# *WINTRONICS, INC.*

## LIGHTING INDUSTRY TECHNOTE

Heitronics has been very active within the lighting industry over the past 20 years. Major users of our products include Osram-Sylvania, Philips and General Electric. Many of the features that are now standard in the Heitronics product line are a result of being active in this area.

Why do Heitronics products meet the requirements found within the Lighting Industry ?

**1)** The detector used by Heitronics is a Heitronics design. It is a **Lithium Tantalate pyroelectric** crystal which does not drift in its detectivity.

**Benefit:** An inherently stable pyrometer. There is no need for an *automatic internal correction feature* which is offered by a reputable competitor.

KT19 long term stability is better than 0.0001( reading in K) per month.

**2)** The pyroelectric detector requires the challenge of chopping the radiation signal in order to make the detector work. Heitronics has used chopper motors in every commercial instrument since the first pyrometer design in 1959. The chopper motor used in KT19 series is a Heitronics design which offers an MTBF of 9 years.

**Benefit:** The resulting use of AC electronic circuits which are more stable than DC circuits. Accuracy is ±(0.5°C + 0.007( target temp. - housing temp.)).

**3)** Pyroelectric based pyrometers are capable of responding faster than competitive thermopile based pyrometers. (The Heitronics response time definition is the time required to respond to 90% of a step change in temperature. Multiply this response time by x 1.5 to approximate the 99% value.)

**Benefit:** KT19 series has adjustable response time to as fast as 30ms.

**4)** The availability of 35 standard lenses, 10 standard possibilities of positioning the lenses out in front of the detector and 4 different detector aperture sizes provides close to a thousand fixed focus options. Combine the focus options with high quality lenses, a very rugged way of precisely fixing the lens in front of the detector and the result is a very high distance to target size ratio. (Heitronics' definition of spot size is for the area where 95% of the total radiant signal comes from.)

**Benefit:** Distance to target size ratios for the 4.9 to 5.5 microns spectral band can be delivered as high as 220:1, for the 400 to 2500°C temperature range which allows viewing small targets at a safe distance from heat, silica dust and moving machinery.

**5)** KT19 series offers three ways in which to help aim the instrument; through the lens visual sighting, laser illumination of the target center or LED illumination of the target area.

The precise way in which Heitronics' production staff aligns the combination of visual, internal light source and infrared target area ensures the coincidence of these three parameters.

**Benefit:** The assurance that when careful aiming is done on small and specific target areas, the infrared measurement will be made from where it is wanted.

**6)** KT19 series is 1990's technology using the latest available surface mounted device components and microprocessors.

**Benefits:** Complete programmability is available via the rear keyboard or via a bi-directional digital interface. A digital display is incorporated on the instrument's rear face. All electronics are built within the one compact sensor housing which saves space and installation expense.

**7)** The suggested 4.9 to 5.5 microns spectral response of KT19.42 corresponds with the glass and quartz absorption band. Viewing through flames or making the temperature measurement of the glass surface while under the direct presence of flame is made with a minimum amount of influence. We suggest to use an emissivity setting of 0.96 for this spectral response. Many other spectral responses are available for applications including low temperature glass measurements and metal surfaces.

**Benefits:** Use of Heitronics pyrometers is possible virtually anywhere within the lamp plant.

**8)** KT19 includes as standard features, an external secondary temperature sensor input or can be programmed by a given value for compensating for the contribution of a high temperature background as seen via the 4% reflection off of the glass target area.

**Benefit:** Measurement of glass surfaces within lehr's can be made while correcting for the contribution of radiation from within the lehr.

**9)** An effective air purge fitting design ensures that the lens can remain clean when the recommended 5 psi of nitrogen is connected.

**Benefit:** The major cause for an "*apparent*" change in instrument calibration can be eliminated by keeping the lens clean.

**10)** KT19 housing design is water-tight, dust-tight and shielded from electromagnetic interferences. It is available as standard to withstand up to 60°C ambients and perform to all published specifications. It is also available in a coolable housing version for handling up to 150°C ambients.

**Benefit:** It survives the conditions that the lighting industry presents.

## Selected instrument specifications which have been applied to Lighting Industry applications:

Heitronics Model **KT19.42**, 4.9 to 5.5 microns spectral response

**Use:** Surface measurement of quartz and glass during iamp fabrication and research

**Features:** Fast response time ( 30ms ); high optical resolution ( 220:1 distance to target ratio, ie: 1mm dia. @ 203mm distance; 2.5mm dia.@ 550mm distance ); wide temperature range 150 to 1600°C or 400 to 2500°C; long term stability better than 0.0001 (reading in K ) per month; through the lens sighting, laser sighting or LED sighting; linearized analog outputs and bi-directional digital interface

**Benefits:** View through flame, measure clear glass*/quartz surface to depth of 0.05mm @ 1400°C; proven to repeat measurements of 2100°C with 30ms response time to ±6°; high repeatability allows

output signal to be put into a control loop

Heitronics Model **KT19.43**, 7.5 to 8.2 microns spectral response

**Use:** surface measurement of quartz and glass during lamp fabrication and research

**Features:** Fast response time ( 30ms ); wide temperature range 200 to 1200°C; long term stability better than 0.0001 (reading in K) per month; through the lens sighting and/or LED or laser sighting; linearized analog outputs and bi-directional communications

**Benefits: Measure** clear glass*/quartz surface to depth of 0.01 mm @ 700°C; high repeatability allows output signal to be put into a control loop, emissivity = 0.98 for this **spectral response**

Heitronics Model **KT81R,** ratio of two wavebands between 0.7 to 1.2 microns

**Use:** Measurement of tungsten and molybdenum for research and production

**Features:** Ratio of two wavelength technique permits the measurement of metals with low and potentially changing emissivity; through the lens sighting, adjustable aperture to block radiation from unwanted surrounding sources, controlled detector temperature plus chopped radiation technique provides highest degree of measurement stability while reducing the dependency of requiring a greybody target, linearized analog output direct from sensor, temperature range, cover 700 to 3600°C

**Benefits:** Target need not fill the field of view ( 50 micron tungsten wire @ 1000°C can be measured with focus of 10mm diameter ), views through quartz windows found on hydrogen sintering furnaces; target can wander within the field of view but because of the chopped radiation technique, if the target wanders out of the field of view, a high reading will result for a duration equal to the response time; additional signal conditioning hardware available for handling targets which wander out of the field of view

Heitronics Model **KT81S**, 0.7 to 1.2 microns spectral response

**Use:** Measurement of tungsten and molybdenum for filament research

**Features:** High optical resolution for viewing 0.005 inch diameter @ 4 1/8 inch distance, spectral

response permits viewing through glass and quartz envelopes; 10 millisecond response time, temperature ranges cover 1100 to 3450°C; calibration accuracy ±3°C plus 0.5% of target temperature; linearized analog output direct from sensor

**Benefits:** Measurements made on an electronic basis as compared to **a human basis as previously found** on disappearing filament optical pyrometers; views through quartz and glass envelopes

* Reference: Theory and Practice of Radiation Thermometry, DeWitt and Nutter, 1989

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