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# HV 433-65 Vario HV 433-85 Vario

Broadband amplifiers



## Operating Manual

## Before operating the device

**HINWEIS:** *Read this operating manual through carefully! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual can be downloaded on the ASTRO website (there may be a more recent version).*

*The ASTRO company confirms that the information in this manual was correct at the time of printing, but it reserves the right to make changes to the specifications, the operation of the device and the operating manual without prior notice.*



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## Symbols and conventions used

### Symbols used in this manual

Pictograms are visual symbols with specific meanings. You will encounter the following pictograms in this installation and operating manual:



Warning about situations in which electrical voltage and non-observance of the instructions in this manual pose a risk of fatal injuries.



Warning about various dangers to health, the environment and material.



Warning about various dangers to health, the environment and material.



Recycling symbol: indicates components or packaging materials which can be recycled (cardboard, inserts, plastic film and bags). Used batteries must be disposed of at approved recycling points. Batteries must be completely discharged before disposal.



This symbol indicates components which must not be disposed of with household rubbish.

## Intended use

The HV 433-65 Vario and HV 433-85 Vario are universal broadband amplifiers for bidirectional building distribution and broadband communication systems. They are exclusively designed for signal amplification in unidirectional and bidirectional distribution systems in single-family and multi-family dwellings.

Modification of the devices or use for any other purpose is not permitted and will immediately void any guarantee provided by the manufacturer.

## Intended audience for this manual

### **Installation, configuration and start-up**

ASTRO amplifiers are intended to be installed and put into operation by qualified experts who have training which enables them to perform the work required by EN 60728-11 and EN 62368-1. Unqualified persons are not permitted to install and operate the device.

## Device description

The device packaging contains the following:

- ☐ Building broadband amplifier HV 433-65 Vario or HV 433-85 Vario
- ☐ Operating manual

- [1] Power cable
- [2] Cover screw
- [3] Power indicator
- [4] Drill holes
- [5] Installation lugs for perforated plate
- [6] Bushing for earth cable



Fig. 1: HV 433-85 Vario amplifier, HV 433-65 Vario similar

- [1] Forward path attenuator (pad)
- [2] Forward path equaliser (pad)
- [3] Frequency switch for duplex filter (forward path)
- [4] Forward path interstage attenuation (jumper)
- [5] Forward path interstage slope (jumper)
- [6] Return path attenuator input (pad)
- [7] Diplex filter (pluggable)
- [8] Output
- [9] Forward-path test socket
- [10] Return path test socket
- [11] Input
- [12] Clamping screw for earth cable
- [13] Interstage Slope return path up to 204 MHz (jumper)
- [14] Attenuation return path output (Pad)
- [15] Installation lugs for perforated plate
- [16] Frequency switch for duplex filter (forward path)

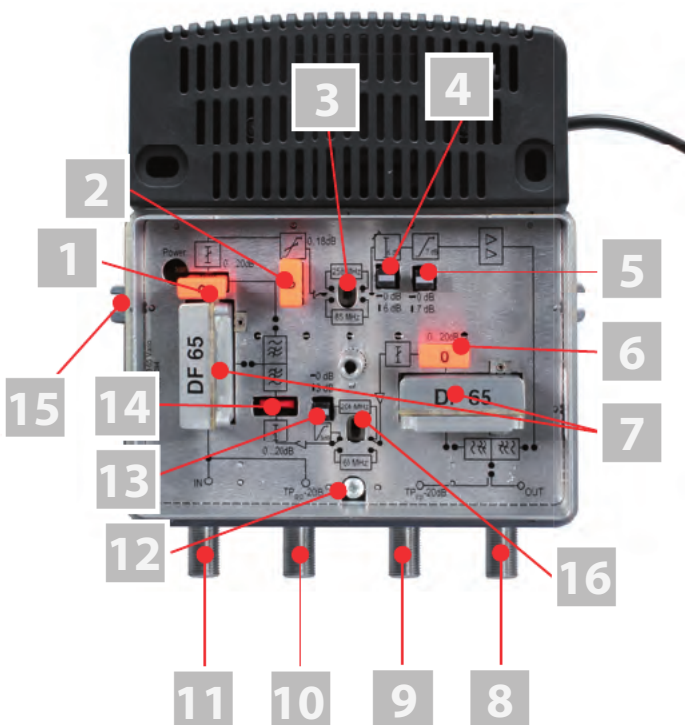


Fig. 2: HV 433-85 Vario amplifier, interior view

The HV 433-65 Vario and HV 433-85 Vario amplifiers have a CE marking. This confirms that the product complies with the relevant EC directives and adheres to the requirements specified therein.



## Important safety information

To avoid any potential risks to the greatest extent possible, you must observe the following safety information:

**ACHTUNG:** *Failure to observe this safety information may result in physical injury due to electrical and thermal dangers!*

### Intended use

- ☐ Only use the device at approved operating sites and under approved ambient conditions (as described in the following), and only for the purpose described in the section "Proper use".

### Before operating the device

**HINWEIS:** *Read this operating manual through carefully! It contains important information about installation, ambient conditions and maintenance of the device. Keep this operating manual for future use and for handover in the event of a change of owner or operator. A PDF version of this manual can be downloaded on the ASTRO website (there may be a more recent version).*

- ☐ Check the packaging and the device for transport damage immediately. Do not operate a device that has been damaged.
- ☐ Carrying the device by the power cable may damage the power cable or the strain relief and is therefore not permitted.

### Installation and operation

- ☐ The device may only be installed and operated by qualified persons (in accordance with EN 62368-1) or by persons who have been instructed by qualified persons. Maintenance work may only be carried out by qualified service personnel.
- ☐ An installation site must be provided that prevents children from playing with the device and its connections.
- ☐ The electrical connection conditions must correspond to the specifications on the device type plate.



- ☐ To avoid damage due to overheating, the device may only be installed on vertical surfaces. The connection for the power supply unit must point to the right. The installation basis should be level and non-flammable. Operating position: Device vertical, with power supply output on the right.
- ☐ The permitted ambient temperatures specified in the technical data must be complied with. If the device overheats, the insulation used to insulate the mains voltage may be damaged.
- ☐ The device and its cable may only be operated away from radiant heat and other sources of heat.
- ☐ To avoid trapped heat, ensure there is good ventilation on all sides (minimum interval of 20 cm to other objects). Installing the device in recesses or covering the installation location, for example using curtains, is not permitted. Ventilation openings must not be covered.
- ☐ If the device is installed in a cabinet, ensure adequate air convection is possible to avoid exceeding the maximum permitted ambient temperature.
- ☐ No objects may be placed on the device.
- ☐ The subscriber network must be earthed in accordance with EN 60728-11 and must remain earthed even when the device is removed. In addition, the earth connection on the device can be used. Devices within hand's reach must also be integrated into the potential equalisation. Operating the device without an earth conductor, without earthing the device or without equipotential bonding of the device is not permitted.
- ☐ The device does not feature protection against water and may therefore only be operated and connected in dry rooms. The device must not be exposed to spraying water, dripping water, condensation or similar sources of moisture.
- ☐ The electrical system supplying current to the device, such as a building installation, must incorporate protective devices against excessive currents, earth faults and short-circuits in accordance with EN 62368-1.
- ☐ Caution! Hot surface: Housing components near the cooling fins at the rear or the cooling fins themselves may become very hot. Do not touch these parts.
- ☐ The power supply plug is used to disconnect the device from the mains voltage for servicing and in the event of danger and must therefore be accessible and in good working condition at all times. The device is operational when connected to the mains voltage.



- ☐ Adhere to all applicable national safety regulations and standards.
- ☐ Excess mechanical loads (e.g. falling, impacts, vibrations) may damage the insulation used to provide protection from the mains voltage.
- ☐ High excess currents (lightning strikes, surges in the power utility grid) may damage the insulation used to provide protection from the mains voltage.
- ☐ If there is no information about the intended use (e.g. operating site, ambient conditions), or the operating manual does not include the corresponding information, you must consult the manufacturer of this device to ensure that the device may be installed. If you do not receive the required information from the manufacturer, do not operate the device.
- ☐ In rooms in which the climatic conditions vary (e.g. due to sunlight), the device may only be operated if the permissible ambient temperature can be maintained.
- ☐ Disconnect devices with a damaged power cable from the mains (unplug the power supply plug).
- ☐ Always use the supplied power adapter (power supply unit) and connect it to a power point with a voltage within the range specified in the "Technical data" section. Failure to observe this warning may result in personal injury or equipment/property damage.

Do not install the device in locations with excessive dust formation, as this may reduce its insulation from the mains voltage.

#### Electromagnetic compatibility (EMC)

In order to avoid malfunctions when operating radio and telecommunications equipment, as well as other operating units or broadcasting services, the following must be observed:

- ☐ Before installation, make certain that you have checked the device for mechanical damage. Do not use damaged or bent covers or housings.
- ☐ During operation, the device must always be covered by the components provided for this purpose. It is not permitted to operate the device when the cover is open.

- ☐ The braided shielding or the spring contacts must not be damaged or removed.

### Maintenance

- ☐ The power indicator only shows whether the DC current, which supplies the device components, has been disconnected. However, if power indicators (on the power supply unit or the device) are not lit up, it is in no way an indication that the device is completely disconnected from the mains. There may still be voltage in the device that is dangerous to touch. Therefore, do not open the device.
- ☐ Read carefully: EN 60728-11, Safety requirements / No service work during electrical storms!
- ☐ Disconnect the mains plug before cleaning the device!

### Repair

- ☐ Repairs may only be performed by the manufacturer. Improperly performed repairs may result in considerable dangers for the user.
- ☐ Do not operate devices with a damaged power cable. You must have the cable repaired by the manufacturer.
- ☐ If malfunctions occur, the device must be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

### General information

- ☐ Store or use the device in a safe location, well out of reach of small children. It may contain small parts that can be swallowed or inhaled. Dispose of any small parts that are not needed.
- ☐ Plastic bags may have been used for packaging the device. Keep these plastic bags away from babies and children to avoid any danger of suffocation. Plastic bags are not toys.
- ☐ Do not store the device near chemicals or in places in which any leakage of chemicals may occur. In particular, organic solvents or fluids may cause the housing and/or cables to melt or disintegrate, presenting a danger of fire or electric shock. They may also cause device malfunctions.
- ☐ Do not connect the supplied mains adapter to any other products.



## Warranty conditions

The general terms and conditions of ASTRO Bit GmbH apply. They can be found in the current catalogue or on the Internet under "www.astro-kom.de".

## Performance description

The HV 433-65 Vario and HV 433-85 Vario are universal broadband amplifiers for bidirectional building distribution and broadband communication systems. They are exclusively designed for signal amplification in unidirectional and bidirectional distribution systems in single-family and multi-family dwellings.

**ACHTUNG:** *Instructions regarding the necessary protective measures to prevent electrostatic discharges in the device according to DIN EN 61340-5-1 must be observed!*

The amplifiers HV 433-65 Vario and HV 433-85 Vario can be flexibly configured for future multimedia cable networks:

- ☐ Adaptation of local level conditions using the built-in attenuator and equaliser in the input (can be adjusted using a pad)
- ☐ Pre-equalisation of the outgoing cable lines is possible using the interstage slope
- ☐ Interstage attenuation (0 or 6 dB, pluggable)
- ☐ Additional test socket (input)
- ☐ Different frequency ranges in forward and return path can be selected using duplex filter DF 65 and DF 204 (HV 433-65 Vario) resp. DF 85 and DF 204 (HV 433-85 Vario)

## Disposal

All of our packaging materials (cardboard boxes, inserts, plastic film and bags) are completely recyclable.

After use, this device must be disposed of in an orderly manner as electronic scrap, in accordance with the current disposal regulations of your district/country/state.

ASTRO Bit is a member of the Elektro system solution for the disposal of packaging materials. Our contract number is 80395.



## Installation

You can install the amplifier using wall plugs in a masonry wall or on a perforated panel using sheet metal screws.

The following describes how to fix the amplifier to a masonry wall:

### VORBEREITUNG:

Drill two holes in a vertical masonry wall and insert the wall plugs. The required distance between the two boreholes is 100 mm.

The following describes how to install the device:

### AUFGABE

1. Place the back of the device against the installation surface so that its drill holes are exactly above the two wall plugs. The device inputs and outputs must point downwards.
2. Screw the device into place using screws (drill holes [4] in the device, see left).

### ERGEBNIS:

The module is now installed and can be connected.

The following describes how to install the amplifier on a perforated panel:

### VORBEREITUNG:

Use the existing boreholes in a perforated plate. The required distance is 130 mm.

The following describes how to install the device:

### AUFGABE

1. Place the device on the installation surface so that the lugs on the outside of the housing are exactly over the boreholes in the panel. The device inputs and outputs must point downwards.
2. Screw the device in place using sheet metal screws (drill holes [5] in the device, see left).

### ERGEBNIS:

The module is now installed and can be connected.



## Connection

### VORBEREITUNG:

To connect the amplifier to coaxial cables, you must first fit them with F connectors 75 Ohm. F connectors are available in various designs, so that direct connection of different cable diameters is possible. The following describes how to connect the amplifier and coaxial cables:

### AUFGABE

1. Plug the F connector into both the input and output connection sockets of the amplifier and screw the outer ring of the F connector tight.
2. Make sure the coaxial cables are laid with a sufficient bending radius.
3. Connect the device to the mains voltage by inserting the mains plug.

### ERGEBNIS:

The device is now ready for operation. The power indicator [3] (see picture left) lights up.



## Configuration and start-up

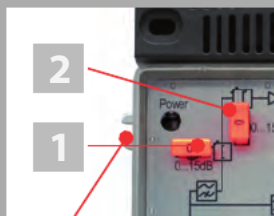
The default configuration for the amplifier is as follows:

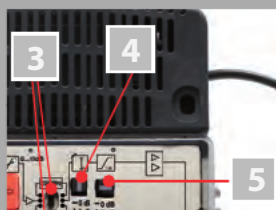
- ☐ The jumpers for activating the interstage attenuation and the interstage slope are set to 0 dB

First configure the amplifier for the transmission of forward signals:

### AUFGABE

1. Remove the housing cover by loosening the cover screw.
2. The amplifier has an attenuator (0...15 dB) [1] and a tilt equaliser (0...15 dB) [2] in the input (see left). They can be used to set the desired attenuation and equalisation by inserting the appropriate pad.





3. You can also set attenuation (0 or 6 dB) between the amplifier stages by reinserting the jumper [4] accordingly. Observe the labelling.
4. Between the amplifier stages (interstage), you can set a pre-equalisation (0 or 7 dB slope) of the outgoing cable length by reinserting the jumper [5] accordingly. Here too, note the label next to the jumper.
5. Use the switches [3] to adjust the frequency range in the forward path according to the inserted diplex filters.  
 HV 433-65: If you want a frequency range of 85 - 1218 MHz: Plug in the DF 65 type diplex filters [7] and set the frequency switch [3] to the position "85 MHz".  
 If you want a frequency range of 258 - 1218 MHz: Plug in the DF 204 type diplex filters [7] and set the frequency switch [3] to the position "258 MHz".  
 HV 433-85: If you want a frequency range of 104 - 1218 MHz: Plug in the DF 85 type diplex filters [7] and set the frequency switch [3] to the position "104 MHz".  
 If you want a frequency range of 258 - 1218 MHz: Plug in the DF 204 type diplex filters [7] and set the frequency switch [3] to the position "258 MHz".

#### ERGEBNIS:

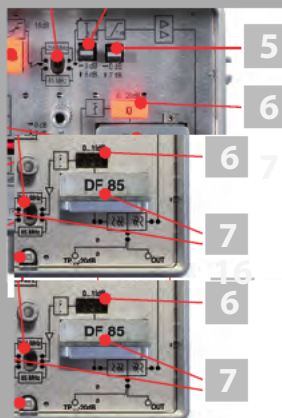
The amplifier is now configured for the transmission of forward signals.

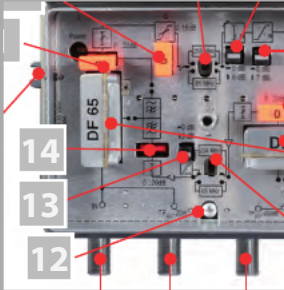
To transmit return signals, the amplifier must be configured accordingly.

The following describes how to configure the amplifier for the transmission of return signals:

#### AUFGABE

1. Adjust the attenuator (0...15 dB) [6] according to the cable network specifications.
2. Use the switch [16] to adjust the frequency range in the return path according to the inserted diplex filters.  
 HV 433-65: If you want a frequency range of 5 - 65 MHz: Plug in the DF 65 type diplex filters [7] and set the frequency switch [16] to the position "65 MHz". If you want a frequency range of 5 - 204 MHz: Plug in the DF 204 type diplex filters [7] and set the frequency switch [16] to the position "204 MHz".  
 HV 433-85: If you want a frequency range of 5 - 85 MHz: Plug in the DF 85 type diplex filters [7] and set the frequency switch [16] to the position "85 MHz". If you want a frequency range of





5 - 204 MHz: Plug in the DF 204 type diplex filters [7] and set the frequency switch [16] to the position "204 MHz".

3. If the diplex filter DF 204 is plugged, an interstage slope of 3 dB is adjusted automatically in the return path. By plugging jumper [13] the slope can optionally be increased by another 3 dB.
4. You can adjust an attenuation at the return path output by 0-20 dB, to compensate the attenuation of the following cable network resp. to reduce the output of the return path. To do so, pull out the red jumper [14] and plug the appropriate pad instead.

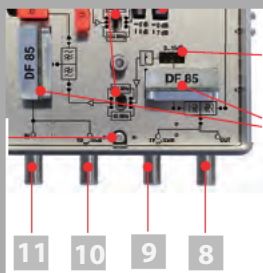
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#### ERGEBNIS:

The device is now configured for the transmission of return signals.

**ACHTUNG:** *The maximum operating level must not be exceeded! (maximum input level = output level minus the set gain for 1218 MHz)*

## Measurements



At the output, there is a directionally coupled test socket [9] with 20 dB decoupling attenuation. You can use it to:

- ☐ Feed in the return signal to set the return path level
- ☐ Determine the output level for the forward range

In addition, there is a bidirectional test socket [10] with 20 dB decoupling attenuation for the return path at the input. You can use it to:

- ☐ Determine the output level for the return range
- ☐ Feed in return signals behind the return path amplifier in the upstream direction

***HINWEIS:** After configuring the amplifier and completing the measurements, it is strongly recommended to terminate the test socket with a 75 Ohm terminating resistor to ensure operation in compliance with the standards.*

## Troubleshooting

If the device is not functioning correctly, perform the following checks:

- ☐ Check whether the device is connected to the required mains voltage (230 V~, 50 Hz).
- ☐ Check whether the coaxial cables are connected correctly and make sure there are no breaks or short circuits in the connectors.
- ☐ Check whether the output level on the device is within the permissible limits for the operating level.

If the problem cannot be resolved, please contact ASTRO customer service.

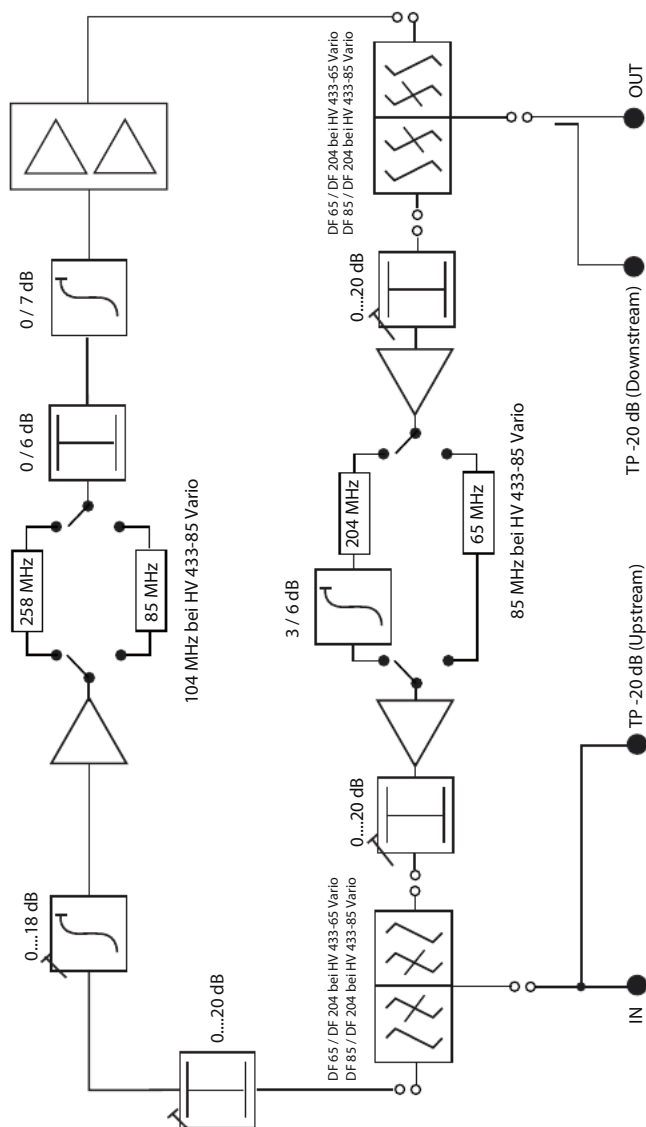
## Maintenance and repair

**ACHTUNG:** *It is essential that the following safety information be observed when performing maintenance and repair work. Failure to observe this safety information may result in physical injury due to electrical and thermal dangers!*



- ☐ The power indicator only shows whether the DC current, which supplies the device components, has been disconnected from the mains voltage. If the power indicator (for the power supply unit or the device) does not light up, it does not mean that the device has been fully disconnected from the mains voltage. There may still be voltage in the device that is dangerous to touch. Therefore, do not open the device.
- ☐ Read carefully: EN 60728-11 Safety requirements: No service work during thunderstorms.
- ☐ Disconnect the mains plug before cleaning the device!
- ☐ A defective device may only be repaired by the manufacturer to ensure that components with the original specification are used (e.g. power cable, fuse). Improperly performed repairs may result in considerable dangers for the user or installer. If malfunctions occur, the device must therefore be disconnected from the mains and authorised experts must be consulted. The device may need to be sent to the manufacturer.

## Block diagram



Block diagram HV 433-65 Vario and HV 433-85 Vario

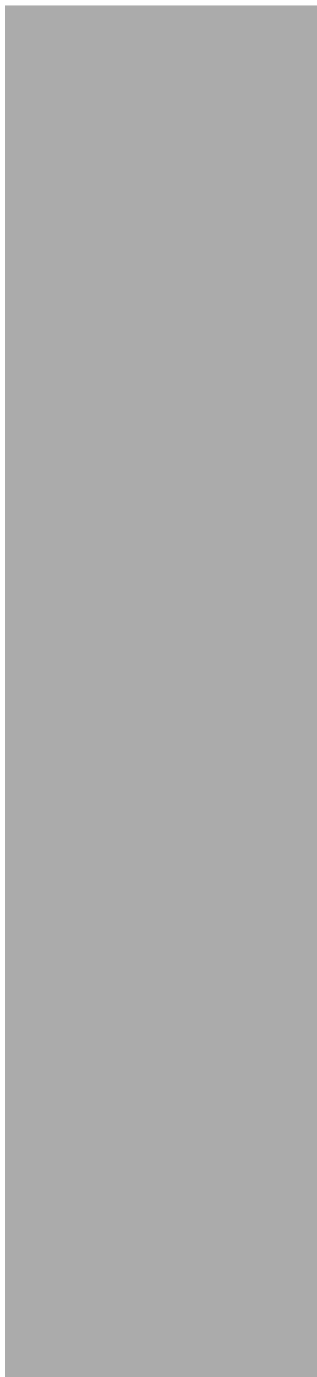
# Technical data

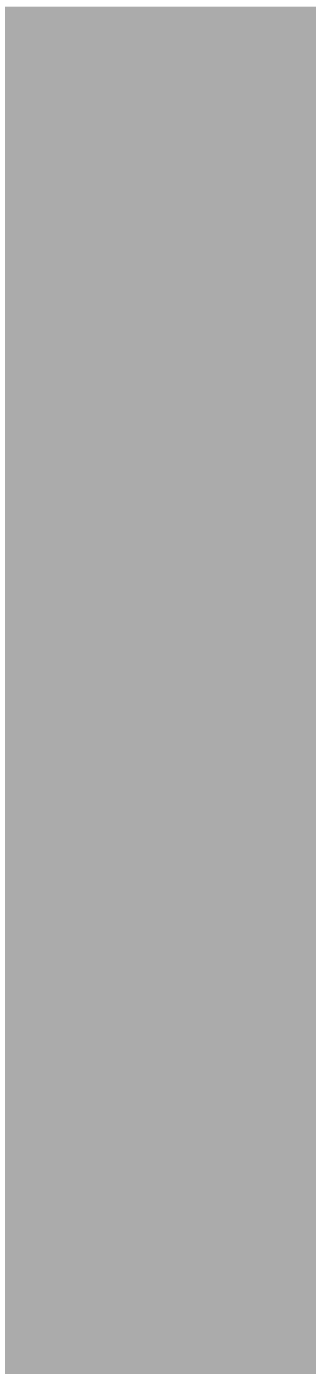
| Type                                                       |            | HV 433-65 Vario                                                           | HV 433-85 Vario                                                           |
|------------------------------------------------------------|------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Order number                                               |            | 217 465                                                                   | 217 420                                                                   |
| EAN-Code                                                   |            | 4026187210144                                                             | 4026187195045                                                             |
| Forward Path                                               |            |                                                                           |                                                                           |
| Frequency Range                                            | [MHz]      | 85 - 1218*<br>usable only with diplex filter <b>DF65</b> and DF204        | 104 - 1218*<br>usable only with diplex filter <b>DF85</b> and DF204       |
| Gain                                                       | [dB]       | 44 ± 1*                                                                   |                                                                           |
| Slope (Interstage)                                         | [dB]       | 0 or 7, Jumper                                                            |                                                                           |
| Attenuation (Interstage)                                   | [dB]       | 0 or 6, Jumper                                                            |                                                                           |
| Noise Figure                                               | [dB]       | ≤ 7                                                                       |                                                                           |
| Slope (Input)                                              | [dB]       | 0 - 18                                                                    |                                                                           |
| Attenuation (Input)                                        | [dB]       | 0 - 20                                                                    |                                                                           |
| Test Point (Output Downstream)                             | [dB]       | 20 ± 1, directional coupler                                               |                                                                           |
| Output Level                                               |            |                                                                           |                                                                           |
| acc. EN 60728-3 with 112 QAM256 carrier<br>8 MHz bandwidth | [dBμV]     | 104 / 106                                                                 |                                                                           |
| acc. EN 60728-3 with 119 QAM256 carrier<br>8 MHz bandwidth | [dBμV]     | 102 / 104                                                                 |                                                                           |
| CENELEC 41 linear / 7 dB Interstage Slope                  | [dBμV]     | 106 / 108                                                                 |                                                                           |
| Return Path                                                |            |                                                                           |                                                                           |
| Frequency Range                                            | [MHz]      | 5 - 65 & 5 - 204*<br>usable only with diplex filter <b>DF65</b> and DF204 | 5 - 85 & 5 - 204*<br>usable only with diplex filter <b>DF85</b> and DF204 |
| Gain                                                       | [dB]       | 29 ± 1                                                                    |                                                                           |
| Noise Figure                                               | [dB]       | ≤ 6**                                                                     |                                                                           |
| Attenuation (Input/Output)                                 | [dB]       | 0 - 20                                                                    |                                                                           |
| Interstage Slope                                           | [dB]       | with DF 204 3 dB fixed, additionally 3 dB pluggable                       |                                                                           |
| Test Point (Output Upstream)                               | [dB]       | 20 ± 1, bi-directional                                                    |                                                                           |
| Output Level                                               |            |                                                                           |                                                                           |
| acc. EN60728-3 with 24 QAM256 carriers<br>8 MHz-bandwidth  | [dBμV]     | 104                                                                       |                                                                           |
| acc. EN60728-3 with 6 QAM256 carriers<br>8 MHz-bandwidth   | [dBμV]     | 112                                                                       |                                                                           |
| with 7 QAM64 carriers / 6 MHz bandwidth                    | [dBμV]     | 113                                                                       |                                                                           |
| Common Data                                                |            |                                                                           |                                                                           |
| Power Consumption                                          | [VA] / [W] | 19 / 9                                                                    |                                                                           |
| Impedance                                                  | [Ω]        | 75                                                                        |                                                                           |

|                               |              |                                                        |
|-------------------------------|--------------|--------------------------------------------------------|
| Return Loss                   | [dB]         | $\geq 14$ and from 40 MHz - 1,5 / Octave (at least 10) |
| Connectors                    |              | F-female, 75 $\Omega$                                  |
| EMC                           | [ $\Omega$ ] | according EN 50083 -2                                  |
| Supply Voltage                | [V~, Hz]     | 230 - 23 %/+10 %, 50                                   |
| Ambient Temperature           | [°C]         | -15...+50                                              |
| Size (W x H x D)              | [mm]         | 135 x 154 x 49 (including connectors)                  |
| Weight                        | [kg]         | 0,75                                                   |
| Mounting and operation height | [m]          | < 4000 over N.N.                                       |
| Protection Class              |              | DIN EN 60 529-IP 20                                    |

\* the gain value corresponds to the practical case of using the input slope and interstage slope

\*\* measured from 10 MHz







## ASTRO Strobel Kommunikationssysteme GmbH

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Change management and copyright:

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