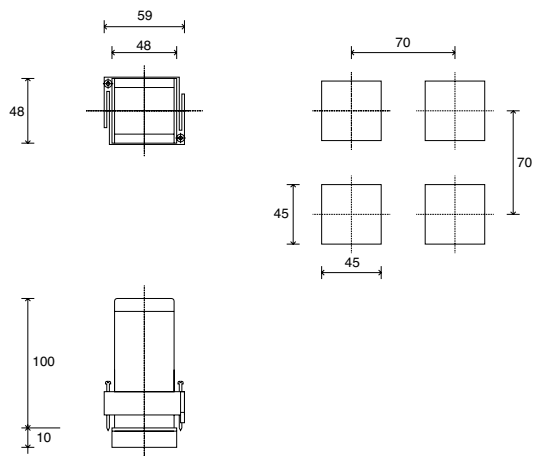


1 • INSTALLATION

• Dimensions and cut-out; panel mounting



Panel mounting.

Faceplate dimensions: 48x48mm./1.89"x1.89" (1/16DIN); depth: 100mm/3.94"

Cut-out dimension: 45(+0.6/-0)x45(+0.6/-0)mm/1.77" (+0.02/-0)x1.77" (+0.02/-0)".

To attach the instrument, insert the two brackets in the housings on the top and bottom of the case and tighten with the screws. To mount two or more instruments in a row or column, use the clips and respect the following cut-out dimensions:

Row: Base (48 x n) -3, (1.89"x n) -0.11" Height 92 (+0.8/-0) /3.62" (+0.03/-0)

Column: Base 45 (+0.6/-0)1.77" (+0.02/-0) Height (96xn)-4/(3.78"xn)0.15"

where "n" is the number of instruments.

CE MARKING: The instrument conforms to the European Directives 2004/108/CE and 2006/95/CE with reference to the generic standards: **EN 61000-6-2** (immunity in industrial environment) **EN 61000-6-3** (emission in residential environment) **EN 61010-1** (safety).

MAINTENANCE: Repairs may be done only by trained and specialized personnel. Cut power to the instrument before accessing internal parts. Do not clean the case with hydrocarbon-based solvents (trichloroethylene, gasoline, etc.). The use of such solvents will compromise the instrument's mechanical reliability. Use a clean cloth moistened with ethyl alcohol or water to clean external plastic parts.

TECHNICAL SERVICE: GEFRA has a technical service department. Defects deriving from any use not conforming to this manual are excluded from the warranty



For correct installation, follow the instructions and warnings contained in this manual.

2 • TECHNICAL DATA

INPUTS

1500V isolation (only with Vac feed to logic output).
3 inputs for count, reset of Counter or Timer, Up-Down or Start/Stop, Hold.

Maximum counting frequency with 50% duty cycle:

- type 2 inputs: fmax = 100Hz
- type 1 inputs: fmax = 1KHz
- type 0 inputs: fmax = 5KHz

Input types:

Mechanical contact: voltage-free, configured in opening/closing

Proximity switch: 2/3 wires NPN

Logic: OFF ≤ 1Vdc, 3mA; 10Vdc < ON < 50Vdc

OUTPUTS

Relays:

With 5A/250Vac contacts at cosφ = 1 (3.5 at cosφ = 0,4)
Spark suppression on NO contact.

Logic (on request):

23Vdc, Rout = 470Ω (20mA, max. 12V)

POWER SUPPLY

110/220Vac ±10% - 120/240Vac ±10%

24/48Vac ±10% - 24Vdc ±10% - 50/60Hz; 5VA max.

POWER SUPPLY FOR SENSOR

12Vdc, 30mA

AMBIENT CONDITIONS

Working temperature: 0...50°C

Storage temperature: -20...70°C

Relative humidity: 20...85% non-condensing

OPERATION

Timer

The software can be programmed to have the timer count up or down.

If the timer is used, the inputs have the following significance:

IN1: Start/Stop input

IN2: Reset input

IN3: Hold or Up/Down input

Output action after alarm is configurable. (*TN47, TVD1)

Counter

The counter can be configured to count up or down.

A prescale factor (:2, :10, :100, x2) can be inserted on the Clock.

The displayed/set value can be expressed in engineering units.

Conversion (from number of pulses to engineering units) is done by setting two factors (MUL and DIV), which will be multiplied or divided, respectively, by the number of pulses actually counted.

The counter inputs perform the following functions:

IN1 : Clock input (fmax. 5KHz)

IN2 : Reset input

IN3 : Hold or Up/Down input

Output action is configurable. (*CN47, CVD)

Frequency meter

The inputs perform the following functions:

IN1 : Clock input

IN2 : Reset input for max. peak or min. peak functions

IN3 : Hold input

In this configuration as well, the display and setting can be expressed as the value converted into engineering units by means of the MOL and DIV factors. (*DRM)

(*)Gefran instruments replaced by model described

OUTPUT FUNCTIONS

The output performs the following functions:

configuration as timer with countdown and input IN3 with HOLD (a) or UP/DOWN (b) function.

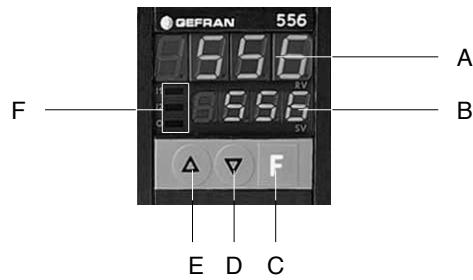
In all other cases (counter and frequency meter), output functions are unchanged.

In timer and counter mode, the max. trip delay is 1msec non-repetitive.

WEIGHT

240g

3 · FACEPLATE DESCRIPTION



A Display

Real value of current time/count/frequency. The real value is the value of the time/count active at that time:

Time 1 (count 1) or Time 2 (count 2). Symbol of parameter set on display B during configuration.

The decimal point on the right indicates display of Time 2 (count 2).

The appearance of the EEP message indicates an EEPROM memory fault.

B Display

Setpoint value of time/count/frequency selected.

These parameters can be set during configuration.

The decimal point on the right indicates display of set 2.

F LED signals

I1 : State of IN1 input signal.

Start/Stop in case of timer

Clock in case of counter and frequency meter

I2 : State of IN2 input signal in case of timer and frequency meter; IN3 in case of counter;

- LED off, corresponds to input OFF

- LED on, corresponds to input ON

O : State of output relay (LED on = relay energized) - OUT.

CONTROLS

C "FUNCTION" button

Accesses display/setting of Time 2 (count 2) setpoint or hysteresis for type U4 frequency meter [see Description of Operation] (decimal point flashes on right display).

If the F button is not pushed to confirm a change, the new value will be stored automatically after 5 seconds.

Push the F button for 5 seconds to access the configuration phase. Scroll the functions to be set by means of short pulses.

To quit configuration, push the F button again for 5 seconds.

NOTE: It is not necessary to press the F key to display/modify Time 1/Count 1.

E/D Raise (E) and Lower (D) buttons

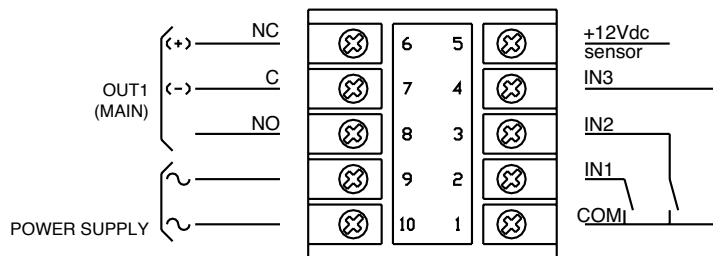
These are used to raise or lower the value shown on display B in order to change a setting or choose an option.

The speed of raising (lowering) is proportional to the time for which the key is pressed. The operation is not cyclical.

If the automatic scale change is enabled, once the maximum (minimum) value of any intermediate scale is reached, the raise (lower) function moves to the next (previous) scale.

In normal operation, these buttons can be used for direct change of Time 1/Count 1 (setpoint).

4 · CONNECTIONS



INPUTS

INPUT 1: Digital input from mechanical contact or logic signal between terminals 1 and 2 with following functions:

- Timer Start/Stop
- Counter input pulses.
- Frequency meter input pulses.

INPUT 2: Digital input from mechanical contact or logic signal between terminals 1 and 3 with following functions:

- Timer reset
- Counter reset
- Frequency meter reset

INPUT 3: Digital input from mechanical contact or logic signal between terminals 1 and 4 with following functions:

- Timer hold or up/down
- Counter hold or up/down
- Frequency meter hold

Sensor power supply to terminals 5(+) and 1(-): 12V/30mA.

OUTPUTS

- Logic (NPN) or relay (5A/220Vac) output;
- Available to terminals 8 (NO contact), 7 (common) and 6 (NC contact); terminals 6 (+) and 7 (-) for logic output.

Power supply: AC Voltage is applied to terminals 9 and 10 (110/220V selected with jumpers).

Voltages available on request: 24/48Vac - 120/240Vac - 110/220Vac - 24Vcc

With 24 Vdc, polarity is not critical. See Hardware Configuration.

5 · HARDWARE CONFIGURATION

Accessing the boards

To remove the electronic parts from the case, open the extraction clips.

Power board

To select the supply voltage 110/220V (24/48Vac; 120/240V):
110V (24/120V) - close two jumpers **P** and remove jumpers **S**;
220V (48/240V) - close two jumpers **S** and remove jumpers **P**;
24Vdc available on request (see order code).

CPU-inputs boards

Hardware protection of configuration.

- Configuration disabled: close jumper **S9** and remove jumper **S10**.
 - Configuration enabled: close jumper **S10** and remove jumper **S9**.
- The standard version is supplied with configuration enabled.

Digital logic input 1 "IN1"

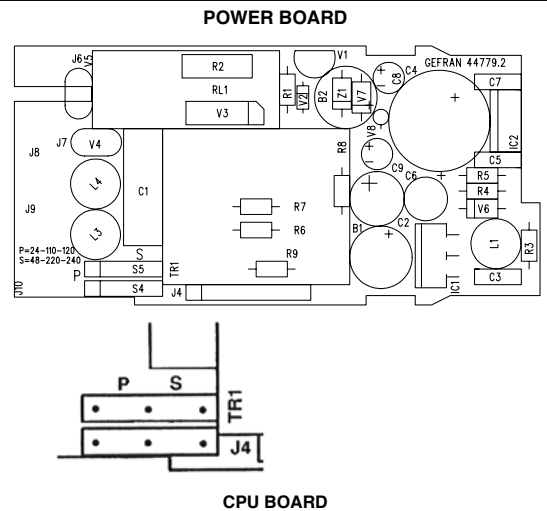
Active when closed: close jumper **S7B**

Active when open: close jumper **S7A**

The standard version is supplied with **IN1** active when closed.

Selecting hardware filter on inputs

You can insert 3 different low pass filters for each input by installing the appropriate jumpers.



	IN1		IN2		IN3	
Freq.	S5	S6	S3	S4	S1	S2
0=5kHz	Open	Open	Open	Open	Open	Open
1=1kHz	Closed*	Open*	Closed	Open	Closed	Open
2=100Hz	Open	Closed	Open*	Closed*	Open*	Closed*

* Standard version

6 · PROGRAMMING

Setpoint variation can be disabled in any application by setting the software password to **1 (Pro function)**.

Programming the TIMER (Function Typ=0)

In normal operation, display **A** shows the real value of the active time. Setpoint values for Time 1 (and Time 2) are set with the raise/lower buttons. Time 1 is changed immediately; Time 2 is selected with the **F** key. They are managed with the following inputs:

- IN1 START/STOP

- IN2 RESET

- IN3 HOLD or UP/DOWN (see configuration of IN3 functions).

If the function of IN3 is defined as UP/DOWN, it causes inversion of the current value of Time 1; Time 2 maintains its direction.

If the timer is configured to down (**Fun=0**), it loads the preset value and counts down toward zero; by closing **IN3** (if configured to "active when closed"), you temporarily reverse the direction of time 1 to up until Full Scale is reached.

If the timer is configured to up (**Fun=1**), it starts from zero and counts to Set, closing **IN3** (if configured to "active when closed") and temporarily reversing the change in time 1 to down. The **HOLD** function freezes the display only: the timer function stays active.

Programming the COUNTER (function Typ=1)

In normal operation, display **A** shows the real value of the active count.

The setpoints for Count 1 Time 2/Count 2 are set by pressing the Raise/Lower buttons.

Time 1 is changed immediately, Select Time 2 / Count 2 with the **F** key.

The Counter is managed with the following inputs:

- IN1 CLOCK (max. frequency 5KHz)

- IN2 RESET

- IN3 HOLD or UP/DOWN (see configuration of IN3 functions).

A prescaler factor can be inserted on the clock: x2, / 2, / 10, / 100.

The displayed/set value can be expressed in engineering units by setting the **MUL** and **DIV** functions.

Example 1:

By setting **MUL = 1** and **DIV = 60**, you reset the parameter so that the display shows:

$$\frac{\text{no. real pulses} \cdot \text{MOL}}{\text{DIV}} = \frac{\text{o. real pulses} \cdot 1}{60} = \frac{\text{o. real pulses}}{60}$$

The setting corresponds to : $\frac{\text{Set value} \cdot \text{DIV}}{\text{MOL}}$

For example, if you set 1, you get: $\frac{1 \cdot 60}{1} = 60$

i.e., with the counter configured up, **60** real pulses have to be counted before "1" is reached.

The count sequence displayed

0, 1, 2, etc., corresponds to a real count of 60 pulses

0, 60, 120, etc.

6 • PROGRAMMING

Example 2:

By setting **MUL = 38** and **DIV = 1**, you get a parameter in engineering units. Therefore, with each pulse actually counted the display will increment as follows:

$$\frac{\text{MOL}}{\text{DIV}} = \frac{38}{1} = 38$$

Counter display in engineering units

0, 38, 76, 114, etc. pulses actually counted

0, 1, 2, 3, etc.

i.e., by setting a preset of 1000, $\frac{1000 \cdot \text{DIV}}{\text{MOL}}$ real pulses will have to be counted before reaching the preset

$$\text{i.e., } \frac{1000 \cdot 1}{38} = 26$$

N.B.: Since the setting (1000) cannot be divided evenly by the MUL factor (38), the instrument automatically rounds the setting off to the closest lower value. In this case, $\frac{1000}{38} = 26,31 \dots$

Decimals are ignored and the setting is automatically revised to $26 \times 38 = 988$.

Programming the FREQUENCY METER (Function Typ=2)

In normal operation, display A shows the current frequency. Frequency setpoint and hysteresis values (for type U4 output) are set with the raise/lower buttons.

The setpoint is changed immediately; hysteresis is selected with the **F** key. Frequency meter operating mode is defined by parameter **FP** (see Configuration procedure). For values 0, 1 and 2, the instrument measures frequency in the range 0.03 - 5000 Hz, with 1/1000 precision on full scale and mobile decimal point, to achieve the maximum precision possible with 4 figures. In this case, parameter **P.d.** represents the decimal point position only for the setpoint and for hysteresis.

For **FP** values 4, 5 and 6 after parameter **P.d.**, parameter **t.SP** appears as settable sampling time, and the instrument counts the pulses arrived during this time. The role of **P.d.** does not change.

For **FP** values 8, 9 and 10, the instrument measures frequency as for 0, 1 and 2, but with fixed decimal point, set with **P.d.**, which in this case represents the position of the point not just for the setpoint and hysteresis. Values 12, 13 and 14 are with sampling time and fixed decimal point. The displayed value can be expressed in engineering units by setting the **MUL** and **DIV** functions: displayed value = frequency * **MUL/DIV**.

Example 1:

You want to display the number of rpms of a wheel with 250 pulses/rev. $\text{Rpm} = \text{frequency} \cdot 60 / 250 = \text{frequency} \cdot 6 / 25$

Set **FP** = 0, **MUL** = 6, **DIV** = 25

Example 2:

You want to determine the frequency in impulses/second of a system, with a decimal figure, using a sampling time of 5 sec for greater stability. Set **FP** = 12, **MUL** = 1, **DIV** = 5, **P.d.** = 1, **t.SP** = 5.0.

In operation as frequency meter, the only available output functions are U1 and U4, the latter with hysteresis below the setpoint value when the relay is de-energized.

7 • SOFTWARE CONFIGURATION

Introduction

Configuration is performed in a single procedure and consists of 14 settable parameters. To access Configuration (if the hardware protection has been removed) keep button **F** pressed until the **CFG** message appears on display A (display B = x.x n. software release). Then press the **F** key briefly to scroll the various functions (parameters) to be set so that the instrument can be configured as required.

The symbol for the parameter shown on display B will appear on display A. Press the **F** key for about 5 seconds to quit the configuration procedure. The display returns to the "real" time/count.

Configuration (CFG) procedure

(accessible only with jumper S10 closed)

Pro/ software protection level

0 - display and change of setpoint with saving of current count in EEPROM at shutdown (556 only)

1 - display of setpoint with saving of current count in EEPROM at shutdown (556 only)

2 - display and change of setpoint without saving

3 - display of setpoint without saving

To assure correct saving, do not change the setpoint or scale when a count is in progress.

Typ/ instrument type :

0 - Timer

1 - Counter

2 - Frequency meter

Fun/count mode and enabling of automatic scale change during setting of timer setpoints (for timer and counter)

0 - count-down with automatic change of time scale

1 - count-up with automatic change of time scale

2 - count-down without automatic change of time scale

3 - count-up without automatic change of time scale

Note : "Automatic change of time scale" regards scales in seconds only.

FP/ frequency meter operating mode.

7 · SOFTWARE CONFIGURATION

- 0 - Normal frequency value
- 1 - Maximum peak value of frequency
- 2 - Minimum peak value of frequency
- +4 - with settable sampling time
- +8 - with fixed scale

In3/ input 3 function (for timer and counter)

- 0 - hold - freezes display
- 1 - up/down for count

out/ output function (see Description of output functions):

- 1 - U1 Standard
 - 2 - U2 Monostable cyclical
 - 3 - U3 Cyclical with timed Reset
 - 4 - U4 Latch1 on output
 - 5 - U5 Latch2 on output
 - 6 - U6 Monostable non-cyclical
 - 7 - U7 Double cyclical counter with overlapped counts
 - 8 - U8 Double cyclical counter with alternating counts
- (Note: U7 and U8 for Typ = 1 only)

LoG/ Logic of digital inputs

LoG	IN.2	IN.3
0	Active when closed	Active when closed
1	Active when open	Active when closed
2	Active when closed	Active when open
3	Active when open	Active when open

Note: state of first input IN1 is defined by jumper (see HW Config.).

Sc.1/ Select Time 1 scale (for timer only) seconds (0.000-9.999)

- 0 - seconds (00.00-99.99)
- 1 - seconds (000.0-999.9)
- 2 - seconds (0000-9999)
- 3 - minutes/seconds (0.00-99.59)
- 4 - hours/minutes (0.00-99.59)

Sc.2/ Select Time 2 scale (for timer and counter)

- 0 - seconds (0.000-9.999)
- 1 - seconds (00.00-99.99)
- 2 - seconds (000.0-999.9)
- 3 - seconds (0000-9999)
- 4 - minutes/seconds (0.00-99.59)
- 5 - hours/minutes (0.00-99.59)

Ps./Select counter prescaler

- 0 - count : 1
- 1 - count : 2
- 2 - count : 10
- 3 - count : 100
- 4 - count x 2

Mul./Multiplier (for counter or frequency meter) 1-100

div./Divisor (for counter or frequency meter) 1-100
(see "Operation of Counter and Frequency meter")

P.d./Decimal point position (counter and frequency meter)

- 0 - without decimal figures
- 1 - 1 decimal figure
- 2 - 2 decimal figures
- 3 - 3 decimal figures

t.SP/Frequency meter sampling time 0.0-10.0 seconds.

8 · DESCRIPTION OF OUTPUT FUNCTIONS

The figures show the Timer functions (Typ=0) with countdown (Fun=0). For counters (Typ=1) in cases out=1...6, "Timer" and "Timer 1" become "Counter 1" and "Counter 2". For the frequency meter (Typ=2) with out=4, there is a second setpoint for hysteresis.

- a) **IN3 = 0:** IN 3 with HOLD display function;
- b) **IN3 = 1:** IN 3 with UP/DOWN function

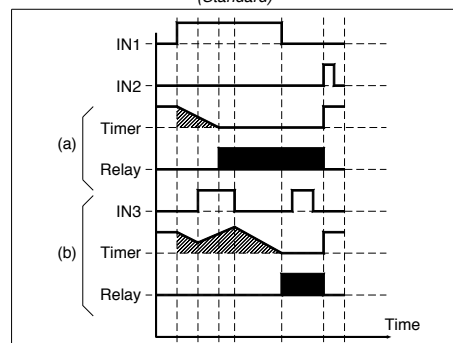
out=1 Standard U1 Function

Timing begins and proceeds until the trip point if the **IN1** signal is present. The output energizes when the set time has elapsed. When the **IN2** signal arrives, the output resets and the timer returns to its preset value. The timer restarts when the **IN1** signal is received. In case **A**, **IN3** does not cause changes in operation of inputs and outputs, but simply freezes the displayed value. In case **B**, if **IN3** arrives when the timer count has already started but not yet finished, it causes the count to reverse direction (up instead of down). In this condition, the current timer value continues to increase until reaching the full scale of the time base. When **IN3** is removed, the countdown resumes from the value reached and goes toward the trip point.

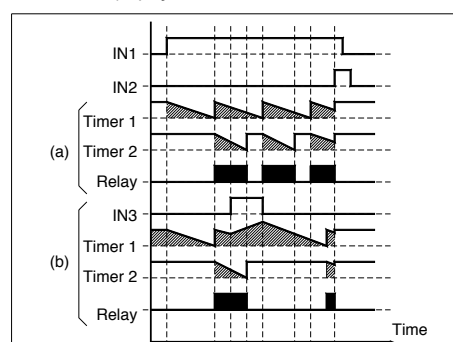
out=2 Cyclical monostable U2 Function

If input **IN1** is present, when the timer reaches the trip point it immediately reloads the preset value and begins a new countdown (cyclical function). The output energizes each time the setpoint is reached and stays energized for time **S.P.2**. The arrival of input **IN2** resets the output and the two timers (S.P.1 and S.P.2) return to their preset values. In case **B**, input **IN3** reverses the count of timer 1 (S.P.1) only; therefore, timer 2 (if started) always reaches end of time state regardless of the presence of **IN3**.

Function (U1) Non-cyclical single timer with reset (Standard)



Function (U2) Cyclical monostable timer with reset



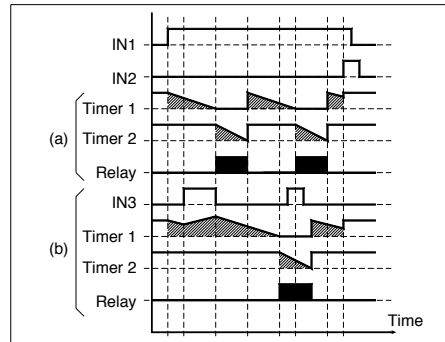
8 • DESCRIPTION OF OUTPUT FUNCTIONS

out=3 Function U3 - Cyclical with timed reset

As opposed to the previous function, the timer reloads the preset value (S.P.1) when time 2 (S.P.2) has elapsed, during which the output remained active.

The other conditions are unchanged.

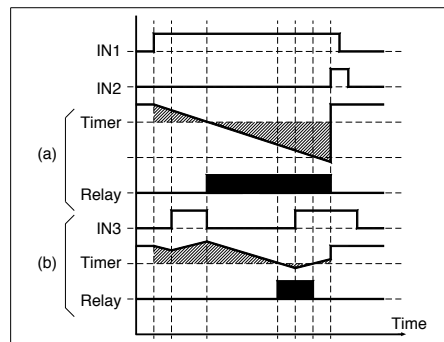
Function (U3) Cyclical timer with timed reset



out=4 Function U4 Latch 1 on output

When the time elapses, the relay energizes but the timer continues (in this case) to count down toward negative values. Signal **IN2** resets the elapsed time, reloads the preset and resets the output. If input **IN3** arrives when the preset has already been reached, it reverses the direction of the count (in this case UP) and, if it passes "0," de-energizes the output.

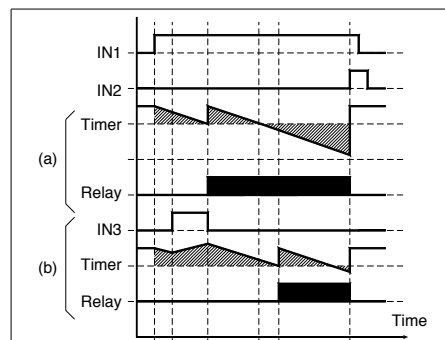
Function (U4) Timer with Output 1 memory



out=5 Function U5 Latch 2 on output

Similar to the previous function, but the first time the timer reaches the set time, in addition to energizing the output, it immediately reloads the preset value and then continues as described for function U4, with the difference that the relay remains energized even if the timer value exceeds the trip point.

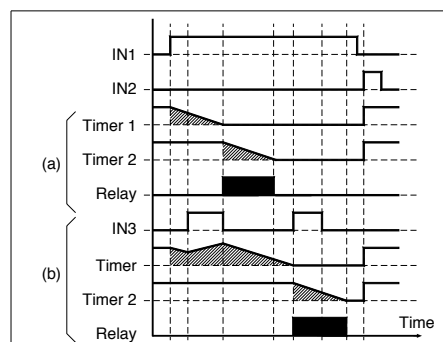
Function (U5) Timer with Output 2 memory



out=6 Function U6 Non-cyclical monostable with reset.

Similar to function U3, but with the difference that at the end of timings the timer reloads the preset value only after input **IN2**.

Function (U6) Non-cyclical monostable timer with reset



out=7 Function U7 Cyclical double counter with superimposed counts.

Similar to U2, but instead of Timer 1 and Timer 2 there are Counter 1 and Counter 2 with **IN1** clock input.

out=8 Function U8 Cyclical double counter with alternating counts

Similar to U3, but instead of Timer 1 and Timer 2 there are Counter 1 and Counter 2 with **IN1** clock input.

ORDER CODE

MODEL	
Timer / Counter / Frequency meter	556

POWER SUPPLY	
24Vdc	0
110Vac	1
220Vac	2*
240Vac	3
24Vac	4
48Vac	5
120Vac	6

INPUT CONFIGURATION	
IN1	
5KHz	0
1KHz	1*
100Hz	2
IN2	
5KHz	0
1KHz	1
100Hz	2*
IN3	
5KHz	0
1KHz	1
100Hz	2*

(*) Positions marked with asterisk indicate standard model

Please, contact GEFRA sales people for the codes availability.

• WARNINGS



WARNING: this symbol indicates danger.

It is placed near the power supply circuit and near high-voltage relay contacts.

Read the following warnings before installing, connecting or using the device:

- follow instructions precisely when connecting the device.
- always use cables that are suitable for the voltage and current levels indicated in the technical specifications.
- the device has no ON/OFF switch: it switches on immediately when power is turned on. For safety reasons, devices permanently connected to the power supply require a two-phase disconnecting switch with proper marking. Such switch must be located near the device and must be easily reachable by the user. A single switch can control several units.
- if the device is connected to electrically NON-ISOLATED equipment (e.g. thermocouples), a grounding wire must be applied to assure that this connection is not made directly through the machine structure.
- if the device is used in applications where there is risk of injury to persons and/or damage to machines or materials, it MUST be used with auxiliary alarm units. You should be able to check the correct operation of such units during normal operation of the device.
- before using the device, the user must check that all device parameters are correctly set in order to avoid injury to persons and/or damage to property.
- the device must NOT be used in inflammable or explosive environments. It may be connected to units operating in such environments only by means of suitable interfaces in conformity to local safety regulations.
- the device contains components that are sensitive to static electrical discharges. Therefore, take appropriate precautions when handling electronic circuit boards in order to prevent permanent damage to these components.

Installation: installation category II, pollution level 2, double isolation

- power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
- install the instrumentation separately from the relays and power switching devices
- do not install high-power remote switches, contactors, relays, thyristor power units (particularly if "phase angle" type), motors, etc... in the same cabinet.
- avoid dust, humidity, corrosive gases and heat sources.
- do not close the ventilation holes; working temperature must be in the range of 0...50°C.

If the device has faston terminals, they must be protected and isolated; if the device has screw terminals, wires should be attached at least in pairs.

- **Power:** supplied from a disconnecting switch with fuse for the device section; path of wires from switch to devices should be as straight as possible; the same supply should not be used to power relays, contactors, solenoid valves, etc.; if the voltage waveform is strongly distorted by thyristor switching units or by electric motors, it is recommended that an isolation transformer be used only for the devices, connecting the screen to ground; it is important for the electrical system to have a good ground connection; voltage between neutral and ground must not exceed 1V and resistance must be less than 60Ω; if the supply voltage is highly variable, use a voltage stabilizer for the device; use line filters in the vicinity of high frequency generators or arc welders; power supply lines must be separated from device input and output lines; always check that the supply voltage matches the voltage indicated on the device label.
- **Input and output connections:** external connected circuits must have double insulation; to connect analog inputs (TC, RTD) you have to: physically separate input wiring from power supply wiring, from output wiring, and from power connections; use twisted and screened cables, with screen connected to ground at only one point; to connect adjustment and alarm outputs (contactors, solenoid valves, motors, fans, etc.), install RC groups (resistor and capacitor in series) in parallel with inductive loads that work in AC (*Note: all capacitors must conform to VDE standards (class x2) and support at least 220 VAC. Resistors must be at least 2W*); fit a 1N4007 diode in parallel with the coil of inductive loads that operate in DC.

GEFRAN spa will not be held liable for any injury to persons and/or damage to property deriving from tampering, from any incorrect or erroneous use, or from any use not conforming to the device specifications.