)
 - Calibration function for two LNBs (multi-feed reception)
 - Acoustic signal tone for antenna alignment
 - Level display optional in dB μ V, dBmV or dBm
 - Direct frequency and channel input
 - Measurement and display of the remote feed current
 - Audio carrier measurement (TV)
 - DAB+: Signal evaluation and decoding for playback (built-in speaker)
 - LTE analyser
 - Automatic measuring range selection
 - AAC/HEAAC, Dolby AC3 with sound control through built-in speaker
 - DiSEqC™1.2 control signal and SCR/SCD2 single cable control commands
 - Programming of the ESU 5x outlets as for the SWP 50
 - Memory for meter settings
 - Storage of measured values and software updates possible via universal USB port
 - TV output: HDMI; video input: Cinch
 - Mains or battery operation
 - Battery life at least 3 hours
- Scope of supply:
- Transport case for meter and accessories
 - High-quality meter bag with carrying strap
 - Plug-in power supply unit
 - Measuring cable with F adapters
 - USB cable
 - USB stick
 - SC/CLIK optical adapter cable

Technical data

Type | Order no.		MSK 140/OHD 217000002
RF component		
Frequency range DVB-C/T/T2, DAB+, TV, FM	MHz	4-1250
Frequency range DVB-S/DVB-S2	MHz	230-2600
Frequency resolution	kHz	Cable/TV/FM: 50, Sat: 100
TV standards		B/G, I, D/K, M, N
Digital satellite receiver DVB-S/S2/S2x		
Modulation process		QPSK, 8PSK, 16/32APSK
Code rate (FEC) DVB-S		1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-S2		1/2, 2/3, 3/4, 5/6, 8/9, 9/10, 2/5, 3/5
Code rate (FEC) DVB-S2x		1/2, 1/3, 1/4, 2/3, 3/4, 2/5, 3/5, 4/5, 5/6, 8/9, 9/10
Input symbol rate	MS/s	1-45 (DVB-S), 2-45 (DVB-S2)
BER		1E-6 ... 2E-2 (pre Viterbi)
MER	dB	25
Digital terrestrial TV receiver DVB-T/T2/H		
Modulation process DVB-T		QPSK, 16/64 QAM
Modulation process DVB-T2		QPSK, 16/64/256 QAM
FFT mode DVB-T		2k, 8k
FFT mode DVB-T2		1k, 2k, 4k, 8k, 16k, 32k
Guard interval DVB-T		1/4, 1/8, 1/16, 1/32
Guard interval DVB-T2		1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256
Code rate (FEC) DVB-T		1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-T2		1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Channel bandwidth	MHz	6, 7, 8
BER		1E-6 ... 2E-2 (pre Viterbi)
MER	dB	40
Digital CATV receiver DVB-C (J.83A)		
Modulation process DVB-C		16/32/64/128/256 QAM
Input symbol rate	MS/s	2-6.999
BER		1E-9 ... 1E-2 (pre RS)
MER	dB	40
Optical receiver		
Inputs		SC, CLIK! (Adapter)
Wavelengths	nm	1310-1550
Input level range	dBm	-40 to +6
Measurement accuracy	dBm	± 0.5
HF frequency range	MHz	4-2600
TV system		
Colour standards		PAL, SECAM, NTSC
Audio		FM, NICAM and AM sound, AAC/HEAAC, Dolby AC3

Technical data

Type | Order no.		MSK 140/OHD 217000002
Digital image decoding		MPEG-2; MPEG-4/AVC; HEVC/H.265
DVB transport stream		
Data rate		Services can be measured in Mbps
Level measurement section		
Level measuring range	dBμV	30-120
Measurement accuracy	dB	Typ. ± 1.5
Analogue detector		TV: Peak value, Sat/FM: Mean value
Digital detector		Mean value
Display		
Monitor		9" touch TFT colour display (800 x 480 pixels)
Sat finder (acoustical)		Level-dependent beep
Power supply		
Lithium/polymer rechargeable battery		4.3 Ah, 31.82 Wh, 7.4 V
Mains (plug-in power supply unit)	V	100-240 (50/60 Hz)
DC external	V	12
Remote feeding		
Remote power feed	V	5/13/18
Remote feed current	mA	Max. 500
Control signals		22 kHz, DiSEqC™ 1.2, SCR-/SCD2 single cable system, SWP 50 control commands
Connections		
RF input (impedance)	Ω	75 (F coaxial socket)
Video in		Cinch
TV output		HDMI
USB port		2 x ports, USB 2.0
LAN interface		RJ 45, 100 Mbps
DC supply 12 V		DC plug adapter 2.5/5.5 mm
General information		
Safety standards		Protection class II (AC/DC power supply unit), VDE EN 61010
Dimensions (W x H x D)	mm	270 x 155 x 40
Weight	kg	Approx. 1.8

> Signal meter Sat/TV/FM/IPTV/ASI/TS/optical

MSK 130/OIA 21710054



The MSK 130/OIA is a portable multi-standard signal meter for DVB-S/DVB-S2, DVB-C, DVB-T/DVB-T2, analogue TV, FM radio, the return path, IPTV and ASI. In addition, it has an optical measuring input.

Analogue and digital video signals in MPEG-2 and MPEG-4 format are displayed on a high-resolution 9" TFT colour touch screen in the highest quality. Additional measuring functions for IPTV and the option to carry out a comprehensive transport stream analysis turn the MSK 130/OIA into real all-rounders. The built-in CI interface also makes it possible to display coded transmitters. Measurement results can be saved on a USB stick.



- Level measurement of analogue and digital TV signals (DVB-S/-S2, DVB-C, DVB-T/-T2, TV, FM) including return path
 - Optical measuring unit
 - TA analysis functions of all DVB input signals (regardless of the physical measurement input)
 - Measurement of transport stream, service and stuffing bitrates, service lists
 - ASI in/out measuring function
 - Video display of analogue and digital TV signals
 - BER/MER measurement and display
 - Constellation diagram display
 - 9" touch TFT colour display (800 x 480 pixels), splash-proof
 - Battery life at least 3 hours
 - Spectrum display
 - Sat finder function (Sat-Expert)
 - Calibration function for two LNBS (multi-feed reception)
 - Acoustic signal tone for antenna alignment
 - Level display optional in dB μ V, dBmV or dBm
 - Automatic measuring range selection
 - Direct frequency and channel input
 - Measurement and display of the remote feed current
 - Audio carrier measurement (TV)
 - Dolby AC3
 - Audio check via built-in loudspeaker
 - Stereo headphone socket
 - Return path measurement
 - DiSEqC™ 1.2 control signal
 - SCR/SCD2 single-cable system control commands
 - IP test: Ping test
 - Data rate measurement of the services in the DVB transport stream
 - Memory for meter settings
 - Storage of measured values and software updates possible via universal USB port
 - Data logger function
 - TV outputs: HDMI and Audio-Video In/Out (analogue)
 - Mains or battery operation
- Scope of supply:
- Transport case for meter and accessories
 - Carrying strap
 - Power supply unit
 - Measuring cable with F adapters
 - USB cable
 - USB stick
 - FC/CLIK optical adapter cable

Technical data

Type | Order no.		MSK 130/OIA 21710054
RF component		
Frequency range DVB-C/T/T2, DAB+, TV, FM	MHz	4-1010
Frequency range DVB-S/DVB-S2	MHz	930-2250
Frequency resolution	kHz	Cable/TV/FM: 50, Sat: 100
TV standards		B/G, I, D/K, M, N
Digital satellite receiver DVB-S/S2		
Modulation process		QPSK, 8PSK, 16/32APSK
Code rate (FEC) DVB-S		1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-S2		1/2, 2/3, 3/4, 5/6, 8/9, 9/10, 2/5, 3/5
Input symbol rate	MS/s	1-45 (DVB-S), 2-45 (DVB-S2)
BER		1E-6 ... 2E-2 (pre Viterbi)
MER	dB	25
Digital terrestrial TV receiver DVB-T/T2/H		
Modulation process DVB-T		QPSK, 16/64 QAM
Modulation process DVB-T2		QPSK, 16/64/256 QAM
FFT mode DVB-T		2k, 8k
FFT mode DVB-T2		1k, 2k, 4k, 8k, 16k, 32k
Guard interval DVB-T		1/4, 1/8, 1/16, 1/32
Guard interval DVB-T2		1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256
Code rate (FEC) DVB-T		1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-T2		1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Channel bandwidth	MHz	6, 7, 8
BER		1E-6 ... 2E-2 (pre Viterbi)
MER	dB	40
Digital CATV receiver DVB-C (J.83A)		
Modulation process DVB-C		16/32/64/128/256 QAM
Input symbol rate	MS/s	2-6.999
BER		1E-9 ... 1E-2 (pre RS)
MER	dB	40
Optical receiver		
Inputs		FC, CLIK! (Adapter)
Wavelengths	nm	1310-1550
Input level range	dBm	-40 to +10
Measurement accuracy	dBm	± 0.5
HF frequency range	MHz	5-2250
TV system		
Colour standards		PAL, SECAM, NTSC
Audio		FM, NICAM and AM sound, AAC/HEAAC, Dolby AC3
Digital image decoding		MPEG-2; MPEG-4/AVC

Technical data

Type | Order no.		MSK 130/OIA 21710054
DVB transport stream		
Data rate		Services can be measured in Mbps
Level measurement section		
Level measuring range	dBμV	30-120
Measurement accuracy	dB	Typ. ± 1
Analogue detector		TV: Peak value, Sat/FM: Mean value
Digital detector		Mean value
Display		
Monitor		9" touch TFT colour display (800 x 480 pixels)
Sat finder (acoustical)		Level-dependent beep
Power supply		
Lithium-ion rechargeable battery		4.8 Ah, 34 Wh, 7.4 V
Mains (plug-in power supply unit)	V	100-240 (50/60 Hz)
DC external	V	12
Remote feeding		
Remote power feed	V	5/13/18
Remote feed current	mA	Max. 500
Control signals		22 kHz, DiSEqC™1.2, SCR/SCD2 single-cable system
Connections		
RF input (impedance)	Ω	75 (F coaxial socket)
ASI IN/OUT	Ω	75 (BNC)
TV output		HDMI, analogue video
Headphone socket	mm	Jack socket, 3.5
USB port		2 x ports, USB 2.0
LAN interface		RJ 45, 100 Mbps
CI interface		CAM module
DC supply 12 V		DC plug adapter 2.5/5.5 mm
IPTV and ASI analysis		
IPTV measurement for SPTS and MPTS transport streams		Protocol type (UDP/RTP), VBR/CBR, packet number and length, FEC type, lost packets, lock failure, video display
ETR101290		MPEG-2 transport stream analysis: 1st/2nd/and 3rd priority errors ¹⁾
Analysis of PSI/SI tables		PAT, CAT, NIT and SDT ²⁾
General information		
Safety standards		Protection class II (AC/DC power supply unit), VDE EN 61010
Dimensions (W x H x D)	mm	295 x 172 x 55
Weight	kg	Approx. 2.2

¹⁾ TS sync loss, sync byte error, PAT error, continuity count error, PMT error, PID error, transport error, CRC error, PCR error, PCR accuracy error, PTS error, CAT error, NIT error, SI repetition error, unreferenced PID, SDT error, EIT error, RST error, TDT error

²⁾ PSI (program specific information), SI (service information), PAT (program association table), CAT (conditional access table), NIT (network information table), SDT (service description table)

> Signal Meter Sat/TV

MSK 30 21710048



The MSK 30 is designed as a portable combination meter for DVB-S/S2, DVB-C, DVB-T/T2 and analogue TV.

The unit is equipped with a high-quality 4.3" TFT colour touch screen which allows analogue and digital video display in MPEG-2 and MPEG-4 in the very highest quality. The intuitive operational concept enables rapid measurements in the SAT and TV range.



- Level measurement of analogue and digital TV signals (DVB-S/S2, DVB-C, DVB-T/T2, TV)
 - Video display of analogue and digital TV signals
 - BER/MER measurement and display
 - Constellation diagram display
 - 4.3" touch TFT colour display (480 x 272 pixels), splash-proof
 - Battery life at least three hours
 - Spectrum display
 - Sat-finder function
 - Acoustic signal tone for antenna alignment
 - Level display optional in dBµV, dBmV or dBm
 - Automatic measuring range selection
 - Direct frequency and channel input
 - Measurement and display of the remote feed current
 - Audio carrier measurement (TV)
 - There is an option of an update for AAC/HEAC, Dolby AC3 *)
- DiSEqC™1.2 control signal
 - SCR/SCD2 single-cable system control commands
 - Data rate measurement of the services in the DVB transport stream
 - Memory for meter settings
 - Software updates possible via universal USB port
 - Data logger function
 - Video Input (Cinch)
 - Mains or battery operation

Scope of supply:

- Bag with carrying strap
- Power supply unit
- Measuring cable with F adapters
- USB cable
- Adjustable attenuator 12 dB (remotely feedable)

*) For more information contact our hotline.

Technical data

Type | Order no.			MSK 30 21710048
RF component			
Frequency range DVB-C/T/T2, TV	MHz		47-880
Frequency range DVB-S/DVB-S2	MHz		950-2150
Frequency resolution	kHz		Cable/TV/FM: 50, Sat: 100
TV standards			B/G, I, D/K, M, N
Digital satellite receiver DVB-S/S2			
Modulation process			QPSK, 8PSK
Code rate (FEC) DVB-S			1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-S2			1/2, 2/3, 3/4, 5/6, 8/9, 9/10, 2/5, 3/5
Input symbol rate	MS/s		2-45 (DVB-S), 2-45 (DVB-S2)
BER			1E-6 ... 2E-2 (pre Viterbi)
MER	dB		25

Technical data

Type | Order no.		MSK 30 21710048
Digital terrestrial TV receiver DVB-T/T2		
Modulation process DVB-T		QPSK, 16/64 QAM
Modulation process DVB-T2		QPSK, 16/64/256 QAM
FFT mode DVB-T		2k, 8k
FFT mode DVB-T2		1k, 2k, 4k, 8k, 16k, 32k
Guard interval DVB-T		1/4, 1/8, 1/16, 1/32
Guard interval DVB-T2		1/4, 1/8, 1/16, 1/32, 1/128, 19/128, 19/256
Code rate (FEC) DVB-T		1/2, 2/3, 3/4, 5/6, 7/8
Code rate (FEC) DVB-T2		1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Channel bandwidth	MHz	6, 7, 8
BER		1E-6 ... 1E-2 (pre Viterbi)
MER	dB	36
Digital CATV receiver DVB-C (J.83A)		
Modulation process DVB-C		16/32/64/128/256 QAM
Input symbol rate	MS/s	2-6.999
BER		1E-9 ... 1E-2 (pre RS)
MER	dB	40
TV system		
Colour standards		PAL, SECAM, NTSC
Audio		FM, NICAM and AM sound
Digital image decoding		MPEG-2; MPEG-4/AVC
DVB transport stream		
Data rate		Services can be measured in Mbps
Level measuring part		
Level measuring range	dB μ V	30 ... 95
Measurement accuracy	dB	Typ. \pm 1.5
Analogue detector		TV: Peak value, Sat/FM: Mean value
Digital detector		Mean value
Display		
Monitor		4.3" touch TFT colour display (480 x 272 pixels)
Sat finder (acoustical)		Level-dependent beep
Power supply		
Lithium-ion rechargeable battery		2.6 Ah, 19 Wh, 7.4 V
Mains (plug-in power supply unit)	V	100-240 (50/60 Hz)
DC external	V	12

Technical data

Type | Order no.		MSK 30 21710048
Remote feeding		
Remote power feed	V	5/13/18
Remote feed current	mA	Max. 500
Control signals		22 kHz, DiSEqC™1.2, SCR/SCD2 single-cable system
Connections		
RF input (impedance)	Ω	75 (F coaxial socket)
Video input		Analog video (Cinch)
USB port		1 x ports, USB 1.1
DC supply 12 V		DC plug adapter 2.5/5.5 mm
General information		
Safety standards		Protection class II (AC/DC power supply unit), VDE EN 61010
Dimensions (W x H x D)	mm	185 x 125 x 44
Weight	kg	Approx. 0.7

> Further information

You will find full information on Kathrein measuring instruments in the special brochure "Measuring Instrument Programme". It can be ordered online or downloaded at www.kathrein.com. You can also order a hard copy of the brochure from the Kathrein sales centres, representatives or directly from Kathrein Digital Systems GmbH. See back page for addresses.

Further meter variants on request.

Euroline Products

➤ Offset parabolic antennas	282
➤ Multi-feed holder	283
➤ Wall supports, aluminium	283
➤ Universal LNBs	284
➤ Single-cable LNB	285
➤ Multi-switch	286
➤ Power supply unit for Euroline multi-switch	288

> Offset parabolic antennas

KEA 650 W	20010047
KEA 650 G	20010048
KEA 650 R	20010049
KEA 750 W	20010050
KEA 750 G	20010051
KEA 750 R	20010052
KEA 850 W	20010053
KEA 850 G	20010053
KEA 850 R	20010055
KEA 1000 W	20010059
KEA 1000 G	20010060
KEA 1000 R	20010061

- Folding LNB carrier arm made of aluminium
- Aluminium reflector, powder-coated



- Back of galvanised sheet steel
- Nuts and screws in stainless steel
- Mast and closing clamps of galvanised steel plate (completely pre-mounted)
- Reflector colours: white, graphite, red-brown

Technical data

Type | Order no.		KEA 650 W 20010047	KEA 650 G 20010048	KEA 650 R 20010049	KEA 750 W 20010050	KEA 750 G 20010051	KEA 750 R 20010052
Diameter	cm	670 x 715			750 x 800		
Colour		White	Graphite grey	Red-brown	White	Graphite grey	Red-brown
Reception range	GHz	10.70-12.75			10.70-12.75		
Antenna gain at 11.70 GHz	dBi	36			37.4		
Half power beam width	°	2.6			2.2		
Wind load ¹⁾	N	451			569		
Max. permissible wind speed	km/h	180			180		
Mast clamp range	mm	30-90			30-90		
Adjustment range Elevation/Azimuth	°	0-80/360			0-80/360		
LNB holder	mm	40			40		
Weight	kg	4.5			4.9		

Type | Order no.		KEA 850 W 20010053	KEA 850 G 20010054	KEA 850 R 20010055	KEA 1000 W 20010059	KEA 1000 G 20010060	KEA 1000 R 20010061
Diameter	cm	850 x 905			970 x 1040		
Colour		White	Graphite grey	Red-brown	White	Graphite grey	Red-brown
Reception range	GHz	10.70-12.75			10.70-12.75		
Antenna gain at 11.70 GHz	dBi	38.5			39.7		
Half power beam width	°	1.95			1.7		
Wind load ¹⁾	N	736			962		
Max. permissible wind speed	km/h	180			180		
Mast clamp range	mm	30-90			30-90		
Adjustment range Elevation/Azimuth	°	0-80/360			0-80/360		
LNB holder	mm	40			40		
Weight	kg	6.2			7.4		

¹⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

> Multi-feed holder

KEZ 02 20010056

The KEZ 02 multi-feed holder can be used in conjunction with the KEA 750, KEA 850 and KEA 1000 offset parabolic antennas. This combination enables the use of two Kathrein Euroline LNB multi-feed satellites to receive two satellites with an orbital spacing of up to 6° (for example, Astra 19.2° or Eutelsat 16° and Eutelsat 10°).



> Wall supports, aluminium

KEZ 2525 2040000001

KEZ 3525 2040000002

KEZ 4525 2040000003



KEZ 2525



KEZ 3525



KEZ 4525

Technical data

Type | Order no.		KEZ 2525 2040000001	KEZ 3525 2040000002	KEZ 4525 2040000003
Suitable for parabolic antenna		KEA 650, KEA 750, KEA 850		
Antenna elevation adjustment range	°	5-45	5-45	5-50
Antenna azimuth adjustment range KEA 650/KEA 750/KEA 850	°	± 61/± 50/± 53	± 87/± 73/± 69	± 90/ ± 90/ ± 90
Material		Aluminium		
Clamping piece clamp height	mm	200		
Wall distance	mm	250	350	450
Total height	mm	250		
Plate size	mm	150 x 150		
Hole spacing/diameter	mm	110 x 110/ 10		
Pipe diameter	mm	50		
Max. forces exerted on attachment points ¹⁾ Tension/compression KEA 650/KEA 750/KEA 850	N	500/560/770	580/740/1000	760/960/1280
Max. forces exerted on attachment points ¹⁾ Shearing KEA 650/KEA 750/KEA 850	N	380/430/590	440/570/770	580/750/1000
Packaging unit/weight	pc./kg	1/0.75	1/0.85	1/0.95

¹⁾ At a dynamic pressure of 800 N/m² in accordance with EN 60728-11

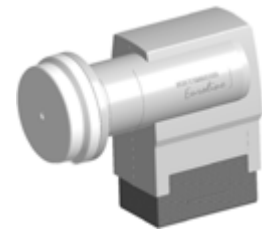
> Universal LNBs

KEL 411	20110027
KEL 422	20110028
KEL 440	20110029
KEL 444	20110030

The Kathrein EuroLine Universal LNBs are suitable for satellite receivers with a 40-mm LNB holder. They are designed to receive Ku-band satellites such as Astra, Eutelsat, Türksat and Hispasat.



KEL 411



KEL 422, KEL 440, KEL 444

- All LNBs are HDTV/DVB-S2 compatible
- KEL 411: Universal single LNB. For a single satellite receiver
- KEL 422: Universal twin LNB. For independent operation of two satellite receivers or one twin receiver
- KEL 440: Universal quatro LNB. Four fixed outputs for use with headends or Sat IF systems
- KEL 444: Universal quad LNB. Four switchable outputs for independent operation of four satellite receivers or two twin receivers

Technical data

Type | Order no.		KEL 411 20110027	KEL 422 20110028	KEL 440 20110029	KEL 444 20110030
Input frequency	GHz	10.7-11.7 and 11.7-12.75			
Oscillator frequency (L.O.)	GHz	9.75/10.6			
Output frequency	MHz	950-1950/1100-2150			
Gain	dB	60	58	55	
Output		1 x F-type connector (m)	2 x F-type connector (m)	4 x F-type connector (m)	
LNB supply voltage	V	11.5-14 (vert.) 16-19 (horiz.)		11.5-19	11.5-14 (vert.) 16-19 (horiz.)
Typ. Power consumption	mA	165	125	280	225
Control signals	kHz	0 (Low band)/ 22 (High band)		–	0 (Low band)/ 22 (High band)
LNB holder (Ø)	mm	40			
Dimensions with cap	mm	80 x 61 x 76	131 x 63 x 108		
Packaging unit/weight	pc./kg	1(10)/0.15		1(10)/0.34	

> Single-cable LNB

KEL 4124 20110031

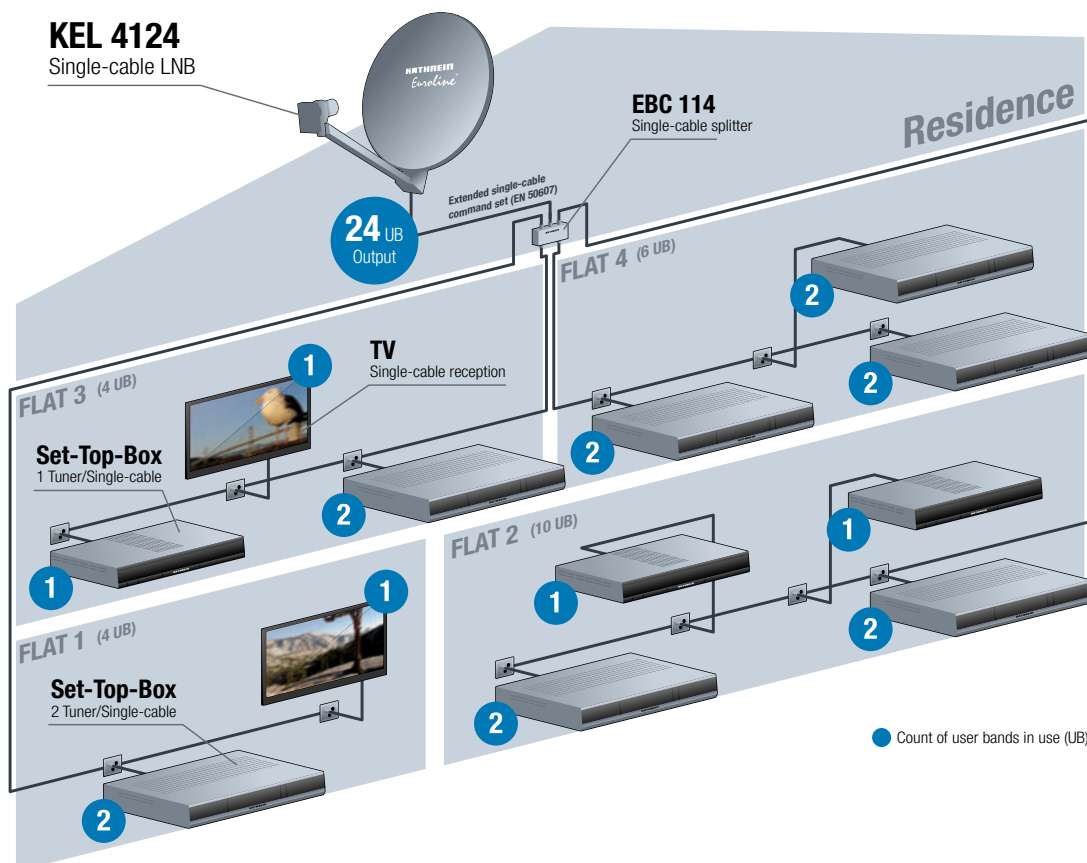
The KEL 4124 is a single-cable feed system for up to 24 subscribers. It makes possible the reception of satellites in the Ku-band, such as Astra, Eutelsat, Türksat and Hispasat. The feed system is designed for offset parabolic antennas, such as KEA 650, KEA 750, KEA 850, KEA 1000.



Technical data

Type		KEL 4124 20110031
Input frequency	GHz	10.70-11.70 and 11.70-12.75
Oscillator frequency (L.O.)	GHz	10.40
Output frequency	MHz	950-2150
Polarisation decoupling	dB	min. 22
Output/impedance	-/Ω	1 x F socket/75
LNB supply voltage	V	11-19
LNB power consumption	mA	max. 300
LNB holder	mm	40
Dimension with cap	mm	121 x 70 x 91
Weight (approx.)	kg	0.195

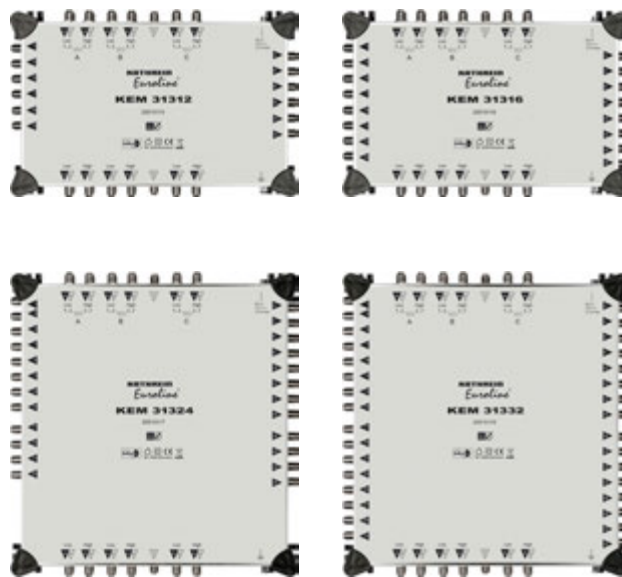
Connection example



> Multi-switch

KEM 31312	20510115
KEM 31316	20510116
KEM 31324	20510117
KEM 31332	20510118

- Cascadable multi-switch for splitting 12 satellite frequency planes and terrestrial signals to multiple receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity horizontal/vertical, low/high, the Sat positions A/B/C/D by each receiver due to DiSEqC™ control
- Terrestrial signals (DVB-T/DVB-T2/FM) are directed to each output, amplified
- Cascadable, for example, for corridor distributions in larger blocks of flats
- Supply via an optional external power supply unit KEMP 15, order no. 20510131, to supply the LNBS and possibly installed SAT IF amplifiers and the internal terrestrial amplifier
- Loop-through multi-switch for system extension with 12, 16, 24 and 32 connections
- For indoor installation



Technical data

Type | Order no.		KEM 31312 20510115		KEM 31316 20510116		KEM 31324 20510117		KEM 31332 20510118	
Subscriber connections		12		16		24		32	
Inputs		1 x terrestrial	12 x Sat IF	1 x terrestrial	12 x Sat IF	1 x terrestrial	12 x Sat IF	1 x terrestrial	12 x Sat IF
Frequency ranges	MHz	40-862	950-2400	40-862	950-2400	40-862	950-2400	40-862	950-2400
Through loss	dB	-2 → -4	-1 → -3	-2 → -4	-1 → -3	-2 → -5	-2 → -6	-2 → -5	-2 → -6
Connection loss	dB	0	-3 → 0	0	-3 → 0	0	-2 → 0	0	-2 → 0
Decoupling horiz./vert. typ.	dB	30							
Decoupling TER/SAT typ.	dB	30							
Impedance	Ω	75							
Max. output level	dBμV	90	105	90	105	90	105	90	105
Vertical/horizontal input control	V	13/18							
Low/High band control	kHz	0/22							
Current consumption per subscriber	mA	49							
Max. LNB supply current	mA	1600							
DC connection type		DC power supply socket 5.5/2.1 mm							
Permissible ambient temperature	°C	-20 to +55							
Connections		F connectors							
Dimensions (W x H x D)	mm	286 x 185 x 63				304 x 286 x 63			
Packaging unit/weight	pc./kg	1/0.65				1/1.0			

KEM 41712	20510119
KEM 41716	20510120
KEM 41724	20510121
KEM 41732	20510122

- Cascadable multi-switch for splitting 16 satellite frequency planes and terrestrial signals to multiple receivers
- Only one drop cable is required per receiver (for twin receivers two drop cables are required)
- Independent choice of polarity horizontal/vertical, low/high, the Sat positions A/B/C/D by each receiver due to DiSEqC™ control
- Terrestrial signals (DVB-T/DVB-T2/FM) are directed to each output, amplified
- Cascadable, for example, for corridor distributions in larger blocks of flats
- Supply via an optional external power supply unit KEMP 15, order no. 20510131, to supply the LNBS and possibly installed SAT IF amplifiers and the internal terrestrial amplifier
- Loop-through multi-switch for system extension with 12, 16, 24 and 32 connections
- For indoor installation



Technical data

Type | Order no.		KEM 41712 20510119		KEM 41716 20510120		KEM 41724 20510121		KEM 41732 20510122	
Subscriber connections		12		16		24		32	
Inputs		1 x terr.	16 x Sat IF	1 x terr.	16 x Sat IF	1 x terr.	16 x Sat IF	1 x terr.	16 x Sat IF
Frequency ranges	MHz	40-862	950-2400	40-862	950-2400	40-862	950-2400	40-862	950-2400
Through loss	dB	-2 → -4	-1 → -3	-2 → -4	-1 → -3	-2 → -5	-2 → -6	-2 → -5	-2 → -6
Connection loss	dB	0	-3 → 0	0	-3 → 0	0	-2 → 0	0	-2 → 0
Decoupling horiz./vert. typ.	dB	30							
Decoupling TER/SAT typ.	dB	30							
Impedance	Ω	75							
Max. output level	dBμV	90	105	90	105	90	105	90	105
Vertical/horizontal input control	V	13/18							
Low/High band control	kHz	0/22							
Current consumption per subscriber	mA	49							
Max. LNB supply current	mA	1600							
DC connection type		DC power supply socket 5.5/2.1 mm							
Permissible ambient temperature	°C	-20 to +55							
Connections		F connectors							
Dimensions (W x H x D)	mm	286 x 185 x 63				304 x 286 x 63			
Packaging unit/weight	pc./kg	1/1.0				1/1.6			

> Power supply unit for Euroline multi-switch

KEMP 15 20510131



- Short-circuit proof
- Conforms to EN 50083-2 (2012) and EN 60065
- Including Y cable (1 x DC coupling 5.5/2.1 to 2 x DC plug 3.5/1.35), wall mount bracket and power cable
- For indoor installation

Technical data

Type | Order no.		KEMP 15 20510131
Nominal input voltage	V	100–240 (50–60 Hz)
Permissible input voltage range	V	90-264
Input current	A	max. 1.5
Output voltage	V=	15
Nominal secondary voltage	mA	Max. 3300
Protection class/protection type		II (double insulated)/IP 40
DC connection		DC plugs 5.5/2.1
Ambient temperature range	°C	-20 to +40
Dimensions	mm	116 x 51 x 33
Packaging unit/weight	pc./kg	1/0.35

Technical Appendix

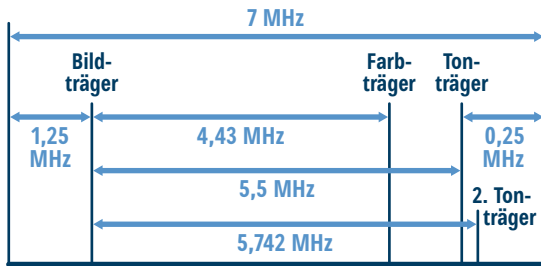
➤ Television standards	290
➤ Channel allocation	291
➤ CENELEC channel plan	294
➤ Catalogue data	296
➤ Planning and installation instructions	298
➤ Notes and requirements	300
➤ Guidelines and standards	301

Television standards

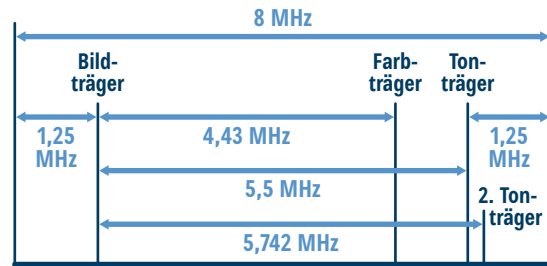
Country	VHF	UHF	Colour system	Country	VHF	UHF	Colour system	Country	VHF	UHF	Colour system
Egypt	B	G	SECAM	Italy	B	G	PAL	Philippines	M	–	NTSC
Albania	B	G	PAL	Japan	M	M	NTSC	Poland	D	K	PAL
Algeria	B	G	PAL	Yemen	B	–	PAL	Portugal	B	G	PAL
Argentina	N	–	PAL	Jordan	B	G	PAL	Qatar	B	G	PAL
Australia	B	B	PAL	Yugoslavia (Rest)	B	G	PAL	Romania	D	K	PAL
Bahrain	B	G	PAL	Canada	M	M	NTSC	Russia	D	K	SECAM
Belgium	B	H	PAL	Korea (South)	M	M	NTSC	Saudi Arabia	B	G	SECAM
Bulgaria	D	K	SECAM	Croatia	B	G	PAL	Sweden	B	G	PAL
China	D	K	PAL	Kuwait	B	G	PAL	Switzerland	B	G	PAL
Denmark	B	G	PAL	Latvia	D	K	SECAM	Singapore	B	G	PAL
Germany	B	G	PAL	Lebanon	B	G	SECAM	Slovakia	D	K	SECAM
England	–	I	PAL	Libya	B	G	SECAM	Slovenia	B	G	PAL
Estonia	D	K	SECAM	Lithuania	D	K	SECAM	Spain	B	G	PAL
Finland	B	G	PAL	Luxembourg	B	G/L	PAL	Sri Lanka	B	–	PAL
France	L	L	SECAM	Malaysia	B	G	PAL	South Africa	I	I	PAL
Gibraltar	B	G	PAL	Malta	B	–	PAL	Syria	B	G	PAL
Greece	B	G	PAL	Morocco	B	G	SECAM	Thailand	B	G	PAL
Hong Kong	–	I	PAL	Mexico	M	M	NTSC	Czech Republic	D	K	SECAM
India	B	–	PAL	Monaco	–/L	G	PAL/SECAM	Tunisia	B	G	SECAM/PAL
Indonesia	B	–	PAL	New Zealand	B	G	PAL	Turkey	B	G	PAL
Iraq	B	G	SECAM	Netherlands	B	G	PAL	Hungary	D	G	PAL
Iran	B	G	SECAM	Nigeria	B	I	PAL	USA	M	M	NTSC
Ireland	I	I	PAL	Oman	B	G	PAL	United Arab Emirates	B	G	NTSC
Iceland	B	G	PAL	Austria	B	G	PAL	Vietnam	D	K	SECAM
Israel	B	G	PAL	Pakistan	B	–	PAL	Cyprus	B	G	SECAM

CCIR Standard		B	D	G	H	I	K	K1	L	M	N
Line number		625	625	625	625	625	625	625	625	625	625
Channel bandwidth	MHz	7	8	8	8	8	8	8	8	6	6
Video bandwidth	MHz	5	6	5	5	5.5	6	8	6	4.2	4.2
Audio/video level spacing	MHz	+ 5.5 (+ 5.742)	+ 6.5	+ 5.5 (+ 5.742)	+ 5.5	+ 6	+ 6.5	+ 6.5	+ 6.5	+ 4.5	+ 4.5
Vestigial sideband	MHz	0.75	0.75	0.75	1.25	1.25	0.75	1.25	1.25	0.75	0.75
Video modulation		Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Pos.	Neg.	Neg.
Audio modulation		FM	FM	FM	FM	FM	FM	FM	AM	FM	FM

Channel allocation



Range B I, USB, B III, OSB standard B



Range ESB B IV, B V standard G

> Channel allocation

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	1. audio carrier ¹⁾ [MHz]	Mid frequency (DVB-T) [MHz]
Standard B & G	Europe (and H, I, K, L for B IV/V) ²⁾				
I	2	47-54	48.25	53.75	50.5
	3	54-61	55.25	60.75	57.5
	4	61-68	62.25	67.75	64.5
Lower Special channel Range (USB)	S 2	109-117	–	–	113.0
	S 3	117-125	–	–	121.0
	S 4	125-132	(126.25)	(131.75)	128.5
	S 5	132-139	(133.25)	(138.75)	135.5
	S 6	139-146	140.25	145.75	142.5
	S 7	146-153	147.25	152.75	149.5
	S 8	153-160	154.25	159.75	156.5
	S 9	160-167	161.25	166.75	163.5
III	S 10	167-174	168.25	173.75	170.5
	5	174-181	175.25	180.75	177.5
	6	181-188	182.25	187.75	184.5
	7	188-195	189.25	194.75	191.5
	8	195-202	196.25	201.75	198.5
Upper Special channel Range [OSB]	9	202-209	203.25	208.75	205.5
	10	209-216	210.25	215.75	212.5
	11	216-223	217.25	222.75	219.5
	12	223-230	224.25	229.75	226.5
IV	S 11	230-237	231.25	236.75	233.5
	S 12	237-244	238.25	243.75	240.5
	S 13	244-251	245.25	250.75	247.5
	S 14	251-258	252.25	257.75	254.5
	S 15	258-265	259.25	264.75	261.5
	S 16	265-272	266.25	271.75	268.5
	S 17	272-279	273.25	278.75	275.5
	S 18	279-286	280.25	285.75	282.5
	S 19	286-293	287.25	292.75	289.5
S 20	293-300	294.25	299.75	296.5	

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	1. audio carrier ¹⁾ [MHz]	Mid frequency (DVB-T) [MHz]
Expanded Special channel Range [ESB]	S 21	302-310	303.25	308.75	306.0
	S 22	310-318	311.25	316.75	314.0
	S 23	318-326	319.25	324.75	322.0
	S 24	326-334	327.25	332.75	330.0
	S 25	334-342	335.25	340.75	338.0
	S 26	342-350	343.25	348.75	346.0
	S 27	350-358	351.25	356.75	354.0
	S 28	358-366	359.25	364.75	362.0
	S 29	366-374	367.25	372.75	370.0
	S 30	374-382	375.25	380.75	378.0
	S 31	382-390	383.25	388.75	386.0
	S 32	390-398	391.25	396.75	394.0
	S 33	398-406	399.25	404.75	402.0
	S 34	406-414	407.25	412.75	410.0
	S 35	414-422	415.25	420.75	418.0
	S 36	422-430	423.25	428.75	426.0
	S 37	430-438	431.25	436.75	434.0
	S 38	438-446	439.25	444.75	442.0
IV	21	470-478	471.25	476.75	474.0
	22	478-486	479.25	484.75	482.0
	23	486-494	487.25	492.75	490.0
	24	494-502	495.25	500.75	498.0
	25	502-510	503.25	508.75	506.0
	26	510-518	511.25	516.75	514.0
	27	518-526	519.25	524.75	522.0
	28	526-534	527.25	532.75	530.0
	29	534-542	535.25	540.75	538.0
	30	542-550	543.25	548.75	546.0
	31	550-558	551.25	556.75	554.0
	32	558-566	559.25	564.75	562.0
	33	566-574	567.25	572.75	570.0
	34	574-582	575.25	580.75	578.0
	35	582-590	583.25	588.75	586.0
	36	590-598	591.25	596.75	594.0
	37	598-606	599.25	604.75	602.0

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	1. audio carrier ¹⁾ [MHz]	Mid frequency (DVB-T) [MHz]
Standard B & G	Europe (and H, I, K, L for B IV/V) ²⁾				
V	38	606-614	607.25	612.75	610.0
	39	614-622	615.25	620.75	618.0
	40	622-630	623.25	628.75	626.0
	41	630-638	631.25	636.75	634.0
	42	638-646	639.25	644.75	642.0
	43	646-654	647.25	652.75	650.0
	44	654-662	655.25	660.75	658.0
	45	662-670	663.25	668.75	666.0
	46	670-678	671.25	676.75	674.0
	47	678-686	679.25	684.75	682.0
	48	686-694	687.25	692.75	690.0
	49	694-702	695.25	700.75	698.0
	50	702-710	703.25	708.75	706.0
	51	710-718	711.25	716.75	714.0
	52	718-726	719.25	724.75	722.0
	53	726-734	727.25	732.75	730.0
	54	734-742	735.35	740.75	738.0
	55	742-750	743.25	748.75	746.0
	56	750-758	751.25	756.75	754.0
	57	758-766	759.25	764.75	762.0
	58	766-774	767.25	772.75	770.0
	59	774-782	775.25	780.75	778.0
	60	782-790	783.25	788.75	786.0
	61	790-798	791.25	796.75	794.0
	62	798-806	799.25	804.75	802.0
	63	806-814	807.25	812.75	810.0
	64	814-822	815.25	820.75	818.0
	65	822-830	823.25	828.75	826.0
	66	830-838	831.25	836.75	834.0
	67	838-846	839.25	844.75	842.0
	68	846-854	847.25	852.75	850.0
	69	854-862	855.25	860.75	858.0
Standard D OIRT					
B I	R I	48.5-56.5	49.75	56.25	
	R II	5-66	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	157.75	
	s7	158-166	159.25	165.75	
	s8	166-174	167.25	173.75	
[B III]	R VI	174-182	175.25	181.75	
	R VII	182-190	183.25	189.75	
	R VIII	190-198	191.25	197.75	
	R IX	198-206	198.25	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	
	etc.	...	...	...
	s38	462-470	463.25	469.75	

¹⁾ 2. audio carrier = video carrier + 5.742 MHz

Lowering 1. audio carrier = 13 dB

Lowering 2. audio carrier = 20 dB

²⁾ Different audio carrier

Standard I: audio carrier = video carrier + 6 MHz

Standard K, L: audio carrier = video carrier + 6.5 MHz



The DVB-C channel allocation depends on the channel grid used by the cable operator. The centre frequencies are given here on channel names: "D130" → 130 MHz

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	Audio carrier [MHz]
Standard B	Italy			
I	A	52.5-59.5	53.75	59.25
	B	61-68	62.25	67.75
(II)	C	81-88	82.25	87.75
(III)	D	174-181	175.25	180.75
	E	182.5-189.5	183.75	189.25
	F	191-198	192.25	197.75
	G	200-207	201.25	206.75
	H	209-216	210.25	215.75
	H1 H2	216-223 223-230	217.25 224.25	222.75 229.75
Standard L	France			
I	2	49.00-57.00	55.75	49.25
	3	53.75-61.75	60.50	54.00
	4	57.00-65.00	63.75	57.25
III	5	174.75-182.75	176.00	182.50
	6	182.75-190.75	184.00	190.50
	7	190.75-198.75	192.00	198.50
	8	198.75-206.75	200.00	206.50
	9	206.75-214.75	208.00	214.50
	10	214.75-222.75	216.00	222.50
	10	214.75-222.75	216.00	222.50
Standard I	Ireland			
I	A	44.5-52.5	45.75	51.75
	B	52.5-60.5	53.75	59.75
	C	60.5-68.5	61.75	67.75
III	D	174-182	175.25	181.25
	E	182-190	183.25	189.25
	F	190-198	191.25	197.25
	G	198-206	199.25	205.25
	H	206-214	207.25	213.25
	I	214-222	215.25	221.25
	J	222-230	223.25	229.25
	J	222-230	223.25	229.25

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	Audio carrier [MHz]
Standard I	South Africa			
III	4	174-182	175.25	181.25
	5	182-190	183.25	189.25
	6	190-198	191.25	197.25
	7	198-206	199.25	205.25
	8	206-214	207.25	213.25
	9	214-222	215.25	221.25
	10	222-230	223.25	229.25
	11	230-238	231.25	237.25
	(12)	238-246	not used	
	13	246-254	247.43	253.443
Standard M	USA			
I	A 02	54-60	55.25	59.75
	A 03	60-66	61.25	65.75
	A 04	66-72	67.25	71.75
	A 05	76-82	77.25	81.75
	A 06	82-88	83.75	87.75
	III	A 07	174-180	175.25	179.75
A 08		180-186	181.25	185.75
A 09		186-192	187.25	191.75
A 10		192-198	193.25	197.75
A 11		198-204	199.25	203.75
A 12		204-210	205.25	209.75
A 13		210-216	211.25	215.75
Standard M	USA			
IV	A 14	470-476	471.25	475.75
	A 15	476-482	477.25	481.75
	A 16	482-488	483.25	487.75
	A 17	488-494	489.25	493.75
	A 18	494-500	495.25	499.75
	A 19	500-506	501.25	505.75
	A 20	506-512	507.25	511.75
	A 21	512-518	513.25	517.75
	A 22	518-524	519.25	523.75
	A 23	524-530	525.25	529.75
	A 24	530-536	531.25	535.75
	A 25	536-542	537.25	541.75
	A 26	542-548	543.25	547.75
	A 27	548-554	549.25	553.75
	A 28	554-560	555.25	559.75
	A 29	560-566	561.25	565.75
	A 30	566-572	567.25	571.75
	A 31	572-578	573.25	577.75
	A 32	578-584	579.25	583.75
	A 33	584-590	585.25	589.75
	A 34	590-596	591.25	595.75
	A 35	596-602	597.25	601.75
	A 36	602-608	603.25	607.75
	A 37	608-614	609.25	613.75
	A 38	614-620	615.25	619.75
	A 39	620-626	621.25	625.75
	A 40	626-632	627.25	631.75
	A 41	632-638	633.25	637.75
	A 42	638-644	639.25	643.75

Range	Channel	Channel limits [MHz]	Video carrier [MHz]	Audio carrier [MHz]
V	A 43	644-650	645.25	649.75
	A 44	650-656	651.25	655.75
	A 45	656-662	657.25	661.75
	A 46	662-668	663.25	667.75
	A 47	668-674	669.25	673.75
	A 48	674-680	675.25	679.75
	A 49	680-686	681.25	685.75
	A 50	686-692	687.25	691.75
	A 51	692-698	693.25	697.75
	A 52	698-704	699.25	703.75
	A 53	704-710	705.25	709.75
	A 54	710-716	711.25	715.75
	A 55	716-722	717.25	721.75
	A 56	722-728	723.25	727.75
	A 57	728-734	729.25	733.75
	A 58	734-740	735.25	739.75
	A 59	740-746	741.25	745.75
	A 60	746-752	747.25	751.75
	A 61	752-758	753.25	757.75
	A 62	758-764	759.25	763.75
	A 63	764-770	765.25	769.75
	A 64	770-776	771.25	775.75
	A 65	776-782	777.25	781.75
	A 66	782-788	783.25	787.75
	A 67	788-794	789.25	793.75
	A 68	794-800	795.25	799.75
	A 69	800-806	801.25	805.75
	A 70	806-812	807.25	811.75
	A 71	812-818	813.25	817.75
	A 72	818-824	819.25	823.75
	A 73	824-830	825.25	829.75
	A 74	830-836	831.25	835.75
	A 75	836-842	837.25	841.75
A 76	842-848	843.25	847.75	
A 77	848-854	849.25	853.75	
A 78	854-860	855.25	859.75	
A 79	860-866	861.25	865.75	
A 80	866-872	867.25	871.75	
A 81	872-878	873.25	877.75	
A 82	878-884	879.25	883.75	
A 83	884-890	885.25	889.75	

> CENELEC channel plan

The output levels for broadband amplifiers were determined in accordance with the following channel assignment:

Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan ¹⁾ 19/29/42 channels	Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan ¹⁾ 19/29/42 channels
I	2	48.25	•	Upper Special channel Super band (OSB)	S 11	231.25	•
	3	55.25			S 12	238.25	
	4	62.25			S 13	245.25	
	Pilot	80.15				247.25	•
Lower Special channel range (USB)	S 2	112.25			S 14	252.25	
	S 3	119.25	•		S 15	259.25	
	S 4	126.25				263.25	•
	S 5	133.25			S 16	266.25	
	S 6	140.25			S 17	273.25	
	S 7	147.25			S 18	280.25	
	S 8	154.25		S 19	287.25	•	
	S 9	161.25		S 20	294.25		
III	S 10	168.25		Expanded Special channel range (ESB)	S 21	303.25	
	5	175.25	•		S 22	311.25	•
	6	182.25			S 23	319.25	
	7	189.25			S 24	327.25	•
		191.25	•		S 25	335.25	
	8	196.25			S 26	343.25	•
	9	203.25			S 27	351.25	
		207.25	•		S 28	359.25	•
	10	210.25			S 29	367.25	
	11	217.25			S 30	375.25	•
		223.25	•		S 31	383.15	
	12	224.25			S 32	391.25	•
			S 33		399.25		
			S 34		407.25	•	
			S 35		415.25		
			S 36		423.25	•	
			S 37		431.25		
			S 38		439.25	•	
			S 39		447.25	•	
			S 40		455.25		
			S 41	463.25	•		

Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan ¹⁾ 19/29/42 channels	Range Band	Channel PAL	Carrier (MHz)	CENELEC channel plan ¹⁾ 19/29/42 channels
IV	21	471.25		V	38	607.25	
	22	479.25	•		39	615.25	
	23	487.25			40	623.25	
	24	495.25	•		41	631.25	
	25	503.25			42	639.25	
	26	511.25	•		43	647.25	
	27	519.25			44	655.25	
	28	527.25	•		45	663.25	•
	29	535.25			46	671.25	
	30	543.25	•		47	679.25	•
	31	551.25			48	687.25	
	32	559.25			49	695.25	•
	33	567.25	•		50	703.25	
	34	575.25			51	711.25	•
	35	583.25	•		52	719.25	
	36	591.25			53	727.25	•
	37	599.25	•		54	735.25	
					55	743.25	•
					56	751.25	
					57	759.25	•
					58	767.25	
					59	775.25	•
					60	783.25	
					61	791.25	•
					62	799.25	
					63	807.25	•
					64	815.25	
					65	823.25	•
					66	831.25	
					67	839.25	•
					68	847.25	
					69	855.25	•

¹⁾ According to EN 60728-3, 19 channels up to 450 MHz, 29 channels up to 606 MHz, 42 channels up to 862 MHz

> Catalogue data

Impedance

The technical values provided in this catalogue apply to an impedance of 75 Ω unless otherwise stated.

Gain values

The gain values for terrestrial antennas refer to the dipole. For gain values of terrestrial antennas that are based on isotropic radiators, the following applies: catalogue value + 2.15 dB.

The gain values of parabolic antennas are based on the isotropic radiator.

Wind load values

The stated values are based on a dynamic pressure of 800 N/m². A dynamic pressure of 800 N/m² corresponds to a wind speed of 36 m/s or approx. 130 km/h, i.e. wind force 12.

When installed higher than 20 m above ground, a dynamic pressure of 1,100 N/m² is to be applied. A dynamic pressure of 1,100 N/m² corresponds to a wind speed of 42 m/s or 150 km/h.

> **Conversion factor:** Wind load (1100 N/m²) = Wind load (800 N/m²) x 1.37

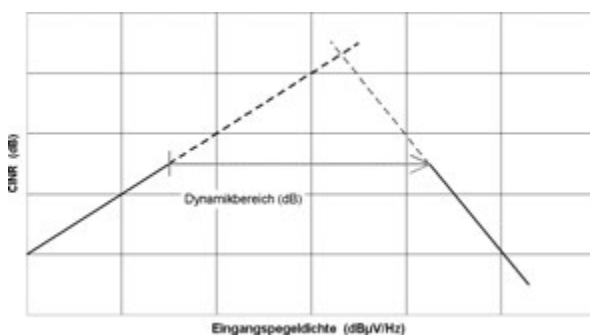
Unless otherwise stated, a maximum permissible wind speed of 150 km/h applies to the antennas.

Maximum output operating level

For	Calculated using measuring procedures	Disturbance ratio
TV channel amplifiers	EN 60728-5/Pkt. 4.2	54 dB, 3rd order
Range amplifiers	EN 60728-5/Pkt. 4.3, Pkt. 4.4	60 dB, 2. order ^{*)} 66 dB, 3rd order
In-house connection amplifiers/ Broadband amplifiers	EN 60728-3	60 dB CTB 60 dB CSO
Return path amplifier	EN 60728-3	CINR (see figure below)
Sat amplifiers	EN 60728-3	35 dB, 2nd order 35 dB, 3rd order

^{*)} For interference products caused by VHF range signals

Input level density [dB (μ V/ \sqrt Hz)]



CINR (Composite Intermodulation Noise Ratio)

The graphic is only meant to improve your understanding of the terms "input level density" and "dynamic range". No electrical data can be deduced from the graphic. See also EN 60728-3.

Labelling



Kathrein uses the CE labelling to indicate the conformance of the products with the respective directives (EMC and Low Voltage Directive) and the standards EN 60728-11, EN 50083-2 and EN 60065 including the supplements.

Receivers also conform to standards EN 55013, EN 55020 and EN 61000.

The labelling is found in the catalogue and where possible on the product, packaging, usage information and operating manuals.



The class A label is used to identify products that fulfil the increased shielding requirements of class A in the EN 50083-2. The labelling is found in the catalogue and where possible on the product, packaging, usage information and operating manuals.

On active products, the Class A label documents that they also conform to EN 50083-2. The labelling is found in the catalogue and on the packaging and where possible on the product.

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



Kathrein has disposal contracts, for all packaging brought onto the domestic market, with ISD-INTERSEROH-Dienstleistungs GmbH.

Contract No. 80312



Kathrein has a disposal contract for all sales packaging brought onto the domestic market marked with the Grüner Punkt (green dot), for participation in the dual system of EKO-PUNKT GmbH.

Contract No. 2183446



Kathrein is registered manufacturer in accordance with the requirements of the EU Directive (WEEE 2002/96/EG) and the Electrical and Electronic Equipment Act (ElektroG) in the National Register for Waste Electric Equipment (EAR).

WEEE reg. no. DE 38438502

The symbol indicates that electronic equipment is not domestic waste – in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27 January 2003 concerning used electrical and electronic appliances, it must be disposed of properly.



Batteries are not allowed in the domestic waste. Used batteries can be returned to the free community collection points or a point of sale. To meet its redemption obligations under the German Batteries Act (BattG), Kathrein is involved in the collection scheme of the foundation "Stiftung Gemeinsames Rücknahmesystem Batterien".

Contract No. 10510822

Changes / Errors

The appearance and value of the articles listed were valid at the time this catalogue went to press. We reserve the right to make changes. E&OE. For the latest information on our products, please visit our product database at www.kathrein.com.

> Planning and installation instructions

Mast calculation

The calculation values for the mechanical stability of the antenna superstructures (wind loads and bending moments) comply with EN 60728-11. See also the mast calculation on page 55 and 64.

When selecting the installation site, take into account the structural features of the building (e.g. susceptibility to oscillation, roof characteristics, installation on cylindrical structures), which could lead to increased wind loads in accordance with DIN 1055, part 4/2005-03 or DIN 4131. The dynamic properties of the antenna and the structure can interact and cause detrimental changes.

Maximum operating level

The maximum operating level for range/multi-range amplifiers for community antenna networks with a maximum of 12 TV channels depends on the catalogue value for the maximum output level and the number of transmission channels.

The maximum operating level is the smaller of the following two values:

- a) Output level for 66 dB crossmodulation ratio minus the level reduction
- or
- b) Output level for 60 dB IMod 2nd order (applies to interfering signal stability amplifiers only in the FM range)

Output level reduction

If more than two channels (up to a maximum of 12 channels) are transmitted, reduce the output level in accordance with the table below. If FM channels are transmitted approx. 10 dB lower than the TV signal levels, these can be disregarded. If the levels are the same, they should be counted like the TV channels.

The level reduction should only be carried out for the output levels of 60 dB and 66 dB crossmodulation. The output level values for 60 dB disturbance ratio 2nd order need not be reduced.

Number of transmission channels	Level reduction (dB)
2	0
3	2
4	3.5
5	4.5
6	5
7	5.5
8	6
9	6.5
10	7
11	7.5
12	8

When cascading at the same disturbance ratio per doubled number of cascaded amplifiers, the output level is to be reduced by 3 dB each time.

EMC threshold values

For **active** devices, in accordance with EN 50083-2, the following values apply for the max. permitted **radiated interference power**:

Frequency range [MHz]	Max. permitted radiated interference power [dBpW]
5-30	27-20
30-950	20
950-2500	43

For **passive** devices, in accordance with EN 50083-2, the following values apply for the **screening factor**:

Frequency range [MHz]	Class A	Threshold value [dB]	Class B
5-30	85		75
30-300	85		75
300-470	80		75
470-950	75		65
950-3000	55		50

For **coaxial cable** the following limit values are valid in accordance with EN 50117 for:

Coupling resistance

Frequency range [MHz]	Limit value [mΩ/m]			
5-30	Class B: ≤ 15	Class A: ≤ 5	Class A+: ≤ 2.5	Class A++: ≤ 0.9

Screening attenuation

Frequency range [MHz]	Limit value [dB]			
	Class B	Class A	Class A+	Class A++
30-1000	75	85	95	105
1000-2000	65	75	85	95
2000-3000	55	65	75	85

Signal-to-noise ratio / noise figure

The signal-to-noise ratio is the difference between the level of the useful signal and the noise level. The noise factor indicates by how many dB an amplifier additionally reduces the signal-to-noise ratio. The noise level of a 75-Ω resistor, in reference to the bandwidth of a TV channel (5 MHz), is 2 dBμV.

>

Signal-to-noise ratio = amplifier input level - noise factor - 2 dBμV

Calculation example: Antenna level = 50 dBμV, noise factor = 4 dB
Signal-to-noise ratio = 50 dBμV - 4 dB - 2 dBμV = 44 dB

Signal-to-noise ratio/image quality

Signal-to-noise ratio	more than 46 dB	37 dB	30 dB	less than 26 dB
noise	noise-free	visible, but not annoying	clearly visible, annoying	noise predominates
picture quality	Very good	Good	Poor	Useless

> Notes and requirements

Earthing wires

Earthing wires for antenna systems (as per EN 60728-11)	
Copper	16-mm ² solid wire (Ø: 4.5 mm), bare or insulated
Aluminium	25-mm ² solid wire (Ø: 5.6 mm), insulated
Steel, galvanised	50-mm ² solid wire (Ø: 8 mm) or ribbon, 2.5 x 20 mm (in accordance with DIN 48801)

Limit values for useful levels

Limits for useful levels for antenna outlets (as per EN 60728-1)		
Range	Min. level [dBµV]	Max. level [dBµV]
FM (mono/stereo)	40/50	70
AM-RSB-TV-Radio	60	77 *)
Frequency modulated TV signals	47	77
DVB-C (64 QAM)	47	67
DVB-C (256 QAM)	54	74
DVB-S2 (QPSK, 8 PSK, 16 APSK, 32 APSK)	47	77
DVB-T (16 QAM; FEC 2/3)	36	74
DVB-T (64 QAM; FEC 2/3)	45	74
DVB-T2 (16 QAM; FEC 2/3)	35	74
DVB-T2 (64 QAM; FEC 2/3)	39	74
DAB (OFDM in band III)	28	94

*) 80 dBµV for systems with fewer than 20 channels

Digitally modulated signals

Additional power requirements for digitally modulated signals (in accordance with EN 60728-1)		
Bit error rate BER (does not apply to DVB-x2)	For quasi-uninterrupted service, the bit error rate (BER) for a DVB signal prior to Reed-Solomon error correction must be less than 10 ⁻⁴ .	
Modulation error ratio MER (Note: This power requirement is for information only)	For each DVB signal, the modulation error ratio (MER) must not be less than the value given in the following table:	
	Signal modulation	Modulation error ratio MER [dB]
	QPSK	11
	8 PSK	14
	16 APSK	16
	32 APSK	18
	16 QAM	20
	64 QAM	26
	256 QAM	32
	COFDM (DVB-T)	26
	COFDM (DVB-T2)	32

Potential equalisation

Potential equalisation wires	
Copper	4 mm ² (Ø: 2.3 mm), bare or insulated

Media law

The media laws of individual countries govern the permission for channel reception. Information can be obtained from the regional media centres.

> Guidelines and standards

EN and DIN standards

For antenna reception and distribution systems, the product standard series EN 60728 or EN 50083 applies.

1. Overview of the European standards series EN 60728 or EN 50083

(The EN 50083 series has been largely replaced by EN 60728.)

Cable distribution systems for television signals, audio signals and interactive multimedia services

EN 60728-11	(EN 50083-1):	1. Safety requirements
EN 50083-2:		2. Electromagnetic compatibility of equipment
EN 60728-3	(EN 50083-3):	3. Active broadband equipment for coaxial cable networks
EN 60728-4	(EN 50083-4):	4. Passive broadband equipment for coaxial cable networks
EN 60728-5	(EN 50083-5):	5. Devices for headends
EN 60728-6	(EN 50083-6):	6. Optical equipment
EN 60728-1	(EN 50083-7):	7. System requirements
EN 50083-8:		8. Electromagnetic compatibility of cable networks
EN 50083-9	(EN 60728-9):	9. Interfaces for CATV/SMATV headends and comparable professional devices for DVB/MPEG-2 transport streams
EN 60728-10:		10. Return path system requirements
EN 60728-1-2:		11. Performance requirements for signals at the subscriber connection socket in real operation

EN 60728, Part 11, deals with all relevant safety regulations, such as earthing, lightning protection, potential equalisation, mechanical strength, etc. and refers to, among other documents, the applicable standards EN 60065 and EN 60950-1.

EN 50083, Part 2, contains all the regulations that are important for EMC, such as the screening factor, radiation of unwanted signals, irradiation of unwanted signals, inflow, interference suppression, etc.

Low Voltage Directive 2006/95/EC or 2014/35/EU

EMC Directive 2004/108/EC or 2014/30/EU

The CE labelling on Kathrein products is proof of their conformance with these standards.

2. Explanations of safety specifications EN 60728-11

With calculation examples, VDE publications issue 6, 4th updated edition 2005

3. Standard overview of coaxial cable for cable distribution systems EN 50117

EN 50117-1 Generic specification
EN 50117-2 Basic specification for cables for cable distribution systems
EN 50117-2-1 In-house installation cable (5-1000 MHz)
EN 50117-2-2 Exterior cables (5-1000 MHz)
EN 50117-2-3 Splitter and line cables (5-1000 MHz)
EN 50117-2-4 In-house installation cable (5-3000 MHz)
EN 50117-2-5 Exterior cables (5-3000 MHz)
EN 60966-2-4 Connection cable for radio and TV sets

4. Mechanical stability standards

DIN 1055, part 4 Structural load specifications
DIN 4131 Antenna support structures made of steel

5. RGA guidelines 8th edition, version: August 2000

Published by the Arbeitskreis Rundfunk-Empfangsanlagen (Broadcasting Systems working group)

6. Technical guidelines for large community antenna systems

Issued by the trade association for satellite & cable in the ZVEI

7. Recommendations of the forum ANGA-ZVEI

TV cable networks: Guaranteed future through expansion to interactive broadband networks

Part I/Part II Network extension – May 2006
Part III Access networks – August 1999
Part IV DVB measurement technology – September 1998
Part V Cable modem – July 2001
Part VI Planning guidelines – May 2004
Part VII Selection criteria for headends – May 2004
Part VIII Expansion strategy for fibre optic networks
Passive components for network infrastructure

Source

DIN standard sheets	BEUTH-Verlag GmbH
EN standard sheets	Burggrafenstraße 4–7, 10787 Berlin
RGA guidelines	VDE-Verlag Postfach 12 01 43, 10591 Berlin
Technical guidelines	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. Fachverband Satellit & Kabel Stresemannallee 13, 60596 Frankfurt
ANGA/ZVEI recommendation	Zentralverband Elektrotechnik- und Elektronikindustrie e.V. Fachverband Satellit & Kabel Stresemannallee 13, 60596 Frankfurt

Your sales partner:

Sales Germany

KATHREIN Digital Systems GmbH
Vertriebsregion Süd/Nord
Eiselauer Weg 13
89081 Ulm, Germany
Phone +49 731 927 67-0
sdz.ulm@kathrein.de

Service centre

autronic electronic-service GmbH
Hauptstraße 2a
35792 Löhnberg-Obershausen, Germany
Phone +49 6477 6123-101
Fax +49 6477 6123-020
service-kathrein@autronic-service.de

Service centre fro caravan products

CSS Caravan-Sat-Service GmbH
Bahnhofstraße 110
83224 Grassau, Germany
Telefon +49 8641 69984-27
Fax +49 8641 69984-29
service@css-grassau.de

Technical Support for Retailers

KATHREIN Digital Systems GmbH
Eiselauer Weg 13
89081 Ulm, Germany
Phone +49 731 270 909 70
Fax +49 731 92767-22
technische-kundenberatung@kathrein.de

KATHREIN Digital Systems GmbH
Anton-Kathrein-Straße 1–3
83022 Rosenheim, Germany
www.kathrein-ds.com | info@kathrein-ds.com

KATHREIN
Digital Systems GmbH