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ASTRO®

Universal broadband amplifiers

VARIO 561 O, 561 O PG11
VARIO 662 O
VARIO 683 O
VARIO 684 O

Operating manual

Version 01-2021A

Before operating the device

NOTE: *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.

Contents

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 thermal dangers due to hot surfaces.

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 amplifiers of the VARIO series 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:

- ☐ VARIO 561 O, VARIO 561 O PG11, VARIO 662 O, VARIO 683 O or VARIO 684 O broadband amplifier
- ☐ 0 dB pads for device configuration, inserted
- ☐ 2 zero cards of type VZ 1001, inserted
- ☐ Zero card VZ 1006, inserted
- ☐ Operating manual

[1] Power indicator
[2] Mains plug
[3] Earth terminal
[4] Output 1
[5] Output 2
[6] Input
[7] Screw mount for housing cover

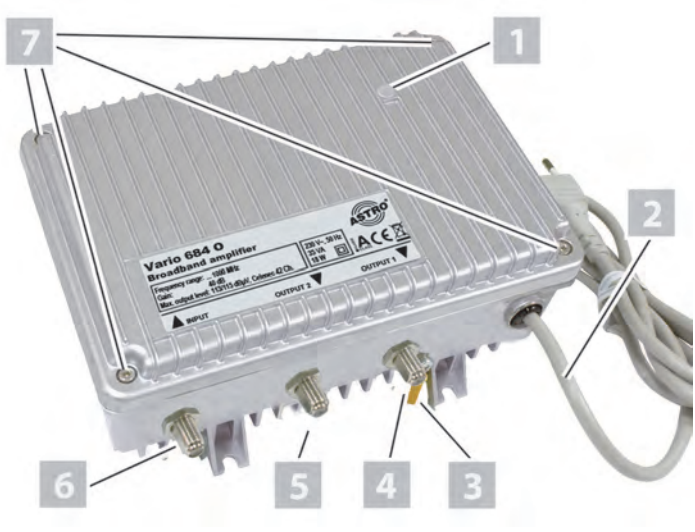


Fig. 1: VARIO 684 O amplifier (similar to VARIO 662, VARIO 683 O and VARIO 561 O)
VARIO 561 PG11 O is equipped with PG11 threaded connections

[1] Input equaliser
[2] Input inverse equaliser
[3] Input attenuation
[4] Output test socket
[5] Interstage equaliser
[6] Interstage attenuation
[7] Return path input attenuation
[8] Optional diplex filter
[9] Power supply unit cover
[10] Output test socket
[11] Power supply unit fuse
[12] Optional distributor
[13] Test socket
[14] Optional return path amplifier
[15] Optional diplex filter
[16] Input test socket

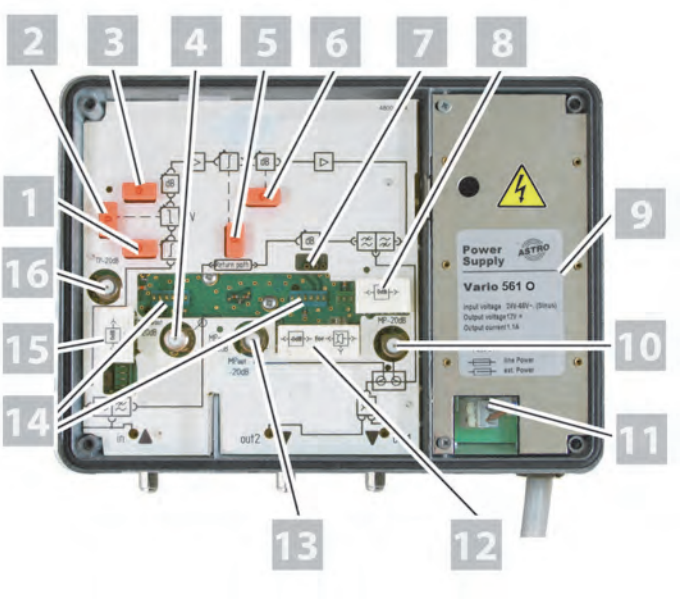


Fig. 2: VARIO 561 O amplifier, interior
(similar to VARIO 662 O, VARIO 683 O and VARIO 684 O)
VARIO 561 PG11 O is equipped with PG11 threaded connections

CE

The VARIO 561 O, VARIO 561 O PG11, VARIO 662 O, VARIO 683 O and VARIO 684 O amplifiers have a CE marking. This confirms that the products comply with the relevant EC directives and adhere 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:

ATTENTION: ***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

NOTE: *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 the 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 Strobel GmbH apply. They can be found in the current catalogue or on the Internet under “www.astro-kom.de”.

Performance description

The amplifiers of the VARIO series are locally or remotely powered broadband amplifiers. The division of the frequency ranges (upstream/downstream) is variable through the use of pluggable filters. You can activate the return path channel with optional diplex filters as well as with various active return path modules. (See "Technical data” section.) You can also activate the return path using the corresponding zero card included in the scope of delivery.

The inputs of VARIO amplifiers are equipped with a push-pull stage using GaAs technology. A GaAs line amplifier is also used in the output. This equipment ensures a very high dynamic range with low power consumption. The possibility of equalisation or interstage equalisation of incoming or
outgoing cable attenuation allows for further improvement of the maximum output level and linearity.

The VARIO 561 O, VARIO 662 O, VARIO 683 O and VARIO 684 O amplifiers can be flexibly configured for future multimedia cable networks:

- 2 outputs (second output can be activated using various junction cards, see “Technical data” section)
- Adjustment of local level conditions using adjustable attenuators and equalisers (pads)
- Distribution of investment costs by upgrading with diplex filters and return path modules as required
- Return path can be activated with a plug-in module
- All return path amplifiers are uninterrupted
- Equaliser and attenuator in the optional return path module

In order to use the device properly, you must carefully read the following safety and operating instructions.

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

Installation

Preparation:

Before you can install the device, you must first drill three holes in a vertical installation surface and insert wall plugs into the holes. For the required borehole spacing and diameters, please refer to the “Drilling distances” section, page 26.

The following describes how to install the device:

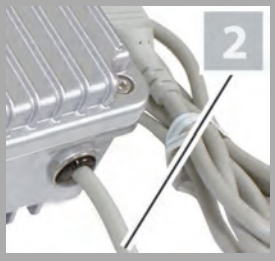
Task

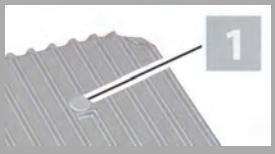
1. Place the back of the device against the installation surface so that its oblong holes are exactly above the two wall plugs. The connection sockets of the device must point downwards.
2. Now screw the device in place with screws that match the size of the wall plug.

Result:

The module is now installed and can be connected.

Connection





PREPARATION:

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.

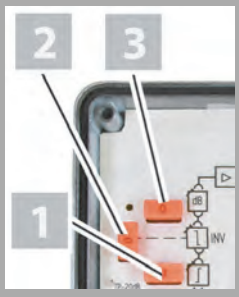
The following describes how to connect the amplifier and coaxial cables:

TASK

1. Plug the F connectors into the corresponding sockets of the amplifier (input [6] and output 1 [4] or output 2 [5], see picture above left) 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 [2] (see centre left).

RESULT:

The device is now ready for operation. The power indicator [1] (see picture bottom left) lights up.



Configuring the forward path

PREPARATION:

The VARIO 561 O, VARIO 662 O, VARIO 683 O and VARIO 684 O have an input equaliser and pad in the forward path to equalise incoming cable attenuation [1], as well as an inverse input equaliser and pad to simulate cable attenuation [2] (see above left). Input attenuation is also adjustable with a pad [3]. Make the desired adjustments here by inserting the corresponding pads.

Between the amplifier stages (interstage), you can also set a pre-equalisation of the outgoing cable length by reinserting the jumper [5] accordingly (see picture bottom left). For attenuation you can also insert a pad here [6].

The amplifier's default configuration is for forward-only operation:

- ☐ The return path is deactivated (two zero cards of type VZ 1001 inserted, no modules for return path transmission inserted).
- ☐ The second output is deactivated (one zero card of type VZ 1006 inserted); to activate the second output, you must replace the zero card with a junction card of type VZ... or a distributor of type VZ... (see "Technical data" section).
- ☐ The jumpers for setting the equalisation and attenuation in the forward path and the return path input attenuation are set to 0 dB.

ATTENTION: ***In cable networks that do not use a return path, the return path must remain deactivated.***

RESULT:

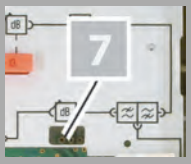
The device is now configured for the transmission of forward signals.

Configuring the return path

PREPARATION:

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

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

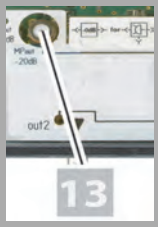


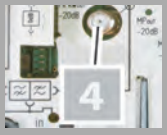
TASK

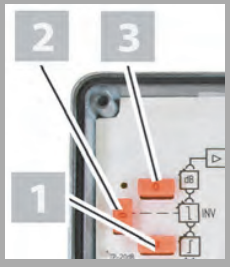
1. Replace each of the zero cards of type VZ 1001 in the input and output with a VD 33 or VD 65 diplex filter.
2. To set up a passive return path, insert the two previously removed zero cards into both return path slots [14] (see centre left).
3. To set up an active return path, insert one of the optionally available VR 411, VR 561, VR 661 or VR 761 return path modules (see “Technical data” section) into both return path slots.
4. Adjust the input attenuation in the return path by inserting the corresponding pad [7] (see bottom left).

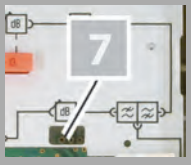
RESULT:

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









Measurements

The VARIO 561 O, VARIO 662 O, VARIO 683 O and VARIO 684 O amplifiers have 4 test sockets. At the input, there is a bidirectional test socket [16] (see picture left) with 20 dB decoupling attenuation, which you can use to measure the input level for the forward path and the output level for the return path.

At the output, there are two directionally coupled test sockets [9] with 20 dB decoupling attenuation.

- ☐ Using the test socket [13] (5...862 MHz), you can measure incoming return signals from the distribution direction or incoming upstream signals before the return path amplifier. You can also perform an error analysis in the distribution direction (e.g. feed in a reference signal).
- ☐ You can use the test socket [10] (47...862 MHz with diplex filter VD 33, or 80...862 MHz with diplex filter VD 65) to measure outgoing signals in the distribution direction and to feed in return signals. (VARIO 684: only 80...1000 MHz, since the VD 33 cannot be used)

Using a further directionally coupled test socket [4], you can measure the return signal after the return path amplifier but before the setting elements of the return path module.

Start-up

When you have connected the mains voltage and the coaxial cables, the device is ready for operation and the levels can be set. To set the levels, you must make the following adjustments to the device:

- ☐ Adjust the input level as needed by inserting the pad for the attenuator [3] in the forward path (see picture left). Equalise the cable attenuation in the forward path as needed by inserting the pad for the equalisers [1] and [2] (see left). The equaliser [1] allows you to run a cable attenuation simulation.
- ☐ Equalise the cable attenuation in the return path as needed by inserting the pad for the equaliser [7] in the return path (see left).

Troubleshooting

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

- ☐ 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.

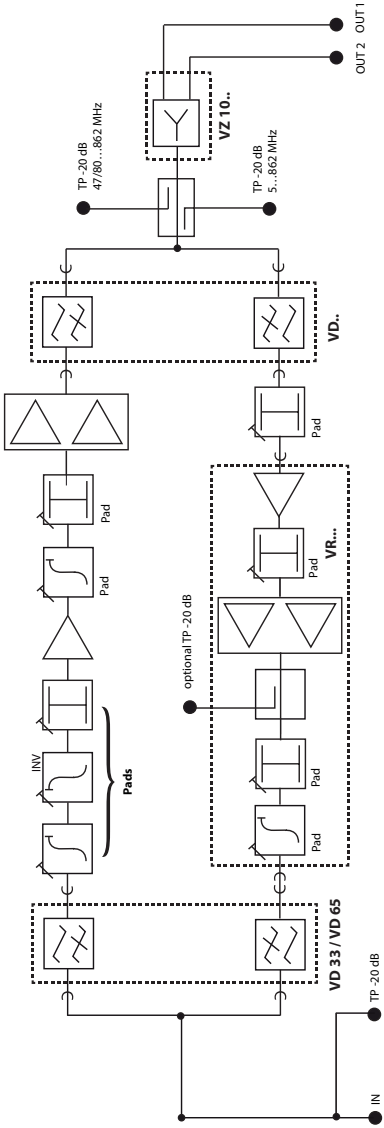
If the problem cannot be resolved, please contact ASTRO customer service.

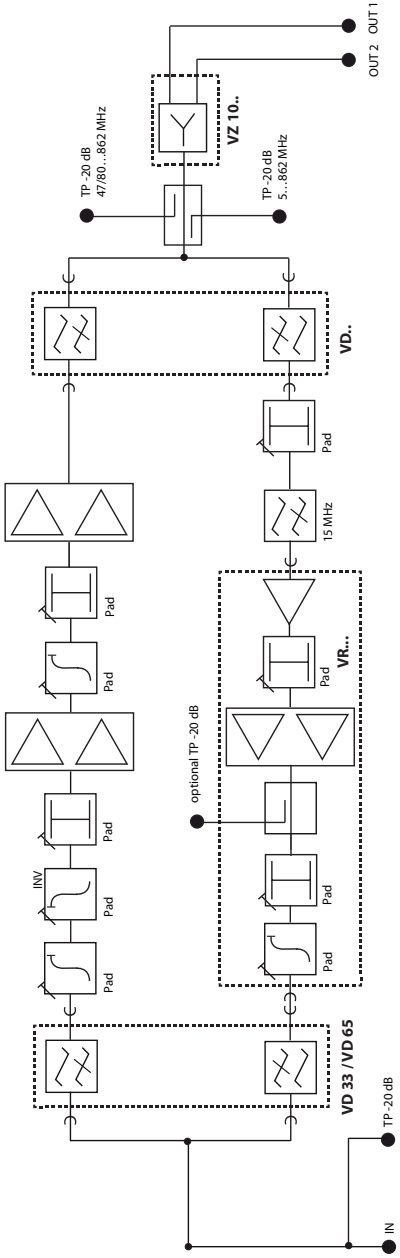
Maintenance and repair

ATTENTION: ***It is essential that the following safety infor-mation 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 diagrams




OUT 2
OUT 1
VZ 10..
TP -20 dB
47/80...862 MHz
TP -20 dB
5...862 MHz
VD..
Pad
15 MHz
VR...
Pad
optional TP -20 dB
Pad
Pad
Pad
INV
Pad
Pad
Pad
VD 33 /VD 65
TP -20 dB
IN

Technical data

Type		Vario 561 O	Vario 662 O
Order number		217 570	217 660
EAN-Code		4026187130398	4026187130459
Forward path			
Gain	[dB]	36 ± 0,8	36,5 ± 0,8
Frequency range	[MHz]	47 - 862	
Frequency flatness incl. temperature drift	[dB]	± 0,8	
Noise figure	[dB]	typ. 5 (± 0,5) / > 800 MHz: + 0,5 dB	
Attenuation (Input)	[dB]	0 - 20 (1 dB - steps)	
Attenuation (Interstage)	[dB]	0 - 7 (1 dB - steps)	
Equalizer (Input)	[dB]	0 - 20 (0,5 dB - steps)	
Equalizer (Interstage)	[dB]	0 - 10	
Base of equalizer	[MHz]	862	
Inverse Equalizer (Input)	[dB]	0 - 10 (0,5 dB - Schritte)	
Frequency base of inverse equalizer	[MHz]	47	
Tespoint (Input)	[dB]	Return path 20 ± 1 / Forward path 20 ± 2	
Testpoint (Output)	[dB]	20 ± 1 (directional coupling) 5 - 862 MHz	
Maximum output level			
42 Channels / linear	[dBµV]	110 (CTBA & CSOA ≥ 60 dB)	112 (CTBA & CSOA ≥ 60 dB)
42 Channels / 7 dB Slope	[dBµV]	112	114
Return path			
Frequency range	[MHz]	5 - 65 / 5 - 33	
Gain	[dB]	depends on return path module	
Diplex filter	[MHz]	5 - 33 / 47 - 862 (VD 33), 5 - 65 / 80 - 1000 (VD 65)	
Common data			
Power consumption with/without return path		17 / 16 W resp.. 28 / 24 VA	17 / 16 W resp. 29 / 24 VA
Connectors	[Ω]	F-jacks 75	
Supply voltage	[V~/Hz]	230 / 50	
Testpoints		4	
Ambient temperature	[°C]	-15...+55	
Housing (W x H x D)	[mm]	204 x 73 x 150	
Weight	[kg]	2.7	
Return loss	[dB]	≥ 18 (> 14 MHz -1,5 dB/Octave) In-/Outputs & Testpoints	
EMC		accord. EN 50083-2	
Protection class		IP 54, categorie 2 accord. DIN EN 60529	

Type		Vario 683 O	Vario 684 O
Order number		217 685	217 687
EAN-Code		4026187003067	4026187003081
Forward path			
Gain	[dB]	40 ± 0,8	40 ± 1 / > 862 MHz ± 1 dB
Frequency range	[MHz]	47 - 862	47 - 1006
Frequency flatness incl. temperature drift	[dB]	± 0,8	± 0,8 / > 862 MHz ± 1 dB
Noise figure	[dB]	typ. 5,5	typ. 5,5 / > 862 MHz: typ. 6
Attenuation (Input)	[dB]	0 - 20 (0,5 dB - steps)	
Attenuation (Interstage)	[dB]	0 - 7 (0,5 dB - steps)	
Equalizer (Input)	[dB]	0 - 20 (0,5 dB - steps)	
Equalizer (Interstage)	[dB]	0 - 10 (0,5 dB - steps)	
Base of equalizer	[MHz]	862	1006
Inverse Equalizer (Input)	[dB]	0 - 10 (0,5 dB - steps)	
Frequency base of inverse equalizer	[MHz]	47	
Tespoint (Input)	[dB]	Return path 20 ± 1 / Forward path 20 ± 2	
Testpoint (Output)	[dB]	20 ± 1 (directional coupling) 5 - 862 MHz	
Maximum output level			
42 Channels / linear	[dBµV]	113 (CTBA & CSOA ≥ 60 dB)	
42 Channels / 7 dB Slope	[dBµV]	115	
Return path			
Frequency range	[MHz]	5 - 65 / 5 - 33	
Gain	[dB]	depends on return path module	
Diplex filter	[MHz]	5 - 33 / 47 - 862 (VD 33), 5 - 65 / 80 - 1000 (VD 65)	
Common data			
Power consumption with/without return path		18 / 16 W; 35 / 32 VA	
Connectors	[Ω]	F-jacks 75	
Supply voltage	[V~/Hz]	230 / 50	
Testpoints		4	
Ambient temperature	[°C]	-15...+55	
Housing (W x H x D)	[mm]	204 x 73 x 150	
Weight	[kg]	2.7	
Return loss	[dB]	≥ 18 (> 14 MHz -1,5 dB/Octave) In-/Outputs & Testpoints	
EMC		accord. EN 50083-2	
Protection class		IP 54, categorie 2 accord. DIN EN 60529	

VR return path modules:

Typ		VR 411	VR 561	VR 661	VR 761
Bestellnummer		216 401	216 561	216 661	216 761
Frequenzbereich	[MHz]	5 - 65			
Verstärkung	[dB]	14 / 11	22 / 17	27 / 24 / 21	32 / 29 / 26
Ausgangspegel 60dB IMA2 / KMA	[dBµV]	105 / 116	117 / 116	117 / 116	117 / 116
Rauschmaß	[dB]	4.5			

Junction cards

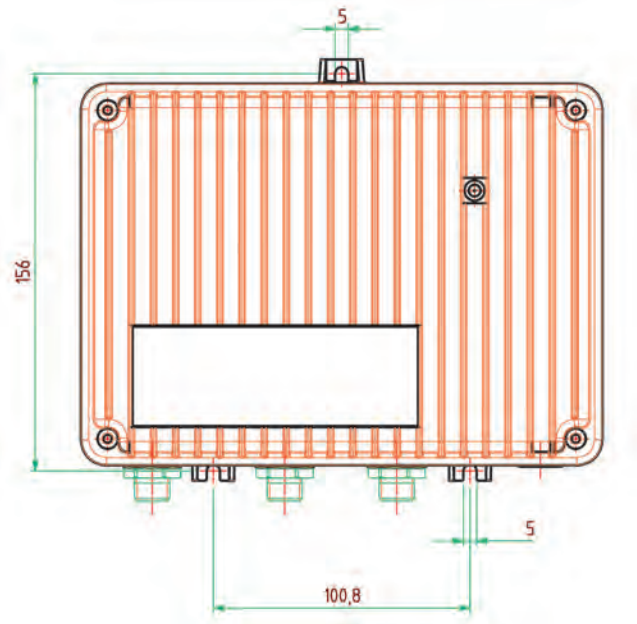
Typ	VZ 1021	VZ 1012	VZ 1013	VZ 1014
Bestellnummer	416 030	416 006	416 007	416 008
Funktion	Abzweiger	Abzweiger	Abzweiger	Abzweiger
Dämpfung	- 7 dB	- 10 dB	- 15 dB	- 18 dB
Frequenzbereich	5 - 1000 MHz			

Zero cards, junction cards and diplex filters:

Typ	VZ 1001	VZ 1006	VZ 1007	VD 33	VD 65
Bestellnummer	216 278	416 001	416 002	216 653	216 652
Funktion	Nullkarte passiv-Rückweg	Nullkarte 1 Ausgang	Verteiler 2-fach	Dipflexfilter	Dipflexfilter
Frequenzbereich	-	-	5 - 1000 MHz	5 - 33 MHz / 47 - 862	5 - 65 MHz / 80 - 1000

Only the VD 65 diplex filter can be used with the VARIO 684.

Drilling distances



ASTRO Strobel Kommunikationssysteme GmbH

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