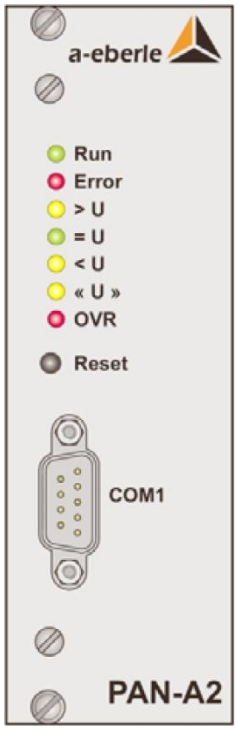
a-eberle

Operating Manual

Monitoring Unit



GB

Model PAN-A2

PAN-A2 Monitoring Unit

Operating Manual

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1. Warnings and Information

The PAN-A2 monitoring unit is exclusively designed for implementation in systems and equipment for electrical energy technology. Only trained experts are permitted to carry out necessary work. Experts are persons who are familiar with the installation, mounting, commissioning and operation of these types of products. Furthermore, experts have qualifications which comply with their field of work.

The PAN-A2 monitoring unit left the factory in a condition that fulfilled all relevant safety regulations. To maintain this condition and to ensure safe operation, the following instructions and warnings in this operating manual must be observed.

- The PAN-A2 monitoring unit has been designed to comply with IEC 10110/EN61010 (DIN VDE 0411), degree of protection I and was tested according to this standard before delivery.
- The PAN-A2 monitoring unit must always be earthed via a protective earth conductor This condition is fulfilled when the voltage regulator is connected to an auxiliary voltage with a protective earth conductor (European power supply system). If the auxiliary voltage network does not have a protective earth conductor, an additional connection must be established from the protective earth conductor connection terminal to earth.
- The upper limit of the permissible auxiliary voltage U_{AUX} may not be exceeded, neither permanently nor for a short period of time.
- A PAN-A2 monitoring unit which has visible damage or an obvious malfunction must not be used and has to be secured against unintentionally being switched on.
- Maintenance and repair work on an open PAN-A2 monitoring unit may only be carried out by authorised experts.

2. Scope of Delivery

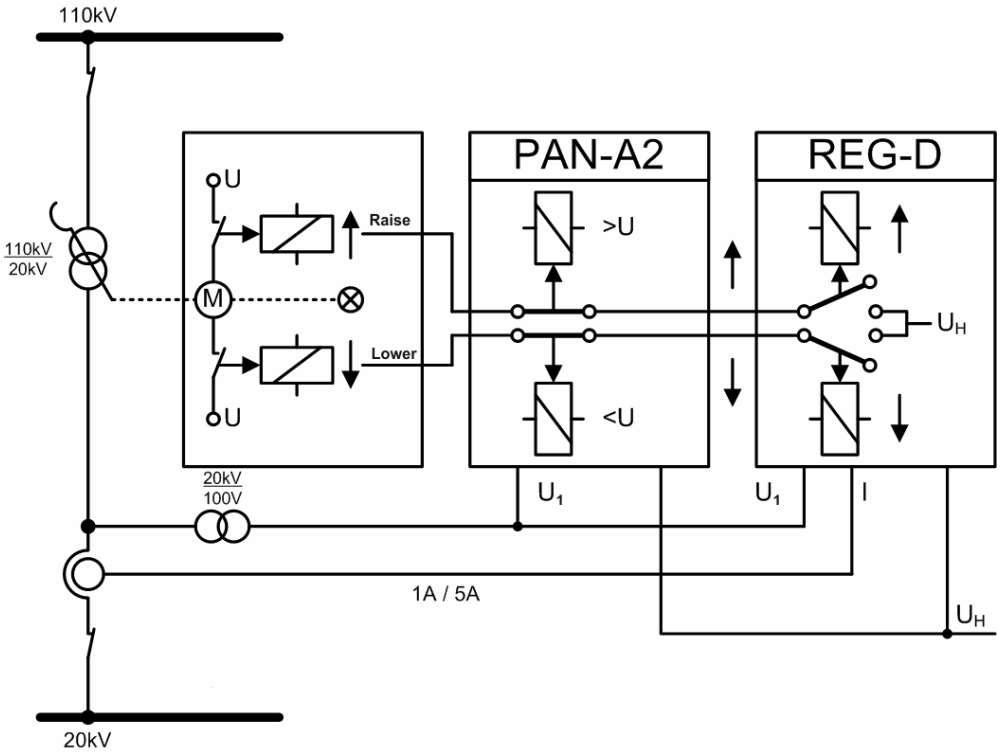
- 1 PAN-A2 monitoring unit
- 1 operating manual in English
- 1 PAN-A2 Control software CD with a zero modem cable

3. PAN-A2 Monitoring Unit

- The PAN-A2 monitoring unit is used to monitor the REG-D(A) voltage regulator.
- The PAN-A2 monitoring unit has its own power supply and is equipped with its own voltage-measurement input. It can therefore be considered to be an independent monitoring relay.
- The monitoring unit measures the input voltage, independent of the regulator, and compares it to the specified limit values for <U, >U, <<U and >>U. If the value exceeds or falls below either the <U or >U limit value, the control commands that are issued in the wrong direction by the regulator are interrupted and this is indicated by LEDs and a separate relay. A violation of the <<U and >>U ranges is indicated by an additional LED and relay.
- If the lower voltage limit <U is violated, the lower command from the regulator is interrupted. If the upper voltage limit >U is violated, the raise command from the regulator is interrupted.
- The “Raise” and “Lower” relays can be swapped using the “Raise/Lower relay swap” function. Thus, if the upper voltage limit is exceeded, the lower command of the regulator is interrupted. Similarly, if the lower limit is violated, the raise command is interrupted. This behavior could be necessary on some inverse tap changers
- The PAN-A2 prevents the regulator guiding the voltage to an impermissible range.
- The monitoring function can be disabled when maintaining or commissioning the REG-D(A) regulator by using a special override input. In this case, if the limit values are violated neither the raise nor the lower command of the regulator can be interrupted. However, limit value violations continue to be indicated via LEDs and relays.
- A soft override is automatically generated if the input voltage falls 20% below the set-point value (limit base value). In this case, the complete monitoring function is disabled. The raise and the lower commands of the regulator are not interrupted and there is no indication via the LEDs or the special relay.
- Furthermore, a new firmware version can be loaded using the COM1 interface.

3.1 Switching Principle

The regulation below is initially carried out using the independent monitoring unit.



Switching principle

3.1.1 Block Diagram of the PAN-A2 Monitoring Unit

The block diagram below shows the PAN-A2 monitoring unit with inputs and outputs leading away from it.

The monitoring unit has three inputs:

- The monitoring unit is supplied via the U_{AUX} auxiliary voltage input.
- The control voltage is analysed via the measurement input and is compared with the pre-specified limits.
- For test/maintenance purposes it is possible to block both the raise and lower relays using the override input.

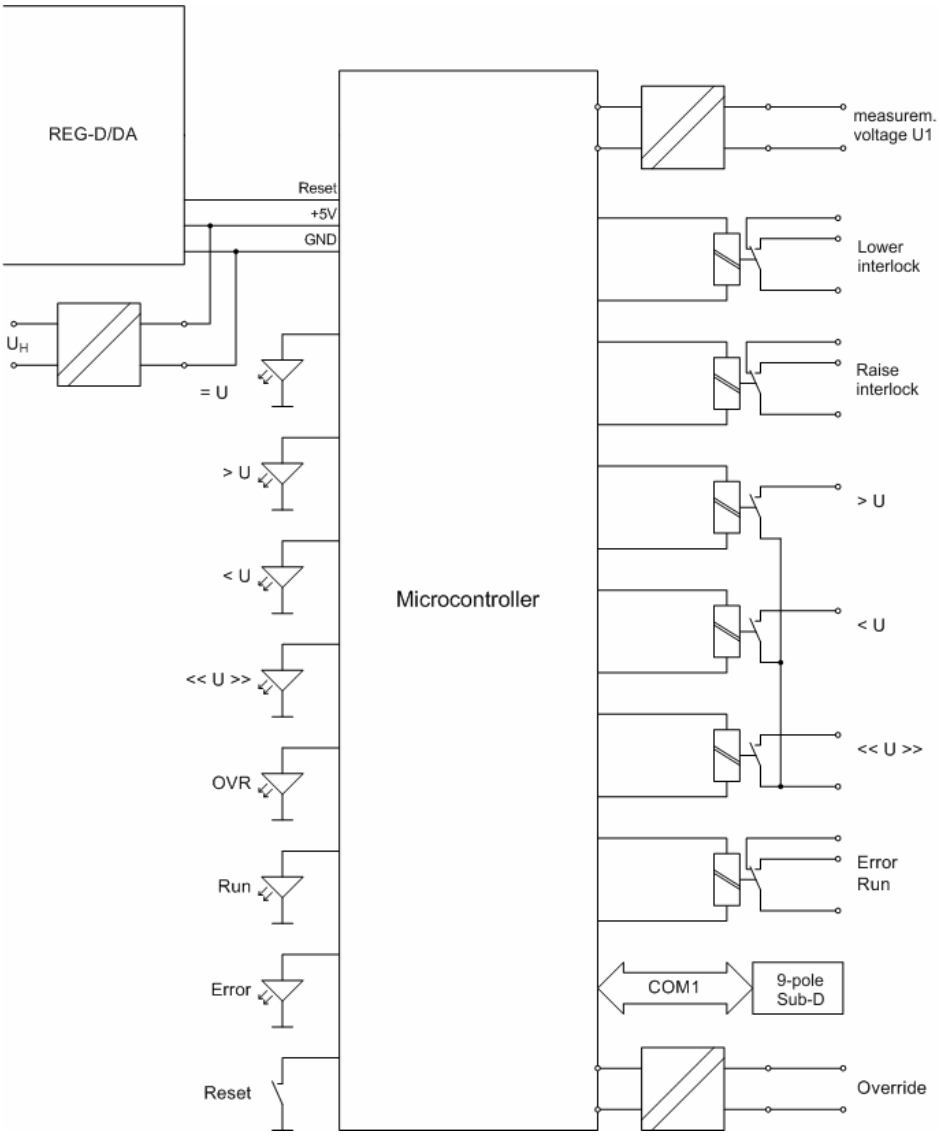
The monitoring unit provides signals via relays and LEDs:

- The raise and lower relays interrupt the control commands of the regulator if appropriate.
- The three relays <U, >U and <<U>> and the corresponding LEDs also indicate that a value has exceeded or fallen below the specified limits. The signal <<U>> is only used in combination with the <U or >U signal.

- The operating status of the monitoring unit is indicated via the Run and Error LEDs as well as the Run/Error relay (life contact).

The monitoring unit has the following interfaces:

- The COM1 interface, in combination with the PAN-A2 Control software, offers the possibility to parameterise the monitoring unit and to install new firmware if required.



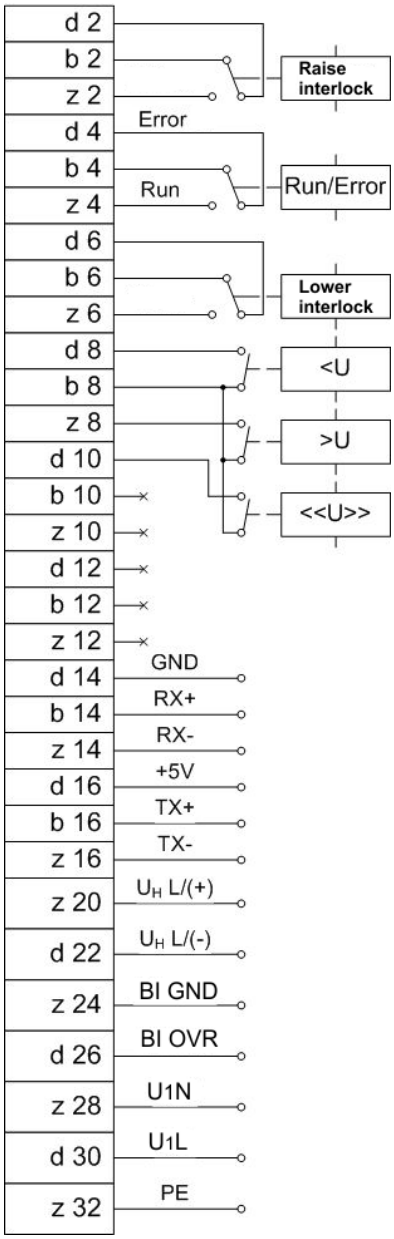
Block Diagram

The entire monitoring unit can be restarted by pressing the reset button for three seconds. Specified parameters remain unchanged.

3.2 Contact Assignment

3.2.1 Terminal Strip

The PAN-A2 monitoring unit is equipped with a Type M (F24 + H7 design) terminal strip. The contact assignment is shown below.



Terminal strip

3.2.2 COM1 interface

The PAN-A2 monitoring unit can be connected to a PC via the COM1 interface. The "PanA2Ctrl" program provides the following options:

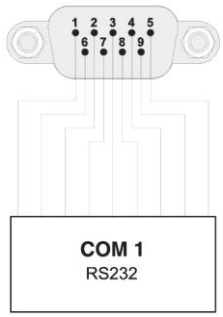
- Parameterising the monitoring unit
- Displaying the present measurement value
- Updating the firmware

COM1 interface

Function	Pin
	1
RXD	2
TXD	3
	4
Signal-Ground	5
	6
RTS	7
CTS	8
	9

COM1 interface

Sub-D plug



Sub-D plug

A so-called "zero-modem" cable is required to connect the monitoring unit to a PC. The wiring of the SUB-D plugs is shown on the next page.

Note

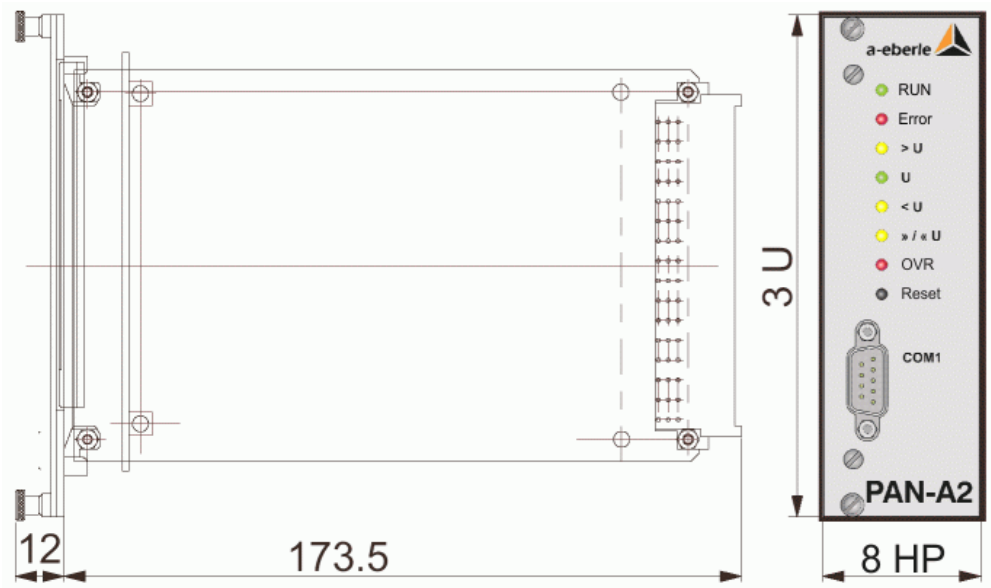
The cable designed for the programming of the REG-D/DA regulator can be used for this purpose.

9 pole female Sub-D		9 pole female Sub-D
1	----------	4
2	----------	3
3	----------	2
4	----------	1
5	----------	5
6		6
7	----------	8
8	----------	7
9	----------	9
shield	----------	shield

zero-modem cable

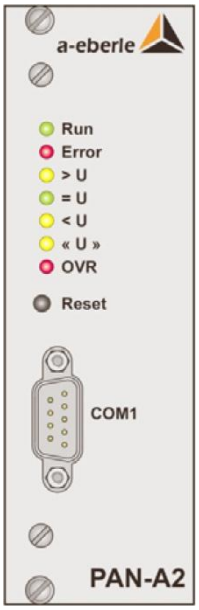
4. Mechanical Design

Front panel	Aluminium, RAL 7035 light grey
Height	3 U (128.5 mm)
Width	8 HP (40.3 mm)
Weight	≤ 0.3 kg
Degree of protection	
- Plug-in modules	IP00
- Socket connector	IP00
Configuration	According to DIN 41494 Part 5
Plug-in connector	DIN 41612



Dimensions in mm

5. Operation



Front view

The module is delivered in a calibrated state with the newest version of the firmware. It is not necessary to carry out a further calibration.

The operation of the monitoring unit is carried out using the PanA2Ctrl software.

How to proceed:

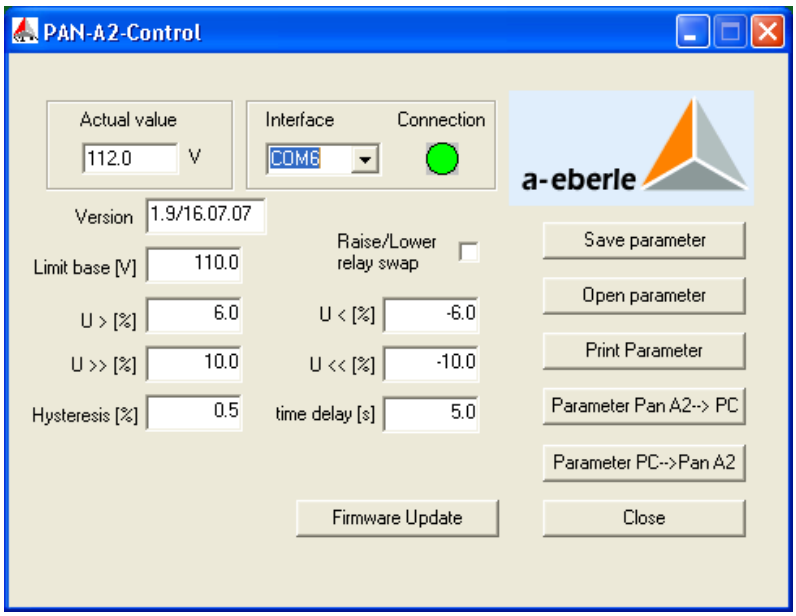
- Please apply a supply voltage to the monitoring unit.
- Connect the monitoring unit to a PC using a zero-modem cable.
- Start the PanA2Ctrl software.

Note

The “PanA2Ctrl” program does not have to be installed. The PAN-A2 Control software can be used on Windows XP, Vista, Win 7 and Server 2003/2008 (and higher) operation systems.

5.1 Starting the Program

The figure below shows the tools interface.



PAN-A2 Control software

The program automatically establishes a connection (initially a red symbol) to the monitoring unit. The “Connection” symbol changes to green as soon as the monitoring unit is connected to the supply voltage and to the PC via a zero-modem cable.

Note

If the “Connection” button does not change from red to green, check if the correct interface is set on the PC.

When the connection has been established, the present measurement value, the firmware version and the parameters of the attached monitoring unit are displayed.

5.2 Parameter setup

The reference setpoint value (limit base) must be specified first, since the monitoring band is defined using percentage values. This forms the basis for the later calculation of the individual limits.

- Reference setpoint value: 50 V ... 150 V

The monitoring band is defined by the <U and >U limit values. Furthermore, an extended monitoring band around the actual monitoring band is defined based on the <<U and >> parameters.

The parameters for the monitoring band are specified in percent, based on the specified reference setpoint value (limit base). The values must be defined within the following limits:

- << U: -35% ... 10%
- < U: -25% ... 10%
- >U: 0% ... 25%
- >>U: 0% ... 35%

Note

The range may be exceed for both the lower limits. This means that, for a measurement voltage of 110 V, it is possible to leave the reference setpoint value at 100 V and to adjust the parameters accordingly. This means that a deviation of 1 % still corresponds to 1 V.

Furthermore, the monitoring band is also defined by specifying a hysteresis.

- Hysteresis: 0.5% ... 5%

If one of the specified limit values is violated, the monitoring unit returns to the original status after passing through the area defined by the hysteresis.

The switching delay specifies how much time elapses before the monitoring unit responds to the violation of a limit value.

- Switching delay: 0s ... 99s

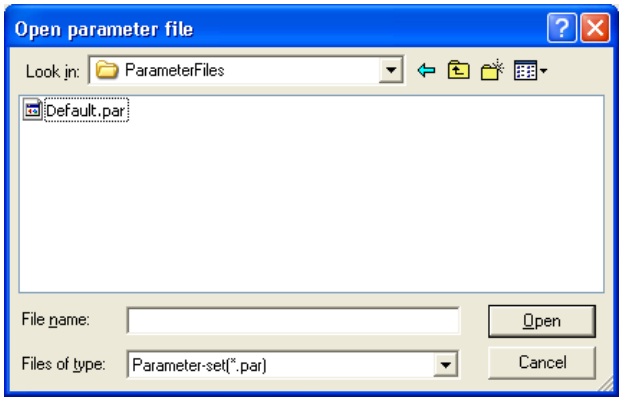
The raise and lower signals (relays) are exchanged by activating the check box “Raise/lower relay swap”. This function may be used on inverse tap changers where a lower command leads to a higher voltage and a raise tap command results in a lower voltage. On the REG-D(A) voltage regulator this behaviour is achieved with the software feature invers =2.

- Raise/Lower relay swap: yes/no

5.3 Transferring and Saving the Parameters

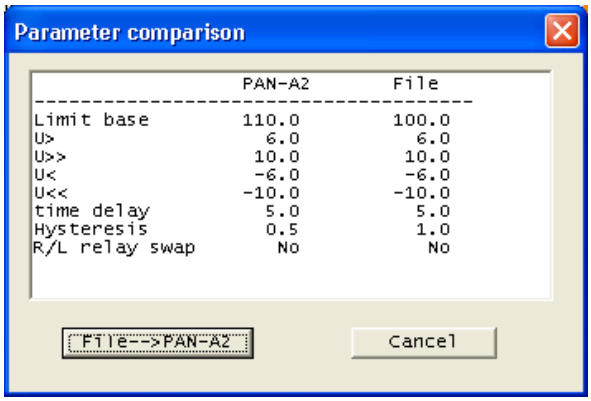
The parameters can be changed manually or by loading a new parameter file. The altered parameters can then be subsequently saved in a file again.

- The parameters can be directly entered manually in the corresponding fields.
- After clicking on the “Open Parameter” button a dialogue box opens that can be used to select the desired file.
- Similarly, clicking on the “Save parameter” button opens a dialogue box that can be used to save the present parameter set.



Open parameter file

The “Parameter comparison” window opens after the new parameter set has been loaded. This window is used to compare the loaded parameters with those currently stored in the monitoring unit. The new parameters can be send to the monitoring unit using the “File --> PAN-A2” button.



Parameter comparison

Alternatively, the individual parameters can also be changed manually. Press the “Parameter PC --> PAN-A2” button to open the “Parameter comparison” window. Then you have to confirm that the changed parameters are to be transferred to the monitoring unit.

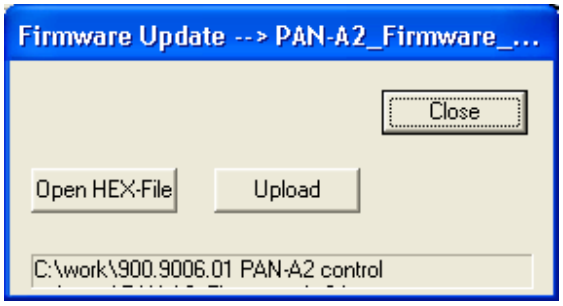
Note

All parameters are checked for plausibility before they are transferred and corresponding error messages are shown if appropriate.

All the parameters stored in the monitoring unit can be displayed by pressing the “PAN-A2 parameters --> PC” button.

5.4 Firmware Update

It is possible to update the firmware of the PAN-A2 monitoring unit using the PanA2Ctrl program. The corresponding dialogue window opens when the “Update firmware” button is pressed.

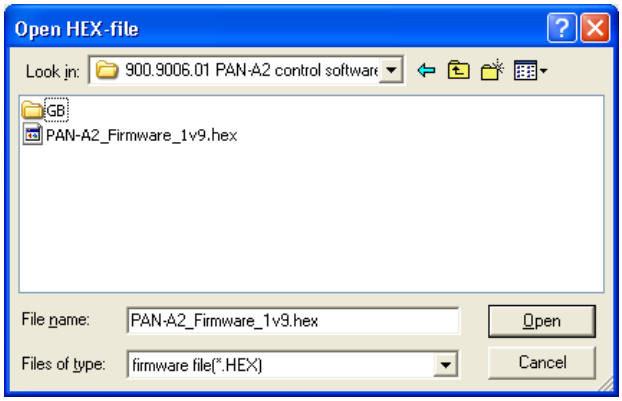


Firmware update

Firstly open the new firmware using the “Open HEX file” command. The “Upload” button then appears. Clicking “Upload” transfers the new firmware to the monitoring unit and automatically verifies it.

Note

If the automatic Verify process fails after the firmware update, then the firmware needs to be reloaded, because a fault occurred whilst transferring the data.



Load HEX file

If the <U and >U LEDs on the monitoring unit are lit simultaneously, a firmware update is taking place.

The new firmware version should appear in the display field after the window is closed.

5.5 Override Mode

During commissioning it is sometimes necessary to operate the transformer over the entire setting range, without the PAN-A2 blocking the control commands.

In the “Transformer without voltage” setting the PAN-A2 automatically changes into “OVR mode”. The input voltage provides the trigger criterion for this automatic procedure. If the value falls below 20 % of the defined limit base (setpoint value), the device automatically switches into soft override mode. This resets all messages without a time delay. The “Raise” and “Lower” control commands from the REG-D(A) regulator are not interrupted in this case, and only the red Override LED is lit.

Furthermore, the PAN-A2 can be manually changed into override mode via a binary input. In order to do this, a 50 V ... 250 V AC/DC voltage (Feature E3) or 10 V ... 50 V AC/DC voltage (Feature E2) must be applied to the override input of the monitoring unit, depending on the equipment version. The “Raise” and “Lower” control commands of the REG-D regulator are also not interrupted in this mode. However, the messages are still generated and, furthermore, the Override LED and the appropriate <U, >U and <<U>> LEDs also light.

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