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ComatReleco

Data sheet

SSU11/...V

VOLTAGE-MONITORING RELAY

55000 - 44 - 57 - 407

1. INTRODUCTION

The voltage control relay is a microprocessor-based precision instrument to measure DC voltages.

It is used as a high/low voltage relay with an ON/OFF delay of 0.1s to 600s.

A 4-digit 7-segment LED display shows current and nominal values. Programming of ON/OFF voltages and their specific time delays is done via 3 push-buttons.

To satisfy user expectations, the device has automatic and manual test features for safe operation.

The output of the standard version consists of a 5A switch-over contact (relay R) and a NPN transistor output.

Several version types cover a supply voltage range of 12V to 240V UC.

We reserve the right for technical changes.

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2. PART NO.'S FOR ORDERING

COMATRELECO voltage control relay

Input measurement range:	… 38V	SSU11/UC12-15V
	… 77V	SSU11/UC24-48V
	…157V	SSU11/UC60-125V
	…270V	SSU11/UC110-220V

Other options:

U_{Mess} …10V	SSU13/UC24-48V
U_{Mess} …38V	SSU23/UC24-48V
U_{Mess} …77V	SSU16/UC110-240V
U_{Mess} 270V	SSU14/UC60-125V

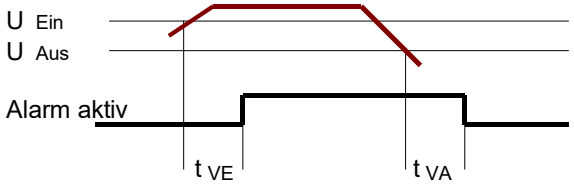
The user may request other U_{Mess} / U_B combinations.

Accessories and added components:

Base	CS-11, coding accessories CA11
	C11A
	EC11
Retaining spring	HF-24
Front assembly accessories	FZ23

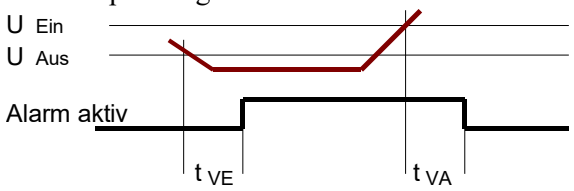
3. OPERATING FUNCTIONS

Maximalspannungsrelais



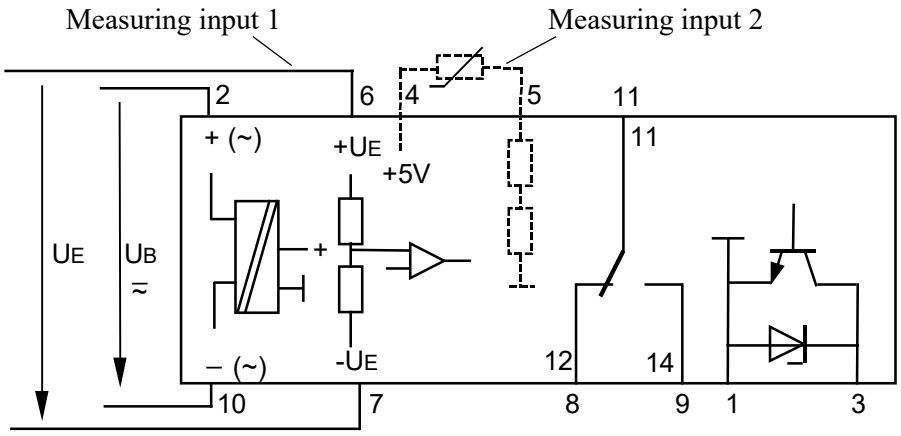
Note for high voltage relay: an alarm is set off when specific minimum, or better low voltages are reached. Low voltages are different for each relay type and do not correlate to programmable error voltages.

Minimalspannungsrelais



Note for low voltage relay: Relay R released means "Alarm Active."

4. SWITCHING DIAGRAM



5. TECHNICAL SPECIFICATIONS

5.1. General specifications

5.1.1. Mechanical specifications

Housing	S2, plug-in type, 11-pole (IEC67-1-18)
Protection Class	Housing IP40
Housing material	Noryl SE1=UL 94V-1
Weight	195g
Mounting	11-pole plug-in base with retaining spring; front assembly with accessories
Ripple	IEC 68-2 – 6 / FC IEC 571
Shock resistance	TW 80

5.1.2. Ambient requirements

Ambient stockroom temperature	-40°C ÷ +85ºC
Ambient operating temperature	(-10ºC)10ºC ÷ 50ºC (60ºC)
Relative humidity	10 ÷ 95% not condensed
Transient safety	IEC 255 (see E, K1. III)

5.2. Electrical specifications

5.2.1. Power supply

Type SSU ../	UC12-15V	UC24-48V	UC60-125V	UC110-220V
$U_{B\ Nominal}$	12-15V	24-60V	60-125V	110-240V
U_B	9-20V	19-75V	48-158V	88-265V
Current consumption $I_{B\ eff}$	80-200mA	30-80mA	15-30mA	10-20mA
Load consumption		2W/2.5VA		
Inrush current		≤ 2.5A;4ms	≤ 2.5A;1ms	

Parallel load	500mWs/2.5Hz single pulse 2.5kV/0.5Ws
Life expectancy (no contact) t_U = 35ºC	> 100 000h

5.2.2. Measuring Input 1, Pin 6-7

Type SSU11	UC12-15V	UC24-48V	UC60-125V	UC110-220V
Input type	3	4	5	6
Input voltage $U_{E\ max}$	± 75V	± 100V	± 180V	± 300V
Measuring range $U_{min} - U_{max}$	1-38V	10-77V	40-157V	50-285V
Resolution/display	00.02V	000.1V	000.1V	000.1V
Accuracy (10-50ºC)	± 0.1V	± 0.2V	± 0.3V	± 0.5V
Input resistance	App. 35kΩ	App. 70kΩ	Appr. 150kΩ	App. 300kΩ
Max. ripple voltage F:$16^2/_3$/50/100/400Hz	≤ 2Vpp	≤ 5Vpp	≤ 5Vpp	≤ 5Vpp
Low voltage alarm (ERR), switch-off if needed	< 0.5V	< 5V	<5V	<5V
High voltage alarm (45)	> 38V	>77V	>157V	>285V

5.2.3. Measuring Input 2, Pin 5-7

On request…
Possible is… * 0 – 10V * PT 1000
* 0 – 20mA * PT 100 etc.

In connection with a respective evaluation (software).

5.3. Time Delay

To Measuring Input 1

5.3.1. Measuring Value Detection

Measuring value detection incl Average value detection via 4 measurements	≤ 150ms

5.3.2. Time Range

Setting range t_{VE} , t_{VA}		0.1 … 600.0s
Setting- and display resolution		0.1s
Time accuracy		Measuring value detection time + (± 20ms, or better ± 1ms)
Time difference Output 1 – Output 2		
(Aux. Output)	Alarm IN	1 … 3ms ($t_{VEA1} > t_{VEA2}$)
	Alarm OUT	5 … 10ms ($t_{VAA1} > t_{VAA2}$)

5.3.3. Time Ratio

Switch on time response	The alarm is active for max. 3s after U_B ON (self-test)

5.4. Additional Data

Type	UC12-15V	UC24-48V	UC60-125V	UC110-220V
Short circuit protection at $U_{B\ min}$	≤ 10ms		≤ 15ms	
Storing setpoints without power		≥ 10 years		
Life expectancy		> 100 000h		

5.5. Outputs

5.5.1. Output 1

Contact		1 x U, AgLeg, sealed (IP67)
Switching voltage		(0.1V) ÷ 250V
Switching capacity	DC	150W/30V 50W/250V
	AC	1250VA
Switching current		5A (AC1) 3A (AC11)
Recommended minimum load		1V, 10mA
Life expectancy electrical		≥ 1 x 10^5 / AC1 5A, 220V
Life expectancy mechanical		≥ 5 x 10^7
Insulation		≥ 2kV rms

5.5.2. Output 2

Note: this output is activated via a specific logic function (software version). It is standard that Output 2 is active at Alarm (switched through).

Output	Solid state is being switched against Minus (NPN/Pin 3 against Pin 1); no short circuit protection.
Switching voltage	UC10-32V
Switching current	50mA
Through voltage	≤ 1.2V
Switch-off voltage limit	Diode (≤ 1V)
Isolation	No galvanic isolation

6. OPERATION

Definition of terms

U_E	Input voltage to be measured (current value)
U_{Ein}	Value of U_E at which the alarm output [1] becomes active.
U_{Aus}	Value of U_E at which the alarm output becomes inactive.
T_{VE} , t_{VA}	ON/OFF delay for switching over the alarm output
Mode-Operation	U_E is displayed and evaluated.
Mode-Display [2]	
U_{Ein} [2]	U_{Ein} is displayed
t_{ve} [2]	Delayed ON response time t_{VE} is displayed.
U_{Aus} [2]	U_{Aus} is displayed
t_{VA} [2]	Delayed OFF response time t_{VA} is displayed.

[1] Alarm output (Output 1)	Alarm inactive : relay is open
	Alarm active : relay is closed

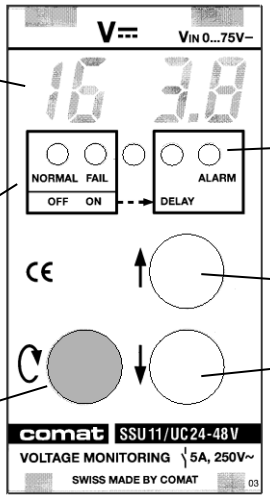
[2] UE is being evaluated in these modes. Switching back into Operating Mode occurs when no push-button is depressed for a period of 20s. The respective mode settings are displayed in the table shown under 6.1.1.

6.1. Function Components

4-digit 7-segment display, approx. 8mm high, for current and nominal values (U_E , U_{Ein} , U_{Aus} , $t_{V\,Ein}$, $t_{V\,Aus}$).

LED display for operating and programming modes (see 6.1.1 for explanation).

Push-button to switch over mode.



LED display for output status, relay and response time.

Push-button "Value Ascend ↑"

Push-button "Value Descend ↓"

6.1.1. Operating- and Programming Status of LED's

Mode		Parameter		LED's	
		Normal (OFF)	Fail (ON)	DELAY	ALARM
Operation	U_E	V	V	BV	V
Display	U_E	0	B	0	0
	t_{VE}	0	B	B	0
	U_{Aus}	B	0	0	0
	T_{VA}	B	0	B	0
Programming	U_E	I	B	I	I
	t_{VE}	I	B	B	I
	U_{Aus}	B	I	I	I
	T_{VA}	B	I	B	I

V : independent from set nominal values and from relay status
0 : dark; I : illuminated; B : blinking
When switched on, all display components are briefly illuminated; the device completes a self-test before it is ready for operation (see point 7).

6.2. Programming nominal values

6.2.1. Accessing Programming Mode

a) Request Display Mode with push-button ↻ and select desired nominal value. The respective LED is blinking.

b) Simultaneously depress push-buttons ↑ and ↓ for a period of 2s. The Programming Mode is switched on when at least 1 LED is blinking and when the remaining LEDs are illuminated (see Table 6.1.1).

Note: the Programming Mode is automatically terminated if a push-button is not depressed for a period of 20s; old nominal values are then maintained.

6.2.2. Programming

a) set nominal value by depressing push-button ↑, or ↓:

depress briefly: change of last digit (4th digit) in 1 increment per stroke

depress continuously: after 1s, the count is automatically increased to 1.0, or decreased (10x per s) until the push-button is released.

b) Store new value by depressing push-button ↻.
At the same time, the Operating Mode is reactivated. If the push-button is not depressed, reset to Operating Mode occurs after 20s, and the old nominal value is maintained.

Note: there are no measurements in the Programming Mode. The switching state of the outputs remains unchanged when the Programming Mode is active. A delayed response is continued if it existed prior to activating the Programming Mode. A response active in the moment may be prolonged or shortened.
Changing the status of the device while the Programming Mode is active will impact the outputs as early as the Programming Mode is exited.
When reprogramming U_{Ein} or U_{Aus}, a response time that may be active is reset. After exiting the Programming Mode, the device will adopt one of the following states:

-46 ; -45-	:	Alarm
Good-Range (Gut-Bereich)	:	No Alarm
Fail-Range (Fail Bereich)	:	Alarm
Range between U_{Ein} and U_{Aus}	:	Prior Status

6.3. **Programming base values**

A special feature provides for programming of base values. Range threshold values of the respective version are adopted.

$U_{Ein} = U_{max}$ *

$U_{Aus} = U_{min}$ *

$T_{VE} = t_{VA} = 1s$

* see section 5.2.2

Procedure

Exit Operating Mode by depressing push-button ↻ repeat until display shows "----".

Data transfer (from EPROM to EEPROM) occurs by simultaneously depressing ↑ and ↓ until device is reset into Operating Mode (approx. 2s).

6.4. Test Mode

It is possible to initiate a self-test to check the unit when switched on; this is independent from continuous, automatic testing.

The Self-test Mode continues until it is manually switched off. Sporadic errors can therefore be detected.

Request Test: Exit Operating Mode by repeatedly depressing push-button Ⓒ until display **8.8.8.8** and LED's are blinking.

Start self-test: Simultaneously depress ⓘ and ⓓ until the LED's are no longer blinking (appr. 2s).

To exit the Self-test Mode depress push-button Ⓒ.

During self-test, the switching status of the outputs is set to Alarm. A delayed response is continued if it existed before the start of the self-test. After exiting, the prior state is adopted.

6.4.1. Calibrating

The device was calibrated prior to delivery. Software is used for calibrating; different calibration voltages are used and the respective measuring values are permanently stored to correct future errors. The user may re-calibrate if desired for any kind of reason, e.g. to compensate for incorrect sensor linearity. However, special lab equipment is needed.

The function "Calibrate" is an added feature under the Test-Mode. Please refer to the specific Standards for calibration 55000-61-76-400 when using this feature.

6.5. Setting outputs

This function is used for start-up and testing. The alarm output can be activated independently from other rules including set response time delays (this means relay drop).

Output 1 (Relay) and Output 2

Procedure

By depressing push-button Ⓒ the Operating Mode is exited and switched forward until "-A1-" is displayed. At this point, both outputs may be activated (⇒ Alarm) by simultaneously depressing ⓘ and ⓓ for a period of at least 2s. Status display continuous to depend on the standard operating mode.

Setting is discontinued via Ⓒ and the device is again in standard operating mode; the output is switched according to the reading, or better data evaluation.

6.6. Switching off ERR 46 (Low Voltage Threshold)

The low voltage threshold is used to recognize wire breakage etc. at the measuring input, and it is helpful during operation when high voltage is being monitored.

Recognizing status

When the firmware version is shown (see 8.2), the following is displayed:

X.XX. ↖ If the last period is visible, the Low/Minimum Voltage Threshold is switched off.
If this period is not visible, the threshold is switched on.

Switching over with/without threshold:

Switch into mode "-A1-" (see 6.5.1), simultaneously depress ↑ ↓ C for approx. 2s until "- - 46" is displayed.

Switch to 0 or 1 with ↑ or ↓ .

0 means without minimum voltage threshold;

1 means with minimum voltage threshold.

Switch back to Operating Mode via C.

7. SELF-DIAGNOSTICS

When the device is switched on, a self-test is being run. During self-test, "**8.8.8.8.**" is displayed, and all LED's are illuminated. After approx. 3s, the device runs in the standard Operating Mode. During operation, automatic self-tests occur periodically. If the device functions are interrupted by an error, error code (-XX-) is displayed for service. The Alarm Output is activated. During operation, self-tests continue to run in the background.

8. OTHER DISPLAYS

8.1. Used error display

Error Display	Comments		Description	Solution
01	1)	2)	EPROM Error	Repair
04	1)	2)	RAM Error	Repair
07	1)	2)	Data Error	Repair
27	1)	2)	Internal Voltage Error 1	Repair
28	1)	2)	Internal Voltage Error 2	Repair
30	1)	2)	Analog Error	Repair
31 . . 36	1)	2)	Calibration value out of range	Only occurs when calibrating
40	2)		No calibration	Device needs to be calibrated
45	1)		Input voltage too high	Possibly defective device
46	1)		Input voltage too low	
80	2)		Incorrect parameters	Check programmed values

1) Alarm output is activated if still possible

2) Standard Operation not possible

8.2. Display of current SW-versions (firmware versions)

The integrated SW-version can be requested during self-test by depressing ⓘ and, or ⓘ

Release when display is shown. Display format:

X.XY.

- Last period: minimum voltage threshold
- Y: input module type
- X.X: SW-version

Use for service and customer inquiries.

9. SHORT DESCRIPTION

The voltage control relay is based on a 1-chip microprocessor and offers to the user many previously unknown advantages:

- ♦ Measuring parameter – user-settable (programmable) in increments of 0.1V, or better 0.1s
- ♦ Precise – up to 0.1V, or better 0.04s depending on range
- ♦ Dependable – self-test device with Error display
- ♦ User-friendly – active LED- and 7-segment display, only 3 push-buttons
- ♦ Service-friendly – easy start-up and service supported by features like setting outputs.

Power supply is galvanically isolated and suitable for a wide range of input voltages. Reverse protection and interference peak absorption are provided, of course. The processor is based on a large-scale integrated CMOS 1-chip microprocessor for many useful applications and high dependability.

During the life of the device, operating data are safely stored in an EEPROM without battery. Data is securely protected via parity checks.

The Analog Input is high voltage protected. AC/DC-overlap (AC/DC piggy back) alternating voltage components are filtered via suitable analog and digital filters.

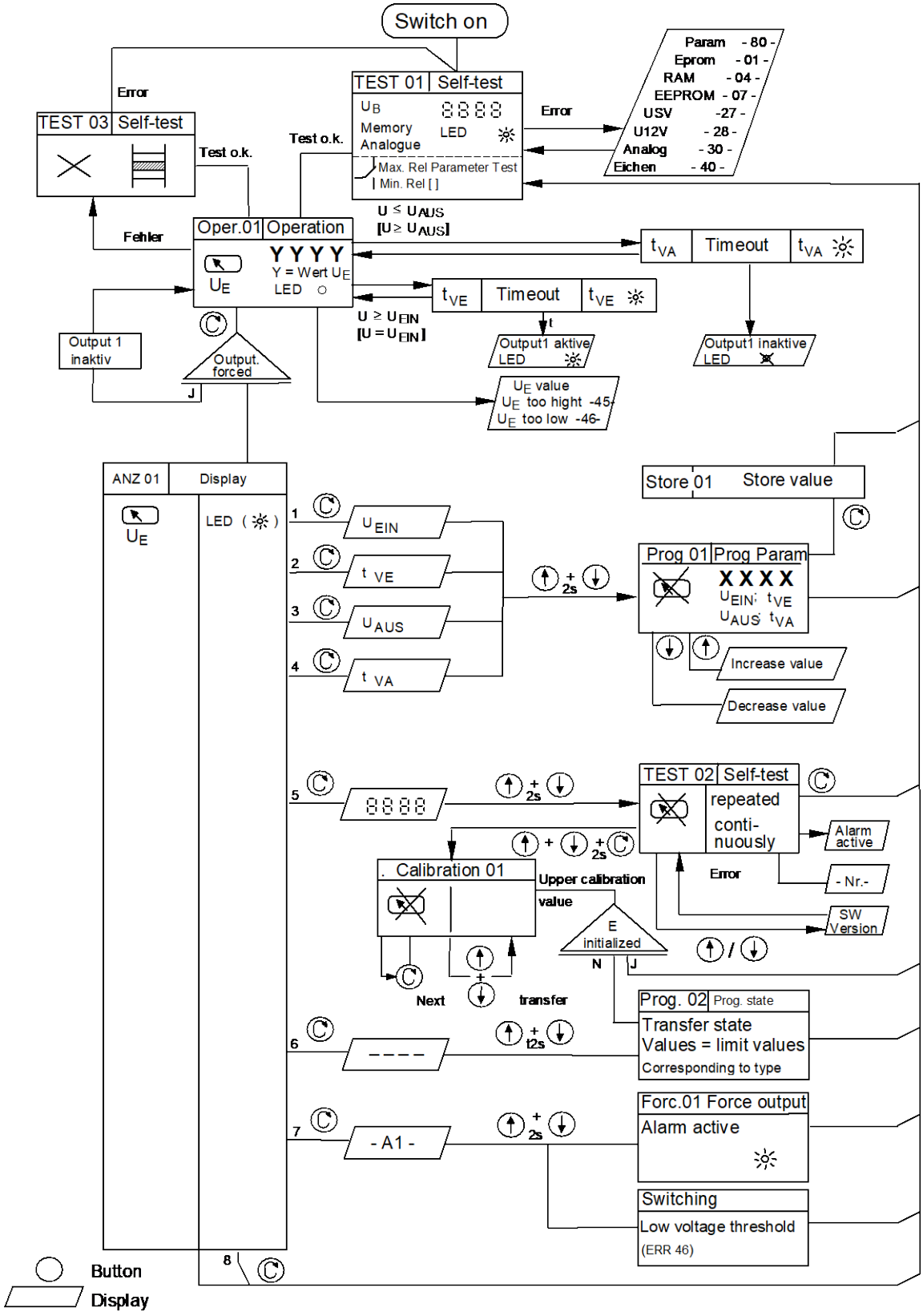
Input functions are protected by checking the offset (0) and threshold values.

The Alarm Output has a safe, hermetically sealed switch-over contact AgLeg with gold-flashing; loads from 0.1V/mA – 250V/5A can be handled. The relay drive is special: when the processor fails, an overturn switch is available so that the output is activated, which means a relay drop.

Highly effective LEDs consuming very little current are used for display to guarantee long life and good visibility.
Operation via the 3 push-buttons is simple; nevertheless, programming and specifications are protected against accidental changes.

A complete self-test is run during operation: the microprocessor checks internal supply voltages, analog I/Os, and the programming and data buffers. An Alarm is sent when an error is found.

10. SWITCHING DIAGRAM



ComatReleco

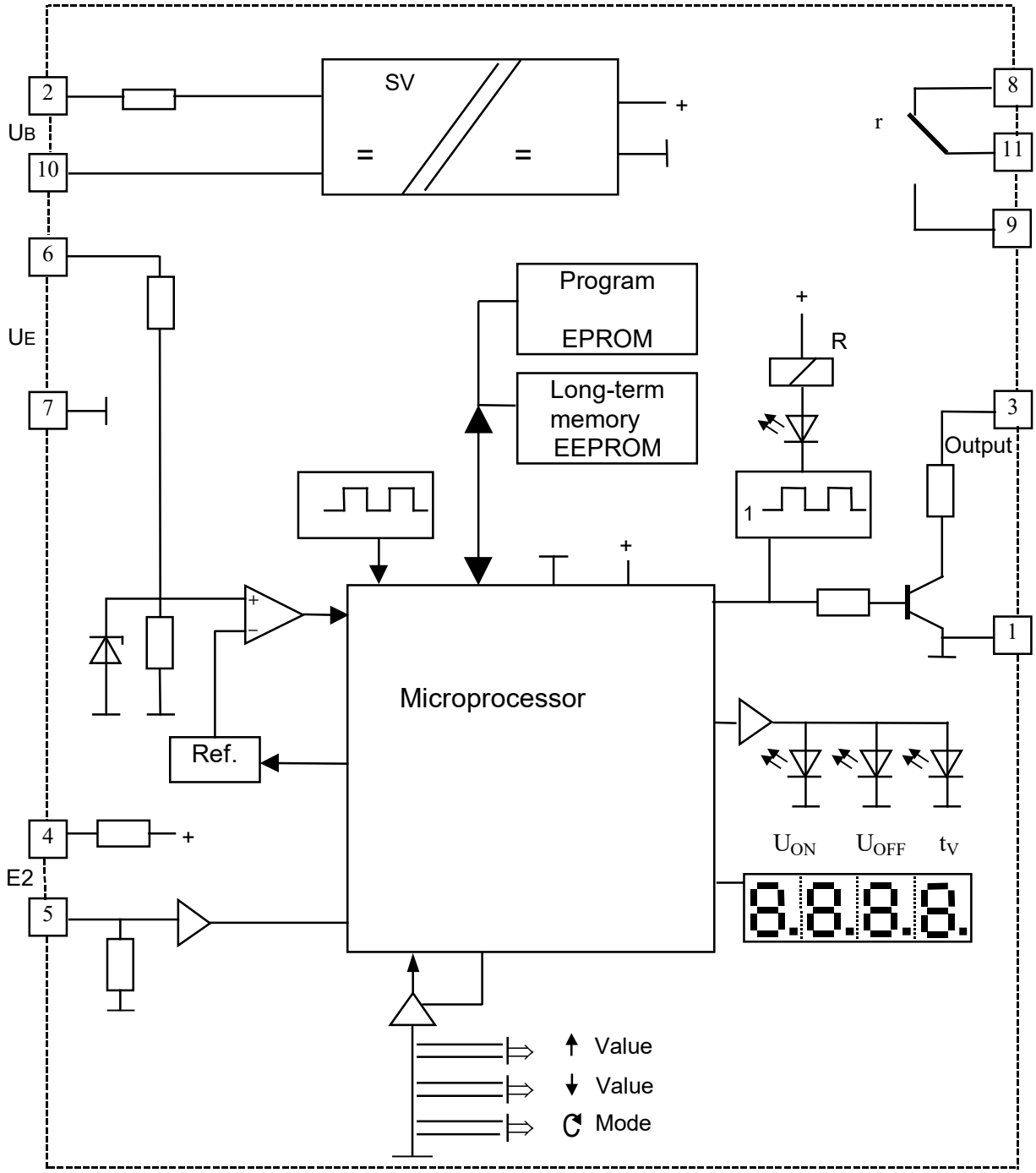
Data sheet

SSU11/...V

VOLTAGE-MONITORING RELAY

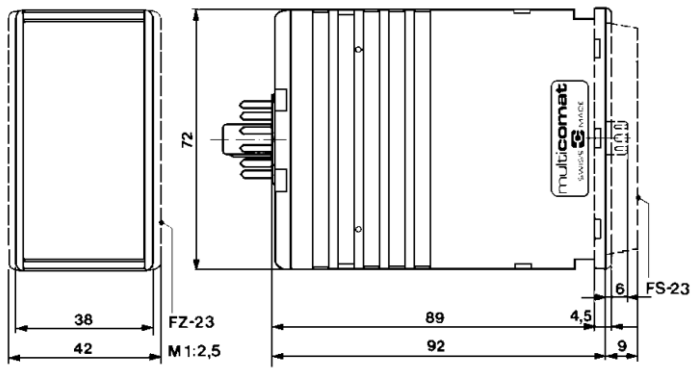
55000 - 44 - 57 - 407

11. BLOCK



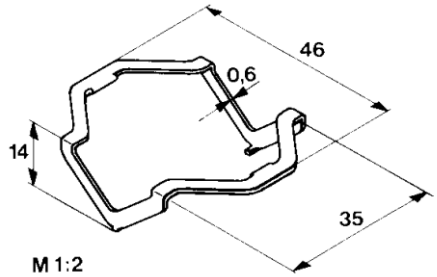
12. HOUSING AND ACCESSORIES

Dimension Case S2

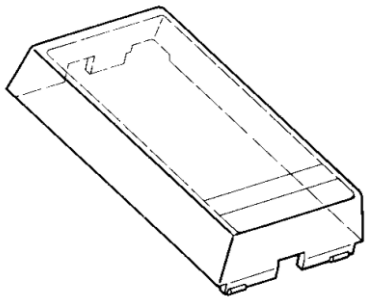


Panel-mounting accessories FZ-23 (hole: 38,5x70 +0,5mm max. panel thickness 3mm) transparent front cover FS-23 (Part of delivery schedule)

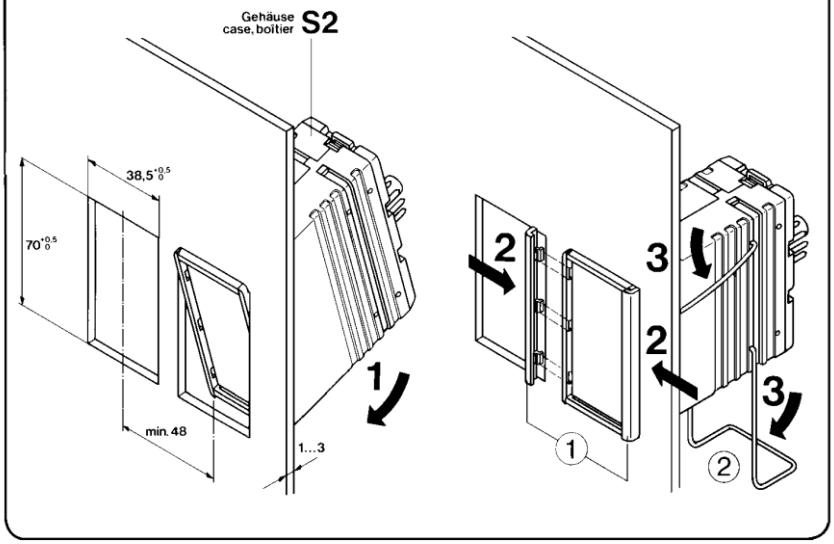
HF-24 Retaining spring, special spring steel
Can be used with all relay socket



FS23 Transparent front cover
(part of relay delivery schedule)



FZ-23 Panel-mounting accessories consisting of 2 front frame elements ①
and 2 clamping springs ②



CS-11 Relay socket with screw terminals for screw-fastening or snap-action