

A large school of fish, possibly yellow perch, forms a dense, roughly spherical shape in the center of the frame. Overlaid on this school and the background is a network diagram consisting of four bright, glowing nodes connected by thin, white, curved lines that form a web-like structure. The background is a gradient of blue, transitioning from a lighter blue at the top to a darker blue at the bottom.

A SIMPLY  
PERFECT  
**NETWORK.**

**CABLE-TV NETWORKS:  
HFC PRODUCTS & MONITORING**



Ed. 05.23

 **DELTA**  
Electronics





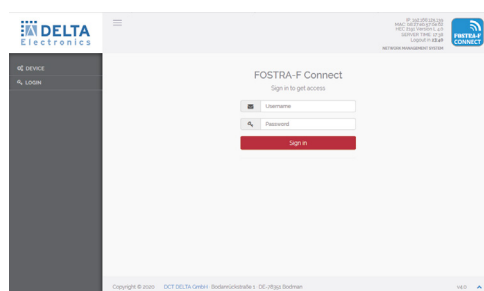
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## DELTANET OVERVIEW - DELTA'S SMART REMOTE CONTROL SOLUTION

- II DELTANET - the smart solution for automated data collection and creation of a topographical overview of installed network components  
Remote access to FTTx and HFC components via DCT DELTA's FOSTRA-F solution. On-site configuration of DCT DELTA components via WiFi access.
- II DELTANET is based on the three applications DELTANET FOSTRA-F, DELTANET SCANAPP and DELTA CONFIGAPP, which can be used independently or in interaction with each other
  - II DELTANET FOSTRA-F: The simple and cost-effective solution for remote access, e.g. for ingress control (supported features depend on the device) with minimal energy consumption and no additional user bandwidth consumption
  - II DELTANET SCANAPP: The app (available for Android and iOS) supports during network commissioning - Register the nodes/amplifiers by scanning appropriate QR codes and get a database based topology overview of your network. Integrated tools assist the installer in avoiding mismatches. SCANAPP also supports on-site configuration via the installer's mobile device due to the integrated CONFIGAPP feature, e.g. configurations can be uploaded and downloaded to the smartphone and thus stored on the centralized DELTANET server. Uploadable recordings / photos of the installed components and configuration complete the data collection, which represents a further source of information, especially for maintenance/service tasks.
  - II DELTANET CONFIGAPP: The app (available for Android, iOS and Windows) allows to configure (via Wi-Fi) Delta Nodes/Amplifiers using a mobile device or Windows laptop. The FOSTRA-C module acts as wireless access point, inserted temporarily in the corresponding slot of the node/amplifier. Thus on-site the service staff can use the app to download and modify a configuration of connected devices. CONFIGAPP is available as a standalone version and also embedded in SCANAPP.

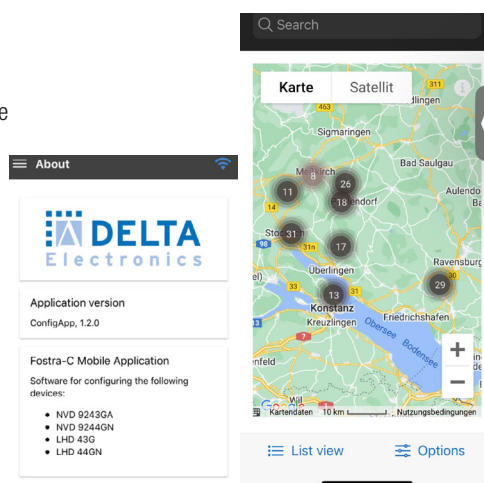
### DELTANET FOSTRA-F

- II Robust remote access to configuration parameters of RfG/HFC nodes/amplifiers
- II Access does not allocate user bandwidth
- II Efficient troubleshooting, e.g. in the event of ingress, by attenuating / switching off the return channel (as well in interaction with a higher-level management system)
- II Linux based database
- II Access via web GUI (http(s)), REST API, SNMP
- II Cost-efficient, license model allows low-cost entry



### DELTANET SCANAPP

- II Client/server system. No direct dependency on server installation location, as long as there is a permanent internet connection
- II Mobile app installed on the service team's smartphones/tablets (Android or iOS). Database synchronization via the Internet
- II Simple node/amplifier registration by scanning the QR code, labeled on the devices
- II One QR code per node/amplifier, one QR code per FOSTRA-F module (if installed)
- II Integrated connection test between HEC and FOSTRA-F module (if installed)
- II Automatic inventory and location detection using GPS
- II Map or table based view of installed components
- II Uploading of photos of the on-site installation or other documents (e.g. acceptance report)
- II Highlighted link from selected device towards the head end
- II Smart device based on-site configuration via the CONFIGAPP feature. Device access realized via Wi-Fi hot spot (FOSTRA-C module)
- II Import/export of the node/amplifier configuration via installer's smart device



### DELTANET CONFIGAPP

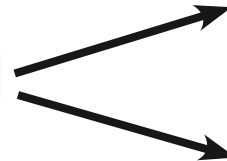
- II Installed on the mobile device (Android or iOS) or Windows laptop of the service staff
- II FOSTRA-C module is temporarily plugged into corresponding slot, detected and connected via Wi-Fi to the mobile device/laptop
- II Configuration of the device via the app, including import /export from/to the mobile device/laptop
- II Available as Standalone version and integrated in DELTANET SCANAPP



# DELTANET FOSTR-A-F



Database on HEC or  
dedicated database server



Node/Amplifier with  
FOSTR-A-F module



## Prerequisites - All you need is ...

- DELTANET FOSTR-A-F requires a platform operating the FOSTR-A-F database. This might be the Headend Controller (HEC, recommended for accessing up to 500 FOSTR-A-F modules) or a centralized server / VM (provided by the customer)
- Access to device-specific information of the nodes/amplifiers, such as name, address and type.
- Access to device-dependent parameters such as DS on/off, burst mode on/off, ECO mode on/off, DS/US path settings (for ingress management)
- Modular license scheme, initially remote control of at least 32 FOSTR-A-F modules, expandable in a stepwidth of 500. Certainly customizable on request.
- The HEC acts as an FSK based transmitter addressing the FOSTR-A-F receiver modules in the nodes/amplifiers

**DELTA Electronics**

FOSTR-A-F Input List

Control Table

10 records per page

Enter keywords...

Name *	HEC #	MAC #	Address Line 1 #	Address Line 2 #	Type
00 LHD 43 Test Telecab	0	00242F0A3C AE			Amplifier LHD or BNC
00 NVD g42 Test Telecab	0	00242F0A3C AB			Amplifier NVD
Fostra-kunle-LHD-1	0	00242F0A39 C4	Address Street 9	2823 LHD City	Amplifier LHD or BNC
Fostra-kunle-LHD-3	0	00242F0A39 C3			Amplifier LHD or BNC
Fostra-kunle-LHD-1	0	00242F0A39 C2			Amplifier NVD
Fostra-kunle-LHD-1	0	00242F0A39 C1			Optical Node 12GHz OND
Fostra-kunle-LHD-1	0	00242F0A39 C0			Optical Node 12GHz OND
Fostra-kunle-LHD-1	0	00242F0A39 B9			Optical Node 12GHz OND
LHD3	0	00242F0A39 B8			Amplifier LHD or BNC
omooft	0	00242F0A39 B7			D-MISO

Showing 1 to 10 of 10 entries

New entry

Re-Transmit test

**Edit data**

Name \* ONH5 12GHz test

HEC 1

MAC Address \* 00242F0A39 B7

Address 1 oakroad

Address 2 address

Comment comment

Type OPT-G

DS ☒ Yes, on

ICS ☐ Yes, on

CW ☐ Yes, on

DS ATT 30dB

US ATT 0dB

Ingress Filter ☐ Yes, on

Slope 3dB ☒ Yes, on

Please be aware switching from "Standard" to "Extended" Command Set cannot be reverted

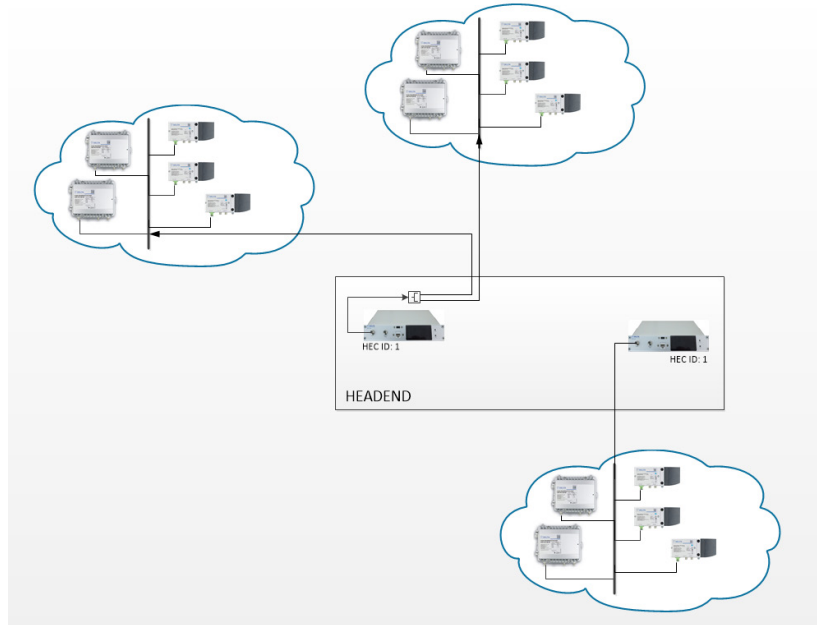
Re-Transmit Cancel Save changes

## DELTANET FOSTRA-F DESIGN RECOMMENDATION

### Standalone approach

Recommended for

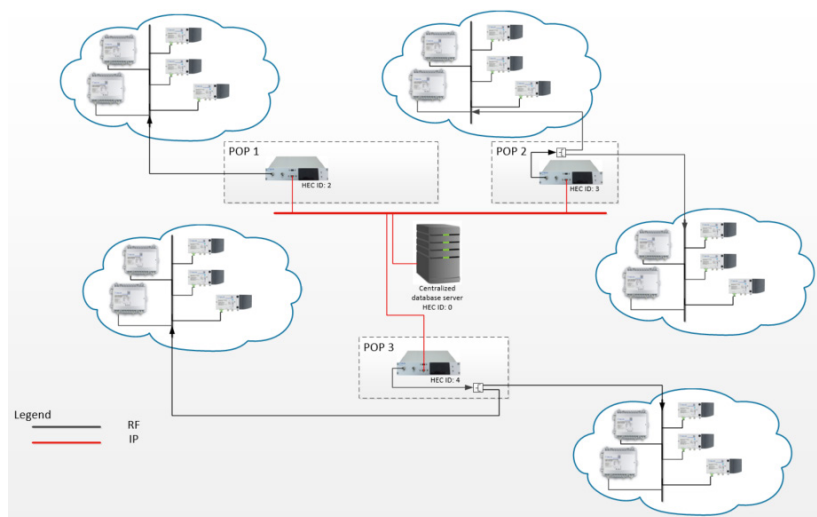
- II Smaller sized networks (for up to 500 FOSTRA-F modules/HEC): HEC in standalone mode
- II Database runs on HEC and HEC acts as RF single controller to attached FOSTRA-F modules



### Centralized Server approach

Recommended for

- II Medium / big sized networks: Centralized server for multiple HECs which hosts the database.
- II HEC acts as RF gateway only



## HEC3191 - HEAD END CONTROLLER FOR DELTANET FOSTRA-F



Cost-effective remote control system for HFC/RFoG nodes/amps

- FOSTRA-F protocol implementation based on EN 60728-14
- Compact FSK-transmitter as desktop unit, mounting kit for 1RU 19" installation included
- Variable transmit frequency ranges in 3 specific ranges from 860.5..879.5 MHz
- Web based GUI, running locally or centralized, Linux operated
- 1 RF output (selectable on front or rear panel) with RF test point (-20dB)
- Electronic level adjustment of output signal
- 100 Base-T RJ-45 connection, USB-port for serial connection
- Standard HEC includes basic test license for 32 FOSTRA-F modules (subscribers), expandable in steps off 500 additional FOSTRA-F modules
- Prepared for bidirectional communication with the FOSTRA-F module (requires FOSTRA-F V3.0)



### FOSTRA-F Microreceiver for Fibre Nodes and Amplifiers

- Remote control functions: DS ON/OFF, Burst Mode ON/OFF, Ingress Detection Switch 0/6/45 dB, Eco Mode on/off, OMI adjustment upstream/downstream path settings \*
- Easy integration into smartphone application DELTANET SCANAPP
- FSK-based, robust, no return path necessary
- FSK signal can be configured between two SC-QAM carrier  
-> no additional bandwidth consumption or other frequency block allocation.

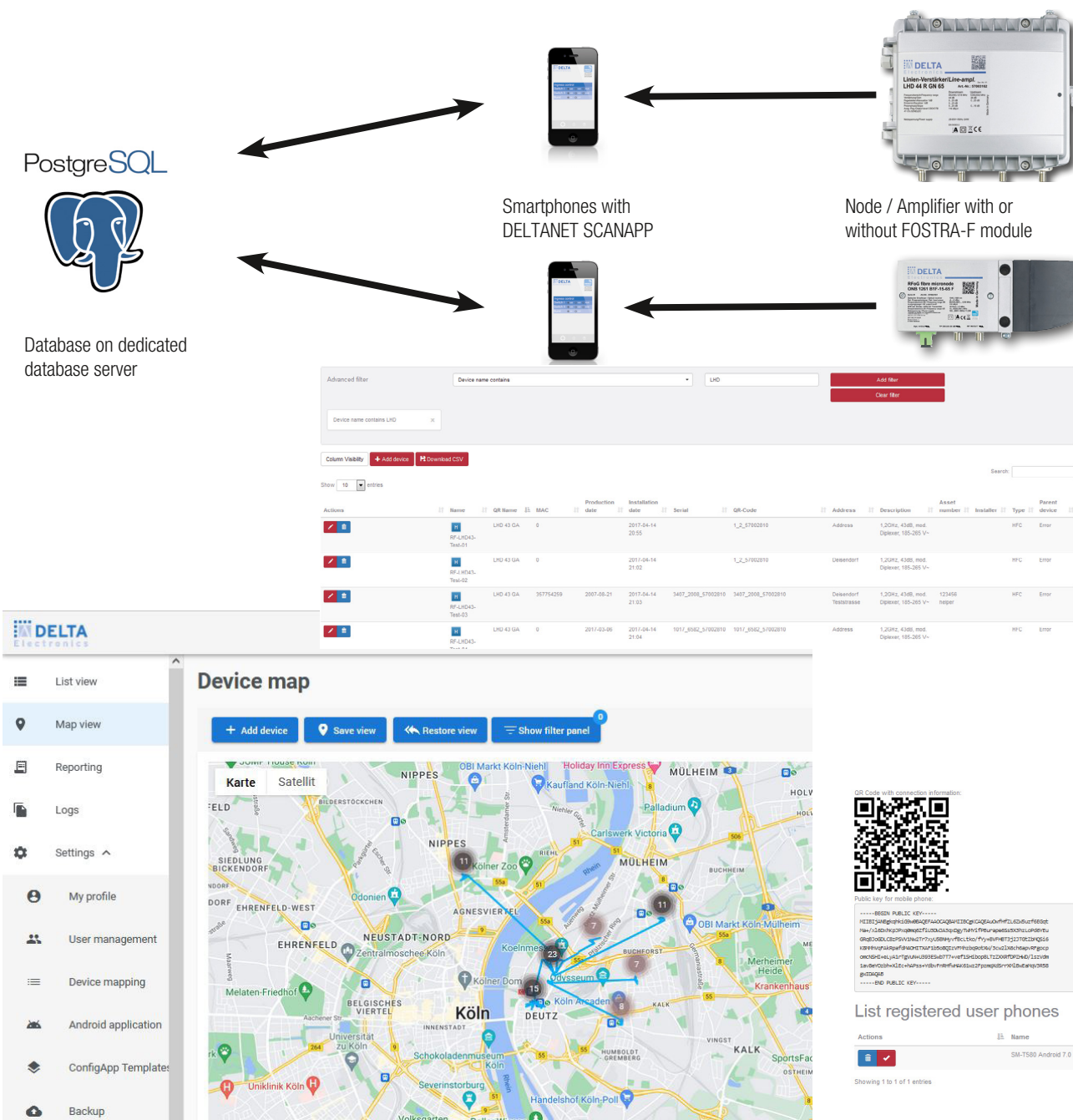
\* whole functionality depending on amp/node type



Type		HEC 3191	FOSTRA-F
Application		DELTANET	ONH, ONB, BKD, LHD, NVD types
Item No.		Item number see page 9 bottom	Item number see page 9 bottom
TX-frequency	MHz	860.5-879.5 MHz (other frequencies on request)	862 / 868.3 / 870 MHz, each with a $\pm 300$ kHz capture range (other frequencies on request)
Monitoring-Status LED		green (=Tx ON)	green: indicated current ICS settings, received command, locked / not locked to HEC
Bandwidth	kHz	120	120
Spurious	dB $\mu$ V	< 10	< 10
Distortion	dB	> 66	-
Dynamic-Input level	dB $\mu$ V	-	30...75
Transmitting level	dB $\mu$ V	1 x 69 ... 100 (set by software)	-
RF test point		1 x -20 dB	-
Data Speed	Bps	4800	4800
Local interface		100 Base-T RJ-45 and USB (as serial port)	RS-232 (only for debugging)
Power supply	V~W	200 - 240 AC / 5 DCV (1A) / < 5	6-24V / < 0.4W@24V / < 0.18W@12V
Dimensions	mm	220 x 140 x 1RU (chassis only) 19" x 140 x 1RU (with mounting frame)	25 x 24 x 8
Weight	kg	< 1.0	0.02
IP protection class		IP 20, Indoor	

## DELTANET SCANAPP

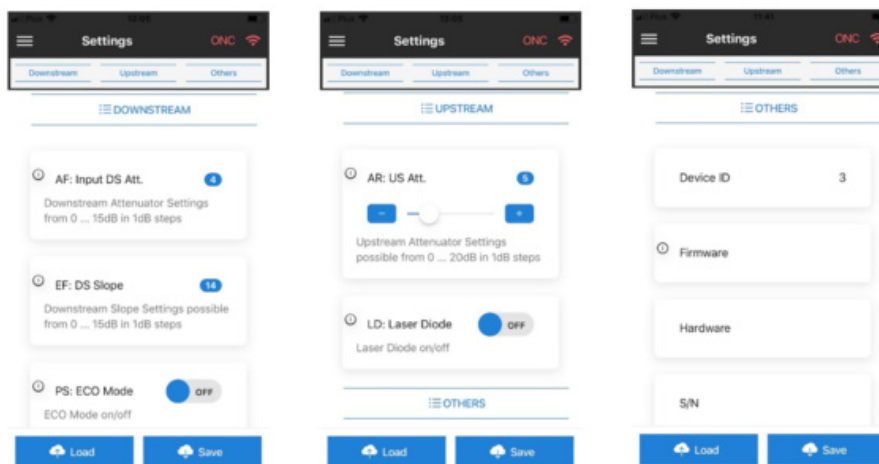
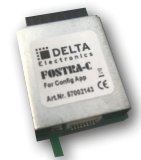
- DELTANET SCANAPP consists of a server-based application (e.g. access via web GUI) and an app, installed on the installer's smart device (supports Android and iOS.)
- Collection of relevant device data (e.g. device type, technical data, serial number, device configuration), positioning data, time of installation, installer's ID, photo(s) of installation.
- Integrated check routines, such as check for duplicated port or return path wavelengths entries, cross connection test to the assigned FOSTRA-F database.
- Automatic synchronization with the central database, resulting in real time updates of the virtual network topology.





## DELTANET CONFIG APP

- || CONFIGAPP enables device configuration export/import via installer's smart device.
- || Connection to the device via a Wi-Fi hotspot (FOSTRA-C module)
- || Access to all parameters that can be set via the push button menu, such as
  - || Downstream and upstream relevant parameters
  - || Device-specific settings, such as eco mode on/off, burst mode on/off
- || Display of hardware and firmware version of connected device



Application menu



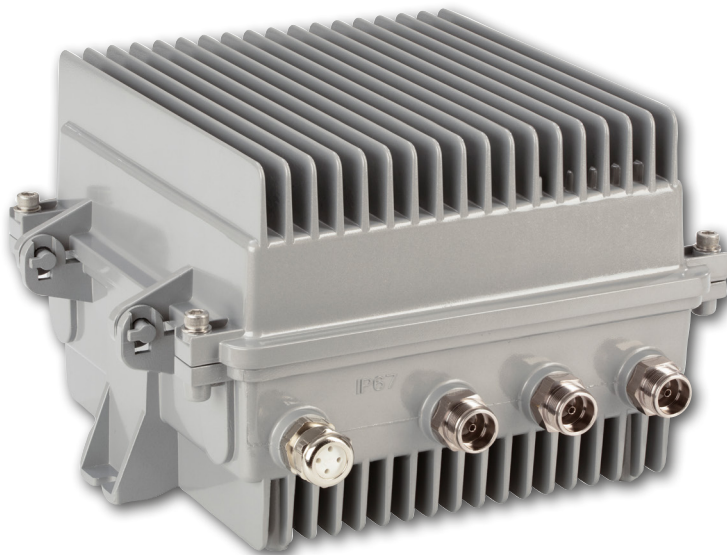
## DELTANET PRODUCT OVERVIEW

Type	Item No.	Description
HEC 3191	57004308	Head End Controller incl. basic 32 user license
DELTANET license extension +500	57005352	Upgrade license, to manage additional 500 FOSTRA-F modules
FOSTRA F V2.5 Tuneable HOR	57004320	For a horizontal mount FSK Receiver 861.7-862.3 MHz / 868.0-868.6 MHz / 869.7-870.3 MHz
FOSTRA F V2.5 Tuneable VER	57004321	For a vertical mount FSK Receiver 861.7-862.3 MHz / 868.0-868.6 MHz / 869.7-870.3 MHz
FOSTRA C * VER	57002143	WiFi Config Module for FOSTRA-F Connect
DELTA SCANAPP BASIS	57003559	SCANAPP Server Software incl. license for 500 subscribers
DELTA SCANAPP +500 LIC	57003560	SCANAPP license for additional 500 devices
DELTA SCANAPP +1000 LIC	57003590	SCANAPP license for additional 1000 devices
DELTA SCANAPP +5000 LIC	57003591	SCANAPP license for additional 5000 devices
DELTA SCANAPP ANDROID	57003561	SCANAPP Mobile App for Android download free in Google Play Store
DELTA SCANAPP IOS	57003562	SCANAPP Mobile App for IOS download free in Apple App Store
DELTA CONFIGAPP WINDOWS v1	57004701	DELTANET CONFIGAPP for Windows based systems v1
DELTA CONFIGAPP ANDROID v2	57004702	DELTANET CONFIGAPP for Android mobile devices v2
DELTA CONFIGAPP IOS v2	57004703	DELTANET CONFIGAPP for iOS mobile devices v2

\* FOSTRA C is a service interface for temporary installation and configuration settings and must be removed from the amplifier or optical node for error-free and standard-compliant operation before it is closed.

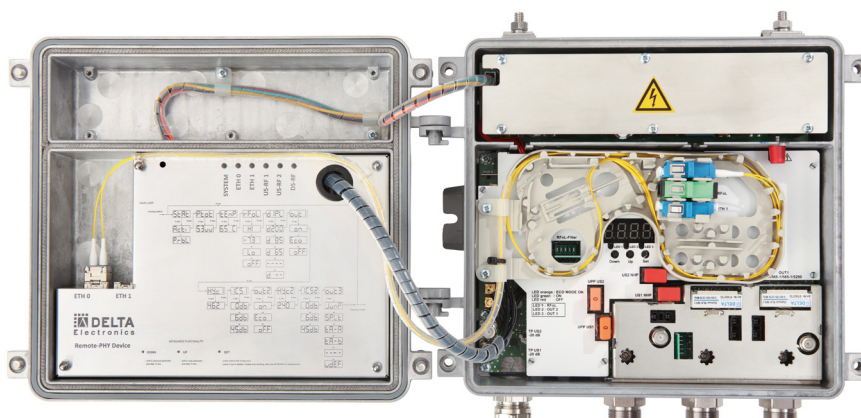
## REMOTE-PHY NODE

With integrated GaN launch amplifier and two active outputs



### Key Benefits

- Flexible FPGA approach – the only alternative to Broadcom ASIC (Xilinx RFSoc)
- CCAP vendor independent – tested by many interops and customer trials
- Optimized housing for size, power-feeding, temperature, 6kV, etc
- Supportable also for non-IT experts/installers on site (GUI/ConsoleApp)
- Integrated design (M&C) of launch amplifier and RPHY module (eg. ECO mode, ...)
- Flexible segmentation concept (RF and IP)
- Supports NDR / NDF functions for VIAVI, Kronback, ...
- Integrated FOSTRA-F functionality in RPD
- Power bridging for short electrical outages, no reboot time needed
- DVB-C MPEG monitoring (SI information, like PCR jitter, ...)







Typ	RPD A-R 244
Item No. Standard Remote-Phy Node is without SFP+ modules and four cable gland	57005332 (complete)
Basic standard carrier configurations but not fixed	DS 96/1 + US 16/0 or DS 64/2 + US 16/0 or DS 48/3+ US 8/1 (each 1:1 or 1:2 SG) (DS SC-QAM/OFDM + US ATDMA/OFDMA)
RF-Overlay	Optional electronically connectable (on/off) RFoG plug in module for extra-DS signal path with JXP pluggable bandpass filter slot
Final amplifier stage	2 x Power Doubler GaN <ul style="list-style-type: none"> <li>Switchable between full powered and configurable eco-mode</li> <li>Remote electrical adjustable current for exact leveling and eco-mode</li> <li>119 CH 256QAM typ. 111-112dBuV/BER before RS &lt; 1.0E-8 and MER &gt; 42dB, up to 116dBuV/BER after RS 1.0E-09 and MER &gt; 32dB with 9dB slope</li> </ul>
Digital-Pre-Distortion DPD	Already prepared for DPD with two independent feedback loops plus integrated ADC and current control of each single GaN amplifier
Frequency	Pluggable diplexer modules with auto-detection and remote read out for 65/85/204 MHz split and automatic peaking
Slope/Att./Peaking/ICS	Electronically adjustable level plates (local via keypad/remote via CLI or GUI) for DS and US
Test points	-20 dB (F-female, internal) unidirectional for DS/Out 1 & DS/Out 2 -20 dB (F-female, internal) unidirectional for US 1 & US 2
RF connectors	PG 11 for Out 1 & Out 2 Out 3 could be used as split or tap port to Out 2 (jumper inside for tap, split or remote power only)
Control	Initial access and control via serial port (µUSB). Remote control possible via CLI and GUI. Local access to RPD module will be blocked after getting connected to CCAP. 4x7 segment display for amplifier parameter and automatic menu (three button keypad)
Fiber connections	Fiber tray inside the node for the fiber connectivity Two 2-port LC-SC adapter for the digital signals One SC-APC adapter for the optional RF-Overlay DS signal
SFP+ slots	Two SFP+ slots for field replaceable SFP+ modules. Can be used for daisy chaining or redundancy design (L2)
Supported SFP+ modules	<ul style="list-style-type: none"> <li>Support of mono/dual fiber, fixed or tunable wavelength 10G modules</li> <li>No dedicated lock for specific modules – open support (however, no guarantee for all possible variants)</li> <li>Specific Example: 57005351 PTO-S1-4103S 10km/1310nm/dual fiber, special industrial grade type (-40°C...+95°C)</li> </ul>
Sensors	Internal temperature and housing open sensors with min/max value storage / power consumption sensor, remote readable
Power Consumption	Depending on enabled features and settings as well as used SFP+ modules - from 55..80W
Dimensions / Weight	263 x 213 x 163 mm / 5 kg (with optional cooling plate in 19" form factor 266 x 483 x 173 mm)

Subject to change without notice.



## OVERVIEW AMPLIFIERS 1 GHz

### House amplifiers

Type	BKE-(B)PS	BKD 40 PS	BKE-P	LHE-P
				
Description	BK	BK	BK	BK
Output level CENELEC*1	98-101	111/113	98-106	111/113
Output level digital*2	95-97	105	99-102	106
Return path 65 MHz	active, on board	active, on board	active, on board	active, on board
Adjustments	variable level attn.	variable level attn.	PAD-JXP	PAD-JXP
RF-connections	F-connector	F-connector	F-connector	F-connector
Local / remote feeding	■ / -	■ / -	■ / -	■ / -

**BKE-Series: PS:** adjustments with variable level attenuators: no accessories needed for operation;  
**P:** adjustments with PADs: JXP PADs needed for operation, values readable

### Line extender- and Distribution amplifier

Type	LHE-RP	LHD
		
Description	Line extender and distribution amplifier	Line extender and distribution amplifier
Output level CENELEC*1	112 / 114	111 / 113
Output level digital*2	106	105
Number of outputs	1 / 2	1 / 2
Adjustments	PAD-JXP	electronical
Return path	active, on board	active, modular
RF-connections	3.5/12 adapter	PG11 adapter or 5/8" Reduce
Local / remote feeding	- / ■	■ / ■

**Line extender- and Distribution amplifier LHD:**  
 FOSTRA-F compliant; IDS – Ingress detection switch  
 Remote power 10A depending on model; protection class IP 67

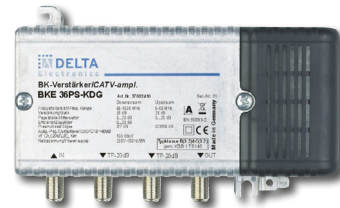
\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat



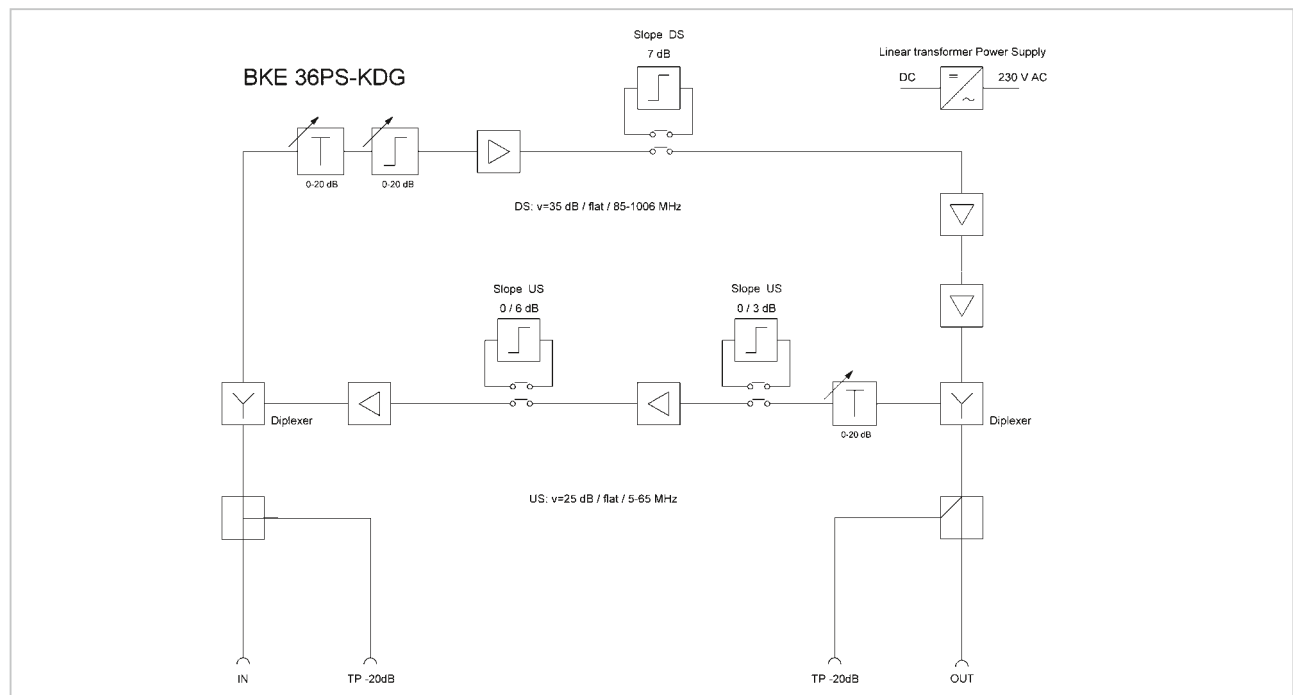
## HOUSE AMPLIFIER PROFI-LINE BKE-PS

- BKE-PS amplifier: return path on board
- Precise and reliable adjustments by variable level attn. (PS) for level and slope control
- Low noise
- LED indicator for operation status
- Vodafone certified



### Types: BKE-PS

Type	BKE 22 PS-KDG	BKE 33 PS-KDG	BKE 36 PS-KDG	BKE 39 PS-KDG
Item No.	57002408 (PU:10) 57002595 (PU:1)	57002409 (PU:10) 57002596 (PU:1)	57002410 (PU:10) 57002597 (PU:1)	57002411 (PU:10) 57002598 (PU:1)
Description	Amplifier with level attn.	Amplifier with level attn.	Amplifier with level attn.	Amplifier with level attn.
Frequency range US / DS	MHz 5-65 / 85-1006	MHz 5-65 / 85-1006	MHz 5-65 / 85-1006	MHz 5-65 / 85-1006
Gain US / DS	dB 18 / 20	dB 25 / 33	dB 25 / 35	dB 29 / 39
Adjustment level / slope DS	dB 0 ... 20	dB 0 ... 20	dB 0 ... 20	dB 0 ... 20
Interstage slope DS (Jumper)	0 / 7	0 / 7	0 / 7	0 / 7
Noise US/DS	dB 5 / 6	dB 5 / 6	dB 5 / 6	dB 5 / 6
Output level CENELEC*1	dBμV 100	dBμV 98	dBμV 100	dBμV 101
Output level digital*2	dBμV 96	dBμV 95	dBμV 96	dBμV 97
Return path (KDG 1TS140)	dB medium load	dB medium load	dB medium load	dB medium load
Level adjustment US	dB 0 ... 20	dB 0 ... 20	dB 0 ... 20	dB 0 ... 20
Slope return path	-	-	0 / 3 / 6 / 9	0 / 3 / 6 / 9
Test point	-	-	Input+Output	Input+Output
Power supply	V~ / W 200 - 240 / 7.5	V~ / W 200 - 240 / 8	V~ / W 200 - 240 / 8	V~ / W 200 - 240 / 6
Dimensions / Weight	mm / kg 153 x 95 x 53 / 0.8	mm / kg 153 x 95 x 53 / 0.8	mm / kg 153 x 95 x 53 / 0.8	mm / kg 153 x 95 x 53 / 0.8
VF-KDG class	B (1.2)	B (3.1)	B (3.2) + C (3.2)	C (4.2)

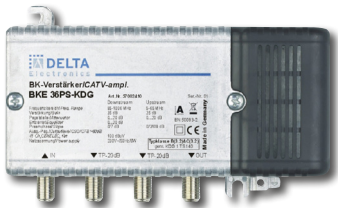


\*1 CENELEC : CTB, CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat

HOUSE AMPLIFIER PROFI-LINE BKE 36 BPS

- BKE-PS amplifier: return path on board
- Precise and reliable adjustments by variable level attn. (PS) for level and slope control
- Low noise
- LED indicator for operation status
- Vodafone certified



BKE 36 BPS for class B (3.2) optimized

Type		BKE 36 BPS
Item No.		57004307 (VPE: 10)
Description		Amplifier with level attn.
Frequency range US / DS	MHz	5-65 / 85-1.006
Gain US / DS	dB	25 / 32 -35
Adjustment level / slope DS	dB	0 ... 20
Interstage slope DS (Jumper)		3
Noise US/DS	dB	5 / 6
Output level CENELEC*1	dBμV	101
Output level digital*2	dBμV	96
Return path (KDG 1TS140)	dB	medium load
Level adjustment US	dB	0 ... 20
Slope return path	dB	-
Test point		-
Power supply	V~/W	200 - 240 / 7.5
Dimensions / Weight	mm / kg	153 x 95 x 53 / 0.8
VF-KDG class		B (3.2)

\*1 CENELEC : CTB,CSO > 60 dB, flat with 3 dB slope

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat

## HOUSE AMPLIFIER PROFI-LINE BKD-PS

- BKD-PS amplifier: return path on board
- Precise and reliable adjustments by variable level attn. (PS) for level and slope control
- Low noise
- LED indicator for operation status
- Vodafone certified

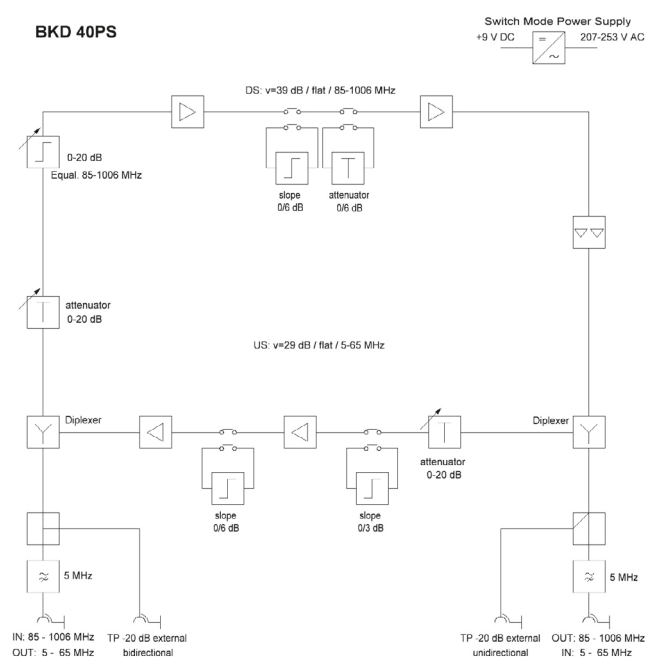


### BKD-PS

Type	BKD 40 PS	
Item No.	57004318	
Description	Amplifier with level attn.	
Frequency range US / DS	MHz	5-65 / 85-1006
Gain US / DS	dB	29 / 40
Adjustment level / slope DS	dB	0 ... 20
Interstage slope DS (Jumper)		0 / 6
Noise US/DS	dB	5 / 5
Output level CENELEC*1	dBμV	107
Output level digital*2	dBμV	105
Return path (KDG 1TS140)	dB	medium load
Level adjustment US	dB	0 ... 20
Slope return path	dB	0 / 3 / 6 / 9
Test point	Input+Output	
Power supply	V~/W	200 - 240 / 8
Dimensions / Weight	mm / kg	188 x 85 x 50 / 0.7
VF-KDG class	C (4.3)	

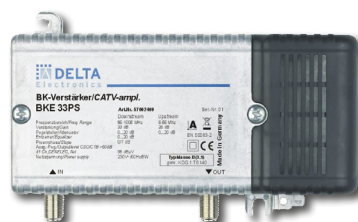
\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat



## HOUSE AMPLIFIER PROFI-LINE BKE-P

- Return path on board
- Frequency range up to 1006 MHz / BKE 220-2 up to 1218 MHz
- Extreme low distortion and noise on return path
- JXP PAD's for level and slope adjustment
- Die-cast housing IP 20 for low operating temperature, long lifetime and reliability
- Very compact shape
- LED indicator for operation status
- F-connectors
- Vodafone certified



PAD

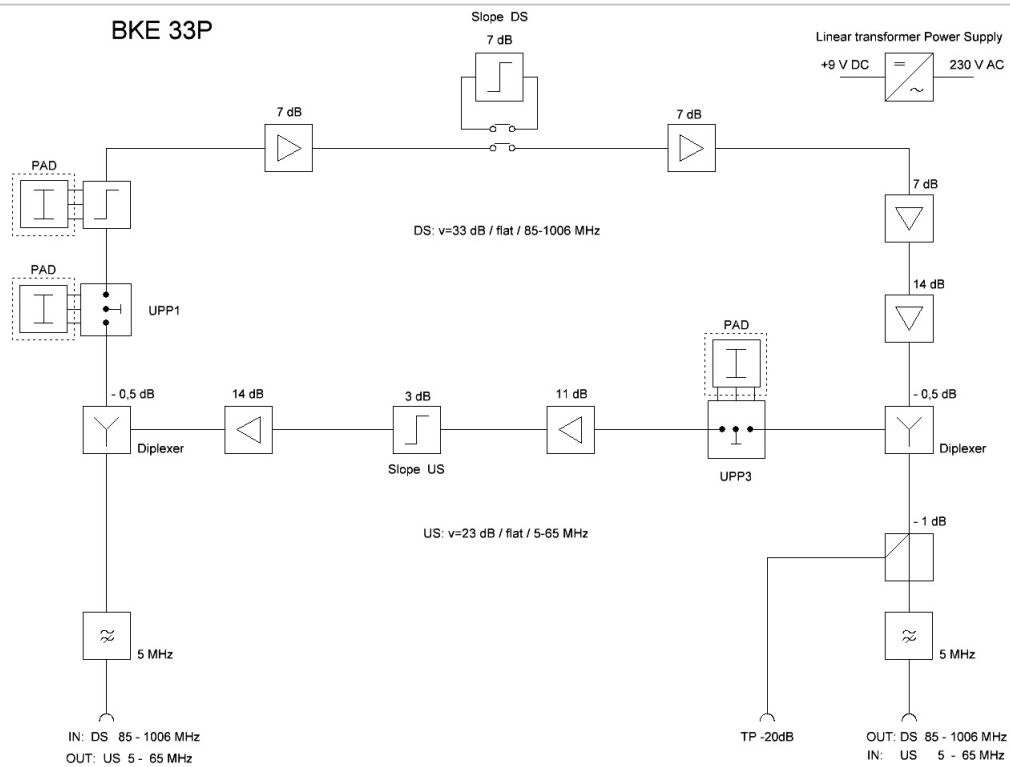
Type			BKE 33 P	BKE 36 P	BKE 39 P	BKE 41 P
Item No.			57001931 PU: 1 57002303 PU: 10	57001932 PU: 1 57002304 PU: 10	57001933 PU: 1 57002305 PU: 10	57001934 PU: 1 57002306 PU: 10
Downstream	Frequency range	MHz	85 - 1006	85 - 1006	85 - 1006	85 - 1006
	Gain	dB	33 ± 1	35 ± 1	39 ± 1	41 ± 1
	Noise	dB	5	5	5	5
	Linearity	dB	± 0.5	± 0.5	± 0.5	± 0.7
	Attenuation (PAD's)	dB	0,1,2... 20	0,1,2... 20	0,1,2... 20	0,1,2... 20
	Attenuation Interstage switchable	dB	–	–	0/6	0/6
	Slope	dB	0,1,2... 20	0,1,2... 20	0,1,2... 20	0,1,2... 20
	Interstage slope switchable	dB	0 / 7	0 / 7	0 / 7	0 / 7
	Outputlevel max.					
	Output level CENELEC*1	dBµV	98	102	103	106
Output level digital*2	dBµV	99	101	105	108	
Upstream	Frequency range	MHz	5 - 65	5 - 65	5 - 65	5 - 65
	Gain with fix 3dB slope	dB	23 ± 1	25 ± 1	29 ± 1	32 ± 1
	Noise	dB	5	5	5	5
	Attenuation (PAD's)	dB	0,1,2... 20	0,1,2... 20	0,1,2... 20	0,1,2... 20
	64 QAM, 3 carriers,120 dBµV		< 1*10 <sup>-8</sup>	< 1*10 <sup>-8</sup>	< 1*10 <sup>-8</sup>	< 1*10 <sup>-8</sup>
	64 QAM, 7 carriers,115dBµV					
Power supply	V~	200 - 240	200 - 240	200 - 240	200 - 240	
Power consumption	W	8.0	8.0	5.0	7.0	
Test point F	-20 dB	Output	Output	Input + Output	Input + Output	
Immunity to surge voltages	kV	2.0	2.0	2.0	2.0	
Connector		F-connector	F-connector	F-connector	F-connector	
Dimensions / Weight	mm / kg	153 x 95 x 53 / 0.8	153 x 95 x 53 / 0.8	153 x 95 x 53 / 0.8	153 x 95 x 53 / 0.8	

\*1 CENELEC : CTB, CSO > 60 dB, flat

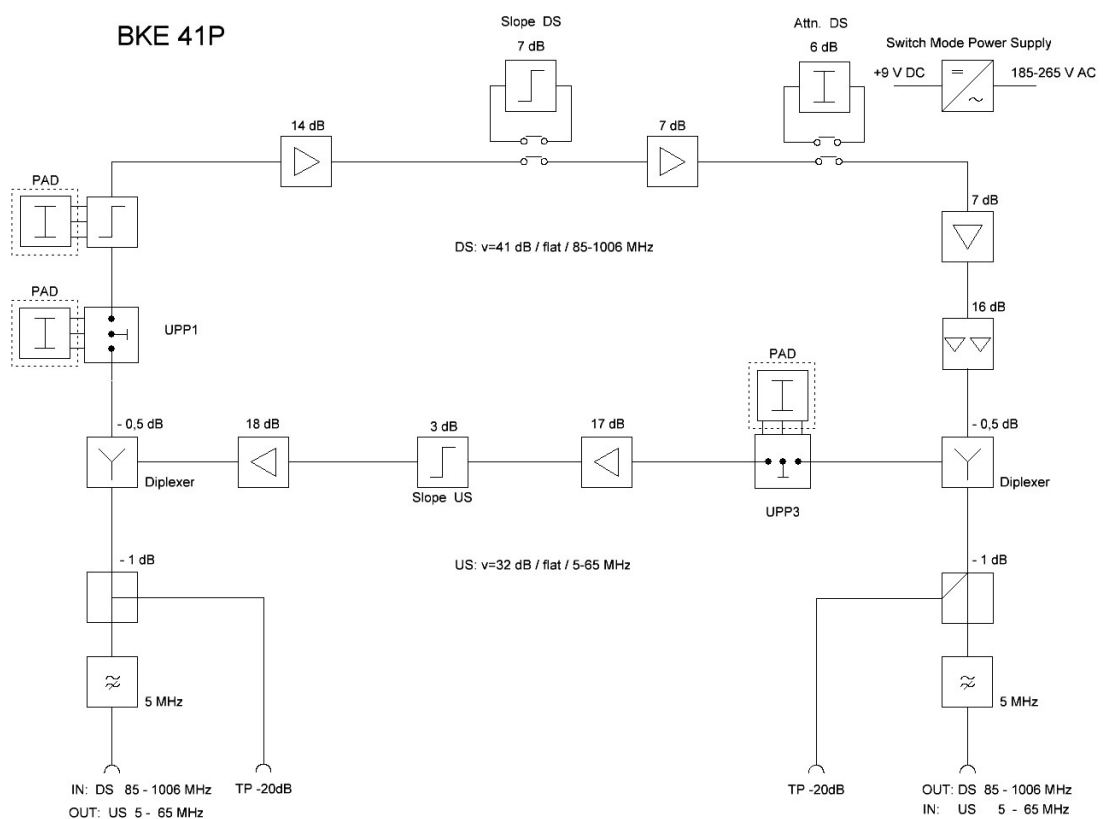
\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat



# BKE 33P



# BKE 41P



## HOUSE AMPLIFIER PROFI-LINE LHE 1032 P / 1040 P

- 1 GHz bandwidth
- MultiGainTech 40/32 dB
- JXP PADS for level and slope adjustment
- Reliable adjustment of all values over lifetime
- Cable simulator on input
- Extreme low distortion and noise on return path
- Input / Output horizontal or vertical assembly
- Excellent linearity up to 1 GHz
- Alu die-cast housing IP 54
- Vodafone certified



Type		LHE 1032 P	LHE 1040 P
Item No.		57003568	57003569
Downstream	Frequency range	MHz 85-1006 (Duplexer on board)	
	Gain	32	32/40, switchable
	Linearity	dB $\pm 0.5$	
	Cable simulation	dB *3	
	Attenuation	dB 0,1,2,3...20, pluggable JXP PADS	
	Slope	dB 0,1,2,3...20, pluggable JXP-PADS	
	Interstage-slope	dB 0 / 7 / 10	
	Interstage attenuation	dB 0,1,2,3...10 with PADS	
	Return loss Input / Output	dB 18 -1.5 dB, Octave, Reference 47 MHz	
	Noise	dB $\leq 5$	
	Output level CENELEC*1	dB $\mu$ V 111 / 113	
	Output level digital*2	dB $\mu$ V $\geq 106$	
Upstream	Frequency range	MHz 5-65	
	Gain	dB 22/32, switchable	
	Linearity	dB $\pm 0.5$	
	Attenuation input	dB 0,1,2,3...20, pluggable JXP-PADS	
	Slope	dB 0,1,2,3...20, pluggable JXP-PADS	
	Attenuation output	dB 0,1,2,3...20, pluggable JXP-PADS	
	Return loss Input / Output	dB 18, 5-65 MHz	
	Noise	dB $\leq 5$	
Max. Output level for BER 10 <sup>-9</sup> 7 Ch 64 QAM, 7 carrier, 5.12 MSymb/s		dB $\mu$ V $\geq 115$	
Power supply		V~ 200 - 240	
Power consumption		W 11.7 max. incl. active return path   13 max. incl. active return path	
Connector		F-connector included	
Dimensions / weight		mm / kg 207 x 150 x 80 / 1.6	

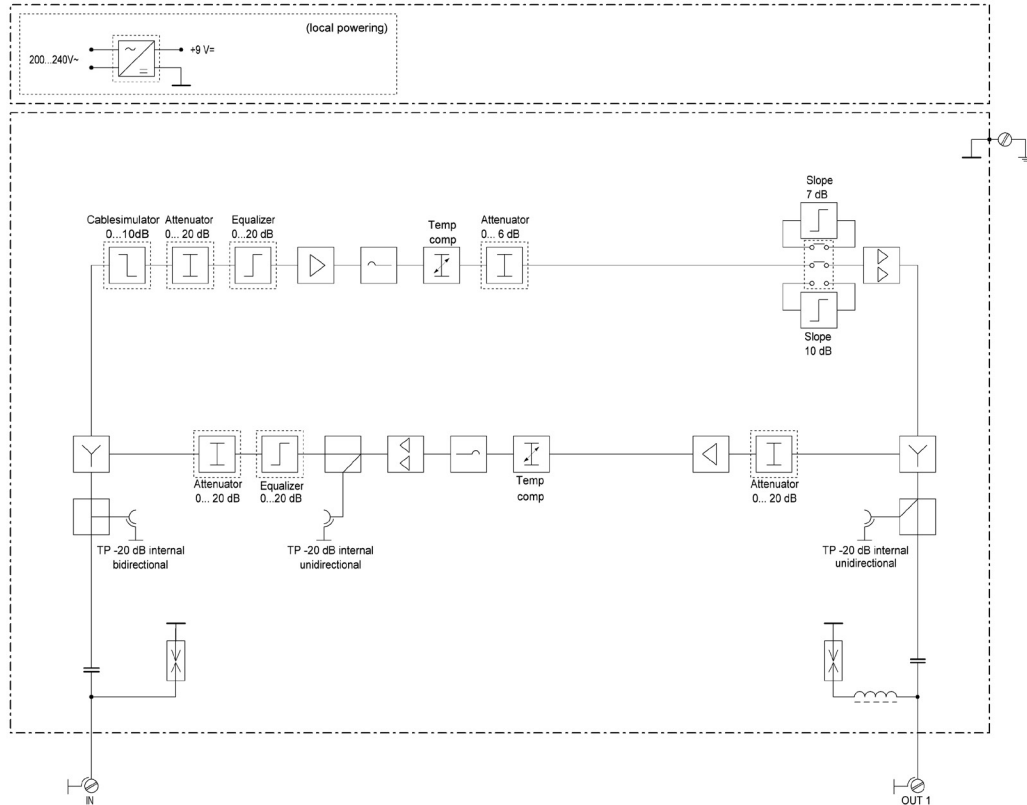
\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat

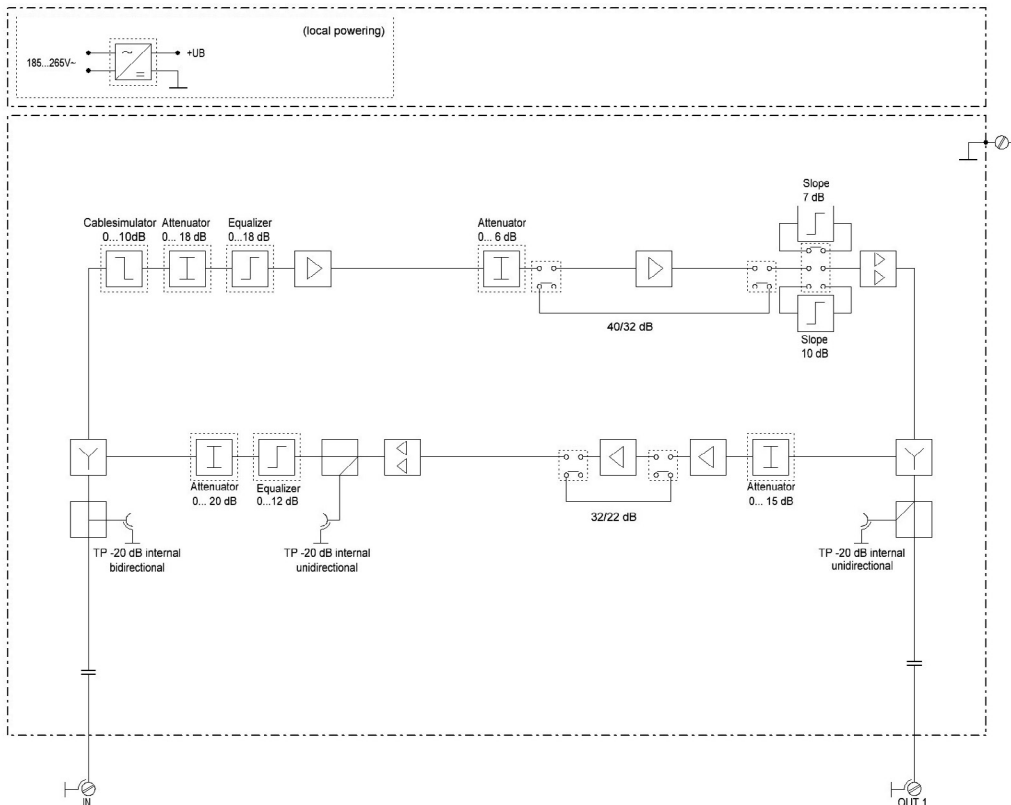
\*3 Cable Simulation Pads on page 43 and 47

# HOUSE AMPLIFIER LHE 1032 P / 1040 P

LHE 1032 P



LHE 1040 P



## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHE 1040 RP

- 1 GHz bandwidth
- MultiGainTech 40/32 dB
- JXP PADS for level and slope adjustment
- Reliable adjustment of all values over lifetime
- Cable simulator on input
- Extreme low distortion and noise on return path
- Input / Output horizontal or vertical assembly
- Excellent linearity up to 1 GHz
- Alu die-cast housing IP 65, strand mount possible
- Vodafone certified



Type		LHE 1040 RP-65	LHE 1040 RP-85	LHE 1040 RP-20
Item No.		57003912	57004203	on request
Downstream	Frequency range (diplexer on board)	MHz	85-1006	105-1006
	Gain	dB	40	
	Linearity	dB	± 0.5	
	Cable simulation	dB	*3	
	Attenuation	dB	0,1,2,3...20, pluggable JXP PADS	
	Slope	dB	0,1,2,3...20, pluggable JXP-PADS	
	Interstage-slope	dB	0 / 7 / 10	
	Interstage attenuation	dB	0,1,2,3...10 with PADS	
	Return loss Input / Output	dB	18 -1.5 dB, Octave, Reference 47 MHz	
	Noise	dB	≤ 5	
	Output level CENELEC*1	dBμV	112 / 114	
	Output level digital*2	dBμV	≥ 106	
Upstream	Frequency range	MHz	5-65	5-85
	Gain	dB	22/32, switchable	
	Linearity	dB	± 0.5	
	Attenuation input	dB	0,1,2,3...20, pluggable JXP-PADS	
	Slope	dB	0,1,2,3...20, pluggable JXP-PADS	
	Attenuation output	dB	0,1,2,3...20, pluggable JXP-PADS	
	Return loss Input/Output	dB	18, 5-65 MHz	
	Noise	dB	≤ 5	
	Max. Output level for BER 10 <sup>-9</sup>			
7 Ch 64 QAM, 7 carrier, 5.12 MSymb/s		dBμV	≥ 115	
Power supply		V~	28 - 65	
Power consumption		W	13 max. incl. active return path	
Connector			3.5/12 adapters (other adapters on request)	
Dimensions / weight		mm / kg	225 x 195 x 95 / 1.8	

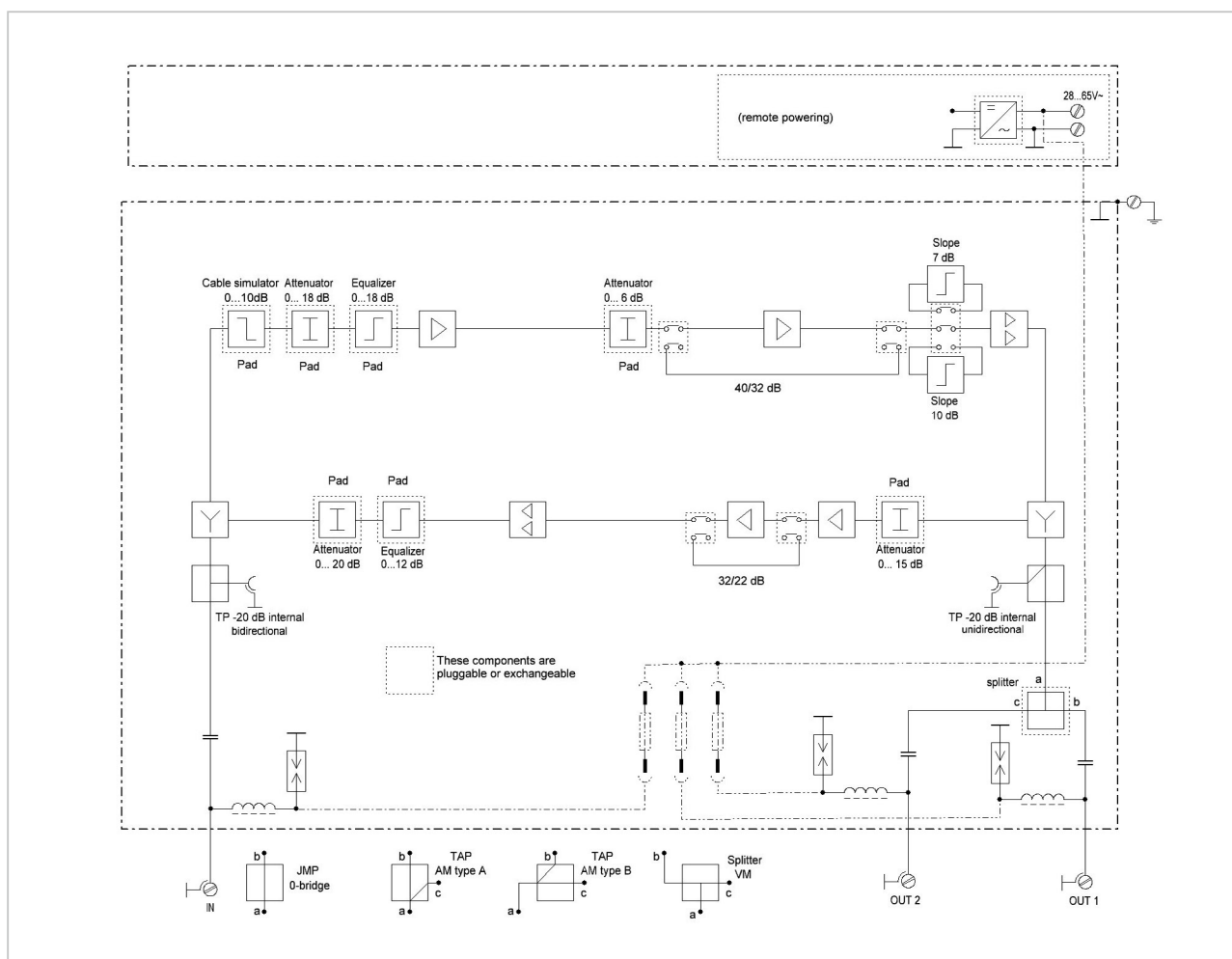
\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 112 CH, 114-1006 MHz, flat

\*3 Cable simulation pads on page 43 and 47



## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHE 1040 RP



## OVERVIEW AMPLIFIER PLUG-IN MODULES 1.0 GHz

■ In the table hereafter the plug-ins for the following products are listed:


■ Amplifier: LHE, LHD



Type	Item No.	Description	LHE 1040 RP
VM 302	57002092	2-way splitter	■
AM 301-08 A	57003889	Tap 8 dB Line out	■
AM 301-08 B	57003760	Tap 8 dB Tap out	■
AM 301-10 A	57002093	Tap 10 dB Line out	■
AM 301-10 B	57002117	Tap 10 dB Tap out	■
AM 301-14 A	57003890	Tap 14 dB Line out	■
AM 301-14 B	57003763	Tap 14 dB Tap out	■

## OVERVIEW AMPLIFIERS 1.2 GHz

**1.2G**

### House amplifier/Line- and Distribution amplifier

Type	BKD-G	
Description		
	BK	
Output level CENELEC* <sup>1</sup>	dBμV	107-112
Output level digital* <sup>2</sup>	dBμV	100.5-104
Downstream	MHz	up to 1218
Return path	active, modular 204 MHz	
Adjustments	Step-Spin	
RF-connections	F-connector	
Local / Remote power	■ / –	

Type	LHD GA/GN	NVD GA/GN
Description		
	Line- and Distribution-amplifier	Networkmanagement-compl. distribution amplifier
Output level CENELEC* <sup>1</sup>	dBμV	114 / 116
Output level digital* <sup>2</sup>	dBμV	107 / 110 <sup>3</sup>
Downstream	MHz	up to 1218
Return path	active, modular 204 MHz	active, modular 204 MHz
Adjustments	electronical	electronical
RF-connections	PG11 (adapters excluded)	PG11 (adapters excluded)
Local / Remote power	■ / ■	■ * <sup>3</sup> / ■

\*<sup>1</sup> CENELEC : CTB, CSO > 60 dB, flat

\*<sup>2</sup> Digital: EN 60728-3, 119 CH, 262-1214MHz, flat

\*<sup>3</sup> Local Power on request

**BKD - G:** 1.2 GHz house amplifier, modular return path up to 204 MHz, FOSTR-F compliant, IDS Ingress Detection Switch, Step-Spin

**LHD/NVD:** 1.2 GHz Line- and Distribution amplifier, modular return path up to 204 MHz, FOSTR-F compliant, electronical adjustments

## HOUSE AMPLIFIER PROFI-LINE BKD-G

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- FOSTRA-F** network monitoring prepared
- Unique Step Spin technology - allows readable values and fast adjustment
- No accessories necessary for operation
- DOCSIS 3.1 compliant
- With **FOSTRA-F**: IDS 0 / 6 / 45 dB on return switchable

### BKD xx G:

- Push-Pull amplifier with high output level
- Switchable De-emphasis
- 85 Mhz return path on resquest available



STEP SPIN  
TECHNOLOGIE

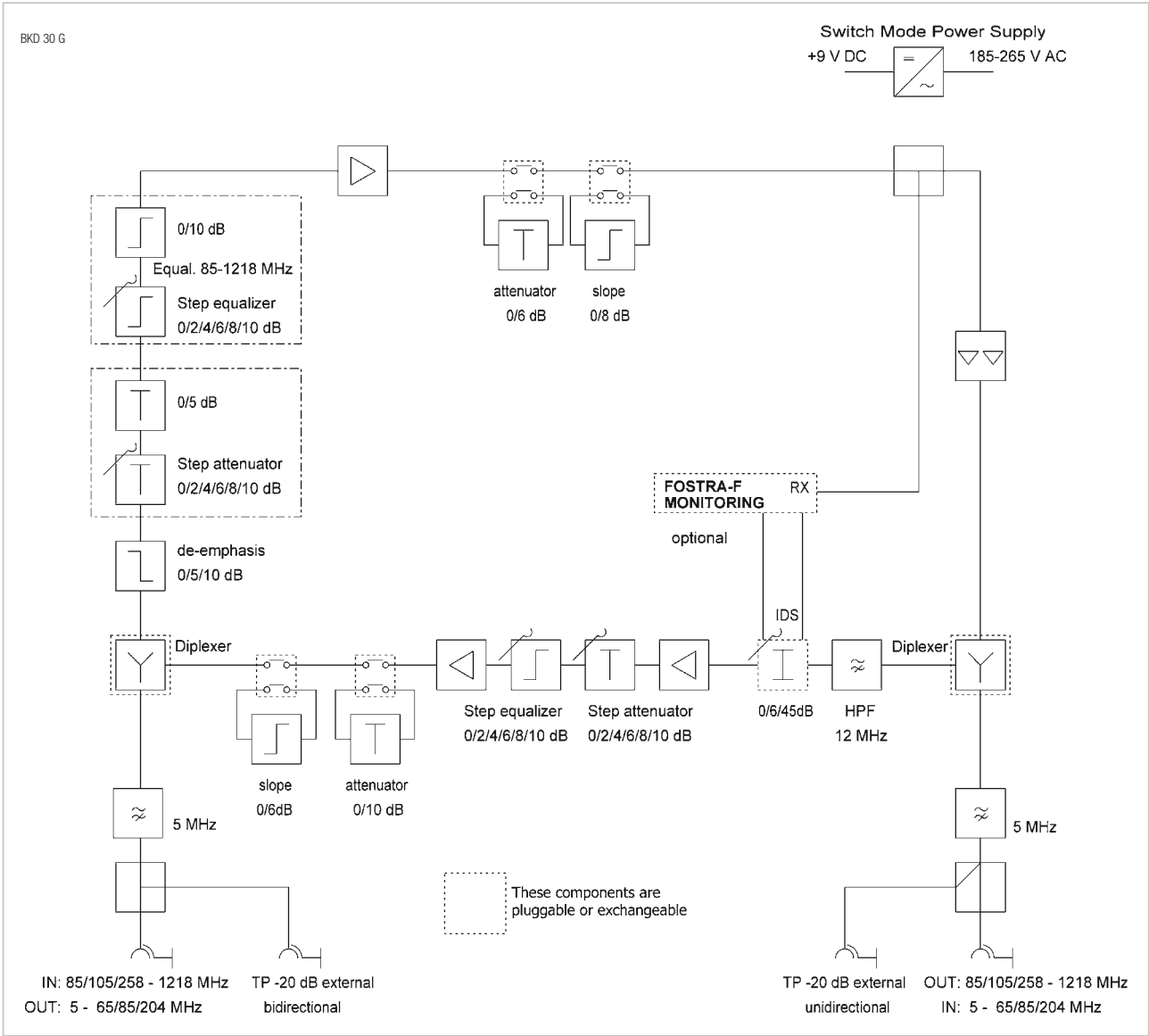


Type		BKD 22 G-65/85/20	BKD 30 G-65/85/20	BKD 38 G-65/85/20
Item No.		57004609 / 57004610 57004608	57004612 / 57004614 57004611	57004616 / 57004617 57004615
Downstream	Frequency range DS MHz	40 - 1218*		
	Slot for return path diplexer	2		
	Gain dB	22 ± 1	24 / 30 ± 1	32/38 ± 1
	Linearity dB	± 0.7		± 0.8
	Noise (typ.) dB	6.5		
	De-emphasis input dB	0 / 5 / 10		
	Slope Step Spin	step attenuator 0...10 dB + 10dB; 2 dB steps		
	Attenuation Step Spin	step attenuator 0...10 dB + 5dB; 2 dB steps		
	Interstage slope	0 / 6 dB switchable		
	Interstage attenuation	0 / 6 dB switchable		
Upstream	Output level max. <sup>1</sup>			
	Output level CENELEC* <sup>1</sup> dBμV	107	112	111
	Output level digital* <sup>2</sup> dBμV	100	104	103
	Frequency range US MHz	12-65 / 12-85 / 12-204	12-65 / 12-85 / 12-204	12-65 / 12-85 / 12-204
	Gain dB	21	25	28
	Linearity dB	± 0.5		
	Interstage slope dB	step attenuator 0...10 dB ; 2 dB steps		
	Interstage attenuation dB	step attenuator 0...10 dB ; 2 dB steps		
	Slope output dB	0 / 6		
	Attenuation output dB	0 / 10		
	Ingress detection switch dB	0 / 6 / 45		
	BER @ 107 dBμV, 24 carrier QAM 256	< 1.0E-09		
	Power supply V~	200 - 240		
	Power consumption W	10.5	11	12
	Test point F -20 dB	Input + Output		
	Immunity to surge voltages kV	2.0		
	Connector	F-connector		
	Dimensions / Weight mm / kg	195 x 120 x 65 / 0.95		

\*1 CENELEC : CTB,CSO > 60 dB,flat

\*2 Digital: EN 60728-3,119 CH, 262-1214MHz, flat

HOUSE AMPLIFIER PROFI-LINE BKD-G





# LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GA CLASSIC-LINE

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- Gallium Arsenide technology (GaAs)**
- Prepared for network monitoring
- Interruption-free electronic adjustment, basic settings without additional accessories
- 7-Segment display, simply to adjust by keypad
- DOCSIS 3.1 compliant
- AGC/ALSC module available
- With **FOSTRA-F**: IDS 0 / 6 / 45 dB switchable at the return (option)
- 2 -Outputs, IN / OUT connectors in vertical or horizontal position
- 10 A Remote current feed through, Immunity to surge voltages 6kV
- Compact alu die-cast housing acc. IP 67
- Return path can be switched off



FOSTRA-F FSK-RX



Type			LHD 43 GA	LHD 43 R GA
Item No.			57002810 - LHD 43 GA (local power) 57002963 - LHD 43-1 GA (Line-OUT)	57002811 - LHD 43 R GA (remote power) 57002964 - LHD 43-1 R GA (rem., Line-OUT)
Final stage			1 x Power Doubler GaAs-FET	
Downstream	Frequency range	MHz	40 - 1218 (return path ampl. 204 MHz on board, diplexer modular)	
	Gain	dB	43	
	Linearity	dB	± 0.5	
	Slope	dB	0 ... 25, 1 dB step adjustment, electrical	
	0-point loss	dB	± 0.5 at 1218 MHz, switchable to 1006 MHz	
	Interstage slope	dB	0...15, electrical adjustment	
	Attenuation	dB	0 ... 20, 1 dB step adjustment, electrical	
	Interstage attn., slot UPP1	dB	for JXP-PAD's	
	Cablesimulation	dB	for JXP-PAD's	
	Testpoint input	dB	-20 ± 1.5 dB, F-connector, internal	
	Testpoint output	dB	-20 ± 0.75 dB, F-connector, internal	
	Return loss In / Out	dB	20dB @ 40MHz -1.5 dB/Octave	
	Noise	dB	typ. 7 dB	
	Output level CENELEC*1	dBμV	114	
	Output level digital*2	dBμV	107	
Upstream	Frequency range	MHz	5-65/85/204 (configuration with modular diplexer)	
	Gain	dB	28	
	Linearity	dB	± 0.5	
	Slope (Output)	dB	0 ... 16, 1 dB step adjustment, electrical	
	Attenuator (Output)	dB	0 ... 30, 1 dB step adjustment, electrical	
	Input slot UPP2	dB	for additional low pass filter LPF x-xx or JXP-PAD's	
	Ingress Detection Switch	dB	0 / 6 / 45, switchable with FOSTRA	
	Slope frequency point	dB	85 / 204 switchable by Jumper	
	Noise	dB	6.5	
	BER @ 107 dBμV with 24 carrier QAM 256		< 1.0E-09	
Power supply		V~	200 - 240 V local power	28 - 65 V remote power - 10 A feed through
Power consumption		W	17.0 with active return path	
Connector			PG 11	
Dimensions / Weight		mm / kg	225 x 195 x 95 / 1.8	

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3,119 CH, 262-1214MHz, flat

## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GA ECO CLASSIC-LINE

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- Gallium Arsenide technology (GaAs)**
- Prepared for network monitoring
- Interruption-free electronic adjustment, basic settings without additional accessories
- 7-Segment display, simply to adjust by keypad
- DOCSIS 3.1 compliant
- AGC/ALSC module available
- With **FOSTRA-F**: IDS 0 / 6 / 45 dB switchable at the return (option)
- 2 -Outputs, IN/OUT connectors in vertical or horizontal position
- 10 A Remote current feed through, immunity to surge voltages 6kV
- Compact alu die-cast housing acc. IP 67
- Return path can be switched off
- ECO-version with 30 % reduction of power consumption**



FOSTRA-F FSK-RX



Type			LHD 43 GA ECO	LHD 43 R GA ECO
Item No.			57004367 - LHD 43 GA ECO(ortsgespeist) 57004420 - LHD 43-1 GA ECO (Line-Out)	5700xxxx: - LHD 43 R GA ECO (remote power) 5700xxxx: - LHD 43-1 R GA ECO (rem. Line-Out)
Final stage			1 x Power Doubler GaAs-FET	
Downstream	Frequency range	MHz	40 - 1218 (return path ampl. 204 MHz on board, diplexer modular)	
	Gain	dB	43	
	Linearity	dB	± 0.5	
	Slope	dB	0 ... 25, 1 dB step adjustment, electrical	
	0-point loss	dB	± 0.5 at 1218 MHz, switchable to 1006 MHz	
	Interstage slope	dB	0...15, electrical adjustment	
	Attenuation	dB	0 ... 20, 1 dB step adjustment, electrical	
	Interstage attn., slot UPP1	dB	for JXP-PAD's	
	Cablesimulation	dB	for JXP-PAD's	
	Testpoint input	dB	-20 ± 1.5 dB, F-connector, internal	
	Testpoint output	dB	-20 ± 0.75 dB, F-connector, internal	
	Return loss In / Out	dB	20dB @ 40MHz -1.5 dB/Octave	
	Noise	dB	typ. 7 dB	
	Output level CENELEC*1	dBμV	111 / 113	
	Output level digital*2	dBμV	104	
Upstream	Frequency range	MHz	5-65/85/204 (configuration with modular diplexer)	
	Gain	dB	28	
	Linearity	dB	± 0.5	
	Slope (Output)	dB	0 ... 16, 1 dB step adjustment, electrical	
	Attenuator (Output)	dB	0 ... 30, 1 dB step adjustment, electrical	
	Input slot UPP2	dB	for additional low pass filter LPF x-xx or JXP-PAD's	
	Ingress Detection Switch	dB	0 / 6 / 45, switchable with FOSTRA	
	Slope frequency point	dB	85 / 204 switchable by Jumper	
	Noise	dB	6.5	
	BER @ 107 dBμV with 24 carrier QAM 256		< 1.0E-09	
Power supply			200 - 240 V local power	28 - 65 V remote power - 10 A feed through
Power consumption			12.0 with active return path	
Connector			PG 11	
Dimensions / Weight			225 x 195 x 95 / 1.8	

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3,119 CH, 262-1214MHz, flat

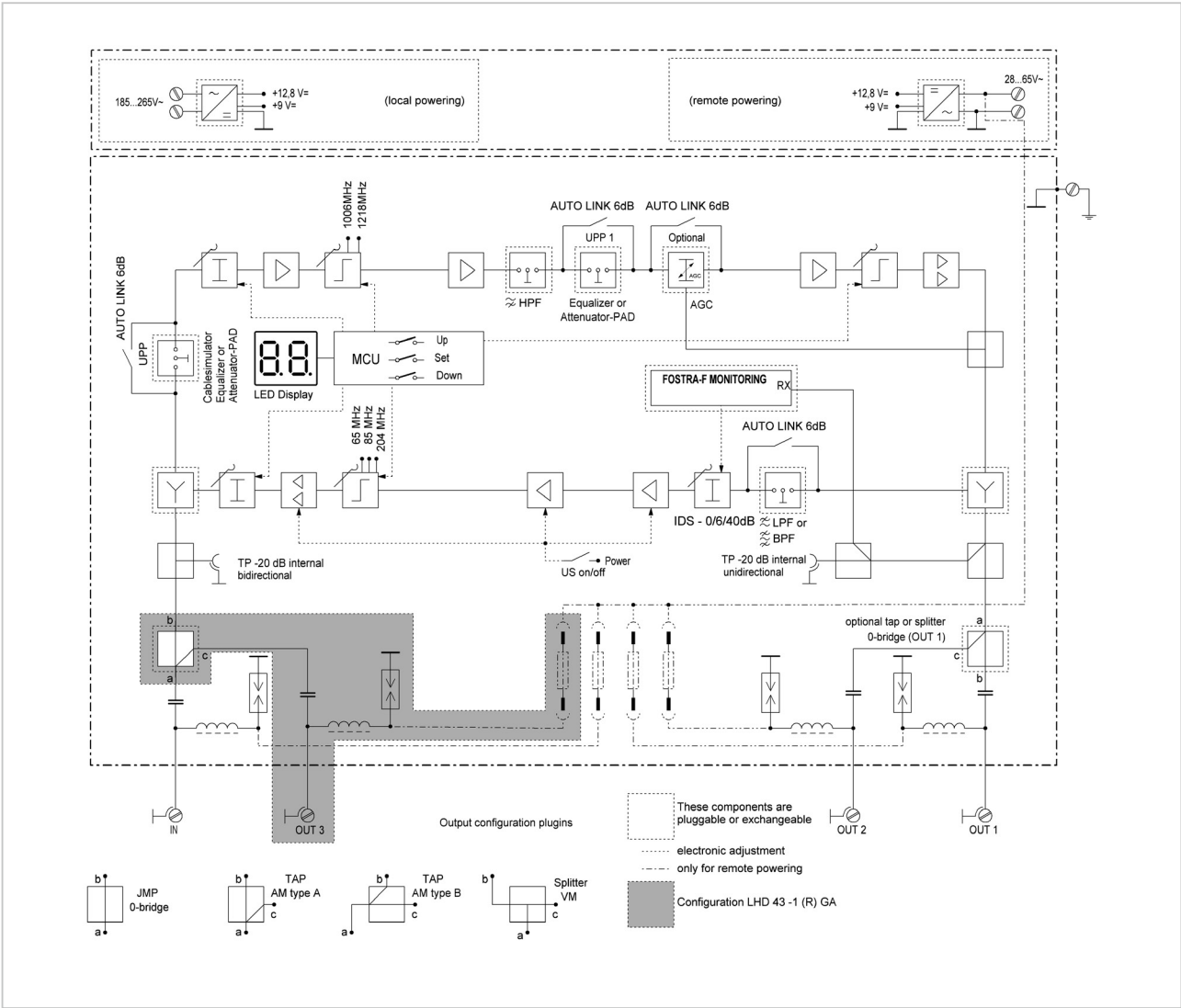
## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GA CLASSIC-LINE

Type		LHD 32-1 R GA	
Item No.		57003761 - LHD 32-1 R GA (remote power)	
Final stage		1 x Power Doubler GaAs-FET	
Downstream	Frequency range	MHz	40 - 1218 (return path ampl. 204 MHz on board, diplexer modular)
	Gain	dB	32
	Linearity	dB	± 0.5
	Slope	dB	0 ... 25, 1 dB step adjustment, electrical
	0-point loss	dB	± 0.5 at 1218 MHz, switchable to 1006 MHz
	Interstage slope	dB	0...15, electrical adjustment
	Attenuation	dB	0 ... 20, 1 dB step adjustment, electrical
	Interstage attn., slot UPP1	dB	for JXP-PAD's
	Cablesimulation	dB	for JXP-PAD's
	Testpoint input	dB	-20 ± 1.5 dB, F-connector, internal
	Testpoint output	dB	-20 ± 0.75 dB, F-connector, internal
	Return loss In/Out	dB	20dB @ 40MHz -1.5 dB/Octave
	Noise	dB	typ. 7
	Output level CENELEC*1	dBμV	114
	Output level digital*2	dBμV	107
Upstream	Frequency range	MHz	5-65/85/204 (configuration with modular diplexer)
	Gain	dB	28
	Linearity	dB	± 0.5
	Slope (Output)	dB	0 ... 16, 1 dB step adjustment, electrical
	Attenuator (Output)	dB	0 ... 30, 1 dB step adjustment, electrical
	Input slot UPP2	dB	for additional low pass filter LPF x-xx or JXP-PAD's
	Ingress Detection Switch	dB	0 / 6 / 45, switchable with FOISTRA
	Slope frequency point	dB	85 / 204 switchable by Jumper
	Noise	dB	6.5
	BER @ 107 dBμV with 24 carrier QAM 256		< 1.0E-09
Power supply		V~	28 - 65 V remote power - 10 A feed through
Power consumption		W	17.0 with active return path
Connector			PG 11
Dimensions / Weight		mm / kg	225 x 195 x 95 / 1.8

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3,119 CH, 262-1214MHz, flat

LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GA CLASSIC-LINE



pre-configured available:

Item No.	Type	Description
57002961	LHD 43 R GA 65	Line amplifier remote powered, gallium arsenide, 1,2GHz, 43dB, US 65/85 MHz
57002962	LHD 43 R GA 85	Line amplifier remote powered, gallium arsenide, 1,2GHz, 43dB, US 85/105 MHz
57003558	LHD 43-1 R GA 65	Line amplifier remote powered, gallium arsenide, 1,2GHz, 43dB, US 65/85 MHz, loop
57003761	LHD 32-1-R GA 85	Line amplifier remote powered, gallium arsenide, 1,2GHz, 32dB, US 85/105 MHz, loop

## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GN PREMIUM-LINE

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- Gallium Nitride technology (GaN)**
- Prepared for network monitoring FOSTR-F
- Interruption-free electronic adjustment, basic settings without additional accessories
- 7-Segment display, simply to adjust by keypad
- DOCSIS 3.1 compliant
- AGC / ALSC module available
- With **FOSTR-F**: IDS 0 / 6 / 45 dB switchable at the return
- 2 outputs, IN/OUT connectors in vertical or horizontal position
- 10 A remote current feed through, immunity to surge voltages 6kV
- Compact alu die-cast housing acc. IP 67, strand mountable
- Return path can be switched off



FOSTR-F FSK-RX

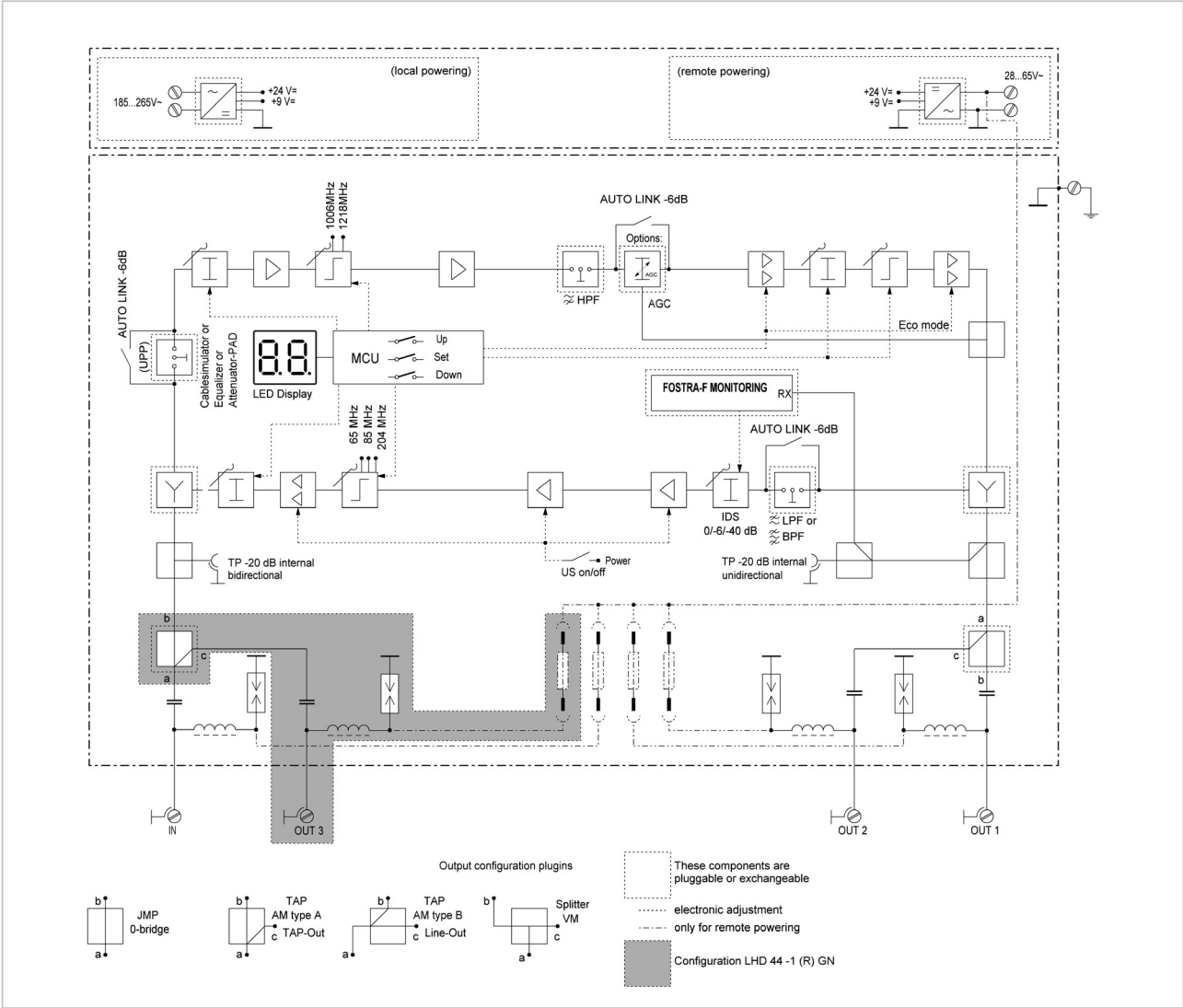


Type		LHD 44 GN	LHD 44 R GN
Item No.		57002972 - LHD 44 GN (local power) 57002977 - LHD 44-1 GN (Line-OUT)	57002974 - LHD 44 R GN (remote power) 57002979 - LHD 44-1 R GN (rem., Line-OUT)
Final stage		1 x Power Doubler GaN	
Downstream	Frequency range	MHz	40 - 1218 (return path ampl. 204 MHz on board, diplexer modular)
	Gain	dB	44
	Linearity	dB	± 0.5
	Slope	dB	0 ... 25, 1 dB step adjustment, electrical
	0-point loss	dB	± 0.5 at 1218 MHz, switchable to 1006 MHz
	Interstage slope	dB	0...15, electrical adjustment
	Attenuation	dB	0 ... 20, 1 dB step adjustment, electrical
	Interstage attn., slot UPP1	dB	for JXP-PAD's
	Cablesimulation	dB	for JXP-PAD's
	Testpoint input	dB	-20 ± 1.5 dB, F-connector, internal
	Testpoint output	dB	-20 ± 0.75 dB, F-connector, internal
	Return loss In / Out	dB	20dB @ 40MHz -1.5 dB/Octave
	Noise	dB	typ. 7
	Output level CENELEC*1	dBμV	116,
	Output level digital*2	dBμV	110
Upstream	Frequency range	MHz	5-65 / 85 / 204 (configuration with modular diplexer)
	Gain	dB	28
	Linearity	dB	± 0.5
	Slope (Output)	dB	0 ... 16, 1 dB step adjustment, electrical
	Attenuator (Output)	dB	0 ... 30, 1 dB step adjustment, electrical
	Input slot UPP2	dB	for additional low pass filter LPF x-xx or JXP-PAD's
	Ingress detection switch	dB	0 / 6 / 45, switchable with FOSTR
	Slope frequency point	dB	85 / 204 switchable by Jumper
	Noise	dB	6.5
	BER @ 107 dBμV with 24 carrier QAM 256		< 1.0E-09
Power supply		V~	200 - 240 V local power   28 - 65 V remote power - 10 A feed through
Power consumption		W	24.0 with active return path
Connector			PG11 (connectors excluded)
Dimensions / Weight		mm / kg	225 x 195 x 95 / 1.8

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 119 CH, 262-1214MHz, flat

LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER LHD (R) GN PREMIUM-LINE



pre-configured available:

Item No.	Type	Description
57003162	LHD 44 R GN 65	Line amplifier remote powered, gallium nitride, 1.2GHz, 44dB, US 65 / 85 MHz
57003163	LHD 44 R GN 85	Line amplifier remote powered, gallium nitride, 1.2GHz, 44dB, US 85 / 105 MHz
57003951	LHD 44-1 R GN 85	Line amplifier remote powered, gallium nitride, 1.2GHz, 44dB, US 85 / 105 MHz, loop



## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER NVD 1.2 GHz



II FOSTRA-F FSK-RX



### Key benefits

- II Manageable 1.2 GHz trunk and line extender for modern HFC-architectures
- II Flexible transponder solution with FSK **FOSTRA-F** microreceiver used to control and monitor with Webbrowser WebGui
- II Manageable by DELTANET
- II Solid alu die-cast housing, protection class IP 65
- II Built-in return amplifier, extended bandwidth to 204 MHz configurable via modular diplexer
- II Ingress-Control-Switch 0 / 6 / 45 dB.
- II State of the art GaAs-FET-IC pre-stages and GaAs-FET MMIC final stage for excellent linearity, low noise and high output level
- II All adjustments electronically operated by keypad and LED-display
- II Electronic interstage-slope and attenuation adjustment
- II For automatic adjustment of temperature induced level variations an AGC/ALSC module can be used
- II Complete equipment and testpoints

**Remark:** Fittings are not included in delivery

### FOSTRA-F microreceiver for amplifier

Cost-effective monitoring system for amplifier and nodes:

- II Monitoring function: Ingress detection switch 0 / 6 / 45 dB
- II Monitoring status LED indicates the operational mode
- II RX frequency 868.3 MHz / 862 MHz / tuneable
- II Identification of the amplifier type and place of installation



## LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER CLASSIC-LINE NVD GA

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- Gallium arsenide technology (GaAs)**
- Controllable line- and distribution amplifier for interactive HFC-networks
- Two independent, active high power outputs
- Flexible transponder solution with FSK **FOSTRA-F** microreceiver
- Electronical level and slope adjustment
- DOCSIS 3.1 compliant
- Ingress-Control-Switch 0 / 6 / 45 dB on return path
- Low noise by GaAs-FET-IC pre-amplifier stages
- High output level using Power-Doubler GaAs-FET technology
- AGC module available
- Power pass of 10 A, immunity to surge voltages 6 kV
- Compact die-cast housing IP 65



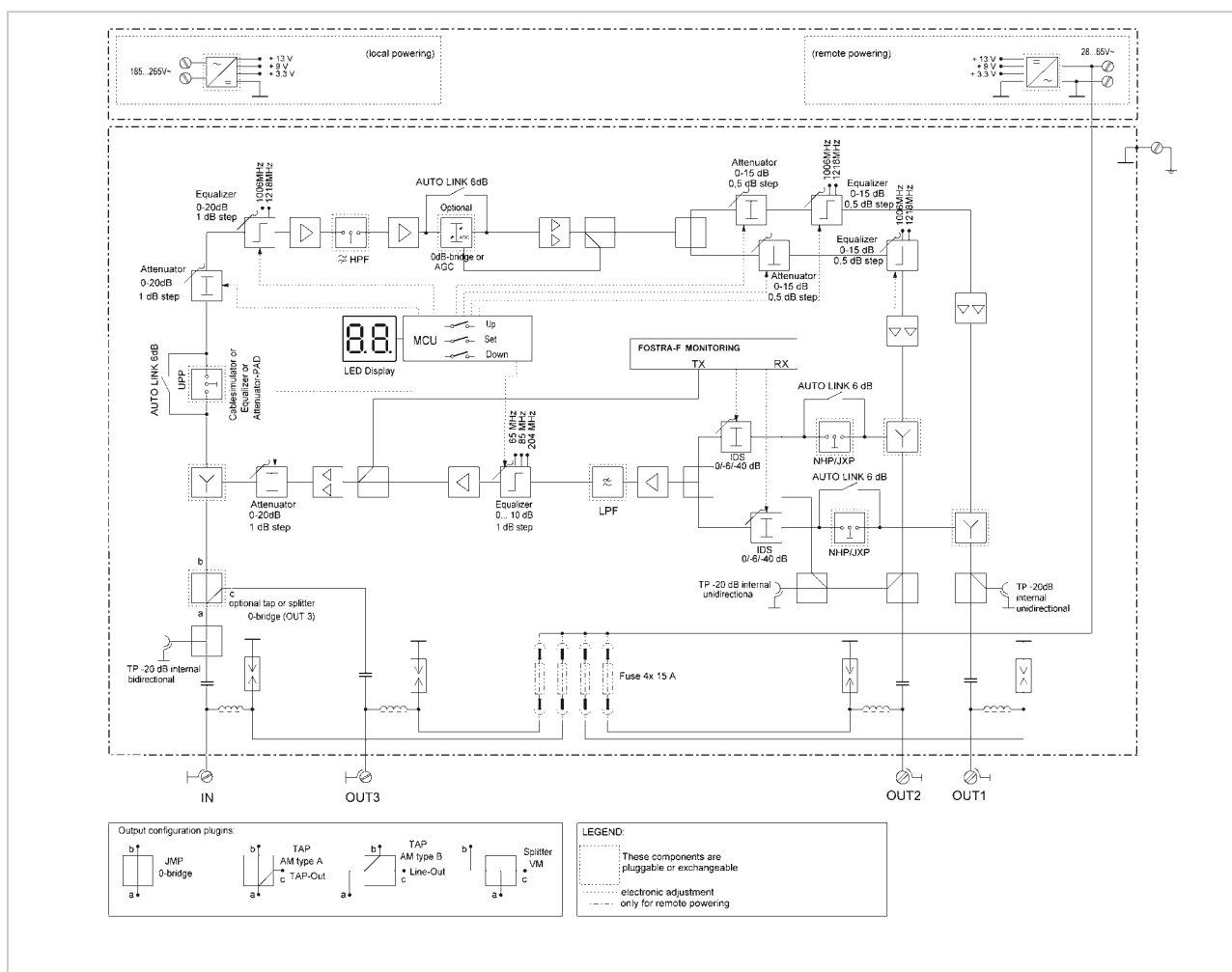
Type			NVD 9243 GA	NVD 9243 R GA
Item No.			57002980	57002812
Final stage			2 x Power Doubler GaAs-FET	
Downstream	Frequency range	MHz	40 - 1218	
	Gain	dB	2 x 43 ± 1	
	Noise	dB	typ. 7.0	
	Linearity	dB	± 0.5	
	Attenuation input	dB	0 ... 20	
	Slope 1006/1218 MHz	dB	0 ... 20	
	Interstage Slope + Attenuation	dB	0 ... 15	
	Output level CENELEC*1	dBμV	2 x 115	
	Output level digital*2	dBμV	2 x 108	
Upstream	Return loss	dB	18 at 40 MHz (-1.5 dB/Octave)	
	Frequency range	MHz	5 - 65/85/204 (with diplexer)	
	Gain	dB	28 ± 1	
	Slope	dB	0 ... 16	
	Attenuation	dB	0 ... 30	
	Ingress Detection Switch		0 / 6 / 45 switchable FOSTRA	
	BER @ 107 dBμV with 24 carriers QAM 256		< 1.0E-09	
	Noise	dB	7	
	Power supply	V~	200 - 240 V local power *3	28 - 65 V remote power
Power pass			10	
Hum-isolation			> 60	
Power consumption			35 (without transp.)	
Testpoint input			-20 (F-female, internal) bidirectional	
Testpoint output			-20 (F-female, internal) unidirectional	
Immunity to surge voltages			6 / 6	
Connector			PG 11 (connectors not incl.)	
RF-IN / OUT connection			PG 11 (connectors excluded)	
Dimensions / Weight			250 x 220 x 100 / 3.0	

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3, 119 CH, 262-1214MHz, flat

\*3 on request

# LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER CLASSIC-LINE NVD GA



pre-configured available:

Item No.	Type	Description
57003164	NVD 9243 R GA 65	Trunk amplifier remote powered, gallium arsenide, 1.2GHz, 43dB, US 65/85 MHz
57003165	NVD 9243 R GA 85	Trunk amplifier remote powered, gallium arsenide, 1.2GHz, 43dB, US 85/105 MHz

# LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER PREMIUM-LINE NVD GN

- 1.2 GHz DS-bandwidth, modular return path up to 204 MHz
- Gallium Nitride technology (GaN)**
- Controllable line- and distribution amplifier for interactive HFC-networks
- Two independent, active high power outputs
- Flexible transponder solution with FSK **FOSTRA-F** microreceiver
- Electronical level and slope adjustment
- DOCSIS 3.1 compliant
- Ingress-Control-Switch 0 / 6 / 45 dB on return path
- High output level using Power-Doubler GaN technology
- AGC module available
- Power pass of 10 A, immunity to surge voltages 6 kV
- Compact die-cast housing IP 65



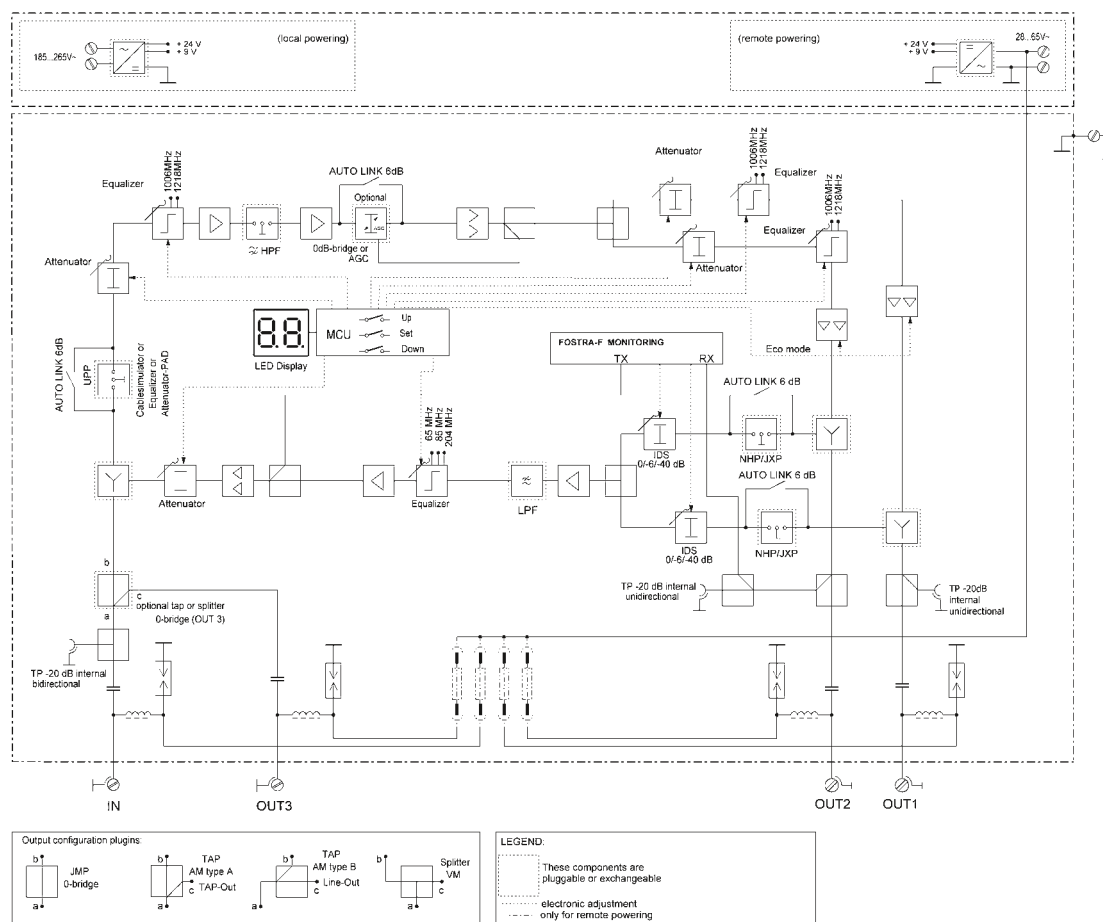
Type			NVD 9244 GN		NVD 9244 R GN	
Item No.			57003055		57003056	
Final stage			2 x Power Doubler GaN			
Downstream	Frequency range	MHz	40 - 1218			
	Gain	dB	2 x 44 ± 1			
	Noise	dB	typ. 7.0			
	Linearity	dB	± 0.5			
	Attenuation input	dB	0 ... 20			
	Slope 1006/1218 MHz	dB	0 ... 20			
	Interstage Slope + Attenuation	dB	0 ... 15			
	Output level CENELEC*1	dBµV	2 x 117			
	Output level digital*2	dBµV	2 x 111			
	Return loss	dB	18 dB at 40 MHz (-1.5 dB/Octave)			
Upstream	Frequency range	MHz	5 - 65 / 85 / 204 (with diplexer)			
	Gain	dB	28 ± 1			
	Noise	dB	7			
	Slope	dB	0 ... 16			
	Attenuation	dB	0 ... 30			
	Ingress detection switch		0 / 6 / 45 switchable FOSTRA			
	BER @ 107 dBµV with 24 carriers QAM 256		< 1.0E-09			
Power supply	V~	200 - 240 V local power*3		28 - 65 V remote power		
Power pass	A	10				
Hum-isolation	dB	> 60				
Power consumption			42 W (without transp.)			
Testpoint input			-20 (F-female, internal) bidirectional			
Testpoint output			-20 (F-female, internal) unidirectional			
Immunity to surge voltages			6 / 6			
Connector			PG 11 (connectors excluded)			
RF-IN/OUT connection			PG 11 (connectors excluded)			
Dimensions / Weight			250 x 220 x 100 / 3.0			

\*1 CENELEC : CTB,CSO > 60 dB, flat

\*2 Digital: EN 60728-3,119 CH, 262-1214MHz, flat

\*3 on request

# LINE EXTENDER-/ DISTRIBUTION-AMPLIFIER PREMIUM-LINE NVD GA



pre-configured available:

Item No.	Type	Description
57003166	NVD 9244 R GN 65	Trunk amplifier remote powered, gallium nitride, 1,2GHz, 44dB, US 65 / 85 MHz
57003167	NVD 9244 R GN 85	Trunk amplifier remote powered, gallium nitride, 1.2GHz, 44dB, US 85 / 105 MHz

## OVERVIEW AMPLIFIER PLUG-IN MODULES 1.2 GHz

■ In the table hereafter the plug-ins for the following products are listed:

■ Amplifier: BKD-G, LHD GA / GN, NVD GA / GN

Type	Item No.	Description	BKD-G	LHD 43 R GA/ LHD 44 R GN LHD 32	NVD 9243 R GA/ NVD 9244 R GN
RLK 565-1	57002732	Diplexer 65/85 MHz	■	■	■
HPF 85-1	57002297	Highpass Filter 85 MHz		■	■
LPF 5-65	57002295	Lowpass Filter 65 MHz		■	■
RLK 585-1	57002733	Diplexer 85/105 MHz	■	■	■
HPF 105-1	57002298	Highpass Filter 105 MHz		■	■
LPF 5-85	57002296	Lowpass Filter 85 MHz		■	■
NHP 12-1	57002815	Ingress Filter 12 MHz			■
NHP 15-1	57002116	Ingress Filter 15 MHz			■
NHP 18-1	57002814	Ingress Filter 18 MHz			■
RLK 5200	57002776	Diplexer 204/254 MHz	■	■	■
HPF 258-1	57002819	Highpass Filter 258 MHz		■	■
LPF 5-204	57002820	Lowpass Filter 204 MHz		■	■
FOSTRA F V2 868.3 VER	57004089	FSK-Tr.	■	■	■
FOSTRA F V2 862 VER	57004088	FSK-Tr.	■	■	■
FOSTRA F V2 Tuneable VER	57003909	FSK-Tr.	■	■	■
VM 302	57002092	2-way splitter		■	■
AM 301-08 A	57003889	Tap 08 dB line out		■	■
AM 301-08 B	57003760	Tap 08 dB tap out		■	■
AM 301-10 A	57002093	Tap 10dB line out		■	■
AM 301-10 B	57002117	Tap 10dB tap out		■	■
AM 301-14 A	57003890	Tap 14dB line out		■	■
AM 301-14 B	57003763	Tap 14dB tap out		■	■
AGC 502 G	57002054	AGC-module		■	■
AGC 503 G	57003964	AGC-module		■	■
CKJ 5-0	57002308	Jumper-module 0dB	■	■	■
BPF 18-65	57003192	Bandpass Filter 18-65 MHz		■	■
CSP 12045	57003641	Cable Simulator Pad			■
CSP 12060	57003642	Cable Simulator Pad			■
CSP 12075	57003643	Cable Simulator Pad			■
CSP 12090	57003644	Cable Simulator Pad			■
CSP 12105	57003645	Cable Simulator Pad			■



## OVERVIEW AMPLIFIER PLUG-IN MODULES

### AGC 503 G

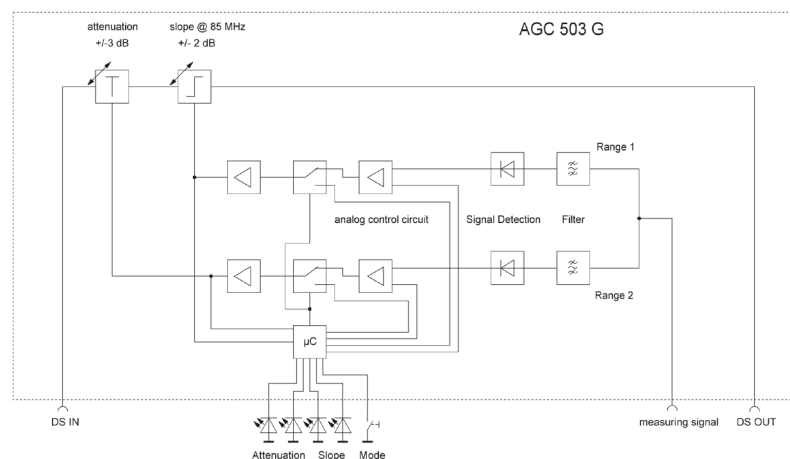
- Application in coaxial networks with temperature sensitive installation
- Automatic gain and slope control
- Level detection in different frequency ranges independant of modulation schemes
- Simple automatic level and slope adjustment at the touch of a button

### AGC 502 G

- Application in coaxial networks with temperature sensitive installation
- Automatic gain control
- Level detection over a couple of channels independant of modulation schemes
- Simple automatic level adjustment at the touch of a button



Type	AGC 502 G	AGC 503 G
Item No.	57002493	57003964
Description	AGC Module	AGC Module
Frequency range MHz	85-1218	85-1218
Linearity dB	$\pm 0.2$	$\pm 0.2$
Through loss dB	2	2
Gain control dB	$\pm 3$	$\pm 3$
Slope control dB		$\pm 2$
Pilotone 1 MHz	244 ...283	244 ...283
Pilotone 2 MHz		598...750
Temperature control range C °	-30...+60	-30...+60
Dimensions / Weight mm / kg	29 x 37 x 10 / 0.05	29 x 37 x 10 / 0.05



### AM / VM-Plug-in modules

- Taps- and splitter modules for LHD / NVD

Type	VM 302	AM 301-08A	AM 301-08B
Item No.	57002092	57003889	57003760
Description	2-way splitter	1-way tap	1-way tap
Frequency range MHz	5-1218	5-1218	5-1218
Loss dB	4.5	1.3 / 8.0	1.3 / 8.0
Type		Tap out	Line out
NVD 9xxx	■	■	■
LHD 4x	■	■	■

For detailed application of VM / AM modules please refer to the respective block diagram

## OVERVIEW AMPLIFIER PLUG-IN MODULES

### AM / VM-Plug-in modules

■ Taps- and splitter modules for LHD / NVD

Type	AM 301-10A	AM 301-10B	AM 301-14A	AM 301-14B
Item No.	57002093	57002117	57003890	57003763
Description	1-way tap	1-way tap	1-way tap	1-way tap
Frequency range MHz	5-1218	5-1218	5-1218	5-1218
Loss dB	1.3 / 10.0	1.3 / 10.0	1.3 / 14.0	1.3 / 14.0
Type	Tap ou	Line out	Tap out	Line out
NVD 9xxx	■	■	■	■
LHD 4x	■	■	■	■

For detailed application of VM / AM modules please refer to the respective block diagram

■ Diplex-filter-modules RLK

■ For 1.2 GHz amplifier BKD-G / LHD-G / NVD-G

■ Return loss >20 dB at 47 MHz, -1.5 dB per octave

■ Metal cover for solid protection and high screening immunity

■ Remark: multiple pieces per amplifier needed



Type	RLK 565-1	RLK 585-1	RLK 5200
Item No.	57002732	57002733	57002776
Application	BKD-G / LHD 43G / NVD 9243G	BKD-G / LHD 43G / NVD 9243G	BKD-G / LHD 43G / NVD 9243G
Frequency range Upstream MHz	5-65	5-85	5-204
Frequency range Downstream MHz	85-1218	105-1218	258-1218
Through loss dB	0.5	0.5	0.5
Isolation Up-/Downstream dB	> 50 per diplexer	> 50 per diplexer	> 50 per diplexer
Dimensions / Weight mm / kg	30 x 26 x 8 / 0.05	30 x 26 x 8 / 0.05	30 x 26 x 8 / 0.05

## FILTER-MODULES FOR LINE-/ DISTRIBUTIONAMPLIFIER

### High pass / low pass-filter plug-in modules

■ For LHD / NVD to increase the isolation between US/DS

■ For pairwise use LPF / HPF depends on RLK diplexer configuration

■ E.g. 2 x RLK 565-1 requires 1 x LPF 5-65 + 1 x HPF 85-1

■ Style JXP 1", 3-PIN

Type	LPF 5-65	LPF 5-85	LPF 5-204	HPF 85-1	HPF 105-1	HPF 258-1
Item No.	57002295	57002296	57002820	57002297	57002298	57002819
Application	LHD / NVD	LHD / NVD	LHD / NVD	LHD / NVD	LHD / NVD	LHD / NVD
Frequency range Upstream MHz	5-65	5-85	5-204	HP stopp	HP stopp	HP stopp
Frequency range Downstream MHz	LP stopp	LP stopp	LP stopp	85-1218	105-1218	285-1218
Through loss dB	0.4	0.4	0.5	0.5	0.5	0.5
Stopp band isolation dB	> 30	> 30	> 30	> 30	> 30	> 30
Dimensions / Weight mm / kg	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01

### Ingress high pass filter - plug-in module

- For LHD / NVD to prevent Ingress distortion jamming on return path
- Style JXP 1", 3-PIN

Type		NHP 12-1	NHP 15-1	NHP 18-1
Item No.		57002815	57002116	57002814
Application		LHD / NVD	LHD / NVD	LHD / NVD
Frequency range Upstream	MHz	12-204	15-204	18-204
Stopp band	MHz	0.1-10	0.1-13	0.1-15
Through loss	dB	0.4	0.4	0.4
Stopp band isolation	dB	> 40	> 40	> 40
Dimensions / Weight	mm / kg	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01	8 x 28 x 4 / 0.01

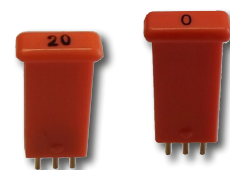
### Bandpass Filter

Type		BPF 18-65
Item No.		57003192
Frequency range Upstream	MHz	18...65
Through loss	dB	0.4
Stopp band Isolation	dB	
f < 13 MHz LP		> 45
f = 13...15 MHz LP		> 20
f = 85...120 MHz HP		> 20
f > 120 MHz HP		> 45
Dimensions / Weight	mm / kg	9 x 28 x 4 / 0.01

other frequencies on request

## ATTENUATION JXP-PADS

- Fix attenuation-PAD's
- 1 dB step values for gain and slope adjustment
- Plastic cover for solid protection
- Length 1" available



Type		PAD 0	PAD 1	PAD 2	PAD 3	PAD 4	PAD 5	PAD 6
Item No.		10161523	10161524	10161525	10161526	10161527	10161528	10161529
Loss	dB	0	1	2	3	4	5	6
Type		PAD 7	PAD 8	PAD 9	PAD 10	PAD 11	PAD 12	PAD 13
Item No.		10161530	10161531	10161532	10161533	10161534	10161535	10161536
Loss	dB	7	8	9	10	11	12	13
Type		PAD 14	PAD 15	PAD 16	PAD 17	PAD 18	PAD 19	PAD 20
Item No.		10161537	10161538	10161539	10161540	10161541	10161542	10161543
Loss	dB	14	15	16	17	18	19	20

Length 25.4 mm (1")




## CABLE SIMULATOR PADS

- For LHD / NVD amplifier
- Frequency range 47-1218 MHz
- 5.6 mm thick

Type		CSP 12045	CSP 12060	CSP 12075	CSP 12090	CSP 12105	CSP 12180
Item No.		57003641 (PU 10)	57003642 (PU 10)	57003643 (PU 10)	57003644 (PU 10)	57003645 (PU 10)	57004446 (PU 10)
EQ values	db	4.5	6.0	7.5	9.0	10.5	18
47 - 1218 MHz	db	3.7	4.9	6.2	7.4	8.6	14.8
47 - 1000 MHz	db	3.2	4.3	5.4	6.4	7.5	12.8
47 - 870 MHz	db	2.9	3.9	4.8	5.8	6.8	11.6
Tolerance eq-val. max.	db	+/- 0.5					
Flatness	db	+/- 0.2					
Insertion loss	db	≤ 1					
Return loss	db	≥ 18					
Impedance	Ω	75					

Length 25.4 mm (1")

## FITTINGS PG 11

Type	PG11m-Ff	PG11m-IECf	PG11m-3,5/12f	PG11m 3,5/12f
				
Item No.	57001082	10161203	57001141	57001291
Description	PG 11 - Adapter PG 11 / F-female	PG 11 - Adapter PG 11 / IEC-female	PG 11 - Adapter PG 11 / 3.5 / 12 female	PG 11 - Adapter PG 11 / 3.5 / 12 female
Connector Pin length	47 mm	17 mm	47 mm	17 mm

Type	PG 11m-5/8f	PG 11 PC
		
Item No.	10161204	10161205
Description	PG 11 - Reduction ring PG 11 / 5 / 8"	PG 11 Blind cap

## Glossary

JXP-PADs required for adjustment

**PAD**

Variable level attenuator included, no additional accessories required for level adjustment



Step-Spin adjustment, precise step control, values readable



Electronical adjustment, display, key pad, precise step control, values readable



1.2 GHz technology, DOCSIS 3.1 compliant



Remote management using FOSTRA-Technology



OPEX Reduction through logistic advantages



OPEX reduction through remote monitoring/control

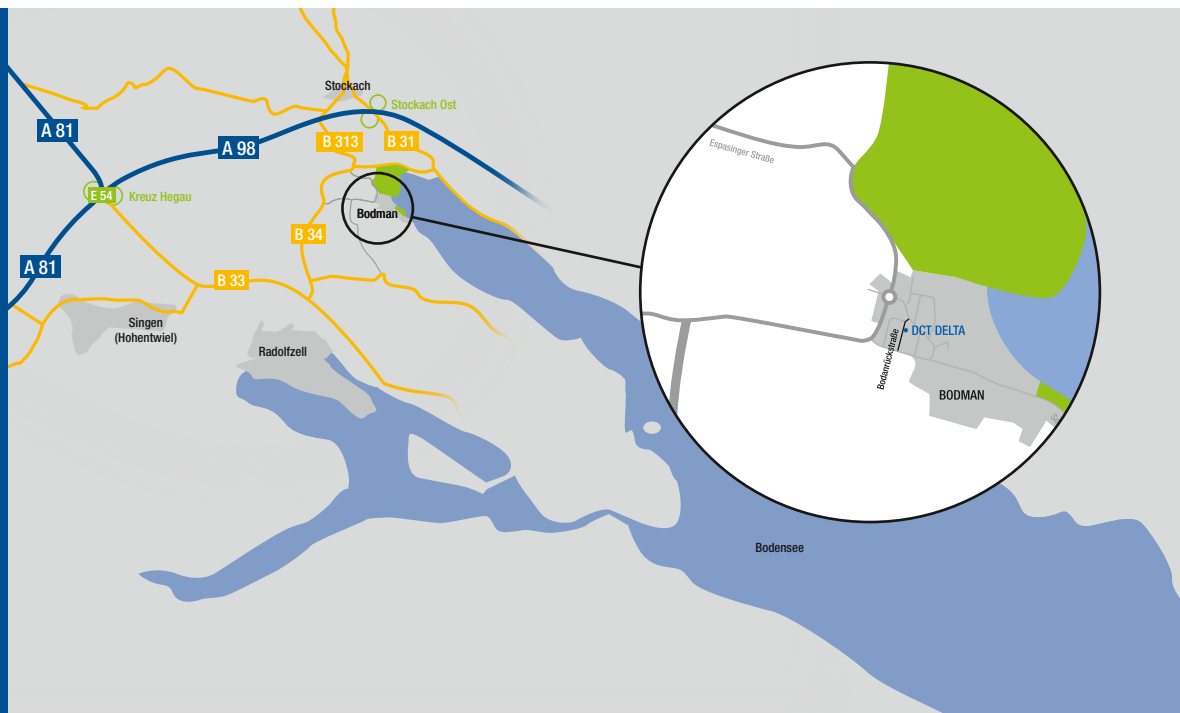


OPEX reduction through power reduction



## Notice





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