

# PSD 4D c Data Sheet

## Key Features

- simultaneous measurement of the beam position and the beam angle
- sub-micrometer precision
- position values independent of the beam diameter
- digitally adjustable gain
- digitally adjustable offsets



TEM Messtechnik's PSD 4D c is a combined angle and position detector to measure the complete pointing of laser beams. By using PSD chips which produce analog outputs, the accuracy of detection is extremely high, limited only by the signal-to-noise ratio. Similarly, the detection bandwidth is very high, comparable to that of large-area photo diodes.

The PSD 4D c can be used to log beam pointing fluctuations or drifts, to measure the straightness of rails and sleighs or to characterize the dynamical properties of moving objects.

The simplest way to use the PSD 4D c is in conjunction with the read-out electronics "PSD Reader" and the provided PC software.

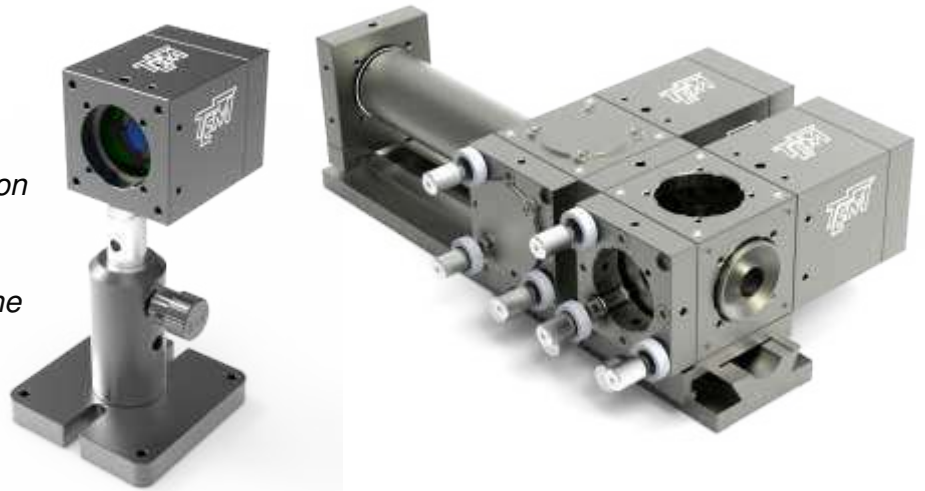
parameter	value
wavelength range	350...1100nm, UV-enhanced and IR models available
power range w/o filters	10uW to 1mW @ 532nm
max. beam diameter	11mm, larger apertures available
typical precision	sub micro-meter, sub mirco-rad
input aperture	Sm1 thread
dimensions	110 x 85 x 45mm

pin	function	voltage
1	diffAx	-10...10V
2	diffAy	-10...10V
3	diffBx	-10...10V
4	diffBy	-10...10V
5	analog GND	
6	supply	+15V
7	supply	-15V
8	supply	GND
9	i2c clock	5V level
10	i2c data	5V level
11	sumAx	0...10V
12	sumAy	0...10V
13	sumBx	0...10V
14	sumBy	0...10V
15	SPI clock	5V level

# PSD 4D e & PSD 2D Data Sheet

## Key Features

- simultaneous or individual measurement of the beam position and the beam angle
- sub-micrometer precision
- position values independent of the beam diameter
- digitally adjustable gain
- digitally adjustable offsets



TEM Messtechnik's PSD 4D e is a combination of an angle and a position detector to measure the complete pointing of laser beams. By using PSD chips which produce analog outputs, the accuracy of detection is extremely high, limited only by the signal-to-noise ratio. Similarly, the detection bandwidth is very high, comparable to that of large-area photo diodes.

The PSD 4D e can be used to log beam pointing fluctuations or drifts, to measure the straightness of rails and sleighs or to characterize the dynamical properties of moving objects. Angle and position detectors can be split for convenient placement on the optical table, or purchased individually (PSD 2D-4 or PSD 2D-9).

The simplest way to use the PSD 4D e is in conjunction with the read-out electronics "PSD Reader" and the provided PC software.

pin	function	voltage
1	diffAx	-10...10V
2	diffAy	-10...10V
3	diffBx	-10...10V
4	diffBy	-10...10V
5	analog GND	
6	supply	+15V
7	supply	-15V
8	supply	GND
9	i2c clock	5V level
10	i2c data	5V level
11	sumAx	0...10V
12	sumAy	0...10V
13	sumBx	0...10V
14	sumBy	0...10V
15	SPI clock	5V level

parameter	value
wavelength range	350...1100nm, UV-enhanced and IR models available
power range w/o filters	10uW to 1mW @ 532nm
chip size	angle detector: 4x4mm, position detector: 9x9mm
typical precision	sub micro-meter, sub mirco-rad
max. beam size	depends on lens placement
dimensions	40 x 40 x 52mm (each detector)

# PSD Reader



昊量光电

# 1 Introduction

The *PSD Reader* from TEM Messtechnik is a multi-purpose device for measuring physical values (optical power, voltage, current) and display them on a PC. In standard application the sensor is a *PSD4Dc* (or derivatives like *PSD2D* or *PSDe*) and the device displays the four degrees of freedom of a laser's beam pointing (angle phi and theta, position x and y, or just two degrees of freedom in case of using a *PSD2D*).

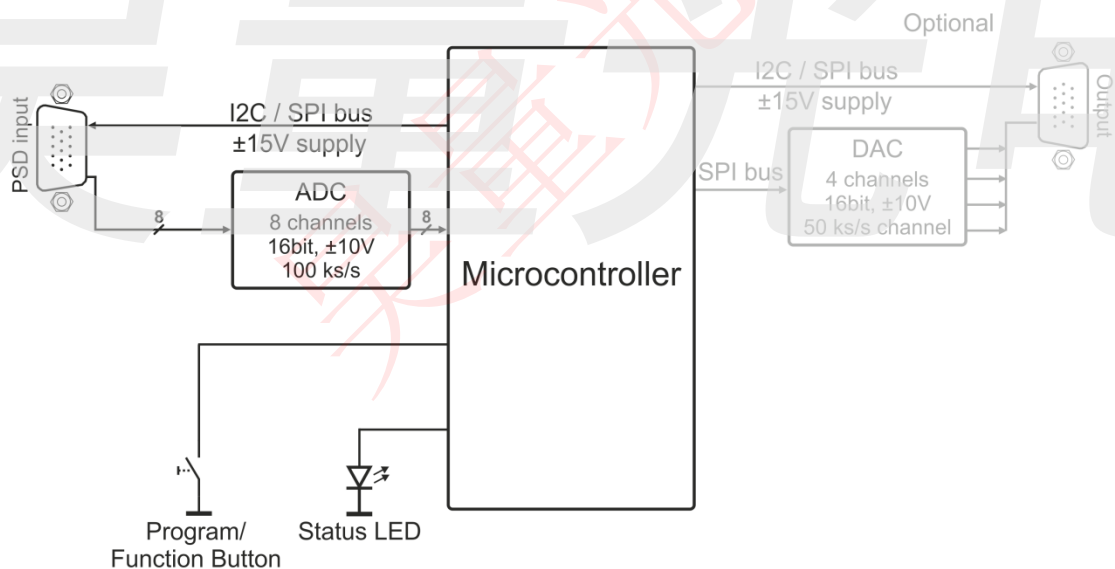
In customized applications the device is able to act as a digital regulator which measures a value, compares it to a setpoint and provides an output to feed it to an actuator.

Since the signal processing is exclusively done by a microcontroller, the *PSD Reader* device shows great flexibility. All important parameters and settings are accessible by interfacing the device with a PC, either using the dedicated program *Kango* or user-supplied software

# 2 Block Diagram *PSD Reader*

At the heart of the *PSD Reader* device lies a microcontroller, which handles all communications over the USB interface and over the I2C or SPI bus. For reading input signals or acquiring data, the *PSD Reader* is equipped with an 8-channel, 16-bit ADC with an input range of +/-10V.

## PSD Reader Block Diagram



**Figure 1** Block diagram, optional components shown semi-transparent

The standard configuration of the *PSD Reader* electronics features one 8-channel input connector for feeding in PSD- or photodiode-signals.

Optionally the controller can do signal processing, such as the implementation of PID-regulators, the generation of control signals for micro-stepper motors or digital filtering.

Optional signal output is provided by a 4-channel, 16-bit digital-to-analog converter (DAC).

The output range of this DAC is +/-10V.

### 3 Kangoo Configuration “CrossHair 4D”

The standard configuration for using the PSD Reader is the configuration “CrossHair 4D”. This configuration is located in the folder C:\TEMKangoo\Data\CrossHair. Figure 8 shows a screenshot of this configuration.

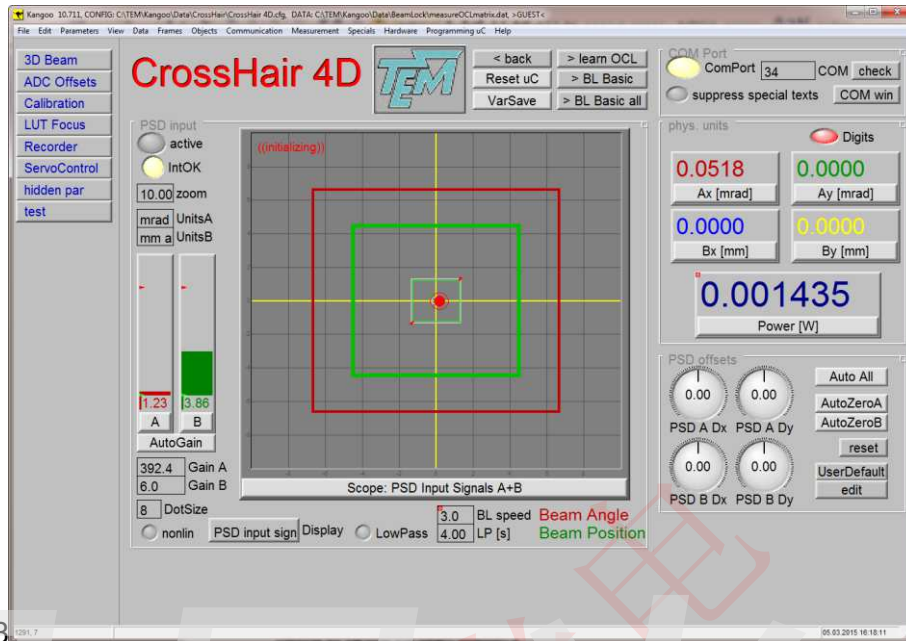


Figure 8 Kangoo Configuration Cross Hair 4D

First you have to connect to the microcontroller of the *PSD Reader*. Left-click on the “check”-button, then choose the matching COM-port (if you’re not sure which channel is correct, please have a look in the device manager). Open the COM-port by left-click on “ComPort”-Button. The Kangoo-LED should light up yellow.

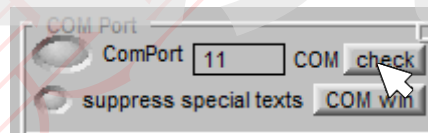
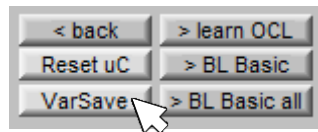


Figure 9 Section “COM Port”

If the PSD Reader and the PSD4Dc/PSD2D have just powered up, the photocurrent-amplifiers may have an incorrect gain. The effect would be a very high or low intensity level. To set the gains correctly, just change the devices “PSD A gain” or “PSD B gain” or do an “Autogain” (The Autogain procedure tries to set the gains the way that the sum-signals of A- and B-detector are 5V). Furthermore the gains have to be in the range between 10...10000. If the beam hits the detector and the sum-signals are in the correct range, you can observe the beam movement on the Kangoo screen. The laser beam position is shown in the scope view. If you have a PSD4Dc the green dot stands for the laser beam position and the red dot stands for the laser beam angle. If the beam changes the position/angle this causes a movement of the green/red dot in Kangoo. If you have a PSD2D then just one dot (the green or the red, depending on the detector) is moving by varying the beam position.

To save your new settings like gain of the PSD, click on the “VarSave”-Button.



The new values will be saved and at the next power cycle or reset, they will be load automatically.

To log the beam pointing, please open the section “Recorder”. In the window you can choose some different record options. By clicking “run” the chart recorder starts to record the beam-pointing.

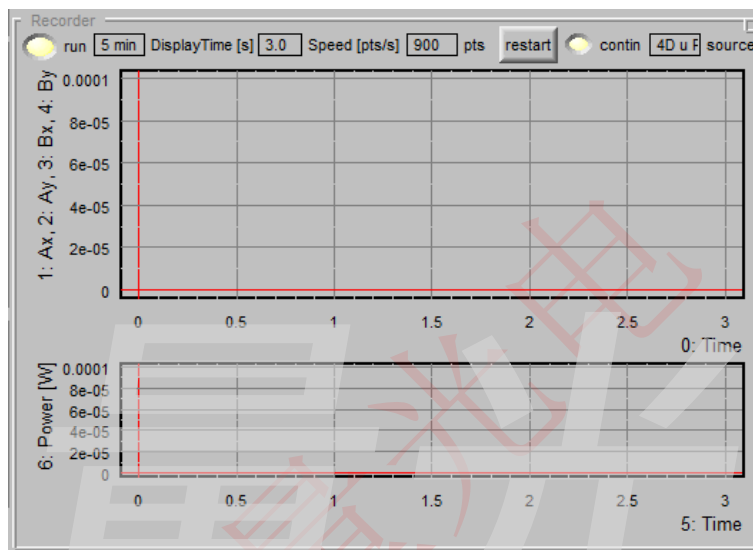


Figure 10 Section "Recorder"

To save these values to your computer choose in the menu bar: Data->Data export... Here you can choose several export options and save the recorded data to a \*.txt file.