



# AMPBOX

---

## 4-20 mA SIGNAL AMPLIFIER FOR SOLAR RADIOMETERS

Galvanically isolated input and output  
Extended temperature range  
Negative inputs allowed

Fixed or adjusted gain  
Digital amplifier  
Weather-proof

### INTRODUCTION

Most Kipp & Zonen solar radiation radiometers are passive instruments that do not require any power to operate. The output signal is generated by the thermopile or photo-diode detector and is a very low voltage, typically in the region of 10 mV on a bright sunny day. The measurement system should have an accuracy of 10  $\mu$ V or better.

For customers who require an industry standard output, or need to use long cables, the AMPBOX signal amplifier can convert the low level instrument voltage output to a 4-20 mA current loop signal.

## AMPBOX

**AMPBOX** is a factory programmable digital amplifier and the input and output are isolated to minimize feedback and to protect the data collection equipment. The amplifier is 'current-sink' (powered by the 4-20 mA current loop) and therefore power must be supplied from the data acquisition system. A signal of 2 to 10 Volts can be created by measuring the voltage across a 500  $\Omega$  shunt resistor placed in the loop.

AMPBOX is IP66 and, like all Kipp & Zonen radiometers, is suitable for outdoor installation under all weather conditions. Two cable glands and internal screw terminals allow for easy connection of the radiometer signal cable and the current loop wires. Radiometer temperature sensors can be connected and passed through the AMPBOX (without amplification).

As standard the amplifier is delivered such that an input signal of 2 mV produces an output of 1 mA, so that 4-20 mA represents 0-16 mV.

At extra cost AMPBOX can be configured with the sensitivity of a particular radiometer to provide a defined radiation output range, for instance such that 4-20 mA represents 0-1600 W/m<sup>2</sup> of radiation.

AMPBOX has excellent performance and is ideally suited to combine with our instruments.

## APPLICATIONS

AMPBOX is typically used in solar energy and industrial applications where the data acquisition system cannot accept the instrument output directly. The 4-20 mA current loop is a widely used industrial standard and can help to reduce interference in electrically noisy environments.

The maximum recommended cable length for most of our radiometers is 100m. Where longer cables are required AMPBOX can be installed close to the radiometer and connected by several hundred meters of cable to the data acquisition system. AMPBOX is weather-proof and suitable for continuous use outdoors.

### Specifications

Current output range	4-20 mA
Input voltage range	-12 mV to +150 mV
Gain standard	2 mV / 1 mA
Gain adjusted	To suit a specific radiometer
Input impedance	10 M $\Omega$
Operating temperature range	-40 °C to +85 °C
Current loop power	Needs to be supplied by DAQ or PSU
Maximum supply voltage	35 VDC
Voltage drop	7.2 VDC
Ingress protection	IP66
Temperature dependence of gain	Within $\pm 0.01$ % of span/K
Zero drift	$< \pm 1$ $\mu$ V/K
Non-linearity	$< 0.2$ %
Update time	440 ms
Inaccuracy, the greater of	$\pm 0.05$ % of span or $\pm 10$ $\mu$ V
Dimensions	64 x 98 x 34 mm
Weight	0.25 kg
Cable diameters	3 to 7 mm

Note: The performance specifications quoted are worst-case and/or maximum values



Go to [www.kippzonen.com](http://www.kippzonen.com) for your local distributor

## HEAD OFFICE

**Kipp & Zonen B.V.**  
Delftechpark 36, 2628 XH Delft  
P.O. Box 507, 2600 AM Delft  
The Netherlands  
T: +31 (0) 15 2755 210  
F: +31 (0) 15 2620 351  
[info@kippzonen.com](mailto:info@kippzonen.com)

Kipp & Zonen B.V. reserve the right to alter specifications of the equipment described in this documentation without prior notice

4414355-V1201