EA 6110

EVENT/TIME/FREQUENCY/SPEED/ PULSE WIDTH-METER

WITH PROGRAMMABLE TIME BASE

FEATURES

* HIGH CONTRAST 4 DIGIT LCD
* 13, 18, 25, 50mm DIGIT HEIGHT AVAILABLE
* SUPPLY 5V ±10%/250µA, VERSION -E 25µA
* ACCURACY ±5ppm (5ppm/V), TK = -0,04ppm/°C²
* DECIMAL POINT DRIVE, OVERFLOW
* 2MHz SCHMITT-TRIGGER COUNT INPUT (20MHz OPTIONAL)
* PROGRAMMABLE CRYSTAL TIME BASE (VERSIONS -T,-F,-P)
* WITH SOLDER STRAPS SETTABLE FROM 10µs TO 1000s
* LEADING ZERO BLANKING, RESET, STORE, ENABLE
* OPERATING TEMPERATURE 0°C TO +55°C (STORAGE TEMP.-20/+60°C)
* 16 PIN SOLDERING CONNECTOR, CONNECTOR PLUG AVAILABLE

OPTIONS

Display for temperature range -20/+80°C (opt. -ET); Electroluminescent backlighting (opt. -LF)
4 1/2 digit version without overflow (except bidirectional counter)
Gate times from 1µs to 1200s on request

ORDERING INFORMATION

Module, digit height 13mm, incl. mounting bezel EA 03	**EA 6110-13??**
Module, digit height 18mm, incl. mounting bezel EA 08-N	**EA 6110-18??**
Module, digit height 25mm, incl. mounting bezel EA 011-N	**EA 6110-25??**
Module, digit height 50mm, incl. mounting bezel EA 050-N	**EA 6110-50??**

Wondering about question-marks? Here's how to specify your needs (??)

Event counter (without time base)	count option 9999	**EA**
~~Event counter (without time base)~~	~~count option 5959~~	~~**EB**~~
~~Bidirectional counter (without time base)~~	~~count option 9999~~	~~**EC**~~
Timer (programmable time base)	count option 9999	**TA**
~~Timer (programmable time base)~~	~~count option 5959~~	~~**TB**~~
~~Bidirectional timer (programmable time base)~~	~~count option 9999~~	~~**TC**~~
Frequency counter (programmable time base)	count option 9999	**FA**
Pulse width counter (programmable time base)	count option 9999	**PA**

Available display options: opt. -LF, -ET, -LFET (Note: EA 6110-50 opt. -ET only)

Accessories:

Pre-scaler, progr. scaling ratio, f_{in}<5MHz	**EA 9110-T**
PLL multiplicator, programmable, f_{in}>5Hz	**EA 9110-M**
Digital multiplicator, programmable, f_{in} from 0,05Hz to 60Hz	**EA 9610**

Pin/socket header: straight **EA G-16** / **EA B-16**; right angle **EA W-16** / **EA L-16**

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Version -EA, ~~-EB, -EC~~

Event counter (without time base and gate control)

Inputs LZ, St, Re, En and U/D ~~(version -EC only)~~ are internally connected to H-level via pull-ups. If input St is left open, the value is 'frozen' on the display. To show the actual value connect St to L-level. Input RT is without function.

Version -TA, ~~-TB, -TC~~

Timer, time meter with progr. time base from 10µs to 1000s (see table)

Input C is internally connected to the time base which includes an active CMOS-output and a symmetric pulse duty factor of 1:1 (50% low, 50% high). The first counting pulse appears 1T (T = chosen unit of time) after switching on or if a negative pulse appears at input Rt. It is recommended to use a reset pulse before, e.g. autoreset by a capacitor between Re and GND. All other functions are the same as on version -E.

Version -FA

Frequency counter with progr. gate time from 10µs to 1000s (see table)

Input C (CMOS Schmitt-trigger) is used as frequency measuring input. Inputs En, St and Re are internally connected to the time base and gate control (see the following pulse diagram fig.1 and fig.2). Colon Col functions as overflow indicator. At very short gate times (T<0,1s) the display is 'running' and you may find it difficult to read. Connect RT to L-level to stop the time base and to store the latest measured value.

Fig. 1 RT open

Long measuring cycle 2 x T

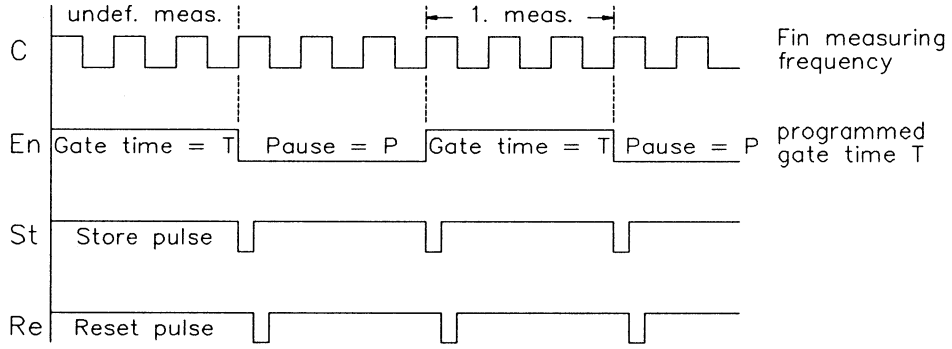
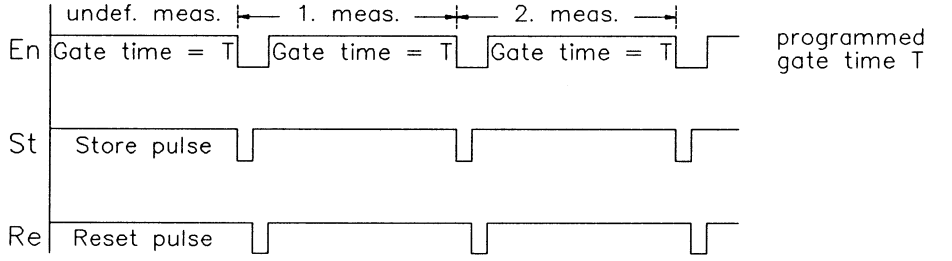


Fig. 2 RT at Re

Short measuring cycle 1 x T + Pmax. = 30µs



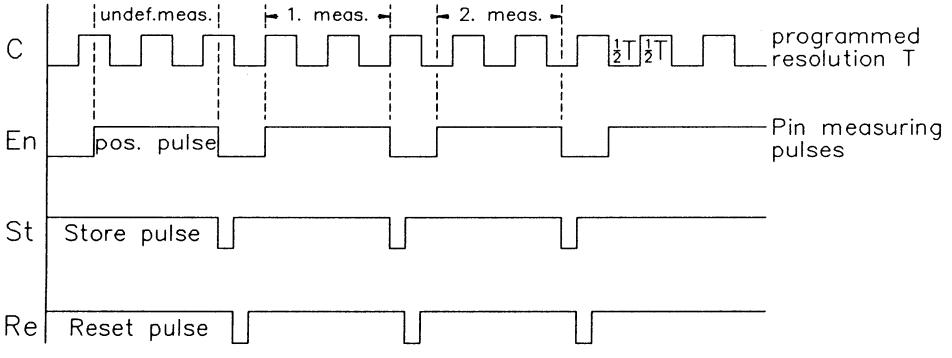
Version -Pa

Pulse width counter with progr. resolution for positive periodic pulses

Input En is used as measuring input (CMOS-level). Input C is internally connected to the time base, inputs St, Re and En to the control logic (Pulse diagram see the following fig.3). Colon functions as overflow indicator.

Measuring process: The negative-going edge of the first pulse at the measuring input En starts the process with a store and reset pulse. The second negative-going edge ends the first measuring process and prepares for the next. If no other pulse follows the latest measured value is 'frozen' on the display. The pause between two pulses must take at least 30µs. If the pulses to be measured are symmetric, a quasi-period measurement can be done by using the half time base (= next higher time base + strap 1 + 3).

Figure 3



ELECTRONIC ASSEMBLY

Programming the time base: solder straps 4, 5, 6, 1, 2, 3 (other times on request!)

Version -T Clocktimer

	Time base	T	max. value		solder straps
1.	1000	s	9999	s·10³	4 5 6 - - 3
2.	100	s	9999	s·10²	4 5 6 - - -
3.	10	s	9999	s·10¹	4 5 - - - -
4.	1	s	9999	s	4 - 6 - - -
5.	0,1	s	999.9	s	4 - - - - -
6.	0,01	s	99.99	s	- 5 6 - - -
7.	0,001	s	9.999	s	- 5 - - - -
8.	0,0001	s	999.9	ms	- - 6 - - -
9.	0,00001	s	99.99	ms	- - - - - -
Minute clock					
10.	10	min	9999	min·10¹	4 5 6 1 2 -
11.	1	min	9999	min	4 5 - 1 2 -
12.	0,1	min	999.9	min	4 - 6 1 2 -
13.	0,01	min	99.99	min	4 - - 1 2 -
14.	0,001	min	9.999	min	- 5 6 1 2 -
15.	0,0001	min	.9999	min	- 5 - 1 2 -

Times 1 to 15 suitable for version -A, ~~-C~~ (max. 9999)
~~Times 4 and 11 suitable for version -B (max.5959)~~

Version -P Pulse width counter

Resolution T programmed like version -T 1. to 9.

Version -F programmed as frequency counter

	Gate time	T	max. value		solder straps
1.	100	s	99.99	Hz	4 5 6 - 2 -
2.	10	s	999.9	Hz	4 5 - - 2 -
3.	1	s	9999	Hz	4 - 6 - 2 -
4.	0,1	s	99.99	kHz	4 - - - 2 -
5.	0,01	s	999.9	kHz	- 5 6 - 2 -
6.*	0,001	s	9999	kHz	- 5 - - 2 -
7.*	0,0001	s	99.99	MHz	- - 6 - 2 -
8.*	0,00001	s	999.9	MHz	- - - - 2 -

Version-F programmed as revolution counter

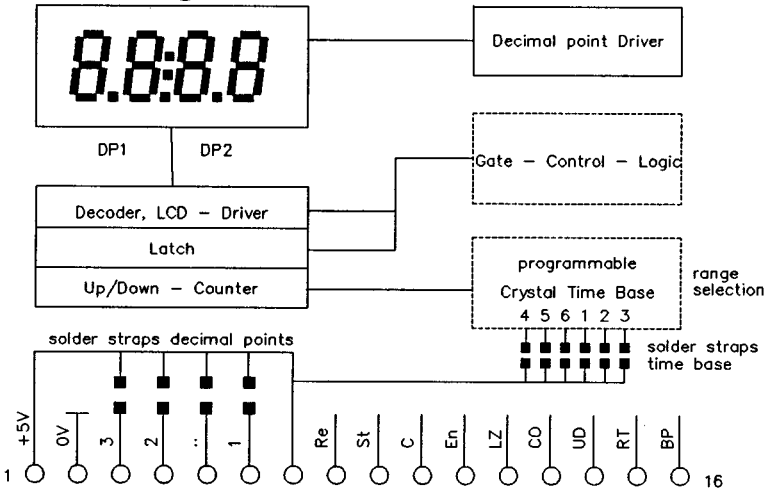
(f_{in} 1 pulse per revolution 1 r.p.m.)

	Gate time	T	max. value		solder straps
1.	600	s	999.9	r.p.m.	4 5 6 1 2 3
2.	60	s	9999	r.p.m.	4 5 - 1 2 3
3.	6	s	9999	r.p.m.·10¹	4 - 5 1 2 3
4.	0,6	s	9999	r.p.m.·10²	4 - - 1 2 3
5.	0,06	s	9999	r.p.m.·10³	- 5 6 1 2 3
6.	0,006	s	9999	r.p.m.·10⁴	- 5 - 1 2 3
7.*	0,0006	s	9999	r.p.m.·10⁵	- - 6 1 2 3
8.*	0,00006	s	9999	r.p.m.·10⁶	- - - 1 2 3

* Versions -F, -P: Take care of limiting frequency f_{in}

Presetting: versions -T, -F: T = 1s; version -P: T = 10 µs

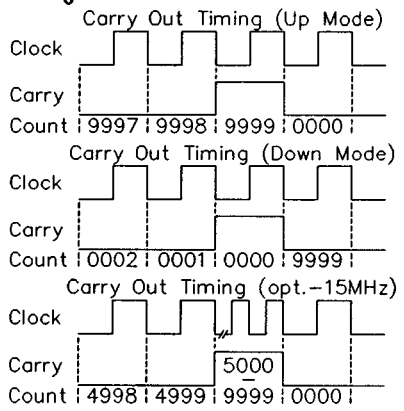
Block diagram



Timing diagram CO - output

Down-mode version -C only

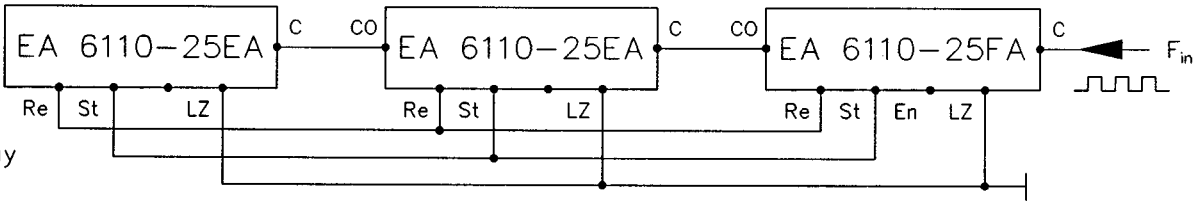
$I_0L = I_0H = 2mA$



Cascading 4 digit blocks to 8, 12 or 16 digit displays

This possibility is especially interesting if using modules with 18, 25, 50 mm displays, because they are available only with 4 digit displays. For cascading you need the corresponding number of modules of the version EA 6110-??E?. To make it easier the side-pieces of the boards can be shortened. Inputs Re, St ~~(U/D version -EC only)~~ are paralleled, output CO of the 1. module connected to input C of the 2. module and so on. Inputs LZ are connected to VSS (L-level) which means that leading zero blanking is disabled.

Example:
12 digit frequency–counter with 25mm display



EA 6110

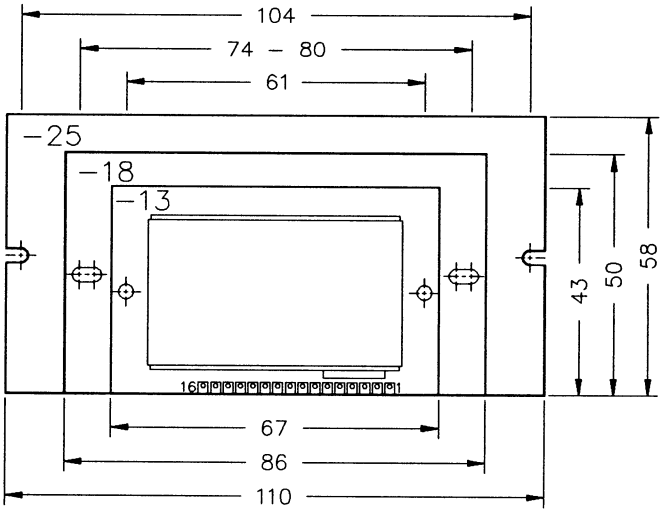
Pin description

Pin	Symbol	Function	Level
1	VDD	pos. supply +5V	H-level
2	VSS	neg. supply 0V	L-level
3	DP3	decimal point, left side	active H (L*)
4	DP2	decimal point, middle	active H (L*)
5	Col*	colon, middle	active H (L*)
6	DP1	decimal point, right side	active H (L*)
7	VDD	same as pin 1	
8	Re	reset counter 0000	active L (H*)
9	St	display store	active H*
10	C	count input (Schmitt-trigger)	CMOS
11	En	count enable	active L (H*)
12	LZ	leading zero blanking	active L (H*)
13	CO	overflow output 10^4	H -> L
14	~~U/D~~	~~up/down input (version -C)~~	~~up = H*, down = L~~
		LCD-overflow (version -A)	BP or inverted BP
15	RT	reset/stop timer (time base)	active L (H*)
16	BP	LCD backplane-frequency output	ca. 80 Hz

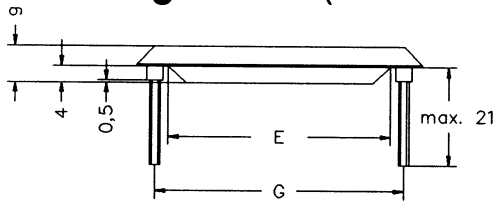
H* = intern. pull-up
L* = intern. pull-down
Col* = no function with versions -FA, -PA
Col* = DP4 on 4 1/2 digit modules
St = connect to L-level for actual value on versions -E, -T

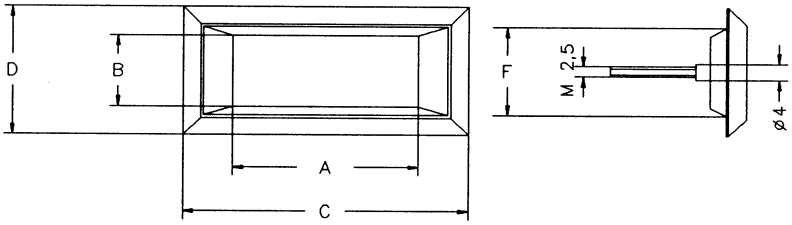
Module dimensions

EA 6110-13, -18, -25.
Dimensions EA 6110-50:
188 x 89 x 15 mm



Mounting bezels: (dimensions in mm) Mount. bezel EA 050-N with 4 screw pins M 2,5





Type	Window A x B	Overall Dim. C x D	Panel Cutout E x F	Mounting Hole G / ∅	Suitable for Module
EA03	45,7 x 17,7	70,0 x 32,0	54,5 x 22,0	61 / M2,5	EA 6110-13
EA08-N	62,2 x 22,6	87,0 x 36,6	74,0 x 28,8	80 / M2,5	EA 6110-18
EA011-N	86,0 x 30,3	110,8 x 44,3	99,0 x 36,5	104 / M2,5	EA 6110-25
EA050-N	160,0 x 56,0	189,0 x 73,0	173,2 x 63,0	180,3 x 61,0	EA 6110-50

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