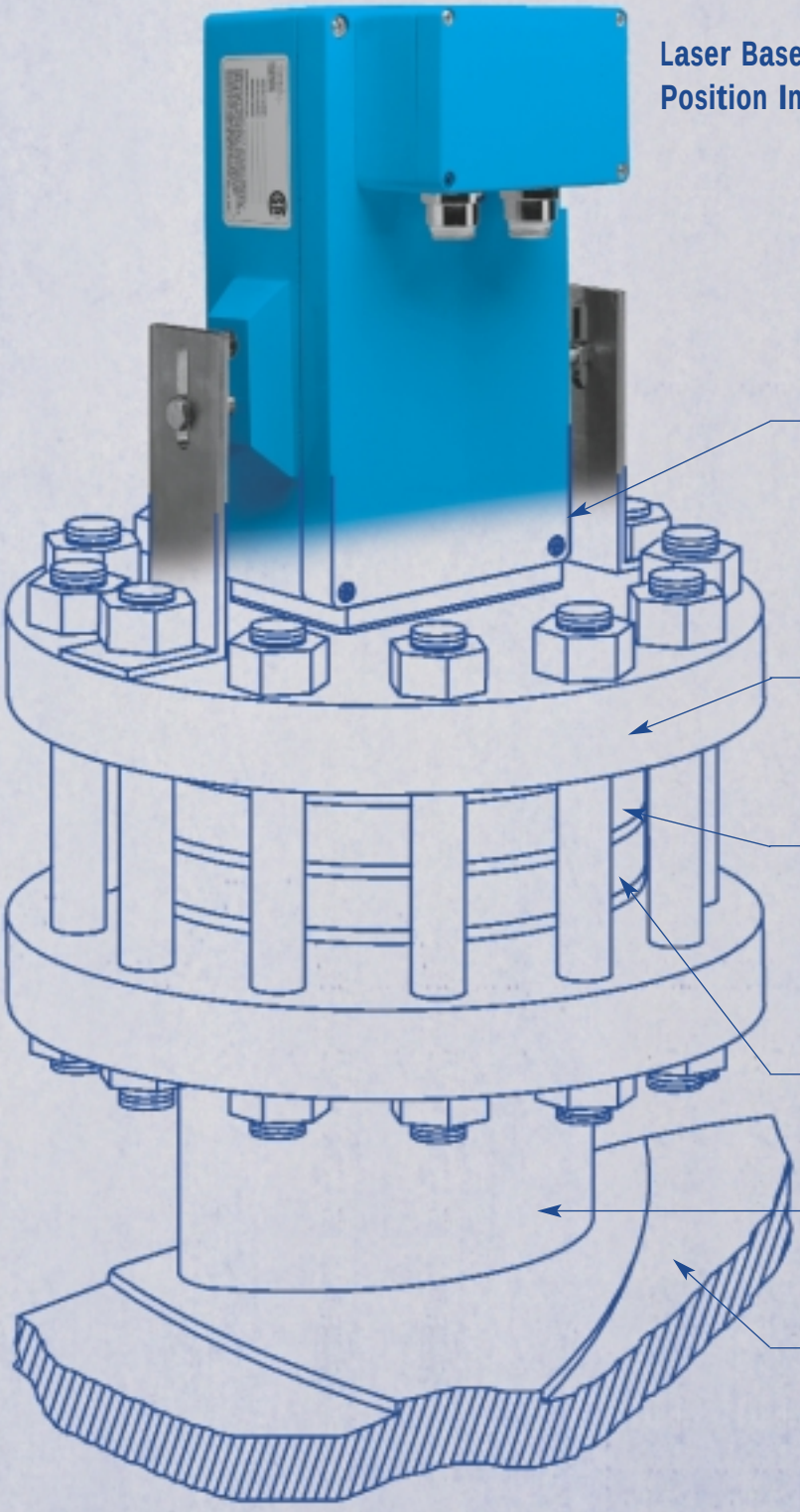
Accu-Pulse

Engineered for the Challenge

Laser Based Level and Position Indication



TN-KSI

TN Technologies & Kay-Ray/Sensall

Accu-Pulse positioner — Non-Contact Object Positioner

The Accu-Pulse Positioner series of non-contact object positioners shares the same properties as the Accu-Pulse level monitor, but is optimized for performance over longer ranges. It has been designed to replace traditional contact sensors (multiple limit switches, wheel encoders, etc.), as well as poorly performing non-contact devices where the range is great or interference severe.

An installation requires only one field cable termination point, regardless of the measurement range. Articulating brackets are available to simplify mounting and alignment, and retro-reflective arrays typically extend the range of the instrument to over 1000 m. The reflective array is easily cleaned and ensures performance under the heaviest dust conditions. The basic property of lasers enables fast data output (up to 20 readings per second) for accurate positioning requirements over long ranges to fast-moving objects. Optional outputs available through special order include velocity and acceleration.



Typical Applications

Positions a variety of bulk material handling equipment, including:

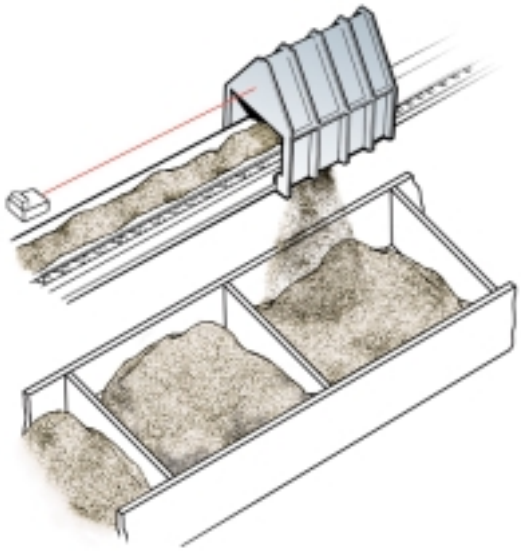
- Tripper cars
- Plough feeders
- Stacker/reclaimers
- Torpedo cars
- Cranes

Also positions:

- Dimensional timber
- Billets and slabs
- Anode/cathodes

Standard Outputs

- **RS-232C** For locally programming all user parameters and checking instrument output. Easily accessed via a nine-pin serial port at the field interface board, and addressed by using either TN-KSI's handheld display keypad, or any Windows 95® PC using Hyperterminal (no special software required).
- **RS-422** For transmitting serial data to customer's control system where digital data is preferred or required due to high data output rate.
- **4-20 mA OUTPUT** allows integration with traditional control systems operating on the analog standard. Fully isolated and designed to drive loads up to 1200 ohms. Zero and span settings are easily programmed via a serial port to any value desired. Once the instrument is installed and aligned at maximum range, calibration can be made with equipment locked out, simply by entering the desired range to correspond with 4 and 20 mA. Complete isolation between setpoints means that the procedure never requires repetition due to interaction or drift, resulting in improved efficiency during commissioning.



Accu-Pulse
liquids
solids

Continuous, Non-Contact Level Monitor (Solids or Liquids)



The Accu-Pulse series of continuous non-contact level monitors is used to monitor material levels under a wide range of process conditions, from the simplest bin to the most demanding vessel application. Designed to remain non-intrusive, the Accu-Pulse series offers a viable alternative in demanding applications where other technologies fail.

How does it work? *The time-of-flight of infrared laser pulses are measured with a precision interval timer; multiple readings are averaged then output, resulting in high-accuracy level measurements even under the most demanding conditions. Rapid, accurate readings are possible because the unique properties of laser are unaffected by conditions such as pressure, vacuum, temperature, vapor, stratified off-gases, tank geometry, obstacles or off-center mounting.*

LIQUIDS

HIGH ACCURACY Meets the demands of typical inventory control applications with no density corrections required.

TN-KSI FLANGE ACCESSORIES Designed for integration to standard 4" or 6" flanges (raised or flat face). Standard sightglass components are designed for operation from vacuum to ANSI 600 class. High temperature (> 300°C) sightglasses are available through special order (specify pressure and temperature). At all times, the entire instrument remains non-intrusive, allowing easy maintenance and trouble-shooting without having to remove the vessel from service.

HIGH TEMPERATURE CONFIGURATIONS The Accu-Pulse configuration affords all the same features, with the ability to operate in settings where the ambient temperature at the instrument is between 50–150°C, and the process (target) temperature can be upwards of 2000°C.

TURBULENT OR AGITATED SLURRIES are easily monitored, even when the instrument is mounted at high incident angles to the surface of the liquid. Software "windowing" can ignore interference readings from agitator blades, scrapers or other intermittent obstacles. The Accu-Pulse series also has the unique ability to read from the surface of a foam layer.

Typical Applications

- Tank gauging for inventory control on a variety of low dielectric crude and refined products
- Level indication of liquid asphalt
- Level of polymerization reactor vessels (under high pressure)
- Level of devoluminizing reactor vessels (under vacuum)
- Level monitoring of molten glass as well as ferrous and non-ferrous metals and alloys.

SOLIDS

BIN GEOMETRY Virtually any bin or silo configuration can be monitored as long as there is a clear line of sight to the target. The instrument is ideally suited for use in tall narrow bins, or "tricky" geometry where internal structures and construction impede the performance of other non-contact technologies. The extremely small beam divergence allows for the precise location and alignment of the sensor, aiming past internal obstacles.

VARYING ANGLES OF REPOSE are easily handled without the use of complex software, due to the laser's inherent property of measuring to diffuse surfaces at oblique angles. This enables direct measurement to any surface of a stockpile, cone or inverted cone profile. No more inferred readings from complex systems that change characteristics after commissioning.

LOW DIELECTRIC SOLIDS pose no problem, regardless of the size of the stockpile and the measurement range.

DUST Enhanced software improves performance through dust, steam and other environmental obstacles.

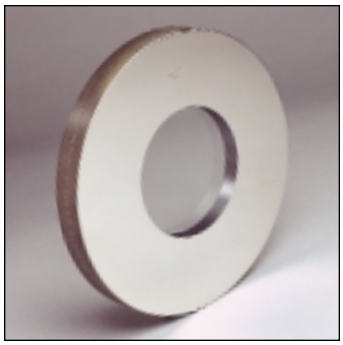
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- **RS-422** For transmitting serial data to the customer's control system where digital data is preferred.
- **4-20 mA OUTPUT** allows integration with traditional control systems operating on the analog standard. Fully isolated and designed to drive loads up to 1200 ohms. Zero and span settings are easily programmed via the serial port to any value desired, allowing quick conversion from innage to ullage readings. Moving the product or reiterating the calibration procedure is never required, as there is absolutely no interaction between zero and span settings, thereby greatly enhancing field start-up and commissioning efficiency.

Typical Applications

- Level of polystyrene, nylon and PVC pellets
- Level of talc and lime powders
- Level of ore and muck in ore passes
- Level of wet or dry wood chips
- Level of stockpiled coal

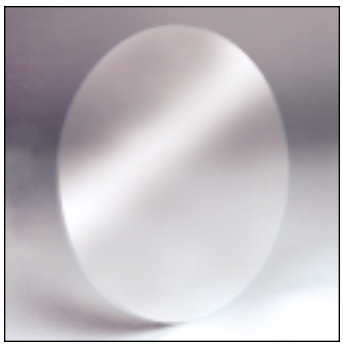
FEATURES, OPTIONS and



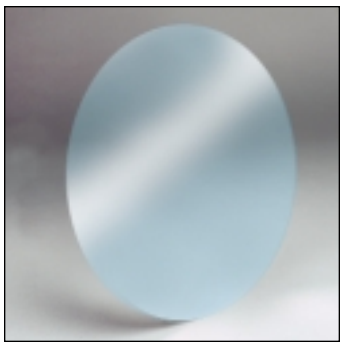
Pressurized Sightglasses:
4" or 6" stainless steel bonded to tempered borosilicate glass. ANSI rated to 150, 300 and 600 classes. Consult factory for optional alloys, or higher pressure requirements.



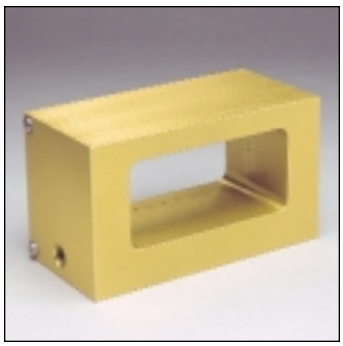
Spray Ring:
4" or 6" stainless steel – designed for cleaning wetted surface of sightglass of liquid or solid build-up. ANSI rated to 150, 300 and 600 classes. Other alloys available on request. For use with liquid or air/gas via 1/4" NPT port.



Non-Pressurized Lexan Sightglass:
4" or 6" Lexan MR10 designed for use with zero pressure and where ambient temperature does not exceed 100° C.



Teflon Liner:
Designed for use with either pressurized or non-pressurized sightglass discs. Designed to increase the chemical resistance of the wetted surface. Consult TN-KSI for application details.



Air Curtain:
Designed for use with clean, dry instrument air. Used for directly cleaning the surface of the bezel window when no sightglass is used. Connection: 1/4" NPT.

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Diagnostic LEDs – shows status at a glance.

Optional handheld keypad – interfaces with on-board RS-232C port, providing quick interrogation and set-up.



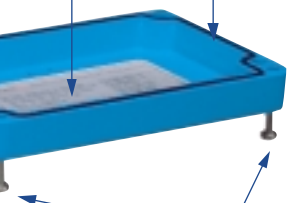
Identification nameplate – ensures product traceability.

Mounting – flange or surface mounting by side bosses or mounting pad on bottom of case. 1/4" NPT ports used for auxiliary mounting or purging.

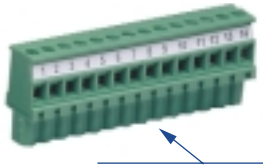
ACCESSORIES

ld wiring code card
ocated on inside lid.

Captive "O-ring" seals
– both enclosure covers.



Captive stainless steel cover screws
– nothing to lose on start-up,
ensures ease of future service.



Pluggable field terminals
– provide quick
disconnect capability.

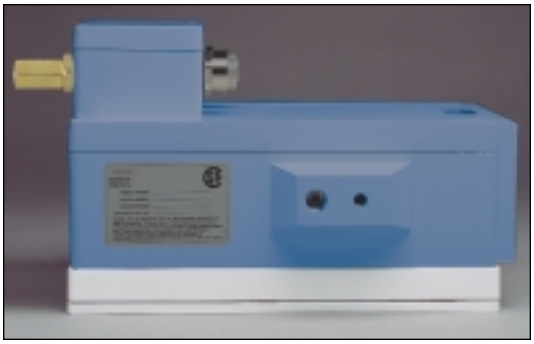
Conduit entries – 1/2" NPT
standard, PG 13.5 optional.

"O-ring" seals throughout
– exceed IP67, NEMA 6.

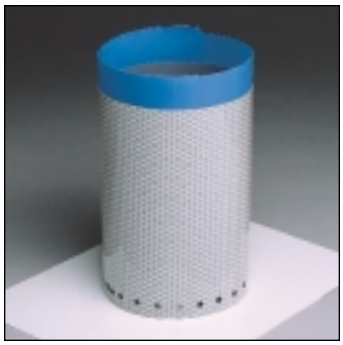
Visible pointer – facilitates alignment
and aids in commissioning.



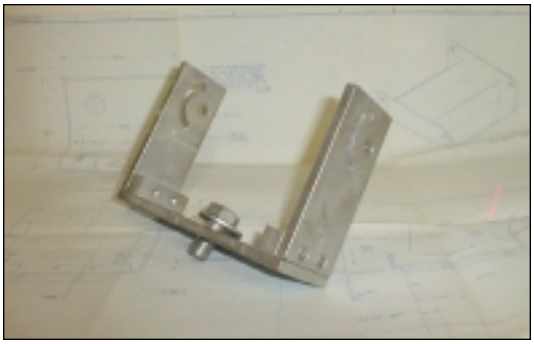
High Temp Configuration
Shown with optional cooler plate to extend operating temperature of unit to 100° C. Designed for use with plant cooling water. Connection – 1/4" NPT.



Extra High Temp Configuration
Shown as above with additional port connection for cooling air. Combination of air and liquid cooling extends operating temperature to 150° C.



Reflector Array:
Designed for use with Accu-Pulse Positioners, enhancing performance and range through dense dust or fog. Types available include 3" diameter reflectors, and various grades of self-adhesive 3M reflective tape.



Articulating Bracket:
Designed to mount rigidly and offer flexible two-axis alignment of Accu-Pulse units. Heavy-plated steel construction maintains alignment, critical on long-distance Accu-Pulse Positioner applications.

SPECIFICATIONS

ACCU-PULSE[1] 0.2 m – 250 m
To grey surface
(20% reflective target): 0.2 m to > 250 m
To white wall: 0.2 m to > 500 m
To reflector: 0.2 m to > 1500 m

LASER CHARACTERISTICS
Beam divergence: 5 mrad (0.28°)
Laser spot size: 4 cm + (0.005 x distance in cm)
Laser wavelength: 905 nm (IR measuring beam)
635 nm (visible pointer)

PERFORMANCE
Absolute accuracy[2]: Within 2 cm
Operating accuracy[3]: Within 5 mm
Repeatability[4]: Within 3 mm
Resolution: 1 mm

OUTPUTS (1000 VDC isolation)
Measurement rate: Programmable from one reading every 5 sec to 20 readings/sec
Units of measurement: Meters or feet
Analog current loop[5]: 4–20 mA; max. 1200 Ω programmable zero/max
Digital data: Serial RS-422

LOCAL SETUP/TEXT: RS-232C port

POWER (1000 VDC isolation)
Consumption: 36 W max. @ 24 VDC
Input voltage: 24 VDC nominal (10.5 – 30 VDC)

ACCESSORIES

Sightglass: Flange mounting to tanks
Full ANSI rating
Mounting brackets: For sightglass or wall mount
Articulating bracket: To facilitate alignment in two axes
Air curtain: For clean, dry air to keep window clean
Spray ring: For keeping sightglass inside the vessel clean
Upgrade for purging: Allows user-supplied equipment to purge enclosure, achieving operation in a Class 1, Div 1, Group CD hazardous environment

All information is subject to change without notice.

OPTIONS

AC/DC POWER SUPPLY
Input voltage: 120 VAC, 20 VA; 50–60 Hz
Operating temperature: –10°C to +50°C

AC HEATER[7]
Input voltage: 120 V, 100 W
Operating temperature: –40°C to +50°C

HANDHELD REMOTE DISPLAY/PROGRAMMER
Display: Four lines by 20 characters LCD
Case: Molded, high-impact ABS
Operating temperature: 0°C to +50°C
Storage temperature: –20°C to +70°C
FMRC & CSA rated for use with Accu-Pulse unit

ENCLOSURES
Accu-Pulse Standard
Enclosure: FMRC and CSA 4X, 6
IP67
FMRC, CSA Class 1, Div 2, Group ABCD
FMRC, CSA Class 2, Group EFG
Size in mm: 280 L x 205 W x 155 D
Weight: 7 kg

Accu-Pulse
High-Temp: FMRC and CSA 4X, 6
IP67
FMRC, CSA Class 1, Div 2, Group ABCD
FMRC, CSA Class 2, Group EFG
Extends operating temperature to 100°C
Size in mm: 280 L x 205 W x 180 D
Weight: 10 kg

Accu-Pulse
Extra High Temp: NEMA 4, 4X, 6
IP67
Extends operating temperature to 150°C
Size in mm: 280 L x 205 W x 180 D
Weight: 10 kg

ENVIRONMENTAL
Operating temperature: –10°C to +50°C
(–40°C to +50°C with heater[6])
Storage temperature: –40°C to +70°C

EYE SAFETY
IR (infrared) laser: Class 1 (U.S. FDA 21 CFR 1040)
Visible pointer: Class 2 (U.S. FDA 21 CFR 1040)

FM APPROVED



This product is eyesafe without viewing aids under normal operation.

NOTES

1. Maximum ranges are typical and depend on target reflectance, vessel conditions (i.e., dust), background radiation, and any sightglass rating. Consult factory for details.
2. At a measurement rate of 1/sec, the specified accuracy is absolute over full temperature range, a variety of materials, and any distance, with one standard deviation.
3. At a measurement rate of 1/sec, this accuracy depends on limited variations in temperature, material and distance associated with the installation.
4. At a measurement rate of 1/sec, under steady state conditions, and one standard deviation.
5. Analog accuracy is equal to absolute or operating accuracy ±0.1% of range.
6. For 24 VDC operation, heater included.
7. For AC operation down to –40°C. Includes AC power supply.

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