14-digit Nixie Calculator Manual (IN-12, IN-16, IN-17 and B-5870 versions)

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General information

Apart from the power supply, the nixie calculator works completely independently and requires neither an internet connection nor any peripheral devices.

Power supply

The calculator needs a DC 12V/2A **regulated** power supply (center positive).

Power on / Power off

Use the power switch to power on and off the calculator. During start-up, the calculator briefly shows the controller firmware version on the left and the keyboard firmware version on the right. By default, the calculator starts in calculator mode.

The [F] key

The [F] key has several functions:

- Press and release the [F] key to switch between the calculator and the clock mode and to leave the menu mode.
- Hold the [F] key for 3 seconds to enter the menu mode.
- Press the [F] key + an operator key to access the second level of functions in calculator mode, for example n!
- Press the [F] key + some defined keys to get a shortcut for some settings, for example LED lighting (see Table of Shortcuts).

Calculator mode

In this mode the device works like a standard calculator. However, be aware, that it uses double type (64-bit) variables for the calculations which provide limited precision.
If an error occurs (overflow, domain, divide by zero), all decimal points will light up.

Clock mode

Entering date and time

In clock mode press the [AC] key. A blinking zero indicates that you can enter the date and the time in the YYYYMMDDhhmmss format. Press the [=] key to confirm, press [AC] to abort.

Predefined clock modes

There are several clock modes that can be reached directly with the numeric keys:

0 - time only
1 - time with no seconds
2 - moving time
3 - time or date
4 - time and date
5 - time and temperature
6 - time and date and temperature
7 - raw date and time
8 - timer
9 - stopwatch

Timer

In timer mode press the [AC] key. A blinking zero indicates that you can enter the number of days, hours, minutes, and seconds in the format DDhhmmss. Press the [=] key to confirm, press [AC] to abort. Press [=] to start and stop the timer. Press [C] to reset the timer. The accuracy depends on the internal MCU oscillator. There is no sound at the end of the countdown!

Stopwatch

In stopwatch mode press the [=] key to start the stopwatch. Press [=] to pause the display while the stopwatch keeps running. Press [C] to reset the stopwatch. The accuracy depends on the internal MCU oscillator.

Menu mode

The menu ID is displayed on the left, the menu value(s) on the right. Key autorepeat is enabled in menu mode and starts after 1 second. The autorepeat speed increases after some time.

Navigation

[M+]	next menu
[M-]	previous menu
[+]	next value
[-]	previous value
[=]	commit value and move to next column if any
[C]	restore to previously stored value
[AC]	reset to default value

Menu table

ID	Name	Description	Values
1	startupmode	Start in calculator or in clock mode	0 = calculator (default) 1 = clock
2	showversion	Show version during start-up	0 = off 1 = on (default)
3	autooffmode	Shutdown high voltage or switch to clock mode after a period of no keyboard activity	0 = off 1 = on 2 = switch to clock mode (default)
4	autooffdelay	Delay in minutes for auto off mode	1 - 720 (default 5)
5	clockmode	Predefined display format in clock mode	0 = time 1 = time, no seconds 2 = moving time 3 = time or date 4 = time and date 5 = time and temperature 6 = time and date and temperature 7 = raw date and time 8 = timer 9 = stopwatch
6	hourmode	12 or 24 hours mode	0 = 12 hours 1 = 24 hours (default)
7	leadingzero	Hours leading zero off or on	0 = off 1 = on (default)
8	dateformat	Date format	0 = ddmmyy (default) 1 = yymmdd 2 = mmddyy
9	pirmode	PIR off or on	0 = off (default) 1 = on
10	pirdelay	PIR delay time in minutes before shutting down the high voltage	1 - 720 (default 5)
11	gpsmode	GPS time sync off or on	0 = off (default) 1 = on
12	gpsspeed	GPS communication baud rate	0 = 2400 1 = 4800 2 = 9600 3 = 19200 4 = 38400 (default) 5 = 57600 6 = 115200
13	gpssyncinterval	GPS time sync interval in minutes	1 - 720 (default 60)
14	temperaturemode	Temperature sensor off or on	0 = off (default) 1 = on
15	temperaturecf	Temperature in C or F	0 = Celsius (default) 1 = Fahrenheit
16	ledmode	LEDs on by time or always	0 = time 1 = always
17	ledrange	All LEDs or only LEDs where the correspondent nixie is on	0 = all (default) 1 = if nixie on
18	calcrgbmode	Fixed colors, wheel, or random colors in calculator mode	0 = off (default) 1 = fixed color 2 = wheel 3 = random
19	clockrgbmode	Fixed colors, wheel, or random colors in clock mode	0 = off (default) 1 = fixed color 2 = wheel 3 = random
20	ledstarttime	Start time of LED lighting	00:00 - 23:59 (default 00:00)
21	ledduration	Duration in minutes of LED lighting	1 - 720 (default 0)

22	zeropadding	Left padding with zeroes in calculator mode off or on	0 = off (default) 1 = on
23	flickermode	Simulate display flickering of an old calculator off or on	0 = off (default) 1 = on
24	acpstarttime	Start time of cathode poisoning prevention	00:00 - 23:59 (default 00:00)
25	acpduration	Duration in minutes of cathode poisoning prevention	0 - 720 (default 0)
26	acpforceon	Force turning nixies on during cathode poisoning prevention	0 = off 1 = on (default)
27	negativecolor	RGB LED color for negative numbers in calculator mode	0-255,0-255,0-255 (default 0,0,0)
28	positivecolor	RGB LED color for positive numbers in calculator mode	0-255,0-255,0-255 (default 0,0,0)
29	errorcolor	RGB LED color for error in calculator mode	0-255,0-255,0-255 (default 0,0,0)
30	timecolor	RGB LED color for time in clock mode	0-255,0-255,0-255 (default 0,0,0)
31	datecolor	RGB LED color for date in clock mode	0-255,0-255,0-255 (default 0,0,0)
32	tempcolor	RGB LED color for temperature in clock mode	0-255,0-255,0-255 (default 0,0,0)
33	dstweek	Daylight saving time change, week of month	0 = last (default) 1 = first 2 = second 3 = third 4 = fourth
34	dstdow	Daylight saving time change, day of week	1 = sunday (default) - 7 = saturday
35	dstmonth	Daylight saving time change, month	1 - 12 (default 3)
36	dsthour	Daylight saving time change, hour	0 - 23 (default 2)
37	dstoffset	Daylight saving time change, offset to UTC in minutes	-720 - 840 (default 120)
38	stdweek	Standard time change, week of month	0 = last (default) 1 = first 2 = second 3 = third 4 = fourth
39	stddow	Standard time change, day of week	1 = sunday (default) - 7 = saturday
40	stdmonth	Standard time change, month	1 - 12 (default 10)
41	stdhour	Standard time change, hour	0 - 23 (default 3)
42	stdoffset	Standard time change, offset to UTC in minutes	-720 - 840 (default 60)

Table of shortcuts

Keys	Description	Mode
[F] + [C]	Switch LED lighting for current mode	All
[F] + [00]	Switches between normal display and zero left padding	Calculator
[0] – [9]	Changes the clock mode	Clock
[F] + [+]	Adjust the time by plus one second	Clock
[F] + [-]	Adjust the time by minus one second	Clock

Peripherals module

If you have assembled the peripherals module you can connect it to the calculator with a **straight** ethernet patch cable.

The default communication speed for the BE-220 GPS module is 38400 and 9600 for the older BN-220 module.

Troubleshooting

If the calculator loses the time, please change the CR2032 battery.