ADAMCZEWSKI
Elektronische Messtechnik GmbH

Indicating / Operating Module

AD-VarioControl
AD-VarioConnect

Operating Instructions



Version 1.7, Date 12.11.2021

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1 About this operating manual

This manual is part of the product.

- Read the operating instructions thoroughly before using the appliance.
- Keep the operating instructions for the entire life of the product and keep them ready for reference.
- Refer to the manual for each subsequent owner or user of the product.

1.1 Structure of warnings

WARNING



Warning Note
Please refer to the documentation. This symbol is intended to warn you of possible dangers that may occur during installation, commissioning and use.

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2 Notes on safety

2.1 Designated usage

WARNING



Damage to property

The conditions for operation, maintenance and repair stipulated in these operating instructions must be strictly adhered to.

The AD-VarioControl / AD-VarioConnect is designated for putting on a hat rail device with appropriate interface.

The AD-VarioControl / AD-VarioConnect has a connection for the supply voltage and is supplied with a voltage of 5 V DC.

Another usage is not according to designation! Unauthorised modifications and alterations at the product result in considerable safety risks and are prohibited for reasons of safety! Adamczewski Elektronische Messtechnik GmbH do not accept any liability for damages resulting from this, or for damages arising from usage not according to designation.

Malfunctions, which can impair the safety, must be eliminated immediately! Access to the operating instructions for the operator must be ensured by the installer. The installer and the operator must have read and understood the operating instructions prior to begin of their work.

2.2 Predictable incorrect usage

This product must not be used especially in the following cases:

- In explosion endangered environment. During operation in explosion endangered areas, sparking can lead to deflagration, fire or explosion.
- Application on persons or animals.

2.3 Safe handling

This product is according to the state of technology and the recognised safety-technical regulations. Each device is checked as to function and safety prior to delivery.
Operate this product only in satisfactory condition with observation of the operating instructions, the usual regulations and guidelines as well as the valid safety regulations and the regulations for the prevention of accidents.

Extreme ambient conditions impair the function of the product.

- protect the product against jolts

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- use the product only in internal rooms
- protect the product against damp

2.4 Qualifications of personnel

Assembly, commissioning, operation, maintenance, decommissioning and disposal must only be carried out by subject-specific qualified personnel. Work at electrical parts must only be carried out by a trained electrician in accordance with the valid regulations and guidelines.

2.5 Alterations at the product

Unauthorised alterations at the product can lead to malfunctions and are prohibited for reasons of safety.

2.6 Usage of spare parts and accessories

The product can be damaged through using unsuitable spare parts or accessories. Please only use original spare parts and original accessories of the manufacturer.

2.7 Notes on liability

The manufacturer does not accept liability of any kind or warranty for damages and consequential damages arising from non-observation of the technical regulations, instructions and recommendations. The manufacturer and the distribution company are not liable for costs or damages, which arise for the user or third parties through the application of this device, especially by improper usage of the device, misuse or malfunctions of the connection, malfunction of the device and of the connected devices. Neither the manufacturer nor the distribution company are liable for not designated usage.

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3 Description

The removable control device AD-VarioControl is used to display measured values of a base device (transmitter, isolation amplifiers ...) of the design GVD with a relevant interface. After plugging in, which is also possible during operation of the base device without restrictions, the basic device is automatically read out and the corresponding measured value is displayed. In addition to the display function, (access) to the parameters and controller functions of the basic device is also possible. The parameter settings can be loaded into the control panel using the backup function and can be restored on a different base device of the same type.

Establishment of a transmitter is usually necessary only once in the operating period of a device, therefore a display and operating elements are not permanently necessary for each device. By using the AD-VarioControl in connection with compatible basic equipment, operating elements and displays on each individual device can be dispensed with. This way, the installed devices are tamper-proof and more cost-effective.

3.1 Delivery

- AD-VarioControl
- Operating Instructions

3.2 Characteristics

- Indicating / Operating Module
- Removeable (Hot-plugged)
- Store and restore of parameters
- LCD for display of different operating modes, lit in several colours (R/Y/B)
- Menu languages switchable to: german, english

3.3 Order number

AD-VarioControl

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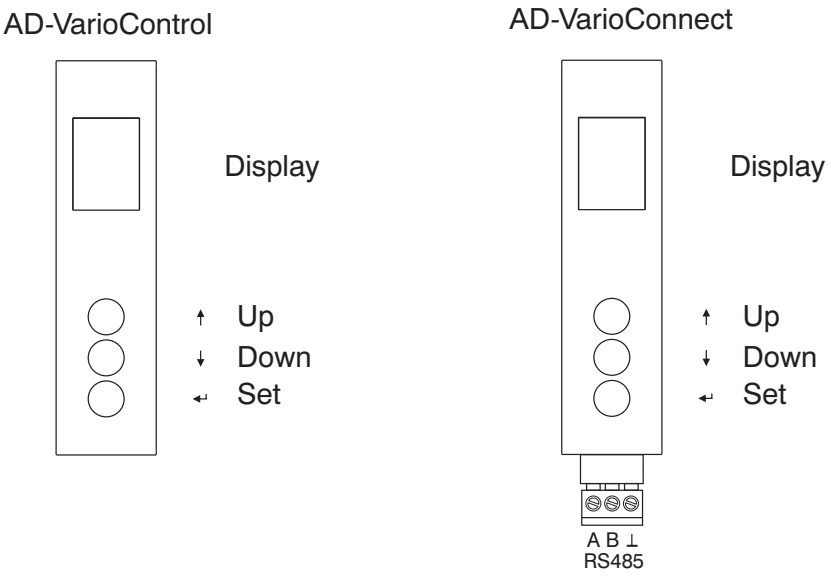
3.4 Display and control elements



The operating module AD-VarioControl has a color-coded LCD display for data display and three buttons for operation and configuration. If the basic unit is installed "upside down", the display can be rotated in the Options/Display menu. The keys are rotated accordingly.

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4 Technische Daten

4.1 Display

Description	Value
Type	LCD graphic
Dimensions (WxH)	18x13 mm
Resolution	42X56 Pixel
Lighting	RGB

4.2 Operation

Description	Value
Type	3 short-stroke keys

4.3 RS485 Bus (Varioconnect)

Description	Value
Protocol	Modbus-RTU
Data format (default)	19200, e, 8, 1
Max. bus users	32
Bus termination	120 ohms both sides at the end
Max. length of bus	500 m (no stubs)
Cable	twisted and shielded

4.4 Supply

Description	Value
Supply voltage	5 DC
Max. power consumption	0,2 W

4.5 Housing

Description	Value
Dimensions (WxHxD)	20x86x14 mm
Dimensions with clamp	20x95x14 mm
Type of protection	IP 20
Weight	20 g

4.6 Environmental conditions

Description	Value
Ambient temperature	0 ... 50 °C
Storage and transport	-10 ... 70 °C (no condensation)

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4.7 EMC

Description	Value
Product family standard	EN 61326
Emitted interference	EN 55011, CISPR11 Cl. B

4.8 Electrical safety requirements

Description	Value
Product family standard	EN 61010-1

4.9

Description	Value
	1,5 kV

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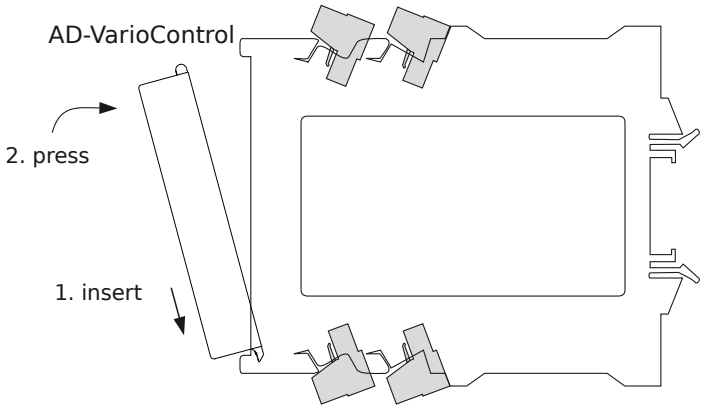
5 Assembly and commissioning

The operating module AD-VarioControl can be put on and taken off during operation of the basic device.

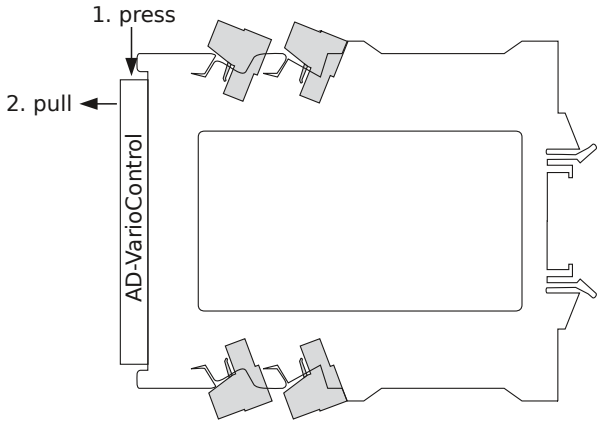
5.1 Commissioning the device

Put the operating module onto the front of the basic device. During this, the bottom guide hooks are pushed into the guide rails provided for this (1) and the upper side is engaged through pressure on the operating module (2).
Remove the protective foil at the front.



5.2 Removing the device

Exert pressure down at the top of the operating module (1) and at the same time pull it out to the front (2).



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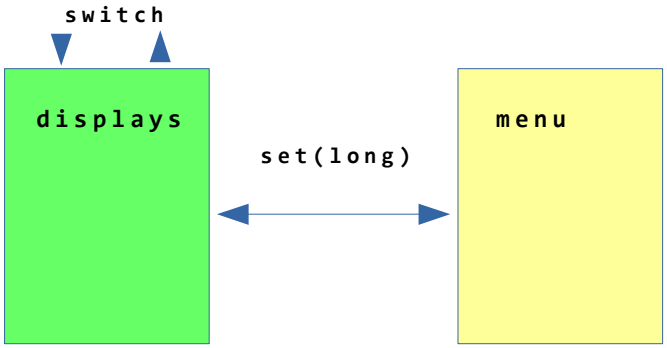
6 Operation

In principle, there are operating modes *displays*, *menu* and *simulation*. After switch-on, the AD-VarioControl is always in display mode.

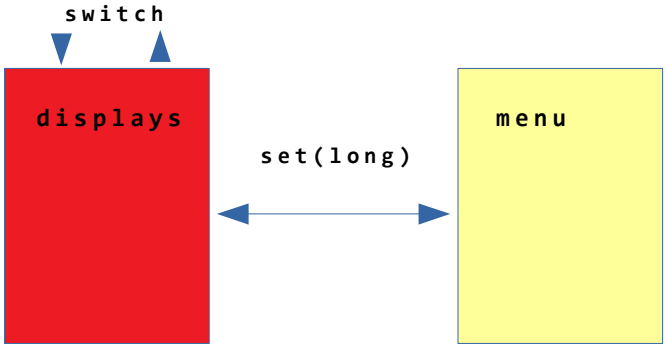
6.1 Displays

From display mode you will get to the menu by a long depression of the key 'Set'. In the menu, you will get back to display mode also by a long depression of the key 'Set' or by selecting '<<' in the main menu.

The displays depend on the basic device. These can be switched over rotary during operation *displays* with the keys 'Up' and 'Down'.



The display turns red when a fault signal from the basic unit, e.g. when the sensor wire breaks.



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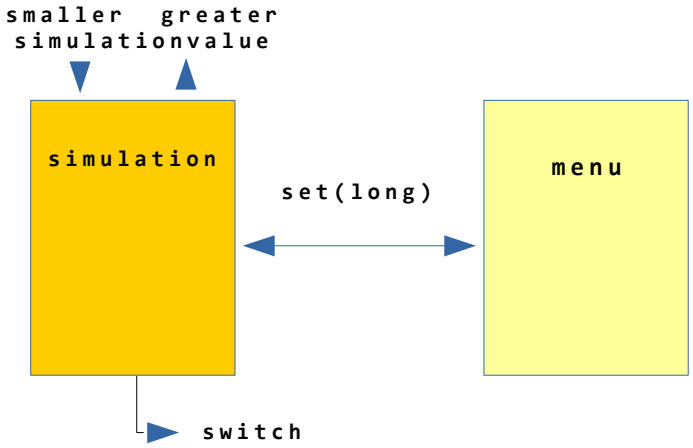
6.2 Simulation

You will get to operation mode simulation through setting the relevant parameter in menu *temporary* or *constant*. The input is sumulated, on starting a simulation, the current measuring value is applied. During this, the display lighting is orange. the simulation ends after approx. 3 minutes in temporary mode, by removing the operating module and by interrupting the auxilliary voltage. The limits are determined by the range parameter of the relevant basic device.

During simulation, the key 'Up' increases the value by the simulatin delta set in the parameter, the key 'Down' reduces this value. A long depression (aprox. 3 s) of the key 'Up' or 'Down' starts the automatic simulation in the relevant direction. During this, this simulation value changes after the set simulation time. On reaching the scale end, the direction is changed.



6.3 Menu

The device parameter for the AD-VarioControl as well as for the basic device can be changed in the menu. The basic device is hereinafter the separation amplifier AD -TV 400 GVD. The display lighting is green, when changing to the menu, the display lighting switches to yellow. With the keys 'Up' und 'Down' you can navigate up and down in the menu tree. Through pressing the key 'Set' the chosen element is selected. This can be a parameter, a further sub-menu or also a device function such as the contrast setting. With a long depression of the key 'Set' or no input for approx. three minutes you will return to the display mode.

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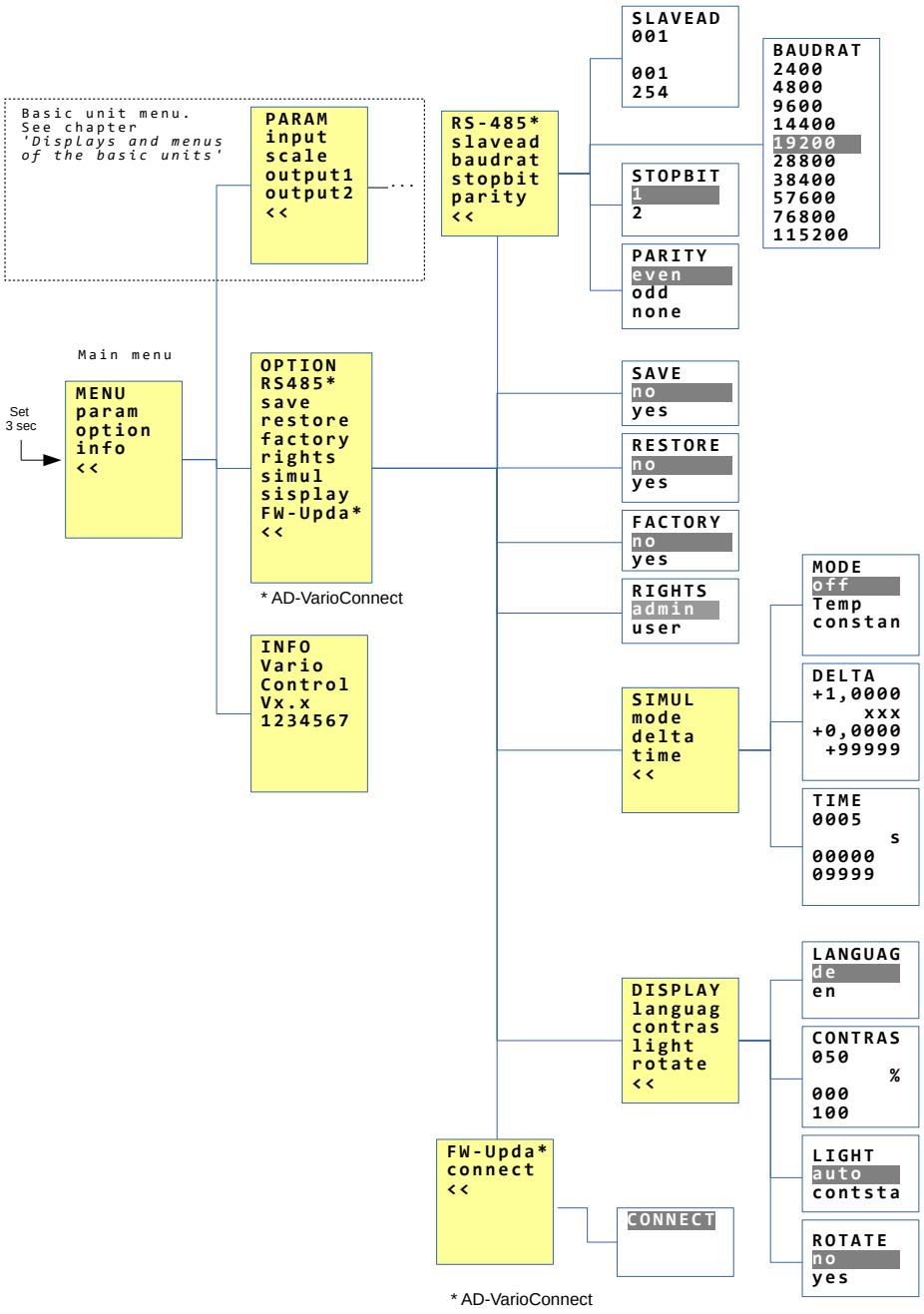
6.3.1 Menu tree



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6.3.2 Main menu

- **TV400** Name of the basic device. Here it is branched to the menu of the basic device (see chapter 7).
- **PARAM** Here are functions located to store the parameter of the basic device to the AD-VarioControl and to restore them. Furthermore, there are menu items for works setting and for the parameter rights of the basic device.
- **SIMUL** Here the settings for the simulatin of the AD-VarioControl are located.
- **OPTION** Settings for language, contrast and background lighting (light) for the AD-VarioControl .
- **INFO** Information about the AD-VarioControl such as firmware version and serial number.

6.4 Configuration

Parameter, which can be altered, are displayed white in the menu. A value can be altered with the keys 'Up' and 'Down' and confirmed with the key 'Set'. With a range parameter, the begin value is initially inputted, after confirmation with 'Set' the end value is inputted. Altered paramter are immediately effective. A long depression of the key 'Set' cancels the input, the altered values are not applied. If no input occurs for approx. three minutes, the configuration is exited.
Alteration of the parameter can be locked with a write protection (PARAM / rights / 'user').

```
FILTER      - parameter name
+2,0000     - value
      s     - unti

+0,0000     - minimal value
+9999,0     - maximal value
Admin       - user
```

6.5 Transmission of the Configuration

The set parameters of a basic unit, such as the AD-TV 420 GVD, can be set to a further AD-TV 420 GVD will be transmitted. Using the menu item Option/Save the parameters can be saved to the AD-VarioControl / AD-VarioConnect. Via Option/Restore these are transferred to the new basic device. The prerequisite is except the same basic device the same firmware.

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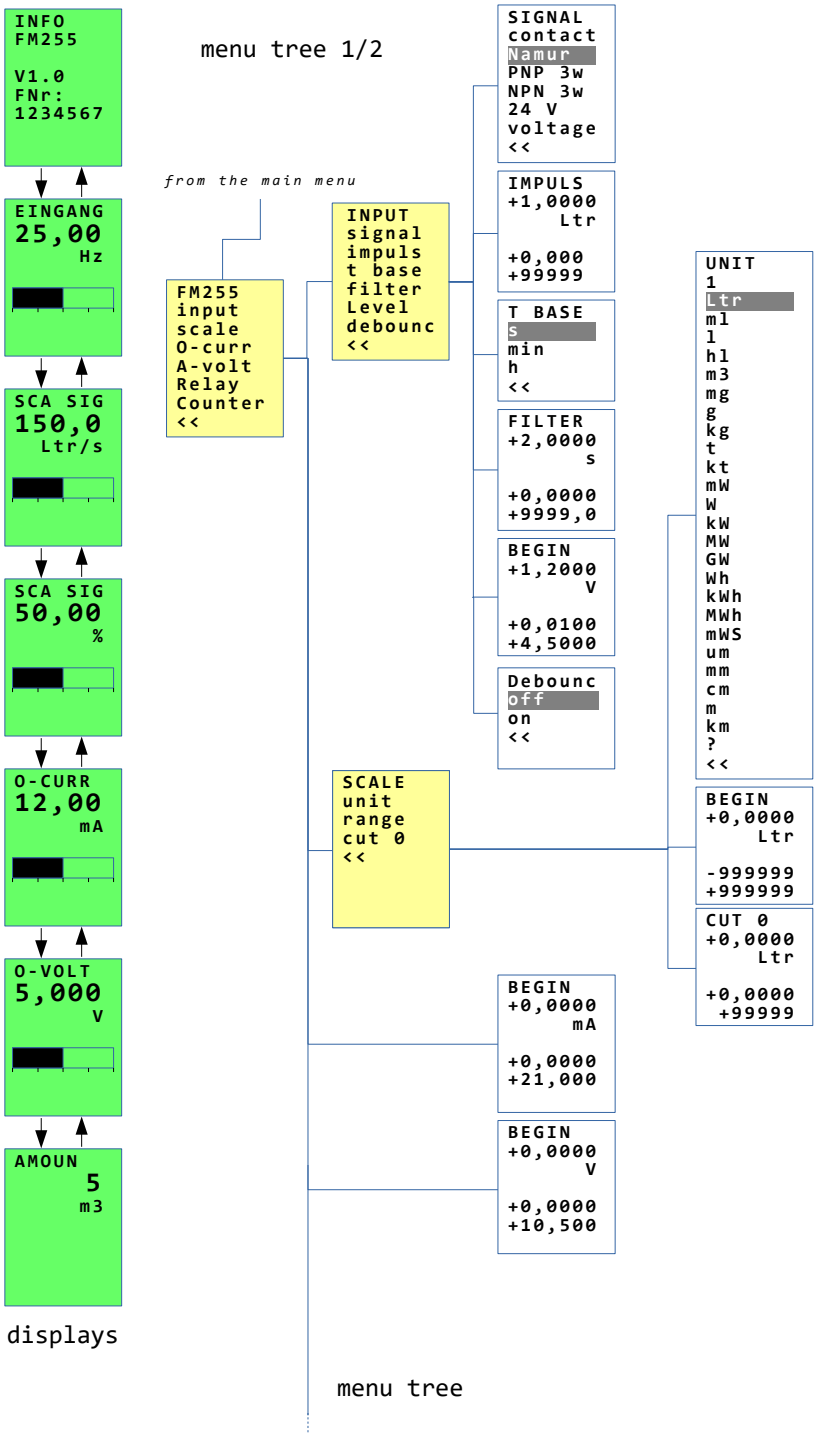
7 Base devices

7.1 AD-FM 255 GVD Frequency analog converter



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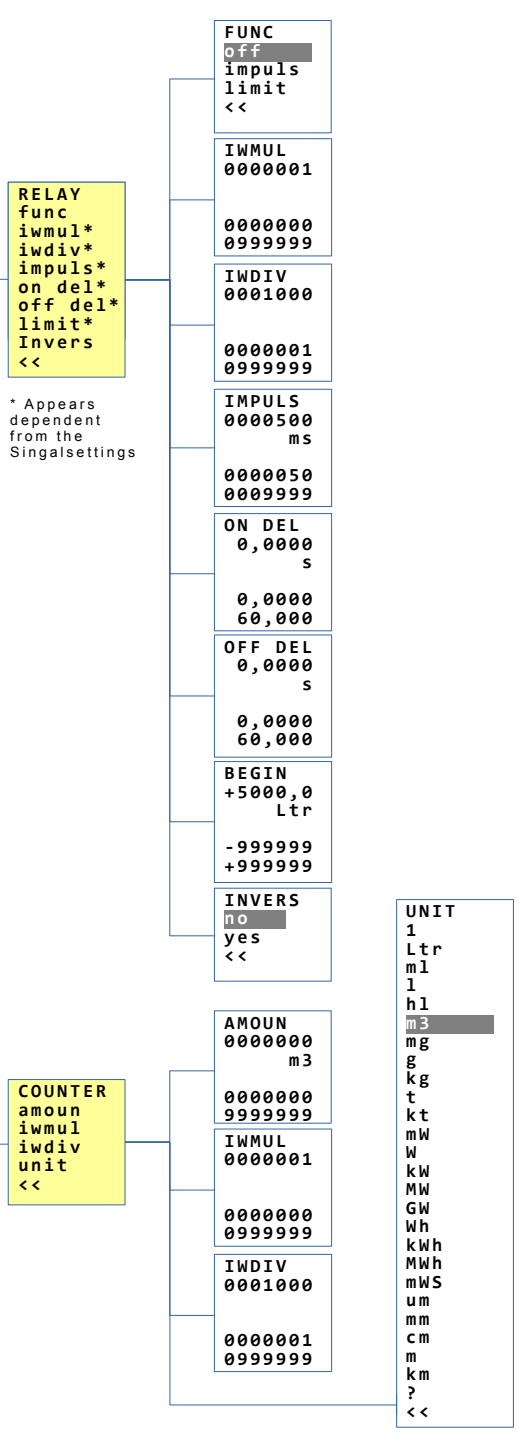
menu tree 2/2



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7.1.1 Commissioning / Quick start guide

The device is set up according to the following grouping:

1. Signal selection
2. Scaling
3. Analog output
4. Relay functions
5. Counter

Required minimum specifications for device setup:

- Input signal selection of the electrical signal (Contact, NAMUR, 24V)
- Pulse value for ONE input pulse (for example 1 Pulse = X Liter)
- Defining the time base [s], [min], [h] (for pulses per unit time)
- Scaling end value per time unit (corresponds to 100 % of the analogue output)
- Analog outputs (only when used) start, end value in milliampere and volt
- Relay functions (only when used)

- Limit (on, off value) as a scaled size
- Pulse function (factor/divider)
  Example: Input pulse = 1 Liter, factor = 1, divider = 1000
  This results in a **cubic meter impulse = (input pulse x factor)/divider**

Optional information when setting up the device:

- Filter in seconds (linear time function from 0...100 % of the scaling area)
- Scaling unit, list selection for the display (for example Ltr, m3 etc.)
- Creep value, if undershot, the analogue output is set to 0%
- Counter display and unit (quantity counter, see pulse function setup)
- Relay (on/off delay times, inverse function)

In operating mode, folende representations can be selected:

- Device information about the firmware
- Frequency display in Hz (physical input signal)
- Scaled signal (according to start and end range value)
- Percentage scale signal (according to start and end range value)
- Analog output, current output (calculated setpoint in milliampere)
- Analog output, voltage output (calculated setpoint in volt)
- Counter (for the display of counted quantities)

7.1.2 Status line / Symbols

The display line provides various status information in operating mode:

*****	Input pulse signal (also static)
I	Output pulse signal (relay contact)
i	Output pulse signal (relay contact), inverse function
G	Limit state (relay contact)
g	Limit state (relay contact), inverse function
▼	Creep value undershot
S	Device in simulation mode
Underfl	Underflow, input signal
Overfl	Exceeded, input signal

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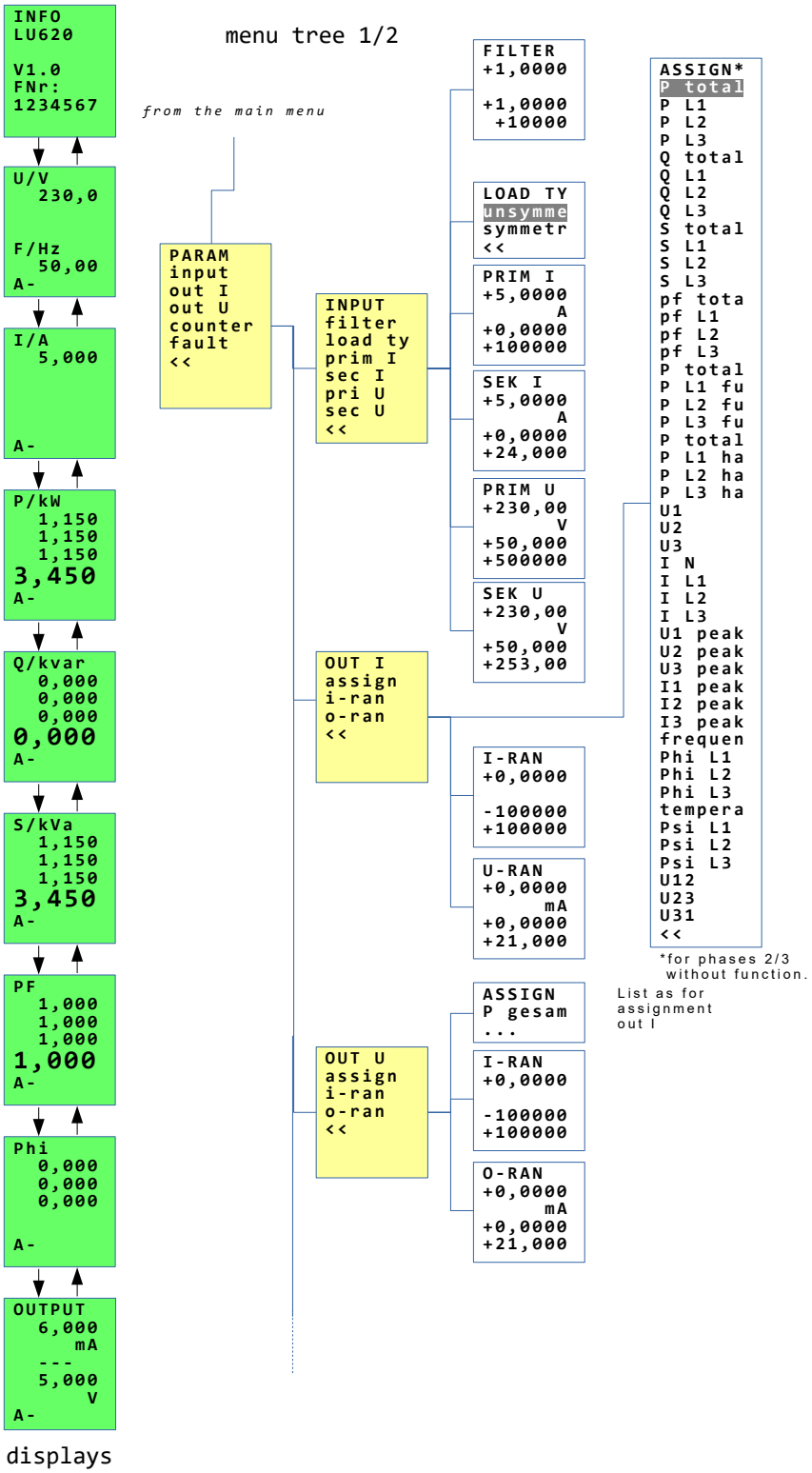
7.2 AD-LU 320 GVD / AD-LU 325 GVD Power-meter



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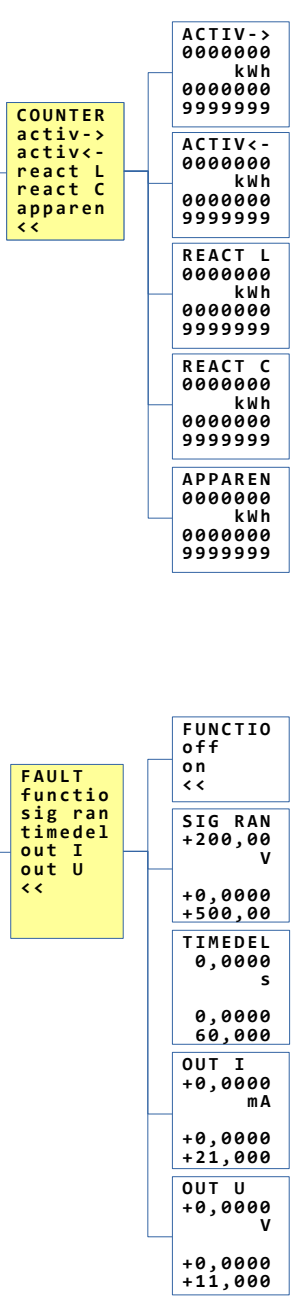
menu tree 2/2



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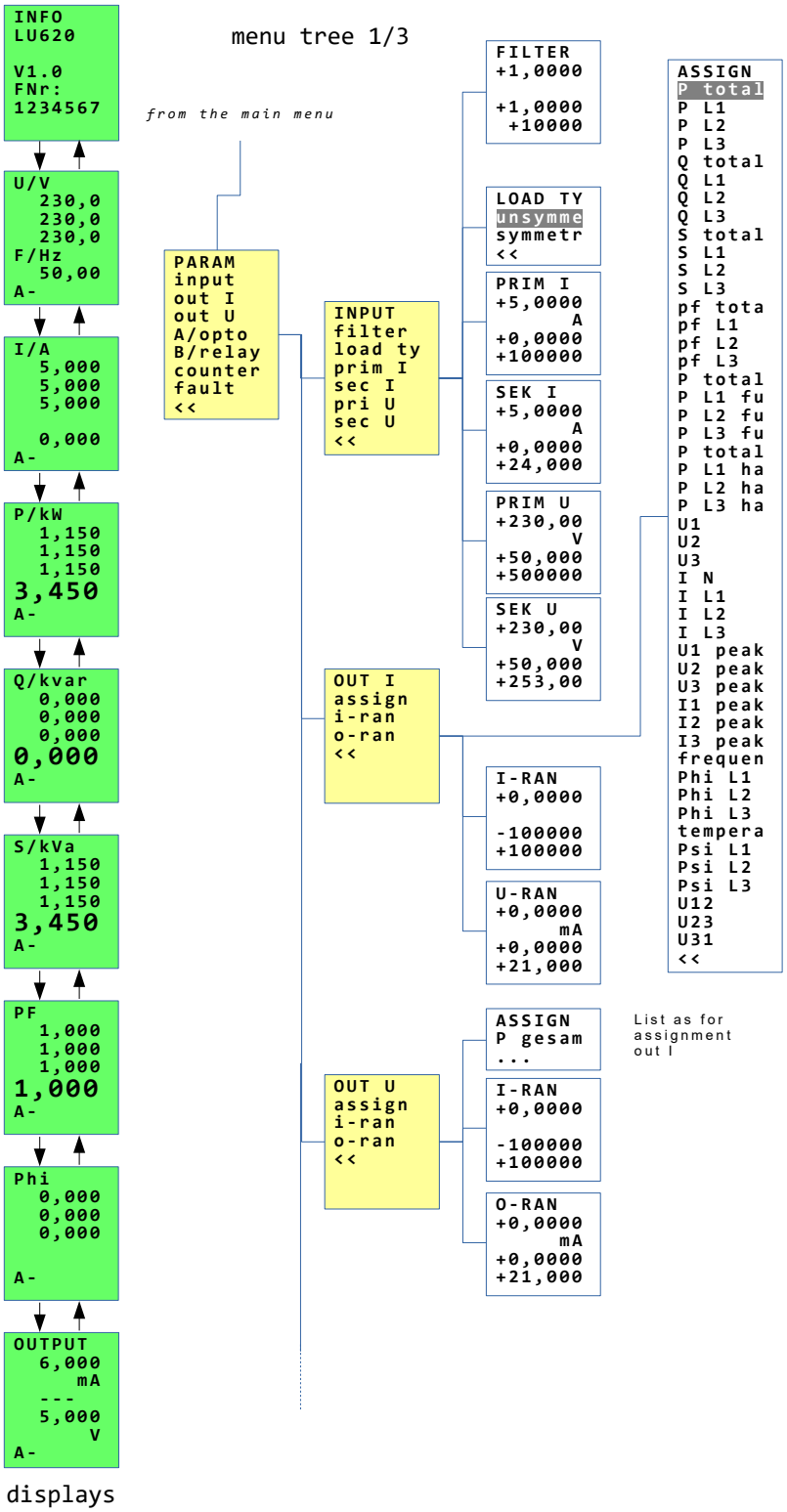
7.3 AD-LU 620 GVF / AD-LU 625 GVF Power-meter



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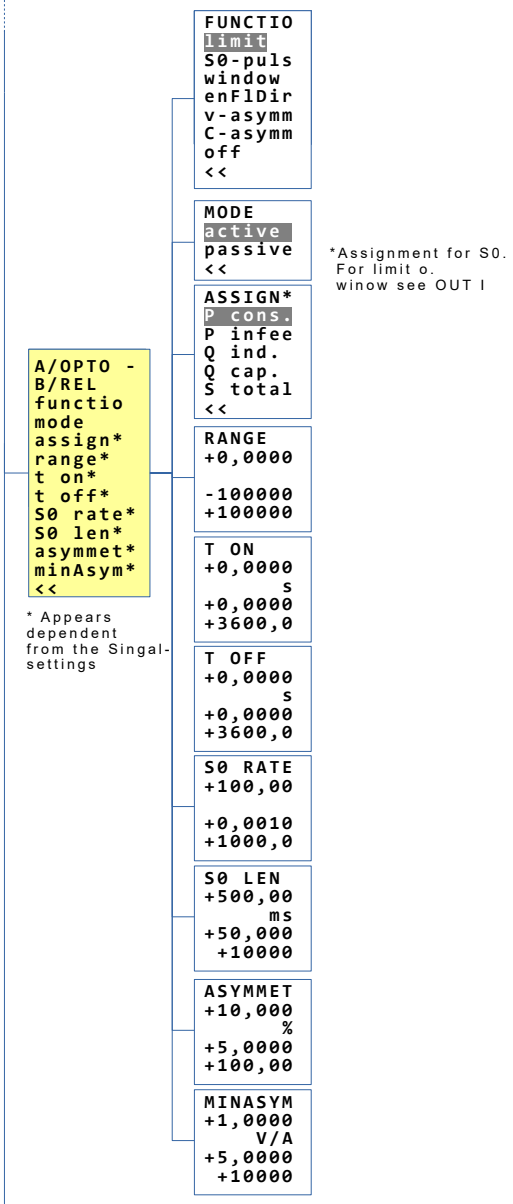
menu tree 2/3



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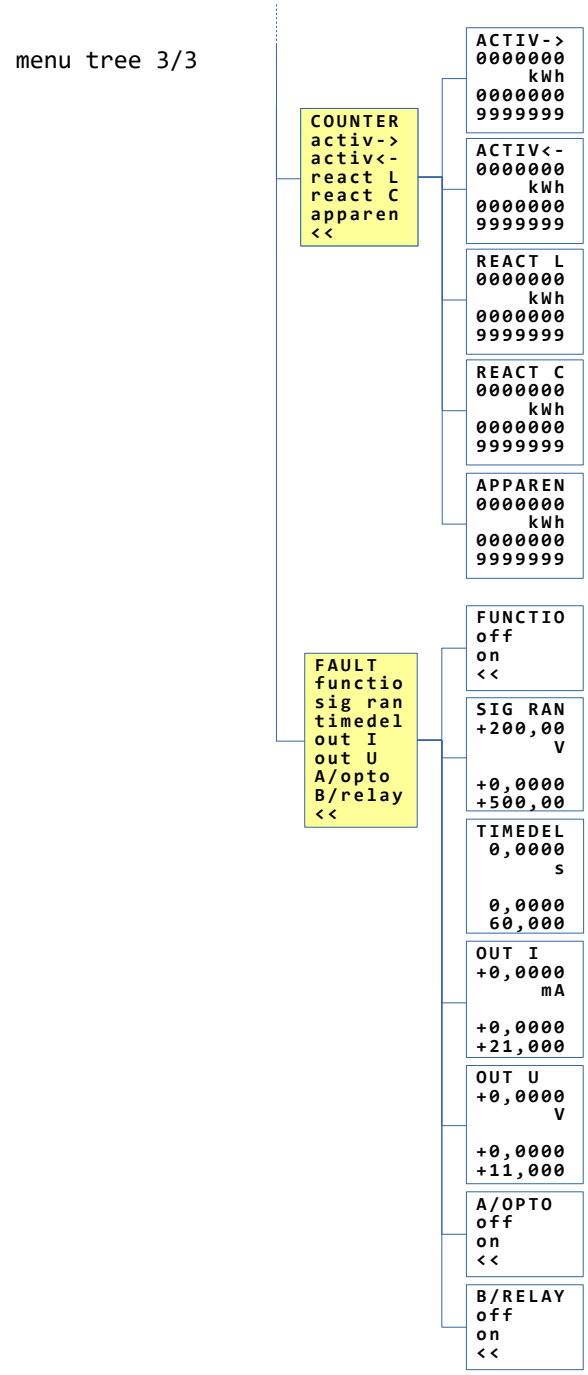
menu tree 3/3



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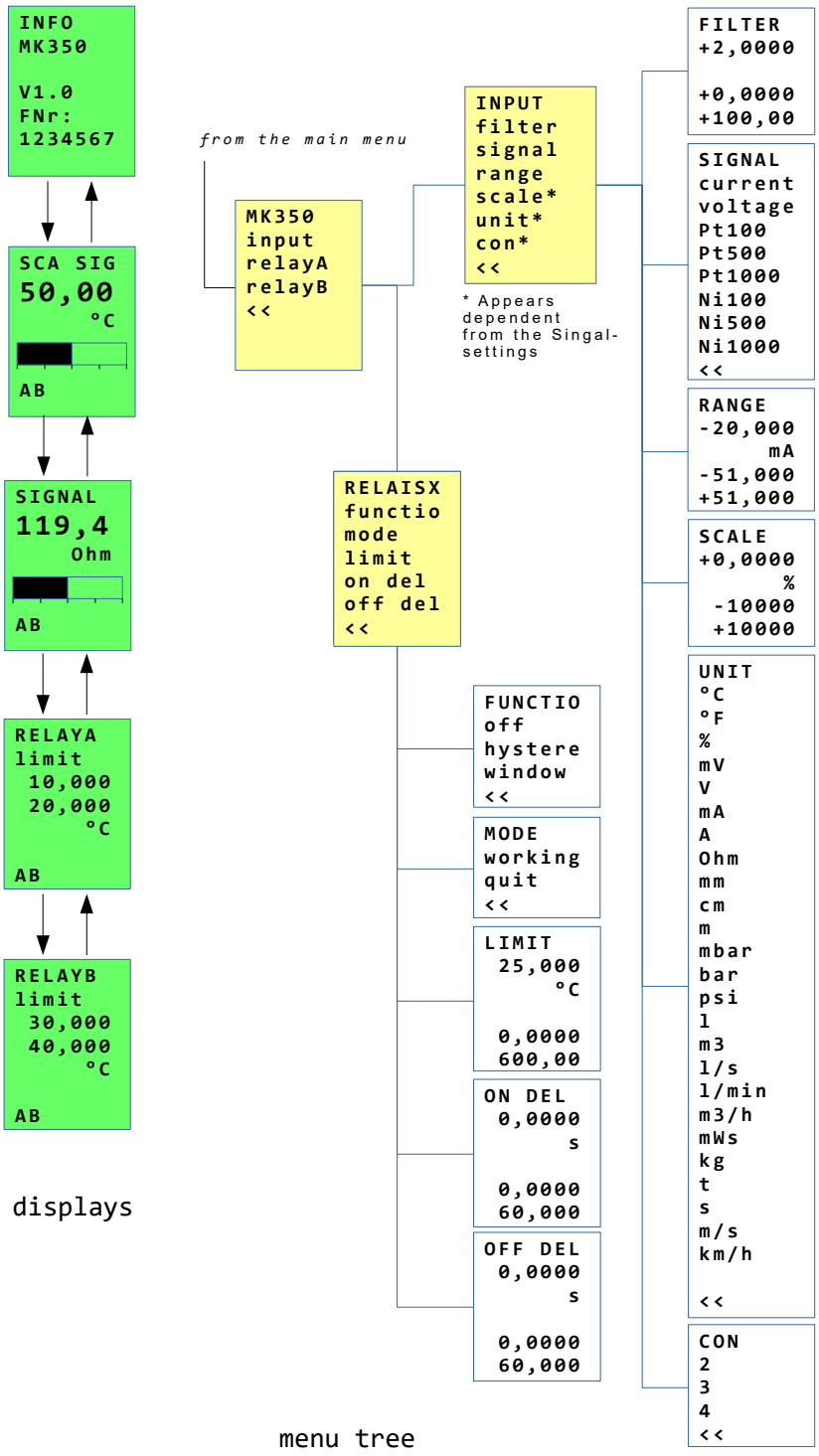
7.4 AD-MK 350 GVD Vario - limit switch



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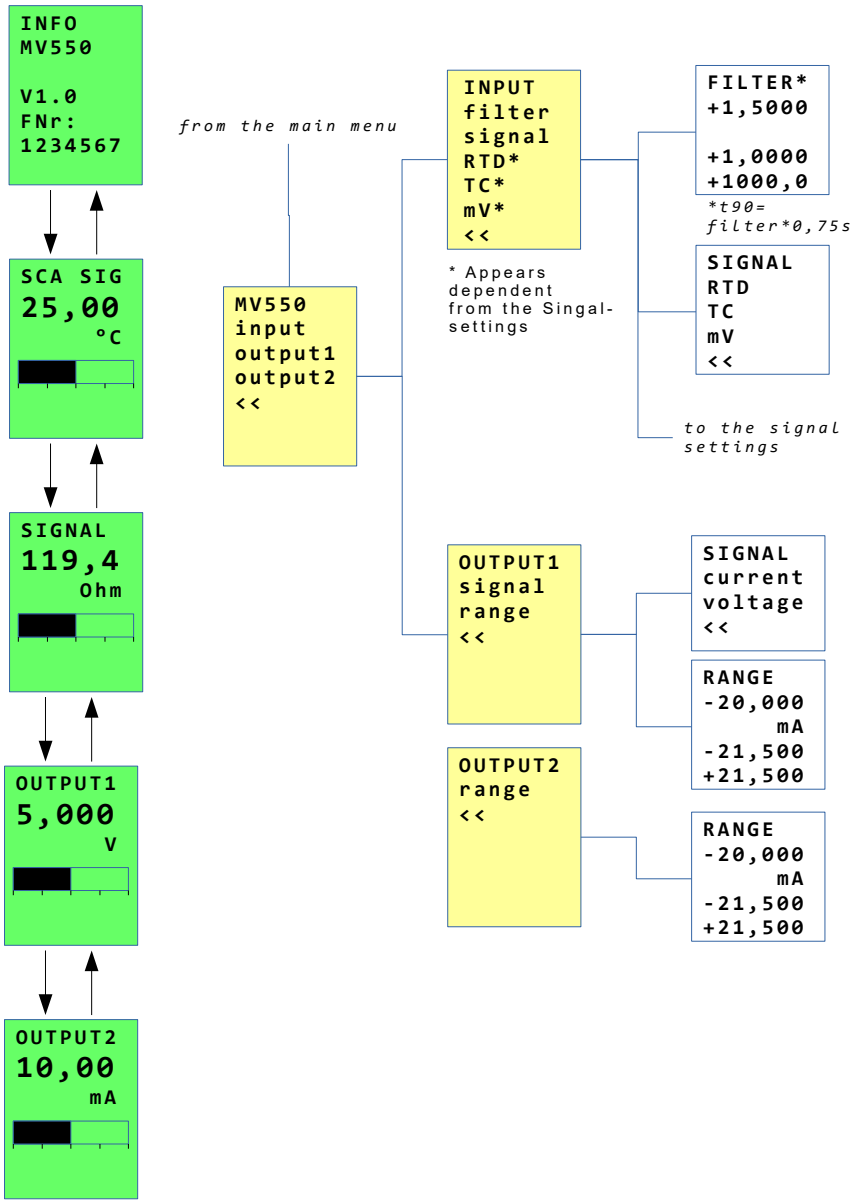
7.5 AD-MV 550 GVD Temperture-converter



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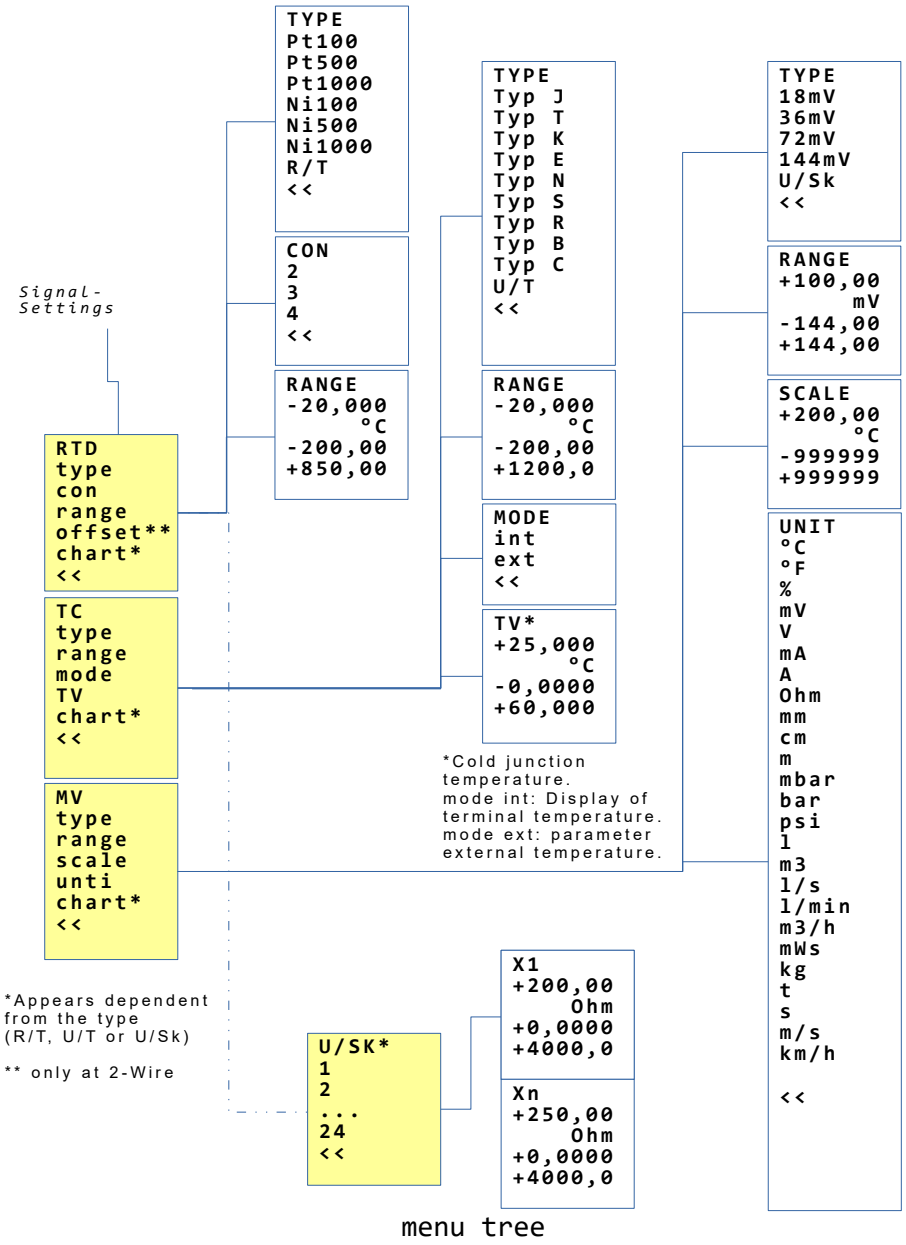

menu tree

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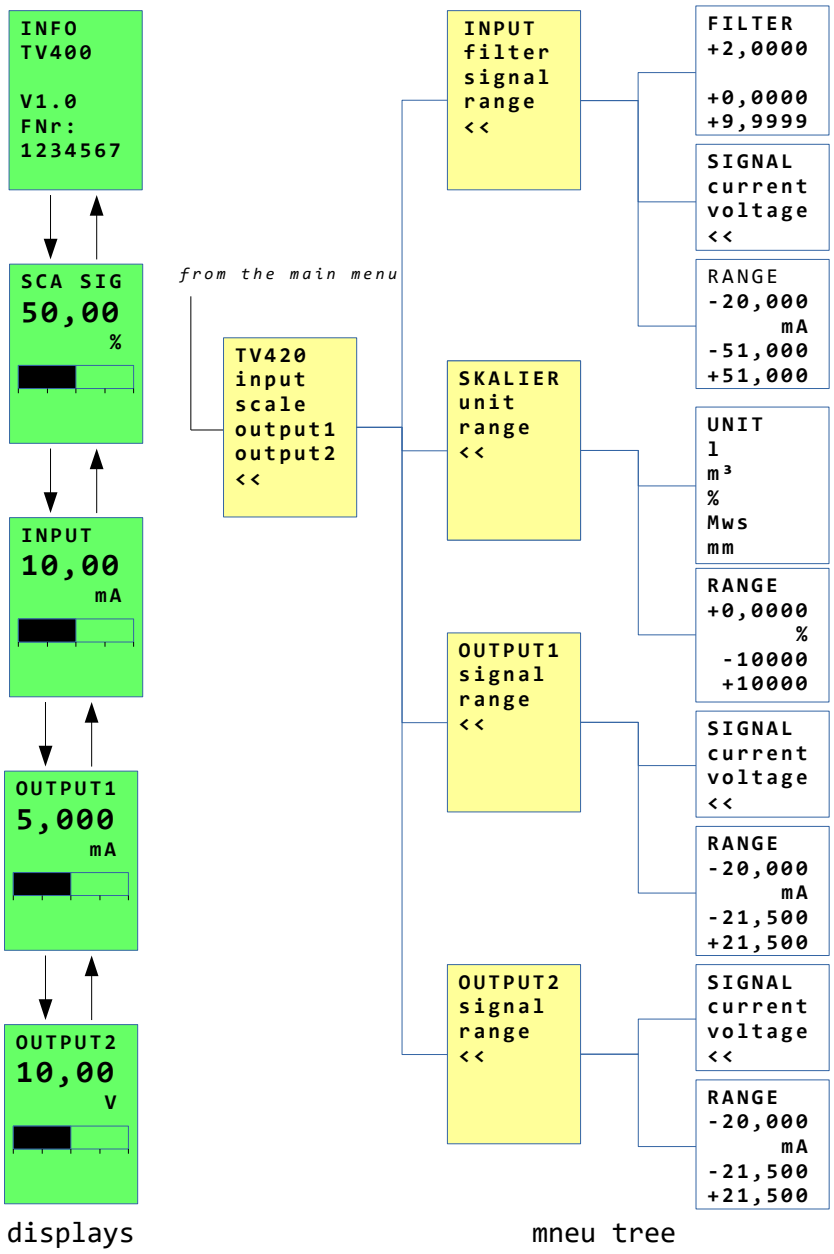
7.6 AD-TV 400 GVD Isolation amplifier



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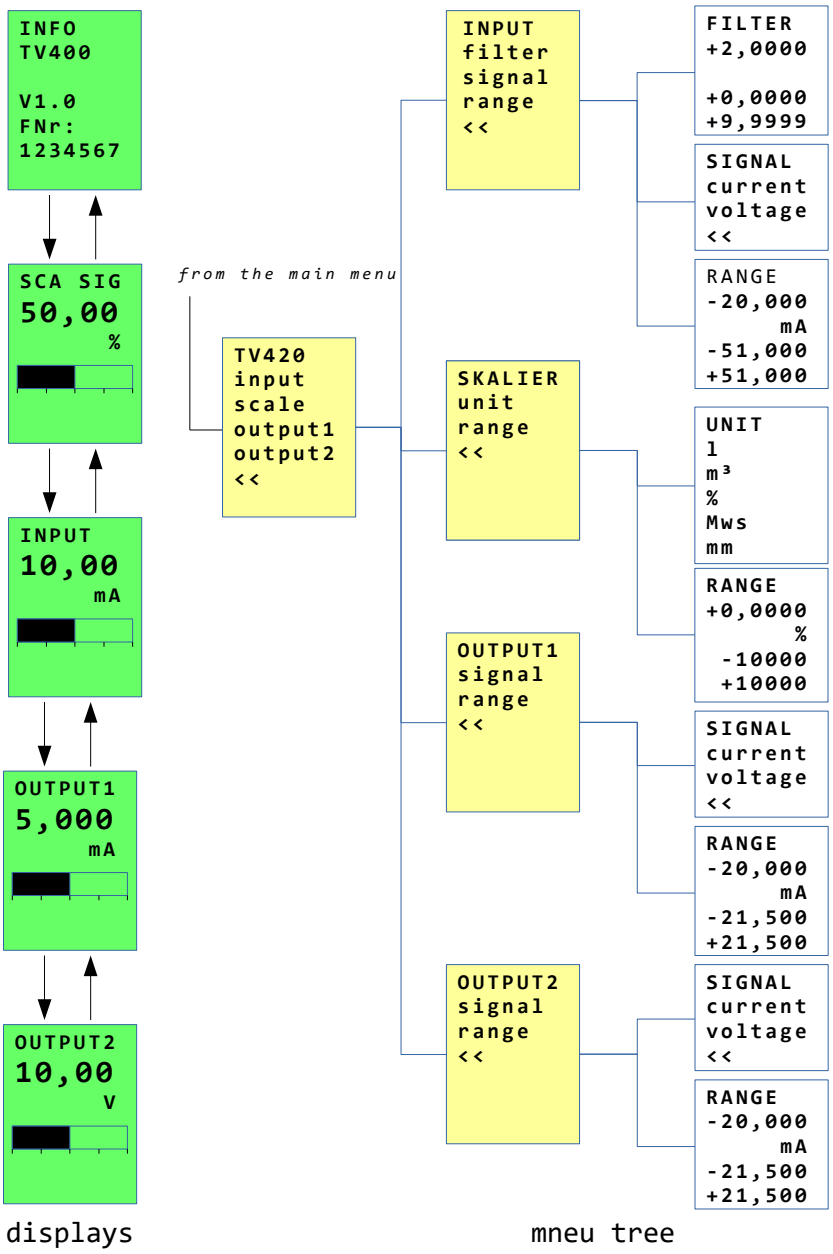
7.7 AD-TV 420 GVD Isolation amplifier



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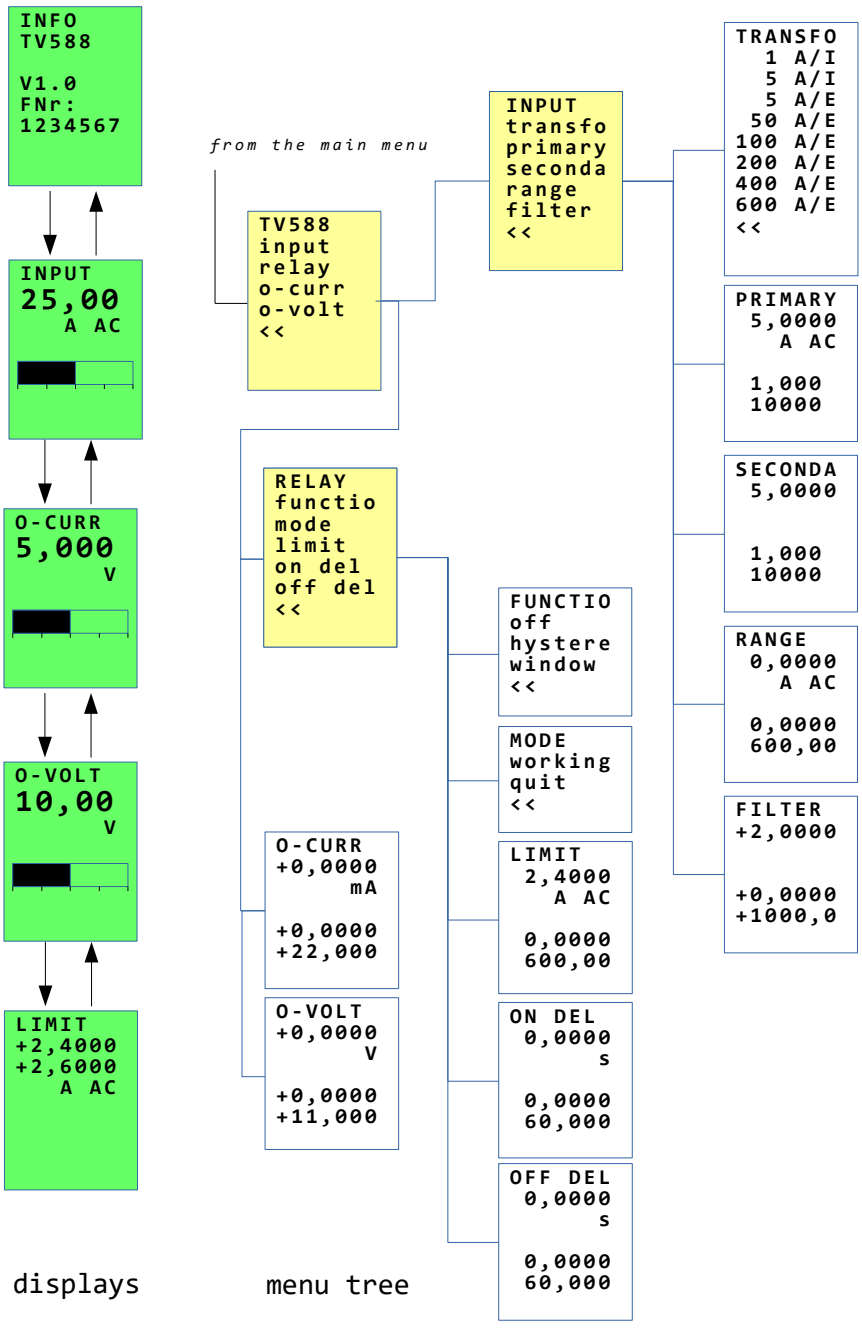
7.8 AD-TV 588 GVD AC-isolation amplifier



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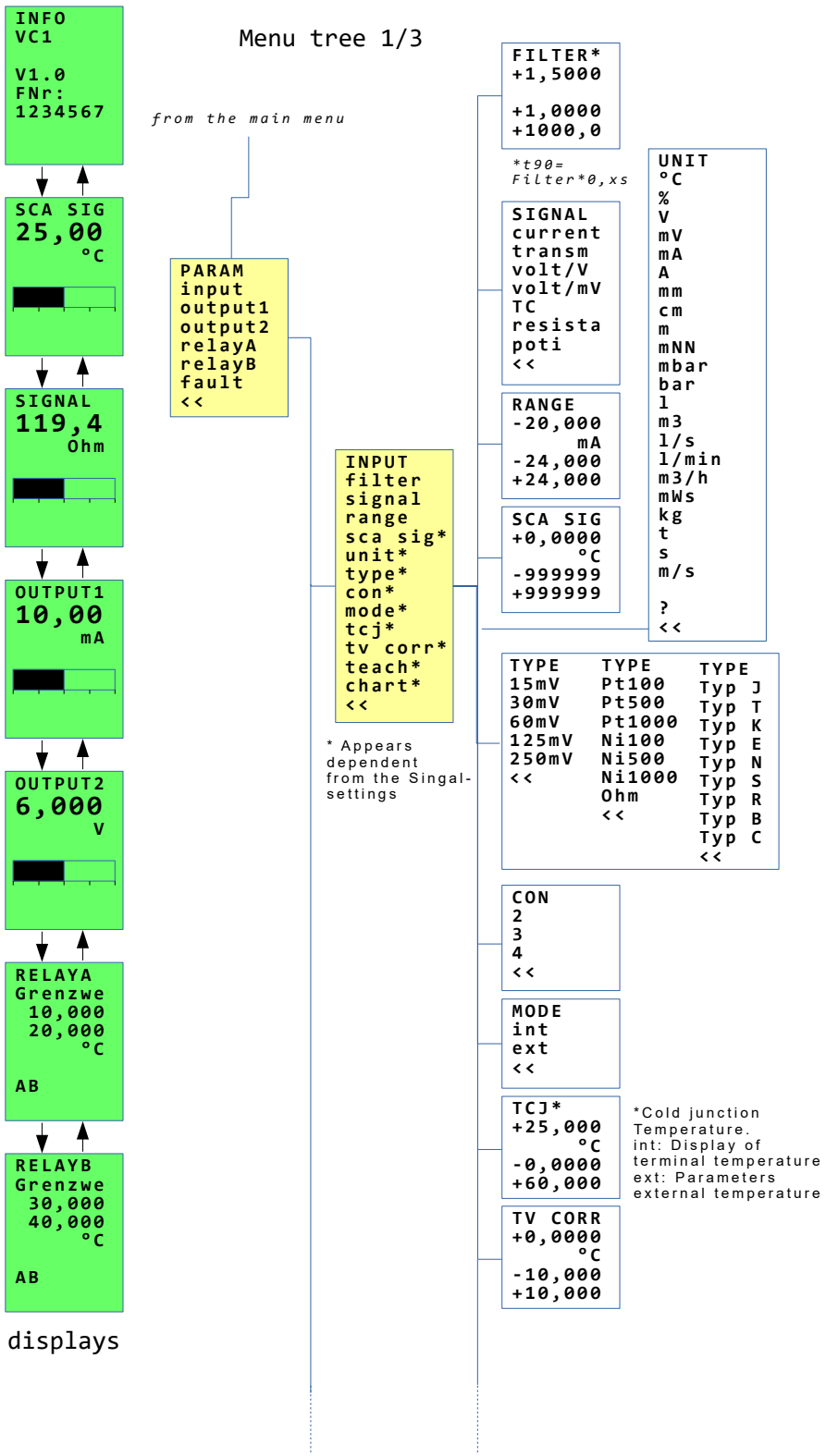
7.9 AD-VC 1 GVD Multifunction transducer



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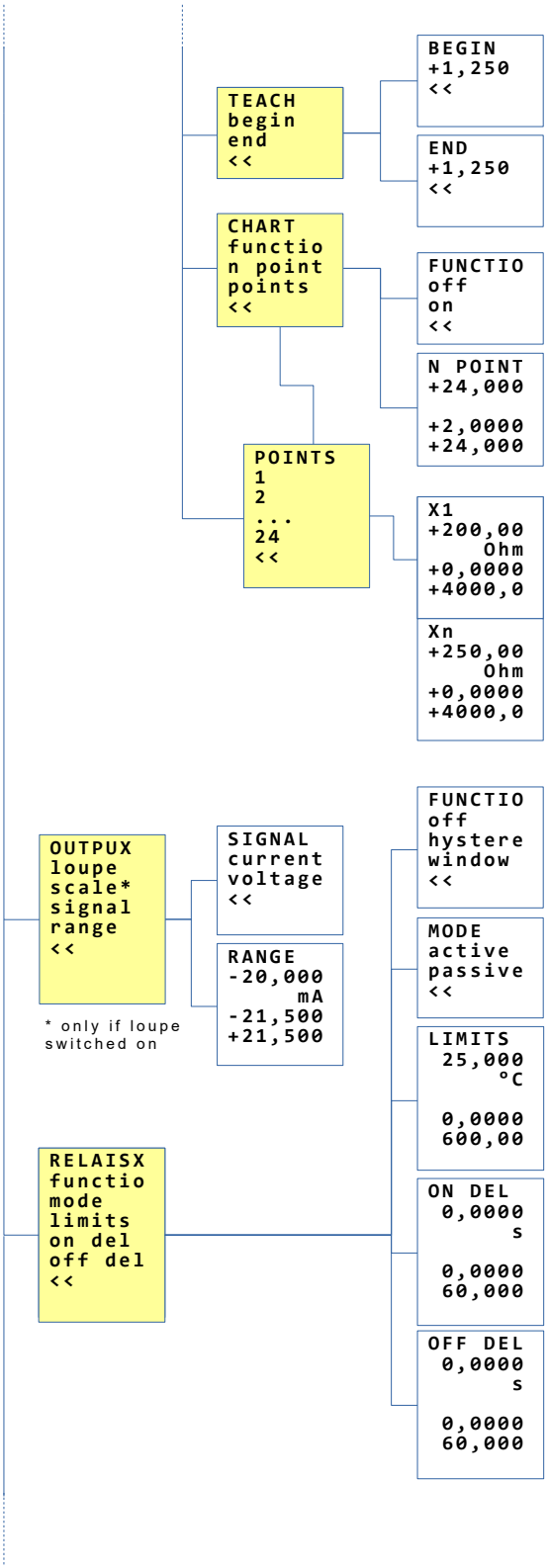
Menu tree 2/3



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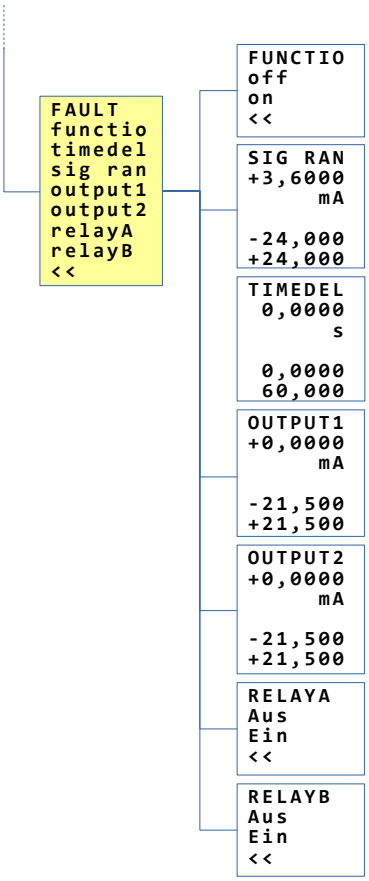
Menu tree 3/3



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8 Modbus

The **AD-VarioConnect** has an RS-485 interface as standard.
The data are transmitted via the Modbus RTU (RTU = Remote Terminal Unit) protocol, the AD-VarioConnect represents a Modbus slave. Communication is carried out according to the master-slave procedure and starts with a request from the master, e.g. a PLC or a PC.
Each slave has a unique address. If a slave recognizes that its address has been addressed by the master, the slave always sends a reply.
The slaves never communicate with each other. They are also not able to start communication with the master. The Modbus master can read out the individual registers via the addresses.

8.1 Settings RS-485

The settings for the RS-485 interface can be found in the menu under Options. Changes will be applied immediately. These settings are saved in the AD-VarioConnect . This means that if the AD-VarioConnect is exchanged, they must be changed again accordingly.

8.1.1 Change Slave Address

The slave address of the AD-VarioConnect can be changed via the menu item 'Slavead'. All addresses from 1 ... 254 are valid.

8.1.2 Change Baud Rate, Stop Bit and Parity

If the baud rate, stop bit or parity must be changed to insert the AD-VarioConnect into an existing bus configuration, these parameters can also be changed via the menu.
The following settings are possible:

Baud rate: 2400, 4800, 9600, **19200**, 28800, 38400, 57600, 76800 und 115200
Stop bit: **1** und 2
Parity: **gerade**, ungerade und keine

8.2 Data format

All data larger than one byte are sent in the 'big-endian' format according to the Modbus specification.
An exception is the checksum. It is sent in 'little-endian' format.
Example: The number 4660 (0x1234) is transmitted as follows

Byte1	Byte0
0x12	0x34

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8.3 Data types

The following data types are used.

Type	Size	Range
bool	1 Byte	0 ... 1
u16	2 Byte	0 ... $2^{16} - 1$
u32	4 Byte	0 ... $2^{32} - 1$
single	4 Byte	IEEE 754

8.4 Supported functions

The following read and write functions are supported.

3 (0x03) Read Holding Registers.

16 (0x10) Write Multiple Registers.

8.4.1 Read Holding Registers

This function is used for reading one or more registers of the AD-VarioConnect .
The master first sends a request with the start address (40801 = 0x9F61) and the number of registers to be read (2 = 0x0002) to the AD-VarioConnect :

Slave	Function	Start-address1	Start-address0	Quantity Register1	Quantity Register0	CRC0	CRC1
1	0x03	0x9F	0x61	0x00	0x02	0xBB	0xC1

The request is being verified. If all data is OK, the AD-VarioConnect replies with the number of bytes and the requested registers:

Slave	Function	Quantity Bytes	Register1	Register0	CRC0	CRC1
1	0x03	4	0x00	0x00	0xFA	0x33

If an error occurs the AD-VarioConnect answers with an error message:

Slave	Errorcode	Exception	CRC0	CRC1
1	0x83	see 8.5		

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8.4.2 Write Multiple Registers

This function is used to write one or more registers of the AD-VarioConnect .
The master first sends a request with the start address, the number of registers and the registers to be written to the AD-VarioConnect :

Slave	Funct.	Start-addr.1	Start-addr.0	Quant. Reg.1	Quant. Reg.0	Quant. Bytes	Wert Reg.1	Wert Reg.0	CRC0	CRC1
1	0x10									

The request is being verified. If all data is OK, the AD-VarioConnect replies with the start address and the number of written registers:

Slave	Funct.	Start-addr.1	Start-addr.0	Quantity Reg.1	Quantity Reg.0	CRC0	CRC1
1	0x10						

If an error occurs the AD-VarioConnect answers with an error message:

Slave	Errorcode	Exception	CRC0	CRC1
1	0x90	see 8.5		

8.5 Exception Codes

In case of a faulty request the AD-VarioConnect answers with a error message and one of the following exception codes. As Error code the function code is returned with 0x80 orered.

1 (0x01) The Modbus function is not supported.

2 (0x02) The register address does not exist.

3 (0x03) The data is invalid.

8.6 Data list

The data list can be found in the respective data sheet of the basic unit.

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9 Appendix

9.1 Maintenance and repair

During proper operation, the AD-VarioControl / AD-VarioConnect is maintenance-free. In case of damage, the device must only be repaired by the manufacturer.

9.2 Malfunctions

Should an error or a malfunction occur, try initially to find the cause based on the following table. Should the error persist, please contact the manufacturer or the dealer of the device.

Error	Reason	Action
no display	no contact to the base device	check supply and contacts at AD-VarioControl / AD-VarioConnect and base device
display "connecting error"	no contact to base device	clean contacts at AD-VarioControl / AD-VarioConnect and base device

9.3 Firmware

9.3.1 AD-VarioControl

A firmware update is not possible for users.

Revision	Date	Comment
1.0	03.05.2016	Release
1.1	23.12.2016	Simulation added; standard user may change; minor changes
1.2	20.02.2017	Characteristic curve possible; minor changes
1.3	27.03.2017	evice functions possible (e.g. learning)
1.4	14.06.2018	Display colour red possible in case of failure of basic device; main menu changed (no device name for this Param, save/restore factory rights and simulation in Options menu);
1.5	09.04.2019	Counter (are not deleted on factory setting); List length increased to 50; Capital letters of the header can be set in display mode
1.6	02.09.2021	Optimization of data exchange with basic device; Correct display FW version
1.7	12.11.2021	Option rotate the display.

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9.3.2 AD-VarioConnect

A firmware update is possible via the configuration software AD-Studio. A direct connection between AD-VarioPass and AD-VarioConnect is necessary for the update process. The standard RS-485 settings (19200,8,1,e) and the slave address 1 are used during the update. If the RS-485 connection or the auxiliary voltage is interrupted, a failure of the AD-VarioConnect is probable.

- Enable update process in AD-VarioConnect (*Option/FW-Upda/V-Conne*)
- connect in AD-Studio (AD-VarioConnect answers)
- *Extras/Firmware Update/Download and update from internet*

An update of the basic units via the AD-VarioConnect is not possible.

Revision	Date	Comment
1.0	01.07.2020	Release
1.1	12.11.2021	Option rotate the display.

9.4 Revision

Revision	Date	Comment
1.0	03.05.2016	Document created
1.1	23.12.2016	Simulation, configuration Users, new devices AD-MV 420 GVD, AD-MV 550 GVD and AD-MK 350 GVD
1.2	20.02.2017	AD-MV 550 GVD Menu updated, characteristic line
1.3	27.03.2017	AD-MK 350 GVD Menu updated, Device functions (e.g. learning)
1.4	06.06.2018	New device AD-VC 1 GVD, Main menu updated
1.4.1	13.11.2018	New device AD-FM 255 GVD
1.4.2	15.11.2018	Firmware versions added
1.5	28.03.2019	New devices LU 320 GVD, LU 325 GVD, LU 620 GVF and LU 625 GVF; Firmware 1.5
1.5.1	14.06.2019	Adding a loupe to the menu tree AD-VC 1 GVD at the output
1.5.2	28.01.2020	Adding the asymmetry to the menu tree AD-LU 620 GVF / LU 625 GVF at the digital outputs
1.6	01.07.2020	AD-VarioConnect
1.6.1	19.10.2020	Menu FM 255 GVD
1.6.2	03.09.2021	Firmware VarioControl
1.7	12.11.2021	Option rotate the display.

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9.5 Addresses

Should you have further questions concerning the product, requests or suggestions, please contact the address below.
Adamczewski Elektronische Messtechnik GmbH

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