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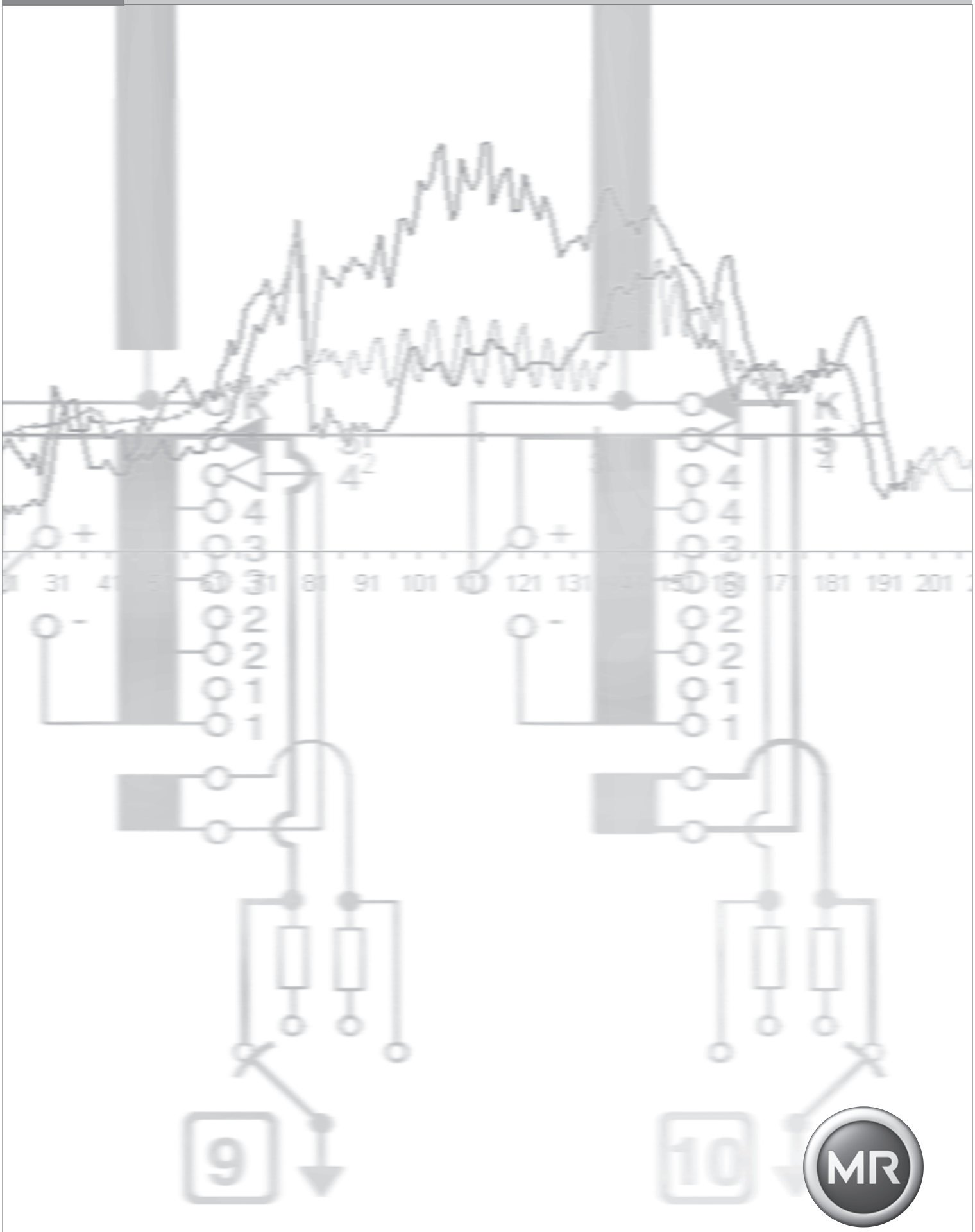
TAPCON® 240-LV

Operating Instructions BA 223/03



Contents

NOTE

Data contained herein may differ in details from the equipment delivered.
We reserve the right to make alterations without notice.

1 General

1.1 Safety instructions

All personnel involved in installation, commissioning, maintenance or repair of this equipment must:

- be suitably qualified and
- strictly observe these operating instructions.

Improper operation or misuse can lead to

- serious or fatal injury,
- damage to the equipment and property of the user and
- a reduction in the efficiency of the equipment.

Safety instructions in this manual are presented in three different forms to emphasize important information.

WARNING

This information indicates particular danger to life and health. Disregarding such a warning can lead to serious or fatal injury.

CAUTION

This information indicates particular danger to the equipment or other property of the user. Serious or fatal injury cannot be excluded.

NOTE

This notes give important information on specific subjects.

1.2 Function, specified application

The TAPCON®240-LV (LimitVolt) was developed for the purpose of monitoring voltage-regulated high-voltage distribution systems. For reliable monitoring of the entire controlled system comprised of „on-load tap-changer mechanism (transformer) – CT/VT circuits – voltage regulators", the VDEW (German power industry association) recommends the use of an autonomous monitoring device (connected to its own assured auxiliary voltage supply) with monitoring measuring of the secondary CT/VT voltage which is generally 100 V.
For this reason, the TAPCON®240-LV was equipped with a power supply unit of its own and equipped with a (separate) 100-V measurement input. In the event of an overshoot or shortfall of the preset limits the TAPCON®240-LV will either intervene in the regulating process or transmit alarm messages configurable within wide limits to the control system

CAUTION

Installation, electrical connection and commissioning of the electronic voltage regulator may only be carried out by qualified, skilled personnel and only in accordance with these operating instructions.

It is the responsibility of the user to make sure that the electronic voltage regulator is used for the specific application only. For safety reasons, any unauthorized and improperly executed works, i.e. installation, modification, alteration of the equipment, electrical connection, or commissioning of the equipment, are forbidden without first consulting MR!

The trouble-free operation of the drive, the on-load tap-changer (OLTC), and the transformer may be put at risk.

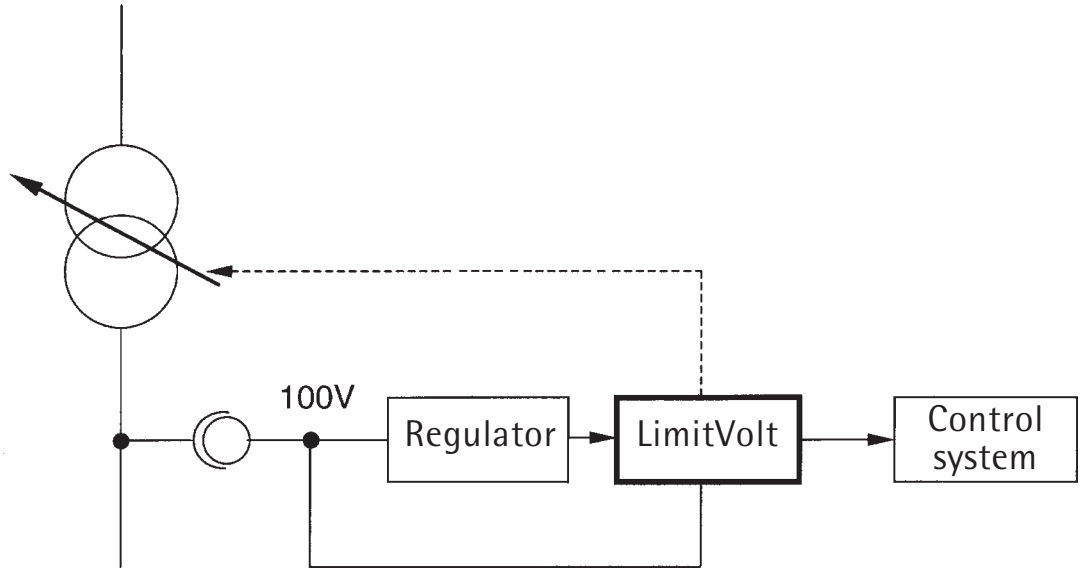
WARNING

All relevant fire protection regulations must be strictly observed

The monitoring functions of the TAPCON®240-LV comprise:

- Monitoring the (regulated) mains voltage, specifically
  - undervoltage U<<
  - undervoltage U<
  - overvoltage U>
  - overvoltage U>>
- Monitoring of voltage changes initiated by tap-change operations upon response of high-speed return control, if
  - undervoltage U< or
  - overvoltage U> is present
- Monitoring the voltage regulator in the presence of
  - undervoltage U<
  - overvoltage U>
- Monitoring the motor drive unit (OLTC mechanism) in the presence of
  - undervoltage U<
  - overvoltage U>

In the event of a transformer shutdown the on-load tap-changer can be controlled back to a specified operating position (tap position).



Basic configuration "monitoring the regulated distance in a HV transformer"

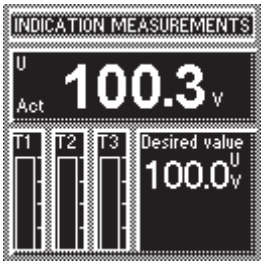
1.3 Design

The TAPCON® 240-LV is housed in a standardized 19-inch sub rack (3 HE, 2 x 42 TE). Usually the device is ordered together with a TAPCON® 240 voltage regulator housed in a joint sub rack. Naturally, the TAPCON® 240-LV is also available in a separate housing.
Connection involves clamp-type terminals for cable-cross sections up to 2.5 sqmm.

All control and display elements are housed in the front panel. The monitoring device features centralized control via microprocessor with integrated AD converter, and in addition to the 100 V voltage transformer input, contains several relays with potential-free output contacts as well as potential-free control inputs.
A serial front interface (COM1, RS 232) serves for parametering the device, for example by laptop. The necessary PC software („TAPCON-trol system") is included in the delivery. A second serial interface (COM2, RS 232) is optional and provided for data communications with a higher-order operations control system.

2 Functions

2.1 Operating status



Measured value (V or KV display)

Desired voltage level (V or kV display) T1, T2, T3

Fig. 1 – TAPCON® 240-LV operating screen

The TAPCON®240-LV's operating screen contains all important information required for the joint operation with a TAPCON® 240 voltage regulator. The measuring values and desired voltage levels can be displayed either as the primary or the secondary value of the CT/VT voltage.
The progress of the time values T1 ...T3 is displayed as a filling bar, a function particularly useful for system commissioning and system checks. Simultaneous signalling with LEDs allows very rapid polling of all information pertaining to the device's monitoring status.

2.1 Monitoring the mains voltage

2.2.1 Undervoltage U<, overvoltage U> (first monitoring range)

The triggering of threshold U< is reported via contacts IO-K5 and IO-K7 as well as via assigned LEDs.
The same applies accordingly to threshold U> (contacts IO-K4 and IO-K6).

At the same time, a TAPCON® 240 voltage regulator connected to IO-K3 is made to generate rapid control pulses on the control circuit of the motor drive unit so that the on-load tap-changer immediately returns to the voltage range between U< and U> regulating range. This procedure is also known as high-speed return control (cf. item 2.2).

If the direction of rotation of the motor-drive mechanism is activated, the TAPCON® 240-LV can as an additional function monitor the control commands. For that purpose, the TAPCON® 240's "Higher" and "Lower" control commands are series-connected with the control command monitoring ("interlocking of control command – on-load tap-changer drive").

If the voltage regulator emits "Lower" pulses, e. g. in the case of an undervoltage U<, the control command monitoring will in that case interrupt the pulse transmission. At the same time, the message "voltage regulator fault" is emitted via contact UC-K1.

This method allows the detection even of wiring errors in the tapping commands from the voltage regulator to the motor-drive mechanism.

If the time T2 has run down with unsuccessful high-speed return control, i.e. if the mains voltage continues to remain outside of the regulating range, the message "OLTC FAIL" will be emitted via the contact UC-K8. At the same time, the motor protective switch (Q1) of the motor-drive mechanism may be tripped.

1st condition	2nd condition	3rd condition	Reaction	Comments
Undervoltage U<	No undervoltage U<<		LED Contact IO-K3 Contact IO-K5 Contact IO-K7	High-speed return control
Undervoltage U<	No undervoltage U<<	T2	LED Contact UC-K3 Contact UC-K8	 Pulse 3s Pulse 3s
Undervoltage U<	No undervoltage U<<	Wrong control command for OLTC	Contact UC-K1	Signal "VRR FAIL"
Overvoltage U>			LED Contact IO-K3 Contact IO-K4 Contact IO-K6	High-speed return control
Overvoltage U>	T2		LED Contact UC-K2 Contact UC-K8	 Pulse 3s Pulse 3s
Overvoltage U>	Wrong control command for OLTC		Contact UC-K1	Signal "VRR FAIL"

Table 1 – Triggering conditions and reactions of TAPCON® 240-LV with simple overvoltage or undervoltage (U<, U>)

2.2.2 Undervoltage U<<, overvoltage U>> (second monitoring range)

1st condition	2nd condition	3rd condition	Reaction	Comments
Undervoltage U<<			LED Contact UC-K4	
Overvoltage U>>			LED Contact UC-K9	
Overvoltage U>>	T1		LED Contact IO-K1 Contact IO-K2	 Pulse 3s Pulse 3s

Table 2 – Triggering conditions and reactions of TAPCON® 240-LV with expanded overvoltage or undervoltage (U<<, U>>)

When the network voltage drops further below the set threshold U<<, the high-speed return control including the related message is suppressed.
The triggering of threshold U<< is reported via contact UCK4 and an assigned LED.

The triggering of threshold U>> is reported via contact UC-K9. After time T1 has expired, an additional message including LED signaling is generated for overvoltage U>>. Some examples of how this message could be used are listed below.

- Stop the voltage regulator
- Trigger the circuit breaker
- Trigger the motor protective switch (Q1) of the motor-drive mechanism

2.2.3 Automatic OLTC return control to a preset operating position

If the input "recirculation" has been connected or the return control set as a parameter, pulses with a length of 1.5 s/1.5 s will be emitted at the relay UC-K5 after a response of the threshold U<< and expiration of the time T3 for moving the on-load tap-changer to the predefined "lower position". This setting can be set at the motor-drive mechanism. At the same time, the ongoing return control will be indicated by the relay UC-K7.

Once the operating position „Low position“ has been reached, the return control process will be aborted via the related input command "Low position (reached)", UC-K5 and UC-K7 will drop.

1st condition	2nd condition	3rd condition	Reaction	Comments
Undervoltage U<<	T3	Return control position “lower” not yet reached.	LED Contact UC-K5 Contact UC-K7	 Pulse 1.5s / 1.5 s “return control in progress”
Undervoltage U<<	T3	Return control position „lower“ reached	(Contact UC-K5) (Contact UC-K7)	Relays drop !

Table 3 – Triggering conditions and reactions of TAPCON® 240-LV with "return control ON"

3 Parametering

Press the "MENU" key once to access the main menu.

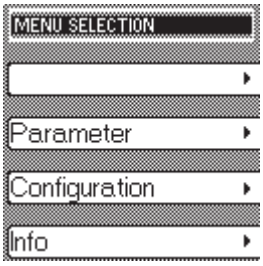


Fig. 2 – Main menu TAPCON® 240-LV

3.1 Parameter setting

Press the F3 key in the main menu – to access the parameter settings.

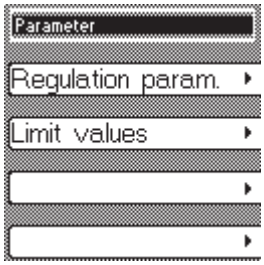
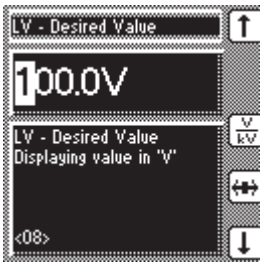


Fig. 3 – Parameter menu TAPCON® 240-LV

3.1.1 Regulating parameters

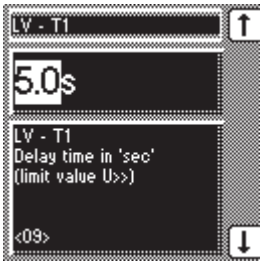
Press F2 in the parameter menu to access the regulating parameters.
Below all parameters are described in the order in which you can scroll the related pages on the TAPCON® 240-LV with the "→" key.



Setting range: 85 ... 140 V
Increments: 0.1 V

Bild 4 – Voltage level setting

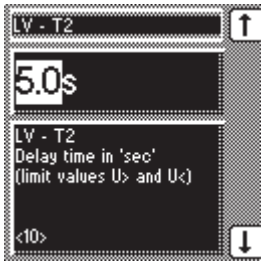
The voltage level is the reference variable for the first and the second monitoring range when the setting parameters in % refer to the voltage level (for "absolute limit values - OFF," see **fig. 13**).



Setting range: 1 ... 10 s
Increments: 0.1 s

Bild 5 – Delay time T1

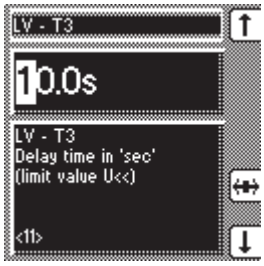
The delay time T1 delays the message that voltage U>> was exceeded.



Setting range: 5 ... 15 s
Increments: 0.1 s

Fig. 6 – Delay time T2

Delay time T2 comprises a delayed signalling of the overvoltage U> and undervoltage U< on a (joint) relay.



Setting range: 2 ... 30 s
Increments: 0.1 s

Fig. 7 – Delay time T3

A return of the on-load tap-changer to "position lower" can be delayed by time T3 on condition that undervoltage threshold U<< falls below preset limits

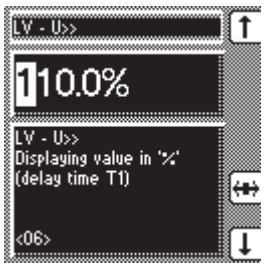
Setting range: ON / OFF

Fig. 8 – LV return control

"Return control ON" contains pulses of the length 1.5 s/1.5 s after a response of threshold U<< and expiration of time T3 on relay UC-K5 so that the on-load tap-changer moves to the predefined position "lower position" (see section 2.2.3). However, you can also set this parameter dynamically via a control input on the TAPCON® 240-LV.

3.1.2 Limit values

Press F3 in the parameter menu to access the limit value settings.
Below all parameters (limit values) are described in the order in which you can scroll the related pages on the TAPCON® 240-LV with the "→" key.

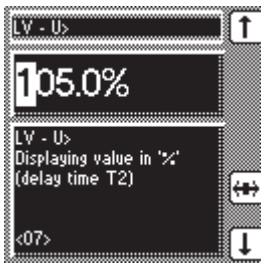


Setting range: 100 ... 140 %
Increments: 0.1 %

Fig. 9 – Limit overvoltage U>>

Setting value of the threshold value for U>> (second monitoring range), in relation to the voltage level. Assigned to this is time T1 for a delayed message.

Note: This parameter only takes effect when "absolute limit values" is set to OFF.

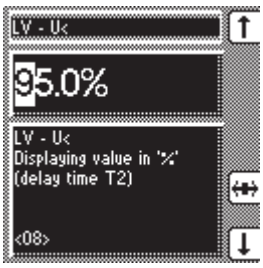


Setting range: 100 ... 140 %
Increments: 0.1 %

Fig. 10 – Limit overvoltage U>

Setting value of the threshold value for U> (first monitoring range), in relation to the voltage level. Assigned to this is time T2 for a delayed message.

Note: This parameter only takes effect when "absolute limit values" is set to OFF.



Setting range: 50 ... 100 %
Increments: 0.1 %

Fig. 11 – Limit undervoltage U<

Setting value of the threshold value for U< (first monitoring range), in relation to the voltage level. Assigned to this is time T2 for a delayed message.

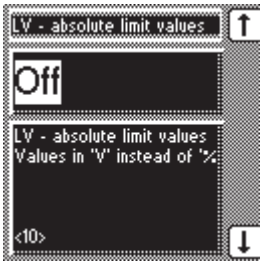
Note: This parameter only takes effect when „absolute limit values" is set to OFF.

Setting range: 50 ... 100 %
Increments: 0.1 %

Fig. 12 – Limit undervoltage U<<

Setting value of the threshold value for U<< (second monitoring range), in relation to the voltage level. Assigned to this is time T3 for a delayed message (return control).

Note: This parameter only takes effect when „absolute limit values" is set to OFF.

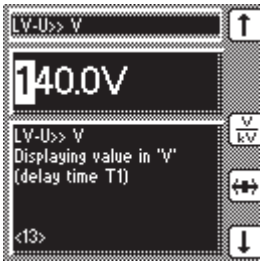


Setting range: ON / OFF

Fig. 13 – Absolute limit values ON/OFF

Naturally you can specify the limit values as previously described as percentage values in relation to the voltage level. However, if you set this parameter to „ON," only the subsequent limit value parameters are considered. This makes it possible for you to set voltages as limit values.

Note: If you prefer to enter the limit values in %, the subsequent limit value settings are not considered.



Setting range: 100 ... 140 V
Increments: 0.1 V

Fig. 14 – Limit overvoltage U>>

Setting value of the threshold value for U>> (second monitoring range). Assigned to this is the time T1 for a delayed message.

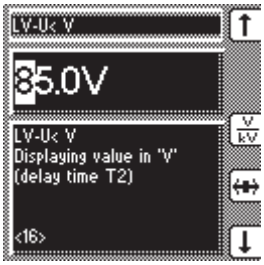
Note: This parameter only takes effect when „absolute limit values" is set to ON.

Setting range: 100 ... 140 V
Increments: 0.1 V

Fig, 15 – Limit overvoltage U>

Setting value of the threshold value for U> (first monitoring range). Assigned to this is time T2 for a delayed message.

Note: This parameter only takes effect when "absolute limit values" is set to ON.

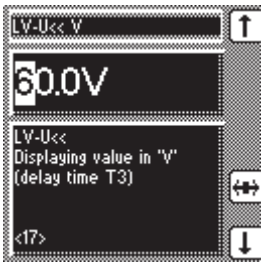


Setting range: 50 ... 100 V
Increments: 0.1 V

Fig. 16 – Limit undervoltage U<

Setting value of the threshold value for U< (first monitoring range). Assigned to this is time T2 for a delayed message.

Note: This parameter only takes effect when "absolute limit values" is set to ON.



Setting range: 50 ... 100 V
Increments: 0.1 V

Fig. 17 – Limit undervoltage U<<

Setting value of the threshold value for U<< (second monitoring range). Assigned to this is time T3 for a delayed message (return control).

Note: This parameter only takes effect when "absolute limit values" is set to ON.

3.2 Configuration

Press F4 in the main menu to access the configuration settings.

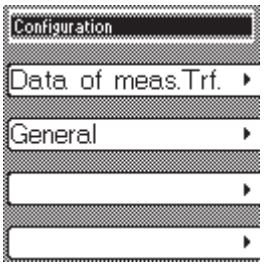
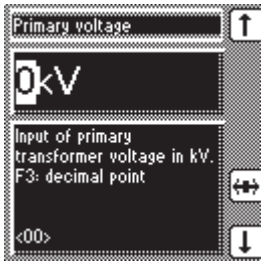


Fig. 18 – Configuration menu TAPCON® 240-LV

3.2.1 CT/VT values

Press F2 in the configuration menu to access the CT/VT settings.
Below all parameters are described in the order in which you can scroll the related pages on the TAPCON® 240-LV with the "→" key.

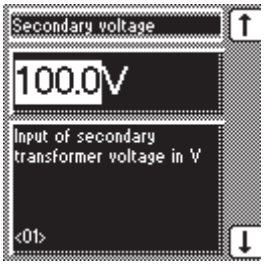


Setting range: 0 ... 9999 kV
Increments: 1 kV

Fig. 19 – Specification of the primary CT/VT voltage

Setting of the primary CT/VT voltage in kV. If you do not enter a value here, the operational measuring indicator (main screen) is not available in kV. Enter the number of positions after the decimal point with F3.

Note: Positions after the decimal point are usually not needed here. You can use F3 to specify the positions after the decimal point for the operational measuring indicator (e. g., setting of 20.0 kV → means the indication of one position after the decimal point for the measured value).



Setting range: 100 ... 110 V
Increments: 0.1 V

Fig. 20 – Specification of the secondary CT/VT voltage

Setting the secondary CT/VT voltage in V.

3.2.2 General

Press F3 in the configuration menu to access the general settings.
Below all parameters are described in the order in which you can scroll the related pages on the TAPCON® 240-LV with the "→" key.

Setting range: German / English / French / Spanish

Fig. 21 – Indication of equipment language

Setting range: 0 ... 9999

Fig. 22 – Regulator

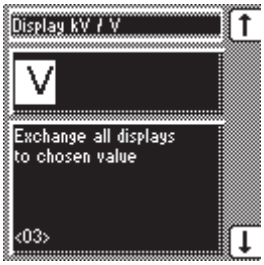
If at all possible, enter a regulator identification for all your TAPCON® 240 and TAPCON® 240-LV devices. This can be a number which you assign as desired, but it should be unique. You can use the regulator identification to immediately recognize the related data set with the included software "TAPCON-trol System" (i. e., when you connect the TAPCON® 240-LV with the PC, the software "TAPCON-trol System" automatically locates the right data set and shows it as the current data set).

Setting range: 9.600 Baud
19.200 Baud
38.400 Baud
57.600 Baud

Fig. 23 – Baud rate for PC communication (COM1)

You can set the baud rate for PC communication.

Note: Usually you do not need to make this setting since the baud rate is automatically detected when the device is connected to your PC. Do not reset the setting unless you experience communication problems with faster baud rates.



Setting range: kV / V

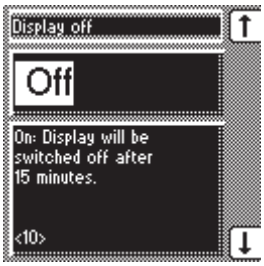
Fig. 24 – Indication of the operational measuring value in V/kV

You can indicate your operational measuring value in V or kV. However, for indication in kV you will need the applicable CT/VT ratio beforehand.

Note: If you still have not set a primary CT/VT voltage (primary CT/VT voltage of 0 kV), you cannot switch to "kV".

Illumination of the display

Menu → Configuration → General
Display dimmed



In case of activating this function, 15 min after the last pushing a button the display will be dimmed but is still readable. By pushing any button the display lights up again.

3.3 Menu info / measured values

Consult this sub-group to retrieve information on the voltage regulator

Line 1: type designation

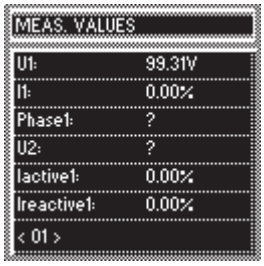
Lines 2 and 3: software version and its date of issue

Line 4 left: EEPROM size

Line 4 right: internal regulator ID number

Lines 5 and 6: size of the built-in RAM and flash memory

Fig. 25 – INFO



Display of measured values

Line 1: voltage on the first measuring input

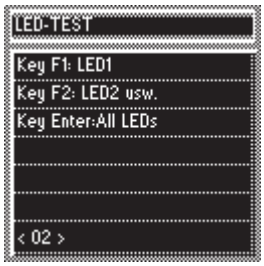
Line 2: current at the first measuring input

Line 3: phase position U1 to I1

Line 4: voltage on the second measuring input

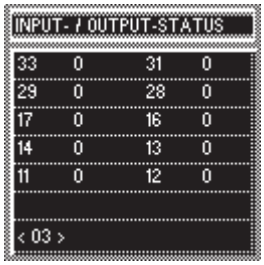
Lines 5 and 6: active and reactive current on the first measuring input

Fig. 26 – MEAS. VALUES



A function test can be performed for the LEDs in accordance with the indicated specifications.

Fig. 27 – LED-TEST

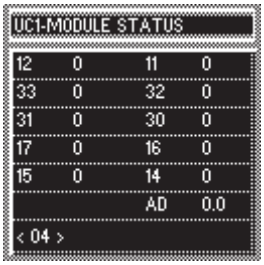


Status display of the inputs on the IO modul

0= no signal on input

1= signal on input

Fig. 28 – INPUT- / OUTPUT-STATUS



Status display on the inputs on the UC1 module

0= no signal on input

1= signal on input

Fig. 29 – UC1-MODULE STATUS

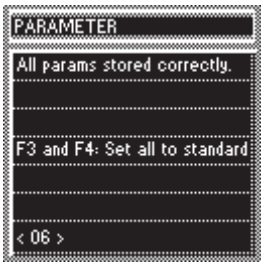


Fig. 30 – PARAMETER

Display indicating whether the parameter sets were properly stored following a regulator restart and/or whether all parameters were properly stored following the recording of a parameter set.

If a parameter was not properly stored, it will be indicated as incorrectly stored and can be reset to a factory standard setting by pressing the F 1 key.

To reset all parameters to standard settings, press the F3 and F4 keys.

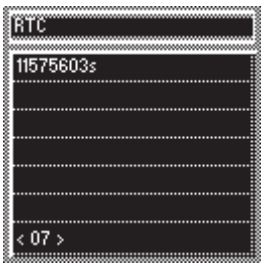


Fig. 31 – RTC

RTC = Real Time Clock

When the voltage regulator is started up for the first time a counter is set in motion which continues to run even while the regulator is inactive. For the visual display of the measuring values, all of the counter's times will be overwritten by the PC's times.

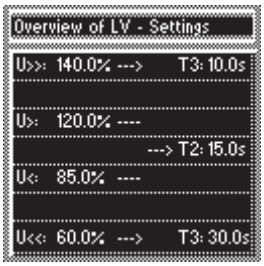


Fig. 32 – Overview of LV-Settings

Overview of the active voltage limit values and the respective times.

4 Operating failures

Thanks to its self-monitoring function, this device is largely secured against malfunctions.

4.1 Failure of a fine-wire fuse

The measuring transformer and the power supply module are protected by a fine-wire fuse each.

Failure of the fine-wire fuse of the measuring transformer Littlefuse Type 3 AG, 100 mA)

Symptom:

The digital display shows 0.0 V (or 0.0 kV).

Failure of the fine-wire fuse of the power supply module Littlefuse Type 3 AG, 3 A)

Symptom:

The digital display and all LED displays are dark, the signaling relay IO- K8 has dropped out.

4.2 Electromagnetic interference

Interferences caused by electromagnetic fields can be safely counted out if the housing is properly connected and earthed.

If the measured values displayed do not make any sense, it is advisable to check the CT/VT circuits for proper screening. It is furthermore advisable to screen the cables used for binary information

5 Front panel

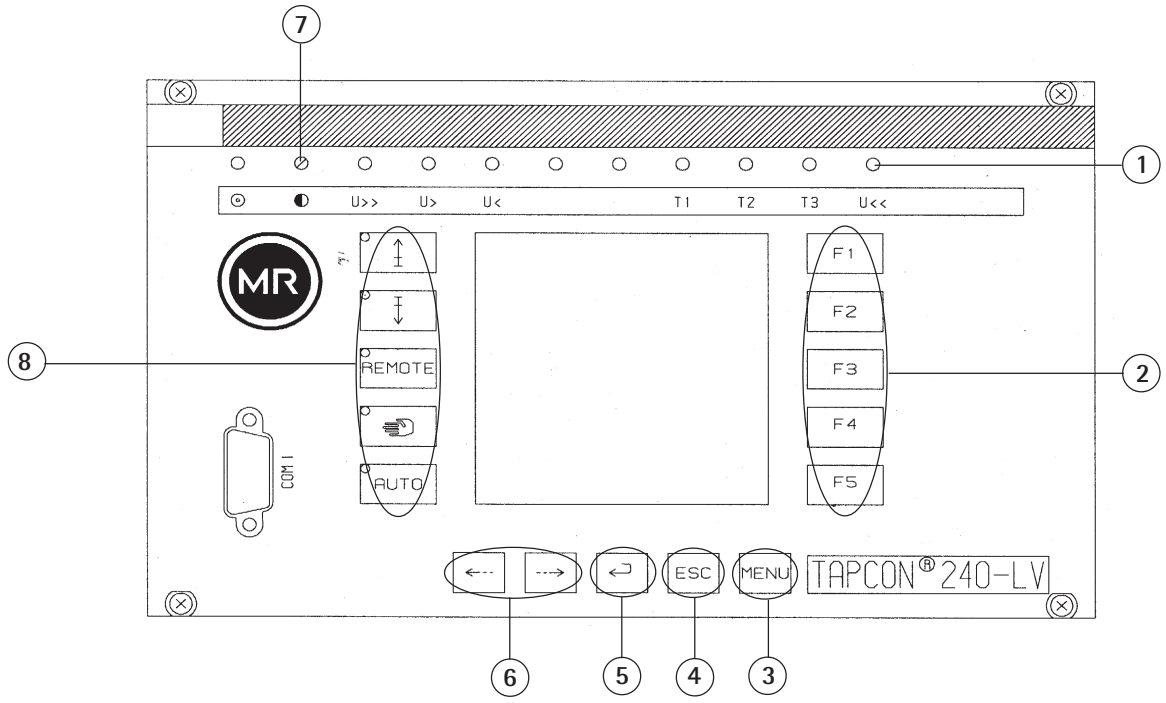
5.1 Description of the front panel

The keys on the front panel are generally categorized in two different groups:

- Operating keys
- Function keys for menu guidance

The LEDs located in the upper area of the front panel serve for signalling the following operating statuses:

- Operating status display
- U>> (red)
- U> (red)
- U< (red)
- T1, T2, T3 (yellow)
- U<< (yellow)



1 - LEDs
2 - Function keys for menu guidance
3 - Select main menu
4 - Return to the respective higher-order level
5 - Key for confirming value entry/saving (ENTER key)
6 - Change of windows within a level
7 - Manual setting option for display contrast
8 – No function (for TAPCON® only)

The readouts shown on the TAPCON® 240-LV display and the keys arranged around the display form a single unit. Akin to the operation of money machines, possible selectable functions are shown on the display either in plain text form or image form.

The key situated closest to the entry in question is used for activating the user's request, although a distinction needs to be made between the horizontal and vertical menu keys.

6 Technical Data

Setting ranges

Desired voltage level	85 to 140 V, adjustable at 0.1 V increments
Voltage limit value U<	50 to 100 % of the desired voltage level in 0.1 % increments
Voltage limit value U<<	50... 100 % of the desired voltage level in 0.1 % increments
Voltage limit value U>	100 to 140 % of the desired voltage level in 0.1 % increments
Voltage limit value U>>	100 to 140 % of the desired voltage level in 0.1 % increments
Delay time T1	1 to 10 s in 0.1s increments (triggering of circuit breaker)
Delay time T2	5 to 15 s in 0.1 s increments (message "OLTC FAIL" / message "VRR FAIL")
Delay time T3	2 to 30 s in 0.1 s increments (message "return control in progress")

Control elements, display

Function keys	MENU key for selecting the menu points
	F1 to F5 keys for setting the functions
Display	7 LEDs,
	U>> (red)
	U> (red)
	U< (red)
	T1, T2, T3 (yellow)
	U<< (yellow)

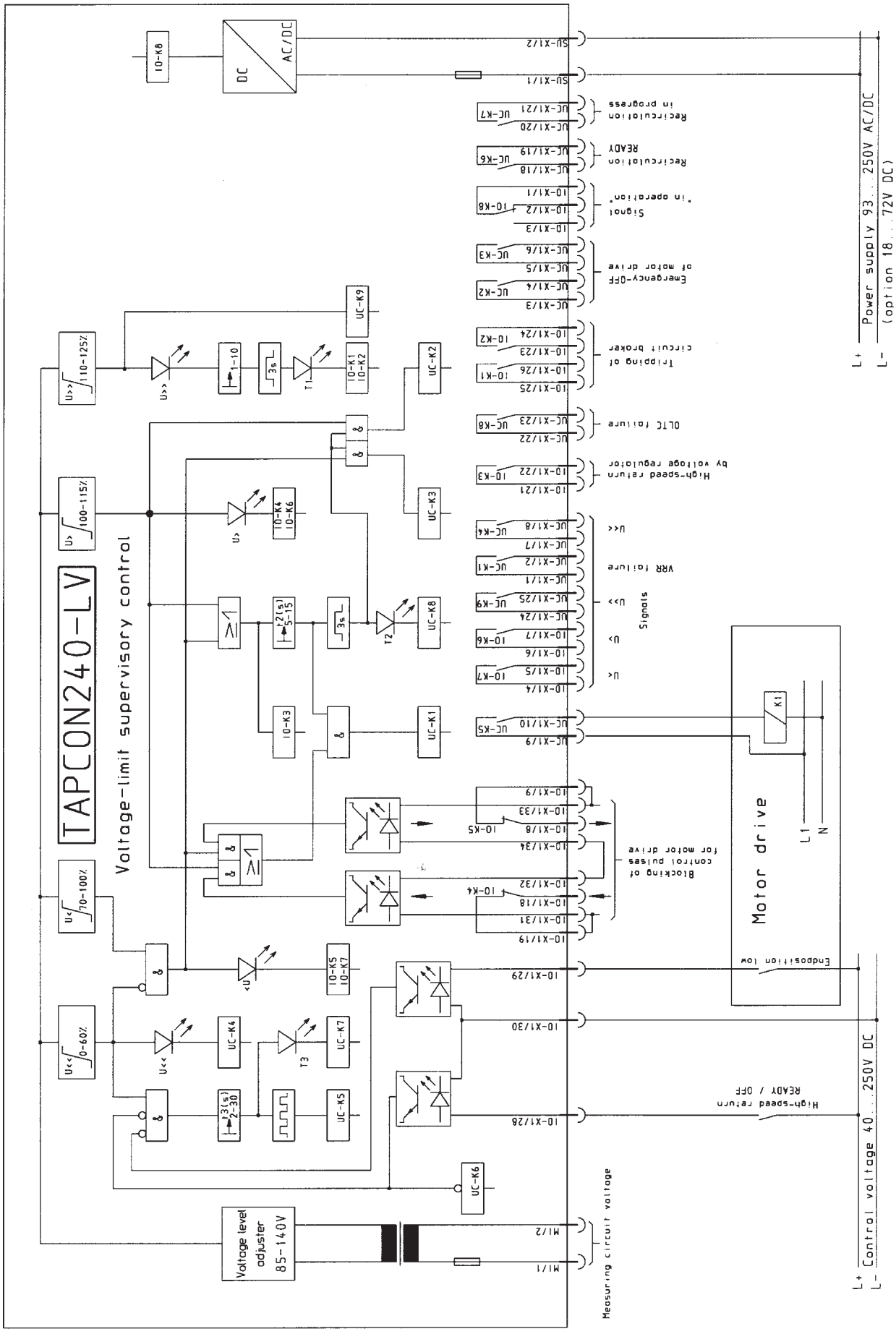
Output relays	Signaling relay IO-K5 for response threshold U<, 1 n/c contact
	Signaling relay IO-K7 for response threshold U<, 1 n/o contact
	Signaling relay IO-K4 for response threshold U>, 1 n/c contact
	Signaling relay IO-K6 for response threshold U>, 1 n/o contact
	Output relay IO-K3, selection of voltage-regulator rapid cycle, 1 n/o contact
	Signaling relay UC-K8 for signaling "OLTC FAIL", 3 s hold time for contact making, 1 n/o contact
	Output relay UC-K9 for signaling the response threshold U>> and output relay IO-K1 and IO-K2 for triggering the circuit-breaker, 3 s hold time for contact making,1 n/o contact each
	Signaling relay UC-K1 for signaling "OLTC FAIL", 1 n/o contact
	2 output relays UC-K2 and UC-K3 for triggering the motor protection switch of the motor-drive mechanism, 3 s hold time for contact making, 1 n/o contact each
	Signaling relay IO-K8 for status signal, 1 change-over contact
	Signaling relay UC-K4 for response threshold U<<, 1 n/o contact
	Output relay UC-K5 for automatic OLTC return control via clock generator 1.5 s / 1.5 s (pulse/pause), 1 n/o contact
	Signaling relay UC-K6 for signaling "Return control on/off", 1 change-over contact
	Signaling relay UC-K7 for signaling "Return control in progress", 1 change-over contact
Making and breaking capacity of the relay contacts	AC 250 V; 5 A / DC 250 V; 3.0 A / DC 100 V; 0.4 A /DC 30 V; 5 A

Control inputs	For "return control on": DC 40 to 250 V For "low position": DC 40 to 250 V for control command of the VRR "raise" or "lower" AC/DC 110 to 230 V
Serial interfaces	Optional: 1 serial interface for control system interfacing
Measuring input	Voltage transformer 85 to 140 V, measuring range 60 to 185 V, 40 to 60 Hz r.m.s. measuring, measuring error < 0.3 % +/- 40 ppm/°C, intrinsic consumption < 0.5 VA
Power supply	DC 18 to 72 V AC/DC 93 to 265 V Consumption: approx. 25 VA
Temperature limits	Admissible ambient temperature for operation: -25° C to + 70° C Admissible ambient temperature for storage and transport: -30 °C to +85 °C
Tests	
Electrical safety	Protection class 1 in accordance with IEC 60536 Protection rating IP00 in accordance with IEC 60529 Degree of soiling 2 in accordance with IEC report 664-1 Overvoltage category III in accordance with IEC report 664-1
EN 61010-1	Safety provisions governing electrical measurement, control, regulation and laboratory equipment. Dielectric test with operating frequency of 2.5 kV/1 min
IEC 60255	Dielectric test with surge voltage, 5 kV, 1.2/50 µs
Electromagnetic compatibility	
IEC 61000-4-2	Interference immunity against electrostatic discharge with 6/8 kV
IEC 61000-4-3	Interference immunity against HF fields with 10 V/m, 80 to 1000 MHz
IEC 61000-4-4	Interference immunity against bursts with 2 kV
IEC 61000-4-5	Interference immunity against surges with 2 kV
IEC 61000-4-6	Interference immunity against HF on lines with 10 V, 150 kHz to 80 MHz
IEC 61000-4-8 continuous	Interference immunity against magnetic fields with 30 mA/m, 50 Hz,
IEC 61000-4-11	Interference immunity against voltage drops with AC supply: 30 % / 0.5 period 60 % / 5 periods; with DC supply 100 % / 10 ms and 60 % / 100 ms
EN 61000-6-2	CE conformity
EN 61000-6-4	CE conformity
Temperature and climate resistance	
IEC 60068-2-1	Dry cold, -10 °C / 20 hours
IEC 60068-2-2	Dry heat, +70 °C / 16 hours
IEC 60068-2-3	Moist heat, constant, +40 °C / 93 %/6 cycles
IEC 60068-2-30	Moist heat, cyclic (12 + 12 hours) + 55 °C / 93 % / 6 cycles

7 Appendix

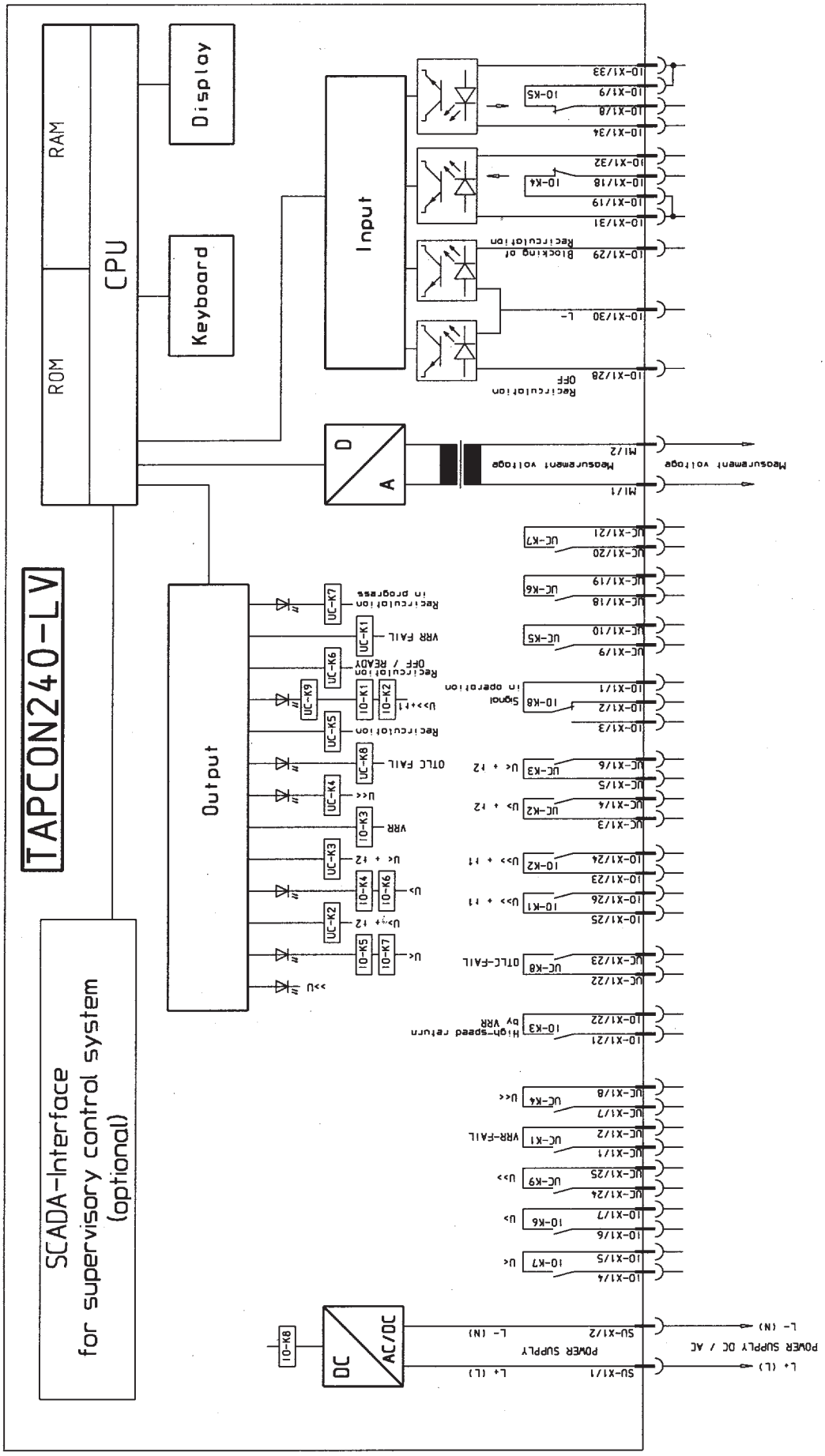
TAPCON® 240-LV

Block diagram



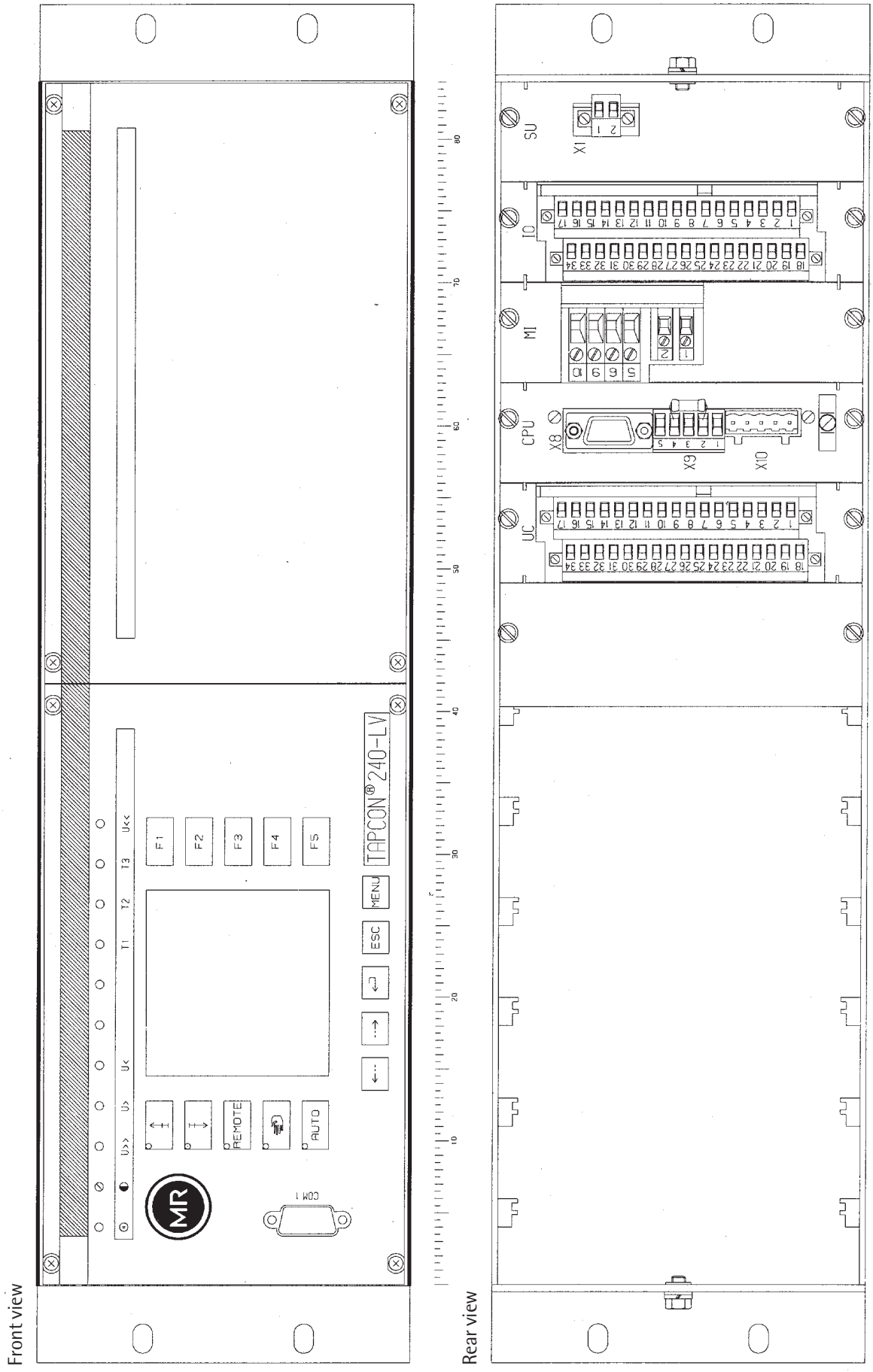
TAPCON® 240-LV

Block diagram



TAPCON® 240-LV

Installation drawing



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