Technical Data

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Timing units

Contents

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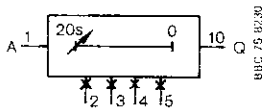
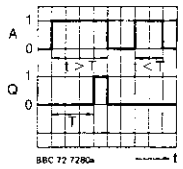
Delay unit R 431





Description

The delay unit R 431 works as an 0-1 retarder. If a 1-signal is placed on the A input a 1-signal will appear at the Q output after the preset delay. An 0-signal at the input is followed by an 0-signal (after a short delay for noise suppression) at the output.

By linking the terminals 2, 3, 4 and 5 three different time ranges can be realised. Within the chosen time range the running time can be adjusted with an incorporated potentiometer.

Order code for module:	**GH R431 0000 V0**
Order code for circuit symbol transparency:	**GH R700 1901 R47**
Order code for application:	**D NG 80764 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 130 g

Technical data

Current consumption, 0-signal at output Q	1 mA
1-signal at output Q	10 mA
Input	4 loads
Fan out	100 loads
Time ranges	link between:
0.02 ··· 0.2 s	2 – 5
0.2 ··· 2.0 s	2 – 3 – 5
2.0 ··· 20.0 s	3 – 4 – 5
Voltage error of running time at 24 V ± 30 %	approx. ± 2 %
Temperature error of running time	approx. – 0.8 %/K
Repeatability over an extended period	approx. ± 5 %
Break delay t_A for time range 0.02 ··· 0.2 s	≦ 5 ms
0.2 ··· 2.0 s	50 ms
2.0 ··· 20.0 s	0.5 s

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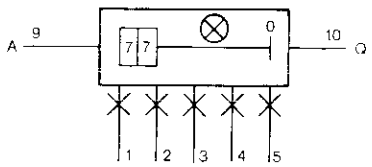
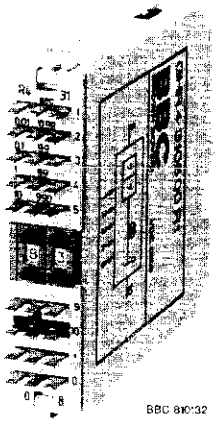
Digital timer R 431.8





Description

The timer R 431.8 operates as a 0-1 delay unit which can be digitally set. If a 1 signal is applied to the input A, a 1 signal appears at output Q after expiry of the set delay time. A 0 signal at the input is followed immediately (after a brief delay period for noise suppression) by a 0 signal at the output.

Four time ranges (10 ms . . . 990 s) can be set by means of links as connections 1, 2, 3, 4 and 5. The delay time can be set with a two-position pushbutton preselector within the time range. Expiry of the time is indicated by a red LED. It is possible to change the time setting while the time is running, but this may lead to a time error within this sequence of operation.

The signal input is delayed for the purpose of noise suppression.

Order code for module:	**GH R431 0800 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R86**
Order code for application:	**D NG 3155 81 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 130 g

Technical data

Current consumption, 0 signal at output Q	18 mA
1 signal at output Q	25 mA
Input load	1 load
Fan out	100 loads
Time ranges	link between
0.01 s... 0.99 s	1-2
0.1 s... 9.9 s	1-3
1 s... 99 s	1-4
10 s...990 s	1-5
Switch-on delay between A and Q	4 ms + set value
Switch-off delay between A and Q	4 ms
Accuracy of running time	± 0.5%, at least ± 2 ms
Repetition error with otherwise constant conditions	± 0.2%, at least ± 2 ms
Temperature error of running time	± 0.1%/K

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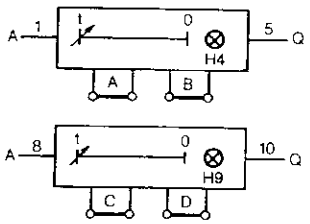
Delay unit (2 functions)
R 433.1



Description

The delay unit R 433.1 works as an 0-1 retarder (2 functions).

If a 1 signal is placed on the input A a 1-signal will appear at the Q output after the preset delay. An 0-signal at the input is followed by an 0-signal (after a short delay for noise suppression) at the output.

By removing the internal links (2 per function module) four different time ranges can be selected (15 ms to 32 ms).

The actual running time within a particular time range is adjustable by a potentiometer. By exchanging the capacitor the maximum running time can be increased to 3.9 hours.

By means of a link on the printed circuit board between the mini-termi point pins P2 and P3, the delay unit R 433.1 can be used as a pulse generator with variable pulse and pause time (for further details, refer to the application).

The unit is fitted with one LED per function to indicate the running of the delay time.

The outputs Q can switch inductive loads **without** use of free running diodes.

Order code for module:	**GH R433 0001 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R70**
Order code for application:	**D NG 80850 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 120 g

Technical data

Current consumption, both outputs 0-signal	14 mA
both outputs 1-signal	32 mA
Input	1 load
Fan out	100 loads
Time ranges	see text
Indication	on both functions by LED
Recovery time (switch off delay)	approx. 3 ms
Temperature error of running time	$< \pm 0.1$ %/K
Repeatibility over long time period	< 1 %

Possible time ranges

The module R 433.1 comprises of two switch-on delay units each with 4 programmable time ranges. These can be realised by using the following linking plan.

Range	Running time	Links to be removed 1st section	2nd section
I	approx. 15 ... 125 ms	B	D
II	approx. 50 ... 500 ms	A	C
III	approx. 400 ms ... 4 s	none	none
IV	approx. 3.2 ... 32 s	A, B	C, D

The running time for each time range is set by potentiometers R32 for the first section, and R34 for the second section.

If longer times than 32 secs are required this can be acheived by exchanging the foil capacitors.

C3 – 1st section
C4 – 2nd section

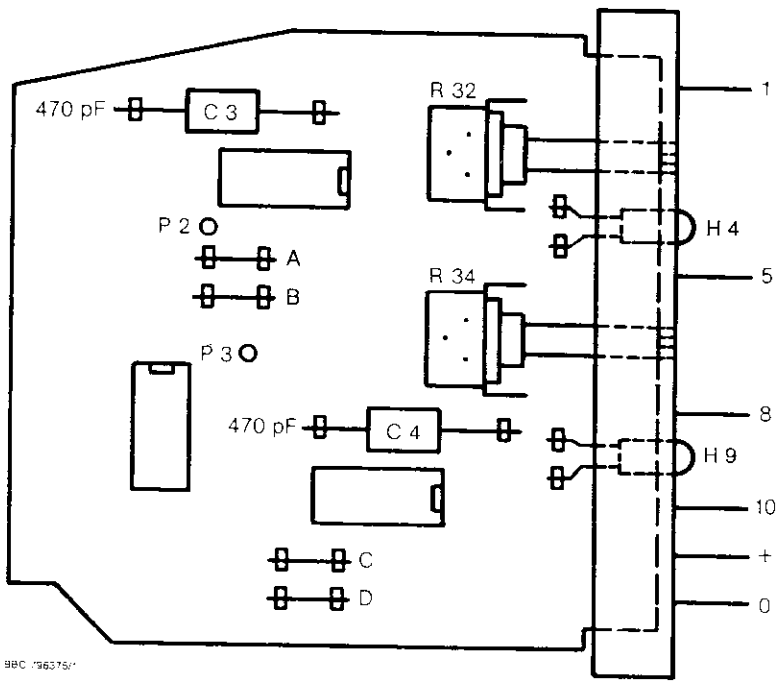
The running time increases linearly with larger value capacitors, e.g. desired maximum running time.

320 s – capacitor 4.7 nF
3200 s – capacitor 47 nF

The maximum running time should not be longer than 14000 s ≙ 3.9 hours.
In this case a foil capacitor of 220 nF is required.

By long or very short times one can use the fact that the four time ranges are in a fixed relationship with one another:

In range IV 64 times longer
In range III 8 times longer
In range I ¼ times as long, as in range II.



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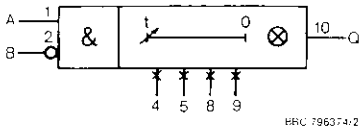
Delay unit R 433.2



Description

The delay unit R 433.2 works as an 0-1 retarder. If, on the input, the inverted-AND conditions are fulfilled, then a 1-signal appears on the output Q after the preset time has elapsed. An 0-signal at the input A or a 1-signal at input B will lead immediately (after a short time delay for noise suppression) to an 0-signal at the output.

By linking between connections 8 and 9 various time ranges, between 20 ms and 1408 s can be programmed. These can be infinitely varied by means of an internal or externally connected potentiometer. By linking between terminals 4 and 5 the internal potentiometer is brought into operation. An external potentiometer of 1 MΩ can be connected to the same terminals. (In this latter case turn the internal potentiometer fully in the anti-clockwise direction.) In addition, the link between 4 and 5 must be removed. If the leads between the external potentiometer and the SIGMA-tronic module are longer than 10 m, then screened cables should be used, with the screen connected to the 0 volts of the equipment.

By exchanging capacitors the maximum running time can be increased to 3.9 hours.

The unit is fitted with a LED to indicate the running of the delay time.

The output Q can switch inductive load **without** use of flywheel diodes.

Order code for module:	**GH R433 0002 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R69**
Order code for application:	**D NG 80850 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 120 g

Technical data

Current consumption, 0-signal at output Q	18 mA
1-signal at output Q	30 mA
Input	1 load
Fan out	100 loads
Required control signal time	10 ms
Time ranges	see text
Indication	LED to signal running time
Recovery time for all time ranges	≦ 8 ms
Temperature error of running time	< ± 0.1 %/K
Repeatibility over long time period	< 1 %

Detailed information regarding the programming of the various time ranges as well as setting of the running time should be taken from the application sheet „New timer unit concept", order code D NG 80850 D.

Possible time ranges

Normally 4 time ranges are available with this module. These are chosen by means of terminals 8 and 9. The terminals 8 and 9 are in accordance with the list, with 1 ≙ + Us switched. 0 ≙ input unswitched.

		Terminal 8	Terminal 9
Range I:	0.5 . . . 5.5 s	1	0
Range II:	2 . . . 22 s	0	1
Range III:	16 . . . 176 s	0	0
Range IV:	128 . . . 1408 s	1	1

If the capacitor C3 (0.47µF) is removed then 4 further time ranges are available:

Range I: 12.5 . . . 125 ms
Range II: 50 . . . 500 ms
Range III: 0.4 . . . 4 s
Range IV: 3.2 . . . 32 s

} Switching off terminals 8 and 9 as above

If longer times than 1408 s are desired this can be acheived by exchanging the capacitor C3 (0.47 µF) for a foil capacitor 4.7 µF. In this case the maximum running time can be increased to approx. 14000 s ≙ 3.9 hours. The initial times ranges mentioned above are increased by a factor of 10.

The setting of the running time within a particular time range can either be acheived by the built-in potentiometer R_{int} = 1 MΩ, or by an external potentiometer R_{ext} = 1 MΩ. In addition, the possibility exists, by connection of a 100 kΩ potentiometer, of a course (R_{int}) as well as a fine (R_{ext}) adjustment. Furthermore, setting of the running time can be made by a external control voltage.

Exact setting of the running time

In many cases this can be done with the aid of a stop watch. In the case of very long or very short times one can use the fact that the four time ranges are in a fixed relationship to one another. In range IV 64 times longer, in range III 8 times longer, and in range I only a ¼ as long as in range II. A time of 640 s for example, can be compared with a time of 10 s in range II. Lastly one re-links on range IV.

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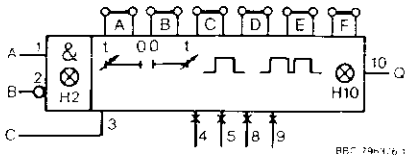
Universal timer R 433.4



Description

The Universal timer R 433.4 can, by means of changing the 6 built-in links, be used in various operating modes such as delay unit, blocker and square wave generator.

By linking between terminals 8 and 9 various time ranges between 12.5 ms and 1408 s can be programmed. These can be significantly varied by means of an internal or externally connected potentiometers. By linking between terminals 4 and 5 the internal potentiometer is brought into operation. An external potentiometer of 1 MΩ can be connected between the same terminals. (In this latter case turn the internal potentiometer fully in the anti-clockwise direction). In addition the link between terminals 4 and 5 must be removed. If the leads between the external potentiometer and the SIGMA-tronic module are longer than 10 m then screened cables should be used and one side must be connected to the neutral rail of the equipment.

By exchanging capacitors the maximum running time can be increase to 3.9 hours.

The module has, on the front side, two LED's (H2 = green and H10 = yellow). The green LED signals control of input functions of the timing module. The yellow LED indicates a 1-signal on the output of the timing module.

Order code for module:	**GH R433 0004 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R68**
Order code for application:	**D NG 80850 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 120 g

Technical data

Current consumption, 0-signal at output Q	15 mA
1-signal at output Q	35 mA
Input	1 load
Fan out	100 loads
Required control signal time	> 10 ms
Time ranges	see text
Choise of operating mode	see text
Indication, for input connection H2	LED
for output connection H10	LED
Recovery time for all time ranges	≦ 8 ms
Temperature error of running time	< ± 0.1 %/K
Repeatibility over long time period	< 1 %

Possible time ranges

Normally 4 time ranges are available with this module. These are chosen by means of terminals 8 and 9. The terminals 8 and 9 are in accordance with the list, with 1 ≙ + Us switched. 0 ≙ input unswitched.

	Terminal 8	Terminal 9
Range I: 0.5 . . . 5.5 s	1	0
Range II: 2 . . . 22 s	0	1
Range III: 16 . . . 176 s	0	0
Range IV: 128 . . . 1408 s	1	1

If the capacitor C3 (0.47µF) is removed then 4 further time ranges are available:

Range I: 12.5 . . . 125 ms Range II: 50 . . . 500 ms Range III: 0.4 . . . 4 s Range IV: 3.2 . . . 32 s	Switching off terminals 8 and 9 as above

If longer times than 1408 s are desired this can be acheived by exchanging the capacitor C3 (0.47 µF) for a foil capacitor 4.7 µF. In this case the maximum running time can be increased to approx. 14000 s ≙ 3.9 hours. The initial times ranges mentioned above are increased by a factor of 10.

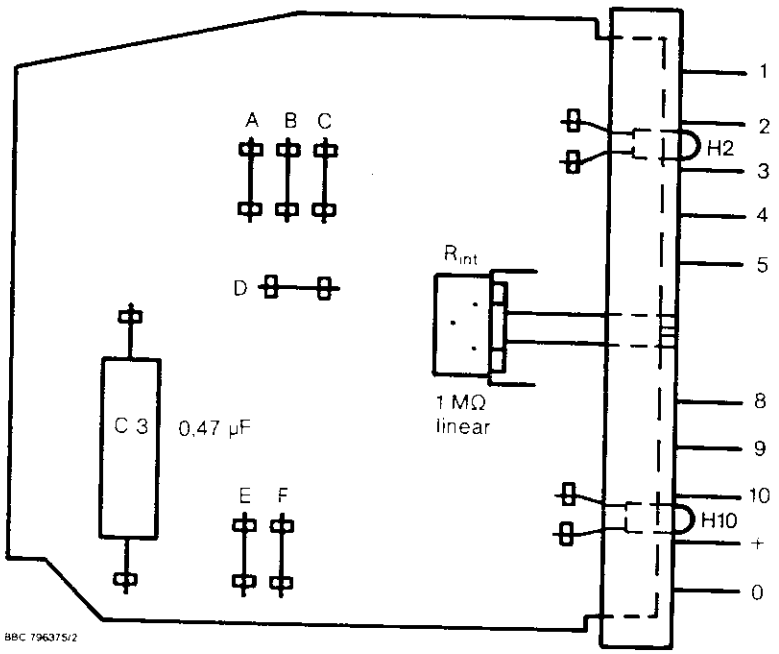
The setting of the running time within a particular time range can either be acheived by the built-in potentiometer R_{int} = 1 MΩ, or by an external potentiometer R_{ext} = 1 MΩ. In addition, the possibility exists, by connection of a 100 kΩ potentiometer, of a course (R_{int}) as well as a fine (R_{ext}) adjustment. Furthermore, setting of the running time can be made by a external control voltage.

Exact setting of the running time

In many cases this can be done with the aid of a stop watch. In the case of very long or very short times one can use the fact that the four time ranges are in a fixed relationship to one another. In range IV 64 times longer, in range III 8 times longer, and in range I only a ¼ as long as in range II. A time of 640 s for example, can be compared with a time of 10 s in range II. Lastly one re-links on range IV.

Summary of possible operating modes

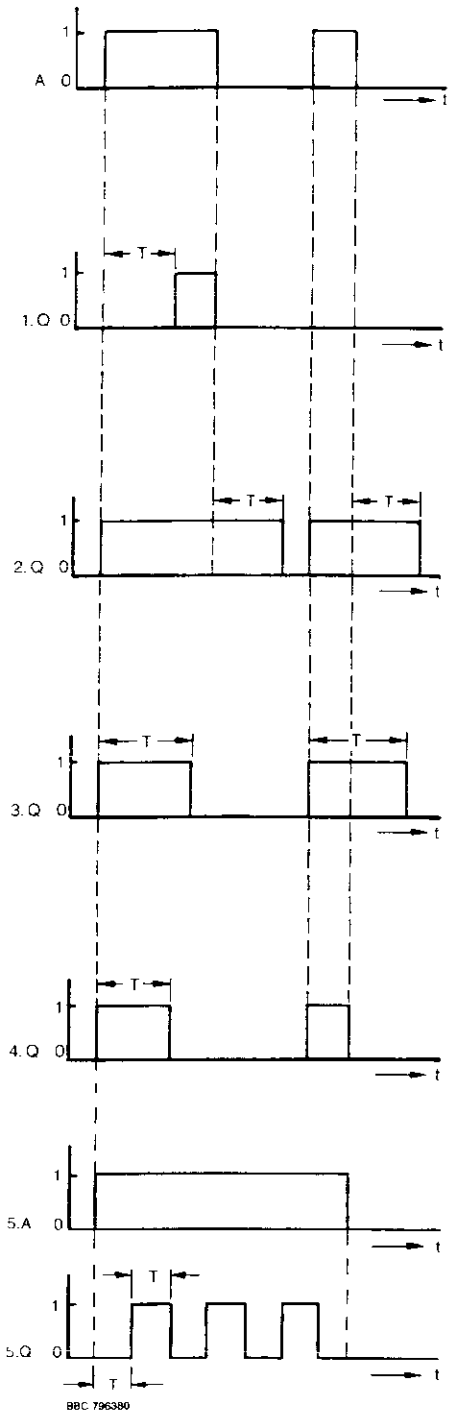
The timer R 433.4, which is delivered as a switch delay unit, can, by means of removing the links on the p.c.b., be used in various operating modes. When used as a switch-on delay unit the links A to F on the diagram below are all fitted.



If other operating modes are desired then these can be realised by linking in accordance with the following plan.

For the operations, delay on energisation timer, block mode 1 and block mode 2 for subsequent triggering the input 3 can be used as a clearing input (premature resetting of timer).

Detailed information regarding the programming of the various time ranges and operating modes should be taken from the application sheet „New timer unit concept", order code D NG 80 850 D.



Linking plan:

1. 0-1 delay unit
If a 1-signal is placed at the input A, a 1-signal will appear at the output after the preset delay. When the 1-signal is removed from the input, an 0-signal will appear at the output.

No links to be removed.

2. 1-0 delay unit
With a 1-signal at the input A a 1-signal will appear immediately at the output. When the 1-signal is removed from the input, the 1-signal will remain for the duration of the preset time.

Remove links C and F.

3. 0-1 Blocker
Mode of operation 1
After applying a 1-signal to the input, a 1-signal will appear at the output, independent of the duration of the applied 1-signal, for the duration of the preset time.

Remove links A, B, C, D and F.

3.1 Operating mode 1 subsequently triggerable.

Remove links B, C, D and F.

4. 0-1 Blocker
Mode of operation 2
After applying a 1-signal to the input, a 1-signal will appear at the output for the duration of the preset time. On resetting to 0 at the input before the preset time has elapsed, an 0-signal will appear immediately at the output.

Remove link F.
Connect terminal 3 to + U_S

5. Square wave generator
If a signal is continually applied to input A then a square wave will appear at the output with a frequency of f = ½t. The impulse has a time/space ratio of 1 : 1.

Remove link E.

6. Store with setting-delay
(predominantly clearing)
If a 1-signal is applied to input A for a time longer than that which is set on the module then a 1-signal will appear at output Q after the set time has elapsed. This can be reset via inputs B or C.

Remove links A and D.
Link from terminal 2 to terminal 3.

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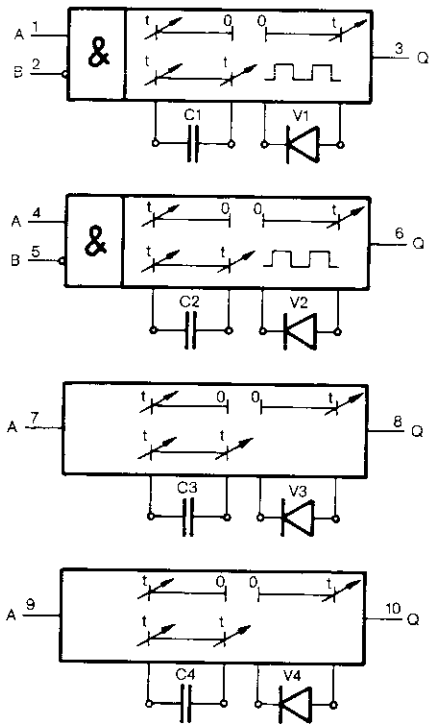
Short timer, 4 functions
R 433.6



Description

The short timer R 433.6 comprises four functional units and, by means of corresponding wiring, can be used as a switch-on delay unit, switch-off delay unit, switch-on and switch-off delay unit or square-wave generator (functional units 1 and 2). The duration of the time delay is determined by the capacitance of capacitors C1 ... C4 which can be fitted by the user. The delay time is adjustable within a range from 0.1 ms to 4.7 s.

The first two functional units are equipped with disable AND inputs.

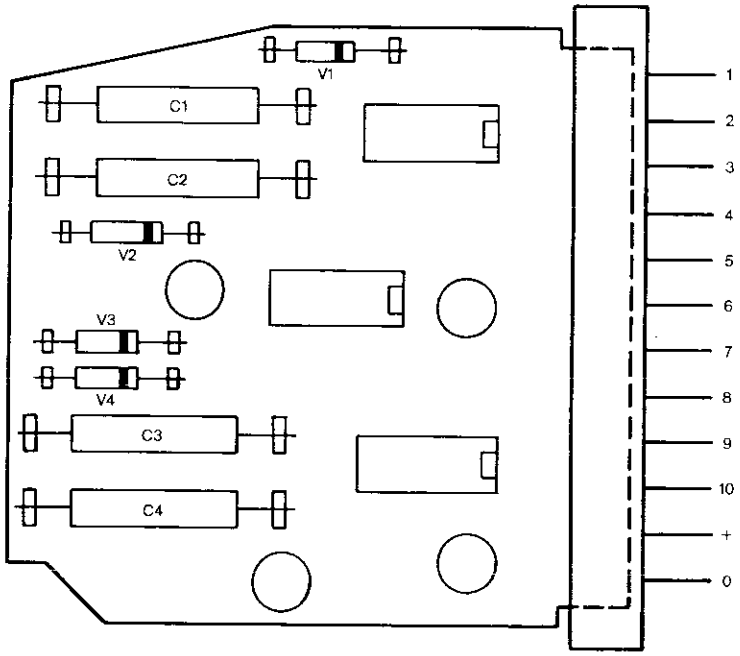
Order code for module:	**GH R433 0006 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R79**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 120 g

Technical data

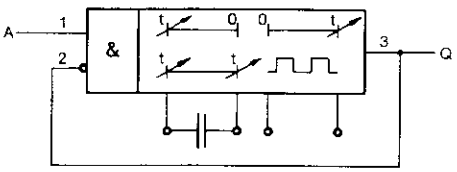
Current consumption, all inputs and outputs 0 signal	approx. 13 mA
all inputs and outputs 1 signal	approx. 42 mA
Input load	1 load
Fan out	100 loads
Necessary capacitor for the delay time (exception: refer to square-wave generator operation)	1 nF/ms
Mode of operation when delivered	Switch-off delay unit
Delay time (when delivered)	
1st and 2nd functional units	22 ms
3rd and 4th functional units	100 ms
Switch-off and switch-on delay when operated as switch-on and switch-off delay unit	approx. 5% of the set time
Maximum delay time error when delivered	± 18%
When equipped with a capacitor with 10% tolerance	± 18%
When equipped with a capacitor with 2% tolerance	± 10%
Possible capacitors for configuration	100 pF...4.7 μF
Time range	0.1 ms...4.7 s
Use of electrolytic capacitors (or tantal)	not allowed
Temperature drift of delay time when using polyester capacitors (fitted when delivered)	typ. − 0.1% / K max. − 0.2% / K
Repetition error after a longer period of time	< 5%

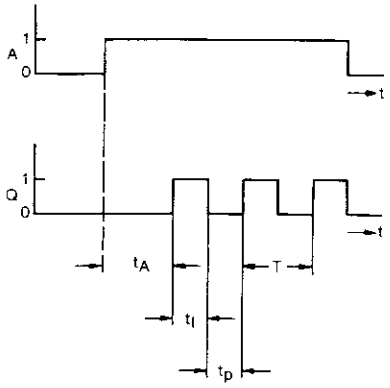
Summary of possible operation modes

1. **Operation mode: "switch-on delay unit" (0-1 delay unit).**
   Fit diodes (V1-V4) in accordance with the pc board drawing. When delivered, the units are equipped as switch-on delay units.



2. **Operation mode: "switch-off delay unit" (1-0 delay unit).**
   Reverse the polarity of the diode belonging to the functional unit.
3. **Operation mode: "switch-on and off delay unit".**
   Remove the diode belonging to the functional unit.
4. **Operation mode: "square-wave generator".**
   The functional units 1 and 2 operate as square-wave generator without supplementary units. For this purpose, the output is connected to the inverted input B of the disable AND gate and the true input A has a 1 signal. This input can also be used for clock enabling. The diode belonging to the functional unit is removed. When the enable signal is removed, a 1 signal just applied still remains at the clock output until expiry of the time t_I.





t_A = starting duration
t_I = pulse width
t_P = pause duration
Period $T = t_I + t_P$

The pulse-pause ratio is approximately 1 : 1

Deviating technical data with respect to delay time:

Necessary capacitor for period	0.9 nF/ms
Period	1.11 ms/nF
Starting duration	1 ms/nF

Formula for calculation of the capacitor to be selected:

$$C\ [nF] = \frac{900}{f\ [Hz]}$$

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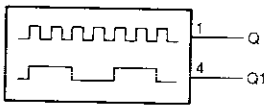
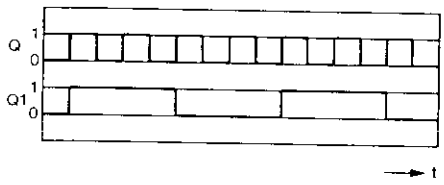
Flasher unit
R 435.3





Description

The flasher unit R 435.3 supplies one square-wave voltage at outputs Q and Q1 each and thus a constant alternation between 0 and 1 signal. It fulfills the specifications of DIN 19 235.

The flashing frequency is:
at output Q: f2 = 2 Hz
at output Q1: f1 = 0.5 Hz

The flashing phases begin at the same time, the pulse/pause ratio is 1 : 1 and the faster flashing frequency is precisely four times as fast as the slower frequency.

On the basis of the application for special uses, the flasher unit can be converted for other frequencies (0.01 Hz to maximally 10 kHz).

Order code for module:	**GH R435 0300 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R90**
Order code for application:	**D NG 3156 81 D**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 110 g

Technical data

Current consumption	15 mA
Fan out at Q or Q1 each	100 loads
Flashing frequency f2 at output Q	2Hz ± 18%
Flashing frequency f1 at output Q1	0.5 Hz ± 18%
Keying ratio (pulse/pause)	1 : 1

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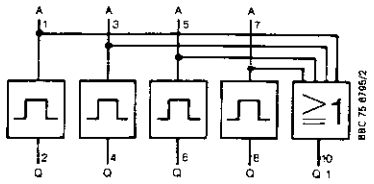
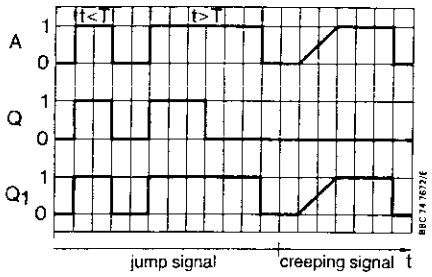
Signal pulse outputs
R 438/V0, passive
R 438.2, active





Description

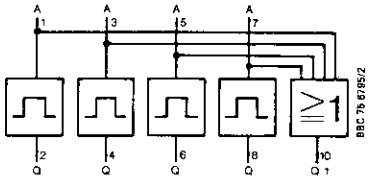
The single pulse output R 438/V0 consists of four independent functions and an OR-gate. From random long control signals at input A, it makes a short impulse of a definite duration at output Q.

This is a passive function, i.e. the input signal is not amplified. Thus, for determination of the total input current, the output current must be added to the input current (sum of the connected output loads). The inputs may be fed only with a step signal, e.g. from a switch, or an active SIGMA-tronic output, etc.

Order code for module:	**GH R438 0000 V0**
Order code for circuit symbol transparency:	**GH R700 1901 R37**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 100 g

Technical data

Input	1 load
Fan out	3 loads
Duration of output signal at 24 V– with 1 output load with 3 output loads	 approx. 135 ms approx. 45 ms
Max. input voltage	+ 65 V–

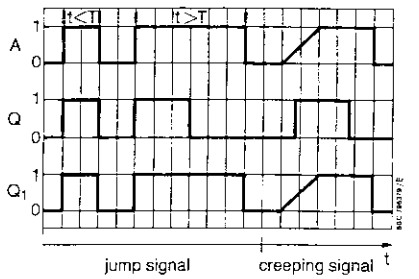


Description

The signal pulse output R 438.2 consists of 4 independent functions and an or gate. From random long control signals at input A, it makes a short impulse of a definate duration at output Q.

The output Q are active functions, i.e. input signals are amplified and creeping signals are transformed into square waves. The OR gate (output Q1) is passive.

Order code for module:	**GH R438 0002 R1**
Order code for circuit symbol transparency:	**GH R700 1901 R37**
Identifying colour:	violet
Mechanical structure:	single width
Weight:	approx. 120 g



Technical data

Power consumption	12 mA
Input	1 load
Fan out output Q	100 loads
output Q1 (operates as additional input load on the signal inputs 1, 3, 5, 7)	dependent on previously switched units
Duration of output signal Q	approx. 25 ms
Voltage error of impulse time at 24 V ± 30 %	± 3.5 %
Recovery time	approx. 35 ms
Max. input voltage	+ 65 V