

Tensiomark SDI12



Overview

The Tensiomark SDI12 was designed to operate simultaneously as analog and digital (SDI12-System). The SDI12 implementation covers only required commands (according to protocol version SDI12-V1.1, see www.sdi-12.org . For checking the 100% compatibility to SDI12-V1.1, the SDI12-Verifier (from www.sdi-12-verifier.com) has been used).

There are two modes of operation: With and without analog mode. The digital (SDI12) mode is always active, optionally the analog mode can be enabled by

In analog mode the pF value (in pF or mBar) can easily be measured with a simple voltage meter.

Connection

Supply voltage is 7-14 Volt (8-12 Volt recommended, 8V is ideal). Normally the current is about 1.5 mA During a measurement the peak current is 50 mA for up to 4-8 seconds.

We recommend, to switch the Tensiomark of, is not used!

Digital/Supply:

Brown: Supply (power +, 8-12V recommended). Important: The supply has only Protection against short overvoltage pulses. If there is a risk of reverse connection, it is important to use an extra extern „Fast Blow“ fuse (500mA) in the supply!

Grey: SDI12 signal (nominal 0 to 5V)

Yellow: GND (power GND)

Analog (optionally):

Green: GND (internally connected to Yellow on the sensor PCB, separate cable for analog measurements, to avoid falsifications due to cable resistance in combination with supply current changes).

White: Analog Output signal, nominal 0..2.500 Volt in steps of 0.5mV) (Output impedance: 1000 Ohm)
(Remark: After Power On of the sensor (ca. 100 msec), a signal of 1.000V can be seen for ca. 1 second, then the signals goes back to 0V before the first measures start).

SDI12 Commands

For tests we recommend to use the SDI12-Term (free!) from www.GeoPrecision.com . Use a SDI12 connector as described in the manual of the SDI12-Term or any other equivalent system.



The most important SDI12 commands (letters a and b are for SDI addresses (0..9, a-z, A-Z, the question mark stands for „unknown“ and works only, if only one sensor is connected to the SDI 12 bus, if several sensors are connected, it can not be used.):

Basic comands

- a!** a: address. By Default a is normally '0'
 Sample command: ?I! -> 311TENSIONMARK_1V4_10123456<CR><LF>
 Remark: Here the SDI address is 3 for this sensor, the serial number (last 6 digits) is 123456
- aAb!** Change SDI12 address from a to b
 Sample command, change address from 3 to 2: 3A2! -> 2<CR><LF>
 Remark: Any address is allowed only once on a single bus.
- aM!** Measure tension (in pF or mBar and Temperature in °C). Only one measure is possible within 1 minute. If the time between two M commands are shorter Than 30 seconde, the already measured values will be used:
- Sample commands:
- 2M! -> 20082<CR><LF> -> 2<CR><LF> (measure max. 8 sec.)
 - 2D0!-> 2+21.93+4.551<CR><LF> (21.93°C, pF=4.551)
 - 2M! -> 20002<CR><LF> (short time, use cached values)
 - 2D0!-> 2+21.93+6.551<CR><LF> (same values as before)
- aM9!** Measure Supply Voltage in Volts (accuracy ca. +/- 0.1V)
- Sample commands:
- 2M9! -> 20001<CR><LF> (available immediatelly)
 - 2D0! -> 2+9.159<CR><LF> (here 9.159 Volts)
- aD0!**
- aR0!** Display measures (pF values in mBar or pF, see „flag“ below)

If the Supply Voltage is under 7 Volts. the sensor will report a pF (or mBar) value of -9.88 and a Temperature value of -99.88 °C. If the sensor finds an internal problem, the Temperature value is -99.99 °C.

Useful commands for setup

aXR! Perform a sensor reset. (the 1 second 1.0 V calibration can be seen on the analog output)

aXAnnnnn! For tests: set manually (once) the analog output voltage. With this command the analog function can be verified or tested. The range of nnnnn is from 0..65535, Adequate of 0..2.500 Volts (26214 is the value for 1.000 Volts).

Sample command:

?XA32768! -> 2<CR><LF> (set output temporarily to 1.250V)

The Tensiomark has some internal flags (currently 10, but only Flag 0 is available, please DO NOT change the other flags). Flag 0 is responsible for the automated analog measures. If enabled, the Tensiomark will perform measures at regular intervals and set the analog output. Communication by SDI12 is still possible, but while the sensor takes an automated measure, SDI12 communication is blocked, hence 100% SDI12-V1.1 compatibility is not granted, while analog mode is enabled.

If you have any problems with SDI12 communication, please check first, if Flag 0 is set to 0 (= factory default) for „no analog mode“, and display format „pF“. A sensor reset is recommended after changes (command aXR!)

aXF!

aXF0! Check „Flag 0“ (both commands are identical)

aXF=xxx!

aXF0=xxx! Set „Flag 0“ to xxx (in decimal mode!)

The „flag“ is a 8-bit value that hold the user's sensor configuration:

Bit [0,1,2]: Scaling of analog output (which is 0..2.500 Volts)

- 000 - OFF (no analog signals)
- 001 - 0 mBar equals 0V, 100mBar equals 2.500 Volts
- 010 - 0 mBar equals 0V, 250mBar equals 2.500 Volts
- 011 - 0 mBar equals 0V, 500mBar equals 2.500 Volts
- 100 - 0 mBar equals 0V, 1250mBar equals 2.500 Volts
- 101 - 0 mBar equals 0V, 3000mBar equals 2.500 Volts
- 110 - 0 mBar equals 0V, 10000mBar equals 2.500 Volts
- 111 - 0 pF equals 0V, 7 pF equals 2.500 Volts

Bit [3,4,5]: Time between two automatic measures:

- 000 - 1 Minute (only for tests, for use recommended: >= 10 Minutes)
- 001 - 5 Minutes (only for tests, for use recommended: >= 10 Minutes)
- 010 - 10 Minutes
- 011 - 15 Minutes
- 100 - 20 Minutes

- 101 - 30 Minutes
- 110 - 60 Minutes
- 111 - 120 Minutes

Remark: If automatic measures are enabled, the sensor will start the first measure about 1 second after Power On., if Bit [0,1,2] of the flag are not set to 000. Also, the measured values are available with the R or D command.

Bit [6]: - reserved for test (if set to 1: automatic text output for automatic measures, might cause conflicts, if used in SDI12-mode), so leave to 0.

Bit [7]: This bit sets the SDI12 display format:
0: in pF (0 - 7)
1: in mBar (0 - 10 000 000)

Examples Setting the „flag“ to

0 (dec.) Analog mode is completely switched of, SDI12 format is set to pF.

128 (dec): equals 1000000 (bin) .The analog mode is completely switched of, but SDI12 format is set to mBar

28(dec): equals 00011100(bin). The analog mode is set to 0..1250 mBar (xx xxx 100) And measure is taken each 15 minutes (xx 011 xx) and digital ououtput format is mBar too (0x xxx xxx), Bit 6 is not used (x0 xxx xxx).

(*END*)