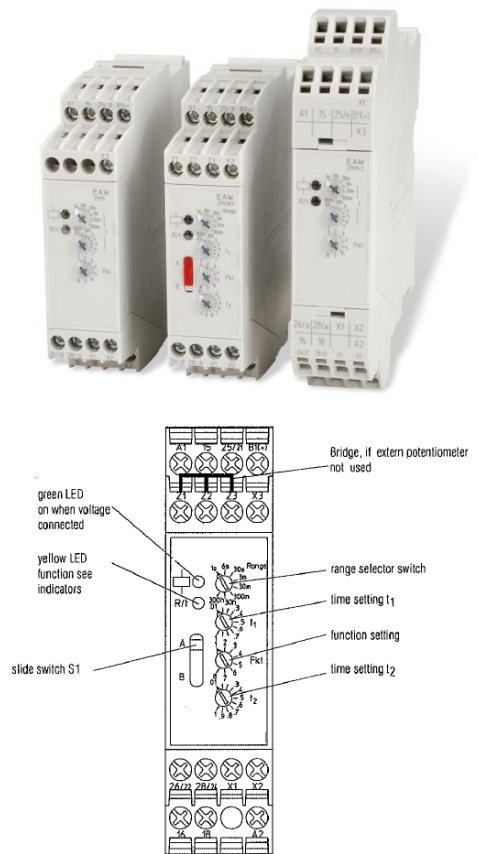


Multifunction Relays ZM 99



Your Advantages

- Up to 10 functions in one unit
- Simplified storage
- Increased flexibility
- Quick setting of long time values

Features

- According to IEC/EN 61 812-1
- 8 functions settable via rotational switch:
 - Delay on energisation (AV)
 - Fleeting on make (EW)
 - Delayed pulse (IE)
 - Flasher, start with pulse (BI)
 - Delay on de-energisation (RV)
 - Pulse forming function (IF)
 - Fleeting on break (AW)
- Delay on energisation and de-energisation (AV / RV)
- 8 time ranges from 0.02 s to 300 h selectable via rotational switches
- Voltage range AC/DC 12 ... 240 V
- With time interruption / time adding input for all functions
- Suitable for 2-wire proximity sensor control
- 2 changeover contacts, one programmable as instantaneous contact
- LED indicators for operation, contact position and time delay
- Wire connection: also 2 x 1.5 mm² stranded ferruled, or 2 x 2.5 mm² solid DIN 46 228-1/-2/-3/-4
- as option with pluggable terminal blocks for easy exchange of devices
- with screw terminals
- or with cage clamp terminals
- 22.5 mm width

Technical Data

Time circuit

Time ranges:	8 time ranges in one unit, settable via rotational switch	
	0.02 ... 1 s	0.3 ... 30 min
	0.06 ... 6 s	3 ... 300 min
	0.3 ... 30 s	0.3 ... 30 h
	0.03 ... 3 min	3 ... 300 h
Time setting t1, t2:	continuous, 1:100 on relative scale	

Recovery time:

at DC 24 V:	approx. 15 ms
at DC 240 V:	approx. 50 ms
at AC 230 V:	approx. 80 ms
Repeat accuracy:	± 0.5 % of selected end of scale value + 20 ms

Voltage and

temperature influence: < 1 % with the complete operating range

Input

Nominal voltage	U _N : AC/DC 12 ... 240 V
Voltage range:	0.8 ... 1.1 U _N
Release voltage (A1/A2)	

AC 50 Hz:	Delayed contact approx. 7.5 V
DC:	approx. 7 V
	Instantaneous contact approx. 3 V
AC 50 Hz:	approx. 3 V
DC:	approx. 3.3 V

Technical Data

General Data

Operating mode:	Continuous operation	
Temperature range:	- 40 ... + 60 ° C	
Clearance and creepage distances		
rated impuls voltage / pollution degree:	4 kV / 2	IEC 60 664-1
EMC		
Electrostatic discharge:	8 kV (air)	IEC/EN 61 000-4-2
HF-irradiation:	30 V / m	IEC/EN 61 000-4-3
Fast transients:	2 kV	IEC/EN 61 000-4-4
Surge voltages between		
wires for power supply:	2 kV	IEC/EN 61 000-4-5
between wire and ground:	4 kV	IEC/EN 61 000-4-5
HF-wire guided:	10 V	IEC/EN 61 000-4-6
Interference suppression:	Limit value class B EN 55 011	
Degree of protection		
Housing:	IP 40	IEC/EN 60 529
Terminals:	IP 20	IEC/EN 60 529
Housing:	Thermoplastic with V0 behaviour according to UL subject 94	
Vibration resistance:	Amplitude 0.35 mm, frequency 10 ... 55 Hz, IEC/EN 60 068-2-6	
Climate resistance:	40 / 060 / 04 IEC/EN 60 068-1	
Terminal designation:	EN 50 005	

Technical Data

Max. permitted residual current with 2-wire proximity sensor control (A1-A2)

up to AC/DC 150 V: AC resp. DC 5 mA

up to AC/DC 264 V: AC resp. DC 3 mA

Control current B1: approx. 1mA, over complete voltage range

Min. on/off time of control input B1(+):

AC 50 Hz: approx. 15 ms / approx. 60 ms

DC: approx. 5 ms / approx. 60 ms

Release voltage (B1/A2)

AC 50 Hz: approx. 3.5 V

DC: approx. 3 V

Nominal power consumption

AC 12 V: approx. 1.5 VA

AC 24 V: approx. 2 VA

AC 240 V: approx. 3 VA

DC 12 V: approx. 1 W

DC 24 V: approx. 1 W

DC 240 V: approx. 1 W

Nominal frequency: 45 ... 400 Hz

Output

Contacts

ZM 99: 2 changeover contacts, one programmable as instantaneous contact

without bridge X1-X2: 25-26-28 delayed changeover contact

with bridge X1-X2: 21-22-24 instantaneous contact at U_N on A1-A2

Thermal current I_{th} : see quadratic total current limit curve (max. 4 A per contact)

Switching capacity

to AC 15

NO contact: 3 A / AC 230 V IEC/EN 60 947-5-1

NC contact: 1 A / AC 230 V IEC/EN 60 947-5-1

to DC 13: 1 A / DC 24 V IEC/EN 60 947-5-1

Electrical life IEC/EN 60 947-5-1

to AC 15 at 1 A, AC 230 V: 1.5 x 10⁵ switching cycles

Short circuit strength

max. fuse rating: 4 A gL IEC/EN 60 947-5-1

Mechanical life: ≥ 30 x 1.000.000 switching cycles

Technical Data

Wire connection Screw terminals (integrated):

DIN 46 228-1/-2/-3/-4

1 x 4 mm² solid or
1 x 2.5 mm² stranded ferruled or
2 x 1.5 mm² stranded ferruled or
2 x 2.5 mm² solid

Insulation of wires

or sleeve length: 8 mm

Plug in with screw terminals

max. cross section

for connection: 1 x 2.5 mm² solid or
1 x 2.5 mm² stranded ferruled

Insulation of wires

or sleeve length: 8 mm

Plug in with cage clamp terminals

max. cross section

for connection: 1 x 4 mm² solid or
1 x 2.5 mm² stranded ferruled

min. cross section

for connection: 0.5 mm²

Insulation of wires

or sleeve length: 12 +/- 0.5mm

Wire fixing:

Plus-minus terminal screws M 3.5
box terminals with wire protection or
cage clamp terminals

Wire fixing:

Box terminals with wire protection

Mounting: DIN rail IEC/EN 60 715

Weight: approx. 150 g

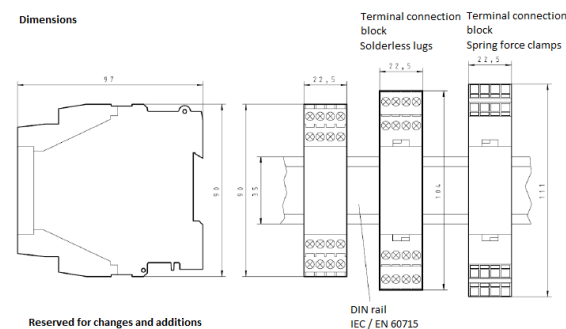
Dimensions

Width x height x depth

Standard 22.5 x 90 x 97 mm

Spring force clamps 22.5 x 111 x 97 mm

Solderless lugs: 22.5 x 104 x 97 mm





Technical specifications

General information	
Operating temperature	-25 to 60°C
Storage temperature	-40 to 70°C
Enclosure type	Panel installation (DIN IEC 61554)
Enclosure fixing	Screw-type clamping technology
Enclosure colour	black (RAL9005)
Enclosure front	72x72mm
Panel cutout	68x68mm
Installation depth	63mm (without connector)
Degree of protection	Front IP54 Rear IP20
Enclosure fire behaviour	UL94 V0
Conformity	EN 61812-1:2012
Rated voltage	250VAC
Electrical isolation	all inputs, outputs and power supply
Behaviour in case of power failure	Time remanence, parameterisable
Supply	
Voltage range	90 to 265V AC/DC
Rated frequency AC	50/60Hz
Rated power consumption	2W
Inputs	
Voltage range	20.4 to 265V AC/DC
Rated frequency AC	50/60Hz
Rated current	<2mA
Minimum pulse duration	100ms
Input functions	Start; Stop/Reset; time range changeover
Outputs	
Contact configuration	2 changeover contacts, floating
Contact use (changeover contacts)	2 time closing contacts or time closing contact / instantaneous contact
Instantaneous contact, parameterisable	for all time functions



Rated voltage	250VAC
Contact rating	5A ohmic
Minimum contact load	5VAC/DC, 100mA ohmic
Life	>100,000 cycles
Controls	
Time setting	Incremental encoder, 360°
Manual time control	joint button for the Start / Stop / Reset functions
Function parameterisation	DIP switch (rear of device)
Instantaneous contact parameterisation	DIP switch (rear of device)
Time range parameterisation	DIP switch (rear of device)
Remanent response parameterisation	DIP switch (rear of device)
Display elements	
Runtime	7-segment display WxH: 50x19mm, red
Response time	7-segment display WxH: 32x10mm, red
Time range display	green LED
Switched status display	red LED
Time functions	
Time ranges, parameterisable	hh:mm / mm:ss
Setting ranges	0:01-99:59 hours 0:01-99:59 minutes
Time control	manual and external
Switching functions, parameterisable	- Operate delay - Release delay - Passing make contact - Passing break contact - Clock pulse generator starting with pause - Clock pulse generator starting with pulse

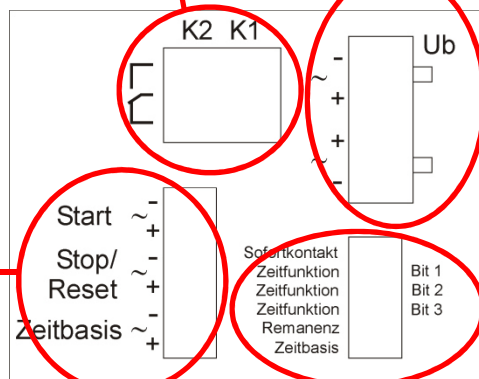
Terminal assignment

K1 – relay output with changeover contact
K2 – relay output with changeover contact
Max. 250VAC, 5A

Supply voltage
90 – 265 V AC/DC

External control inputs
20.4-265V AC/DC

Start: Pulse min. 100ms
Stop: Pulse min. 100ms
Reset: Pulse min. 3s
Time base: Continuous signal



DIP1 Instantaneous contact configuration

on	K2 = instantaneous contact
off	K2 = time closing contact

DIP1-3 time function configuration

Bit1	Bit2	Bit3	Function
off	off	on	Operate delay
off	on	off	Release delay
off	on	on	Passing make contact
on	off	on	Passing break contact
on	on	off	Clock pulse generator starting with pause
on	on	on	Clock pulse generator starting with pulse

DIP5 Remanence configuration

on	Storage of the time setting
off	no remanence

DIP6 Time base configuration

on	Time base mm:ss
off	Time base hh:mm





Functional description

Operation

- Time setting
The time is preset uniformly for all time functions using a rotary knob/incremental encoder. Turning clockwise increases the time with each latching of the incremental encoder depending on the set time range
 - hh:mm - increase by 1 minute
 - mm:ss - increase by 1 secondTurning anti-clockwise reduces the time with each latching of the incremental encoder depending on the set time range
 - hh:mm - reduce by 1 minute
 - mm:ss - reduce by 1 secondThe time can only be set if the time sequence is inactive. If the time sequence is active or paused, actuating the rotary knob/incremental encoder has no effect.
- Button
The optional button or push function of the incremental encoder included in the default configuration starts the time sequence with inactive time sequence (Start). Actuating while the time sequence is active (Stop) freezes the runtime. The time sequence pauses. The time sequence can be continued by actuating the button during paused time sequence (Start). Pressing the button continuously without interruption for a period of at least 3 seconds in each operating case results in resetting of the time sequence with the following consequence:
 - Cancellation of the time sequence and updating of the runtime display with the preset target runtime
 - All outputs switched to the initial state
 - Switching off the status LED
- START input
The START input starts the time sequence with a high pulse of at least 100ms and inactive time sequence. A high pulse with minimum length 100ms at the START input during paused time sequence continues the active time sequence. In all other operating states the input has no effect.
- STOP (Reset) input
A high pulse with minimum length 100ms at the STOP input freezes the runtime if the time sequence is active. In all other operating states the input with pulse length < 3 s has no effect.

A high pulse with minimum length 3 seconds at the STOP input in each operating case causes resetting of the time sequence with the following consequence:
 - Cancellation of the time sequence and updating of the runtime display with the preset target runtime
 - All outputs switched to the initial state
 - Switching off the status LED

- Time changeover input

Loading of the time changeover input with a high signal results in changeover to the second time range not preselected at the coding switch for the duration of the signal.

! If the time sequence is active the time sequence is continued to the end with the time base existing at the start time. Set times are deleted on changing over.

Behaviour on failure of the power supply

The system monitors the level of the secondary voltage of the power adapter. If it falls below a defined minimum voltage, all loads in the system (displays, outputs, etc) are switched off and the time and switched status of the *flare* TIME relay is saved in the EEPROM. Saving the time and switched status requires the remanence DIP switch to be set to ON.

If the voltage returns the time status (response time and (remaining) runtime) of the flareTIME relay before the failure is restored. If the relay was in the active time sequence the remaining time is restored and the relay is placed in the pause state. In this case the operator can deliberately continue the time sequence or reset the relay and start a new time sequence.

Time switch diagrams

- Overview of the time functions

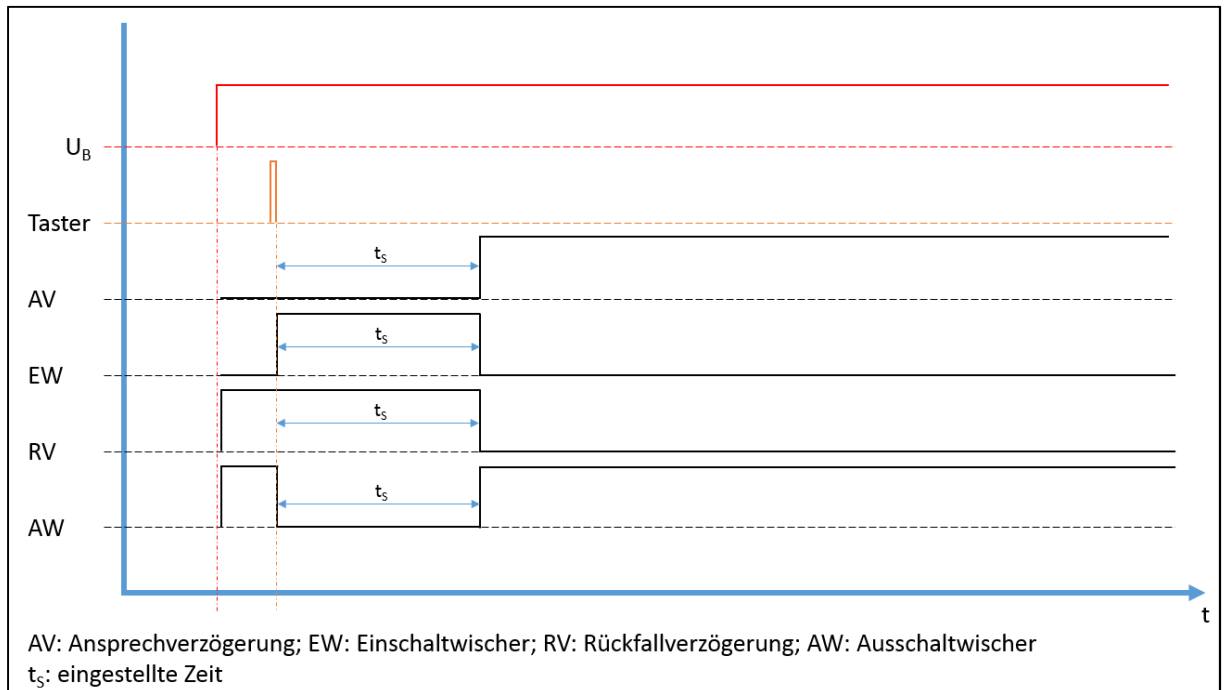


Figure 7: Overview of unlocked time functions

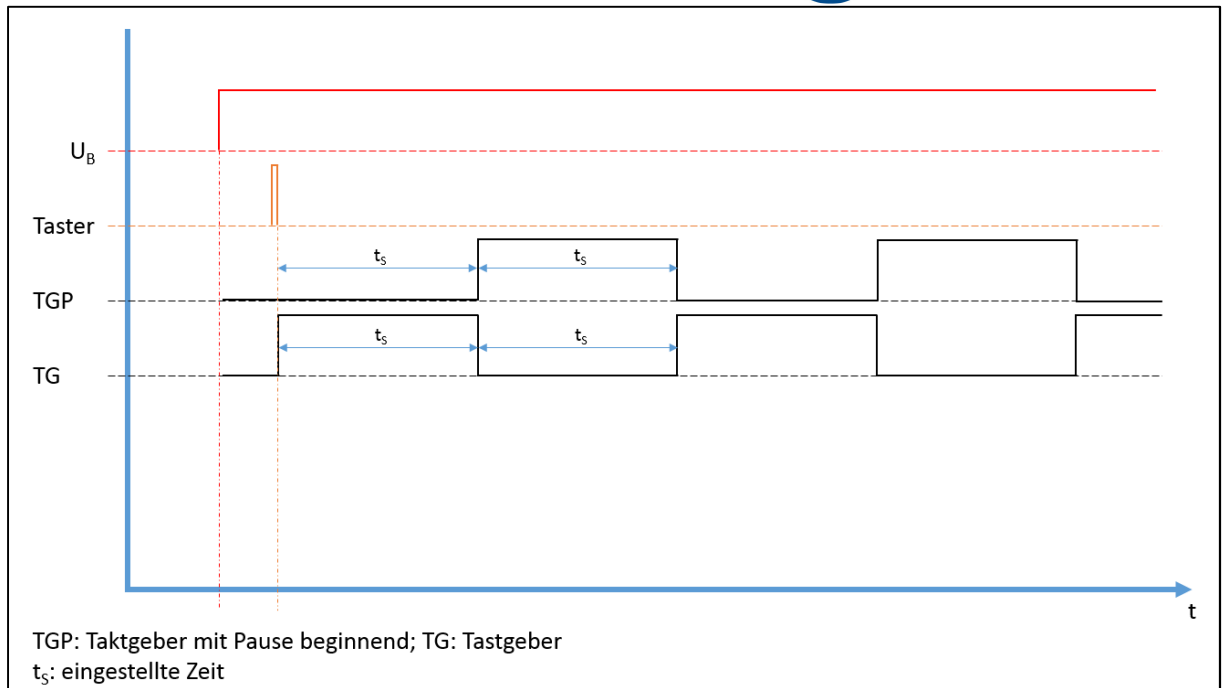


Figure 8: Overview of the clocked time functions

- Time functions in detail

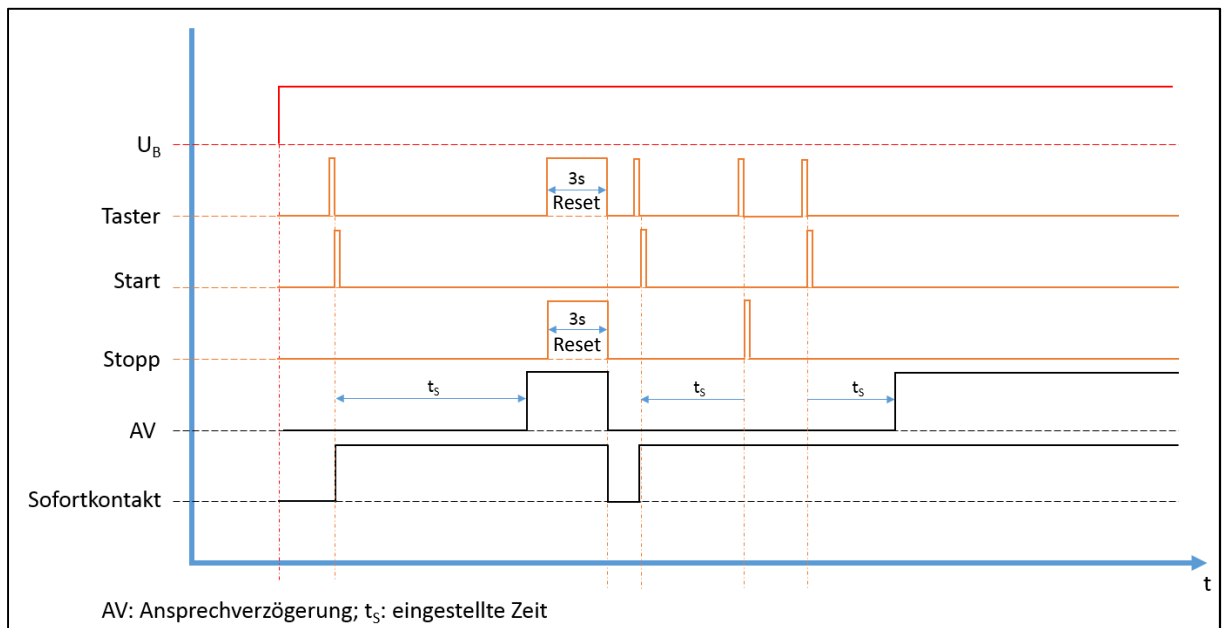


Figure 9: Operate delay function setting

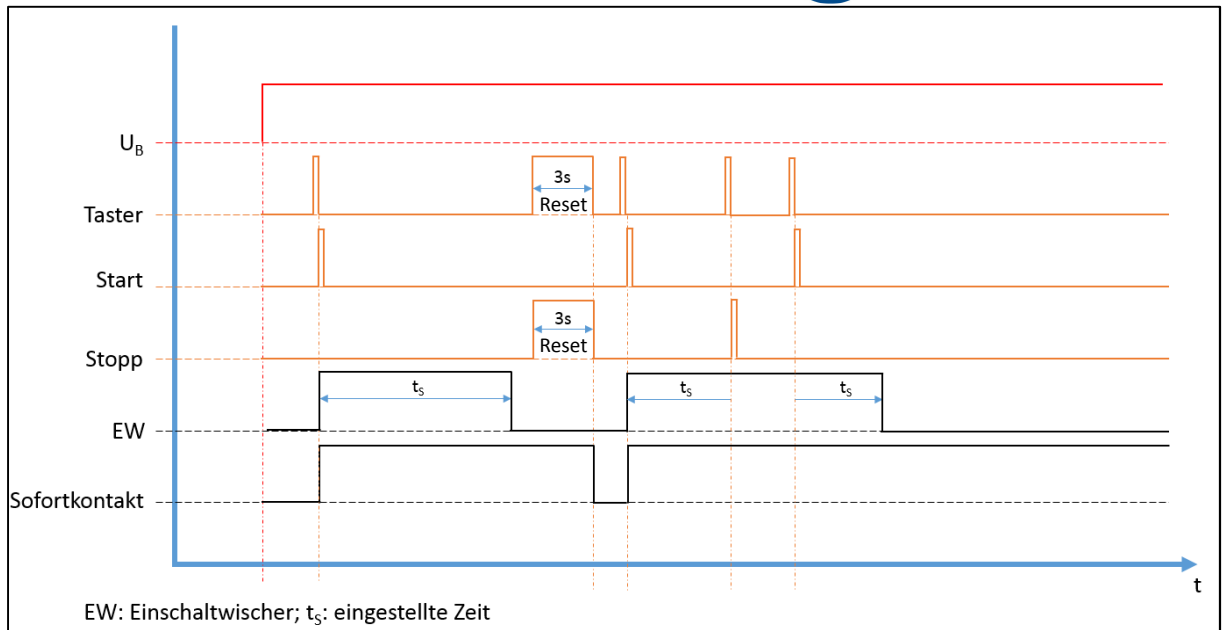


Figure 10: Passing make contact function setting

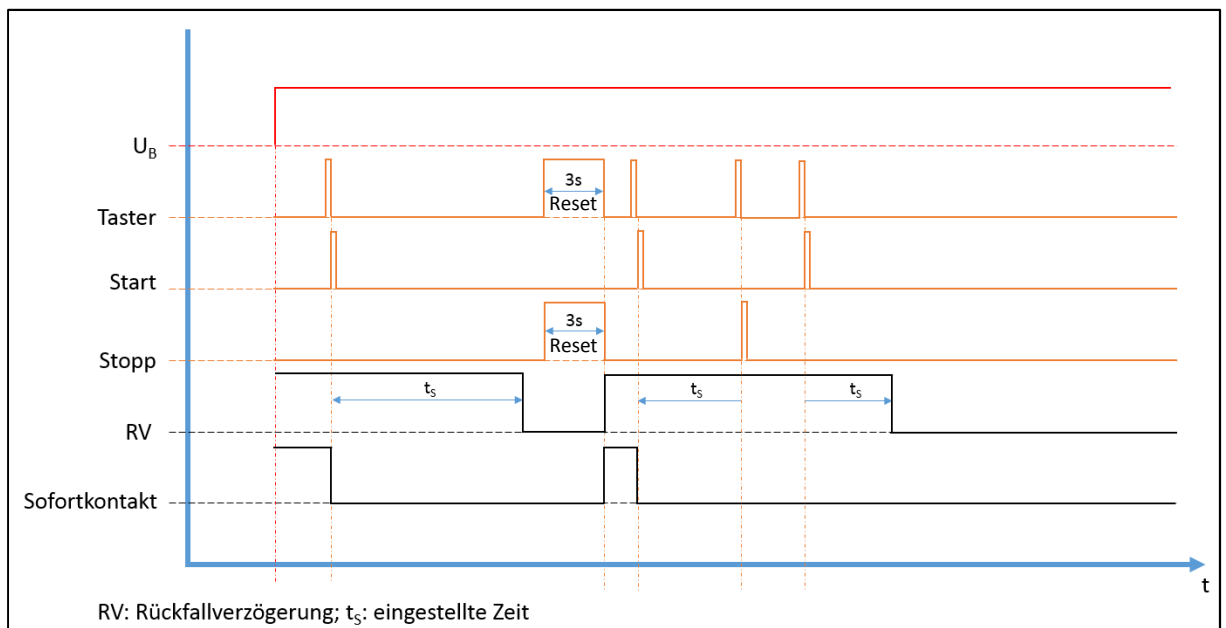


Figure 11: Release delay function setting

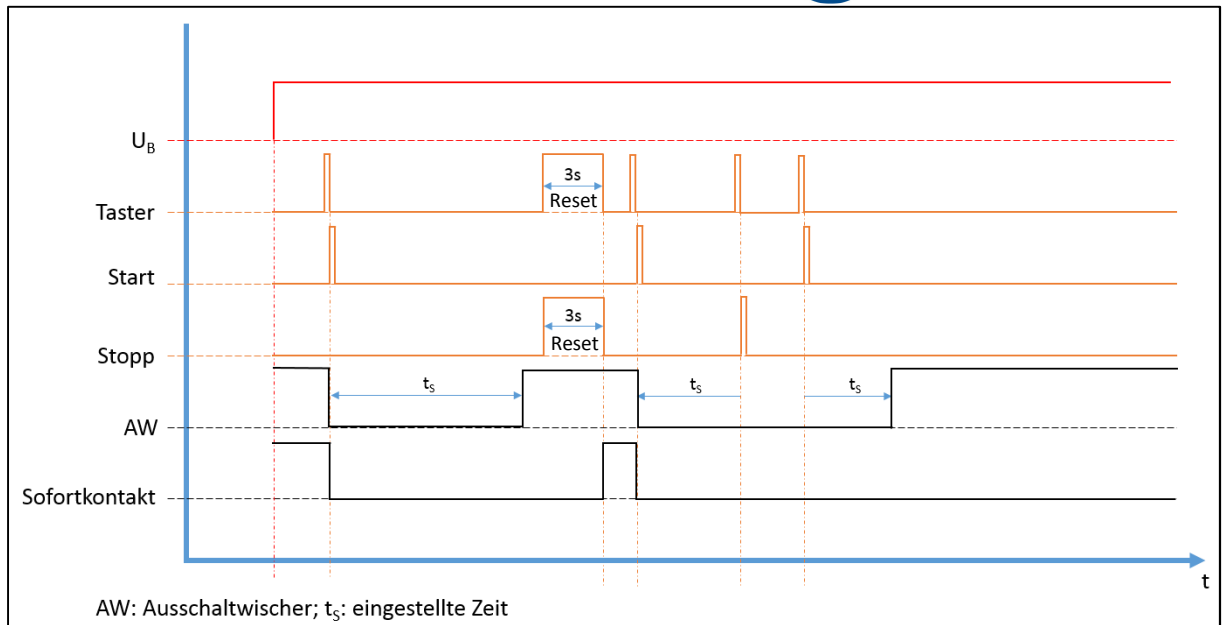


Figure 12: Passing break contact function setting

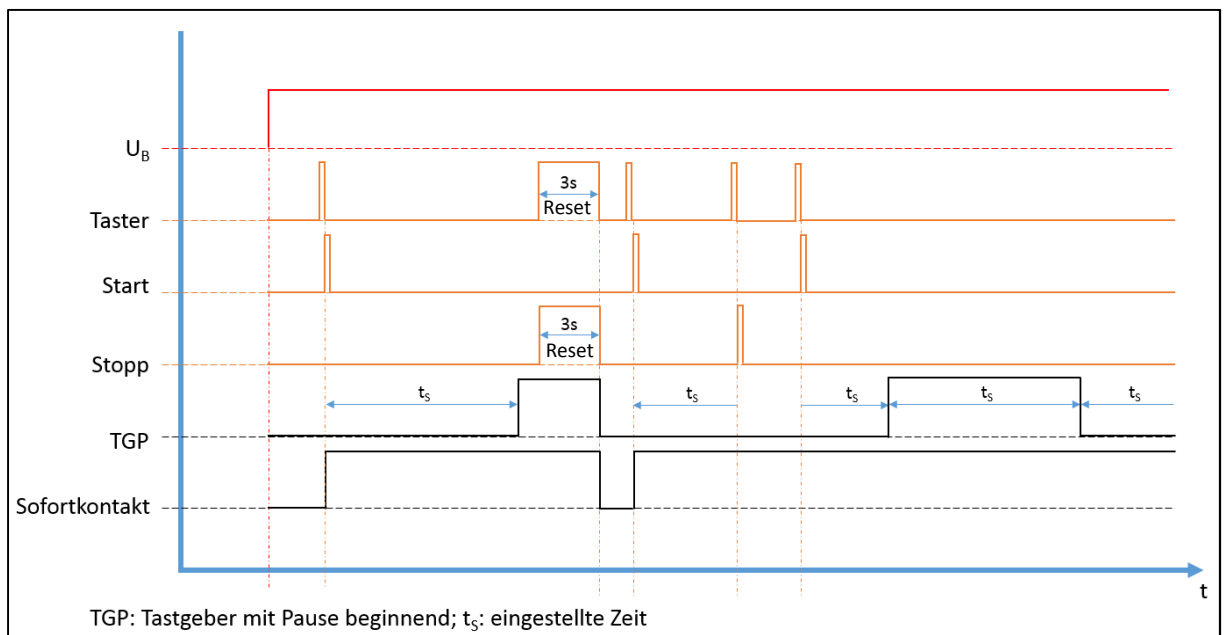


Figure 13: Clock pulse generator starting with pause function setting

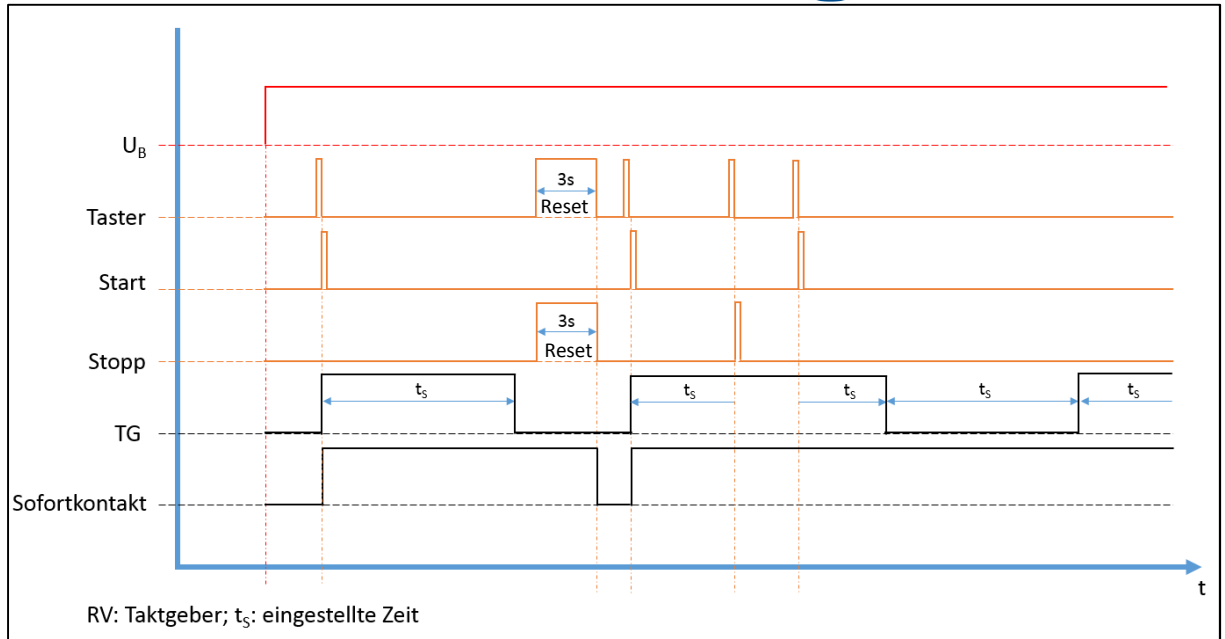


Figure 14: Clock pulse generator starting with pulse function setting

EMC/Climate/Shock tests

Apart from the basic tests to maintain conformity with the EN 61812-1 standard, the following tests are performed by external service providers on behalf of EAW.

- Basic insulation, 2kV, 1.2/50 μ s, not in operation, preloading 96h 40°C, 90-95% humidity
- Insulation resistance measurement, 500VDC, 1 min, $\geq 20\text{M}\Omega$, not in operation, preloading 96h 40°C, 90-95% humidity
- Static discharge, 8 kV air or 4 kV contacting, not in operation
- High-frequency electromagnetic fields, 10 V/m 80.0 MHz-1.0 GHz, 10 V/m 1.4 MHz-2.0 GHz, 3 V/m 2.0 MHz-2.7 GHz, in operation
- Magnetic fields 30 A/m, in operation
- Burst 2 kV / 5/50ns, 5 kHz (contacts), 1 kV / 5/50ns, 5 kHz (control connections), in operation
- Surge 1 kV line to line, 2 kV line to PE (contacts), 2 kV line to PE (control connections), in operation
- conducted disturbance 10V 150 kHz – 80 MHz, in operation
- noise radiation, 30 - 230 MHz 40 dB μ V 10 m, 230 MHz-1.0 GHz 47 dB μ V 10 m, in operation
- Single shock, half-sine 15 g / 11 ms, in operation
- Vibration, 5 – 150 Hz, 3.5 mm, 1 g, in operation
- Dry heat, storage, 55°C +/-2K, 48:00h, not in operation
- Damp heat, steady state, 25°C +/-2K, 93% +/-2% rH, 48h, not in operation
- Damp heat, cyclical, 25°C/55°C, 95% rH, 2x24h, not in operation

Types / Options

- Manual Start/Stop/Reset using separate button or using the push function of the incremental encoder
- Operating instructions as data matrix code for type without separate button
- Supply voltage range 18-36VDC