



### COMPANY PROFILE

Levelstate Systems Ltd is a UK based company, that has been manufacturing level indicators, level switches and level probes for over a decade. We also market an entire range of gauge glasses and valves.

We now have a comprehensive range of Electronic Level Switches (to replace the mechanical float level switch), Electronic Level Indicators (to replace gauge glass technology), Valves, Gauge Glasses and a complete range of replacement level probes.

The guiding philosophy of Reliability and user Friendly Design has made Levelstate Systems Ltd. a successful business entity in the 21st century. The user base includes Power, Petrochemicals, Refinery, Fertilizer, Sugar, Paper, Cement, Metallurgical and Chemical Industries in various countries across the globe like Belgium, Germany, India, Italy, Indonesia, Middle East, Netherlands, Spain, USA and UK.

Factory Mutual Research (FM), SAFed Type Approval Service, SIRA and ERA Technology have approved Levelstate products. The quality system has been accredited ISO 9001 approval. All Levelstate products carry the CE mark, showing that they are fully compatible with EC Directive 89/336/EEC.

With professional marketing efficiency and on-time service delivery, Levelstate assures its customers "value for money". Factory trained Engineers are available on call to provide diagnostic assistance, pre-engineering, indenting support, installation and commissioning services.

[Below you will find a brief description of some of our products. For further information click the links to open the full specification sheet for that product.](#)

### ELECTRONIC DRUM LEVEL INDICATORS

6 or 48 probes are spaced vertically in a side arm water column attached to the boiler drum and with each probe connected to its own sensing circuit. The results are displayed on the local and remote displays. The probes are spaced in the water column to suit the site range.

Units range from the base level 201 unit with 12 channels and single power supply to the 202 unit which is a 14 channel **approved gauge glass** replacement and the micro-processor based 202B, which runs upto 48 channels. All units feature high and low level alarms and trip logic with relay output

[High and low level trip logic with relay output](#)

[High and low level alarms with relay output](#)

[4-20mA output](#)

[Single or dual power supply](#)

[Remote indication](#)

[System and process faults \(on some units\)](#)

### ELECTRONIC LEVEL SWITCHES

Electronic level switches are an alternative to float level switches for steam / water applications. They provide a significant improvement in reliability and safety, reduced installation and maintenance costs.

Applications include the detection of water in turbine extraction lines, level alarms and tripping circuits for feed water heaters and high security low water cut-off for boilers.

[1 to 4 independent probe channels](#)

[Single or dual power supplies](#)

[Horizontal and vertical validation](#)

[DPDT relay output per probe.](#)

[System fault with relay output and process fault](#)

### WATER COLUMNS

The Levelstate side arm water column is made from either large bore thick walled carbon steel extruded section conforming to ASTM A105, or thick walled seamless pipe in carbon steel or stainless steel. The seamless section design and fabrication meets the requirement of ASME B31.1 Power Piping Code.

The water columns are designed to promote condensation of saturated steam with minimum loss of temperature. Circulating condensate into the water column flushes the vessel and probes continuously. This prevents buildup of sediment and eliminates the need for periodic blowdown. Models available upto 570 deg C and 207 Bar

### PROBES

As the primary element in sensing level signals, the conductivity probe is the heart of electronic level indicating systems. Probes are manufactured from stainless steel, with high purity ceramic insulators that exhibit a high degree of chemical inertness at elevated temperatures. Pressure sealing of the ceramic to metal body is achieved through a vacuum brazing process.

The braze joints are treated with a special gilding that protects it from the abrasive action of water. All probes are Helium leak tested, Hydrostatically tested at twice rated pressure and electrically tested for correct resistance.

We offer a complete range of direct replacement probes for all major manufacturers systems.

### SPECIFICATION SHEET TO DOWNLOADS

[Type 201 Electronic Level Indicator](#)

[Type 202 Electronic Level Indicator](#)

[Type 202B Electronic Level Indicator](#)

[Type 300-M Electronic Level Switch](#)

[Type 300-MP Electronic Level Switch](#)

[Water Columns](#)

[Probes](#)

[Replacement Probes](#)

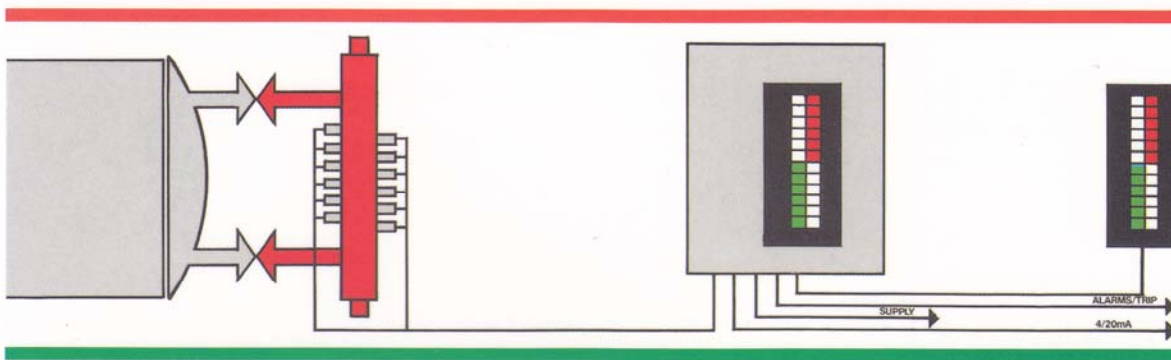
# PRINCIPLES OF OPERATION

## EDLI (Electronic Drum Level Indicator)

The Levelstate EDLI uses the well-proven principle of resistivity difference to differentiate between water and steam. This resistivity difference is measured by a vertical row of electrodes, normally aligned so that they are spaced evenly above and below normal water level. The resistance measurement is made between the insulated tip of each electrode and uses the vessel wall, forming a "cell". Low voltages are used, which ensure operator safety and meet requirements also for hazardous locations. Since resistivities of water and steam are substantially different, as great as 200 to 1 over the range 100°C to 370°C, the system is relatively simple and requires no set-up or calibrations. It is not sensitive to power supply variations or ambient temperature changes and, therefore, has proven to be a highly reliable system.

The water column has been designed to encourage heat flow to reduce density error to the extent that it can be ignored. By avoiding glass components in contact with water, maintenance work, necessary to keep the glass clear, is eliminated. There is no need for periodical "blow downs" and no setting adjustments or calibrations to be made.

Levelstate manufacture a broad range of models with options that can be tailored to suit a customer's particular need. Models are available with 8 to 32 channels and for pressures up to 3000 psi and to 370°C. All units are supplied with relays for alarm/trip actions; an optional remote display is also available for location within the control room.



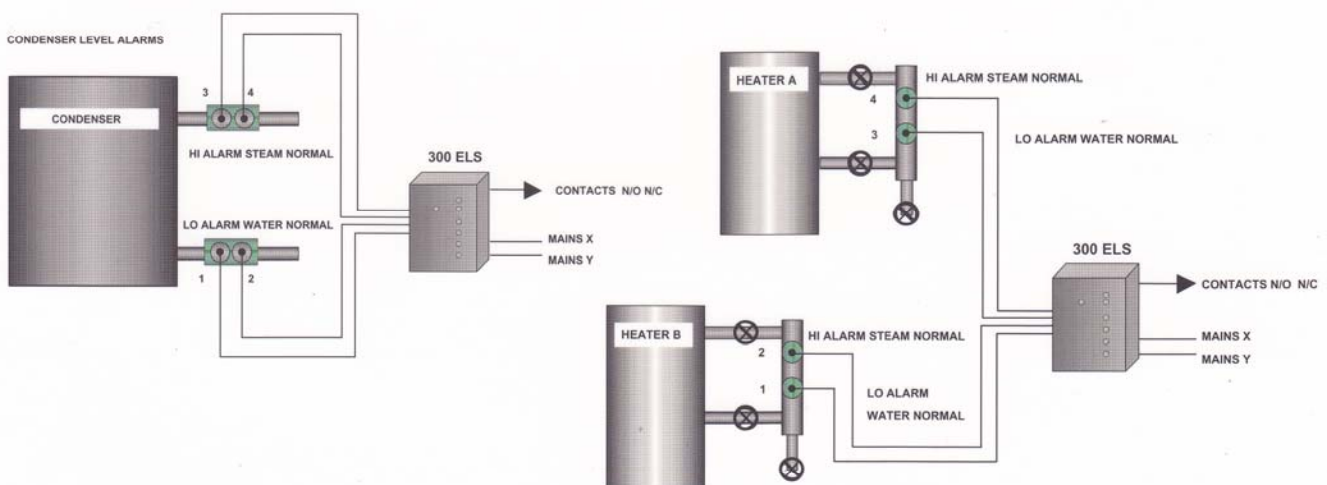
## ELS (Electronic Level Switch)

The Principle of Resistance Probe Discrimination between water and steam is well established and accepted by the Power Plants industry as the most reliable, convenient and maintenance-free method of detecting alarm levels and initiating protective actions.

By introducing 4 Detection Channels in one electronic enclosure the installation cost per detection can be appreciably lower than traditional float level switches.

For high integrity tripping functions integral dual probe output interconnections are provided where each probe channel is supplied from a different main source. A comprehensive fault detection system is included which caters for any configuration of probe channel interconnection.

The probe insert assembly is welded into pipe work or vessels at the selected detection points. This provides internal shrouding of the probe for defined water conductivities and a robust housing for external production of the probe.



Multiple probe pipe work can be supplied to suit particular applications.

# Type 202B

# Electronic Drum Level Indicator



## SYSTEM SPECIFICATION

**Inputs** - From Conductivity types probes 2-wire connection. 48 Channels numbered in ascending order.

**Enclosure** - Wall mounted glass-fiber reinforced polyester enclosure, IP65 / NEMA 4X protection for location in harsh environments. Dimensions (mm): 500 H x 400 W x 200D)

Temperature Rating: Ambient: - 10 C to 65 C Storage: 50 C to 100 C  
No of Channels: Maximum 48 Channels. Configurable from 6 to 48 Channels through handheld programmer.

**Power Supply** - Two independent AC sources 90 to 270 Volts AC @ 36VA, 48-63Hz.

**Display** - Two vertical columns of LED (BAR Graph) are provided on the front of the enclosure. 10 x 10 Sq. mm each LED for 16 Channels. 5 x 10 Sq. mm each LED for above 16 channels to 48 Channels. For any other combination of channels the bottom redundant LED will be blank i.e for 40 Channels, bottom 8 rows will be blank. Left column is GREEN LED and Right column is RED LED. Two 10 x 10 Sq. mm. Yellow LED at top for System fault indication always in 2 Hz blinking during any system fault. Left yellow LED for ODD channel and Right yellow LED for EVEN channel.

**Probe Cable** - Special PTFE high temperature cable maximum 30 meters length. For longer cable length use 4 meters special PTFE high temperature cable and balance 26 meters ordinary instrumentation cable through junction Box.

**System Measurement** - Microprocessor / Microcontroller Based fully integrated electronics unit. Separate controller are used for ODD and EVEN channel to scan the probe signal and do necessary discrimination for Water, Steam, Open Circuit and Short Circuit. System based on 8/16bit processor and having RS485 serial communication with the peripherals and Remotes. Total 10 Cards, either Remote Display or Remote Relay card with additional power supply, can be connected in daisy chain configuration with RS485. Programmer interface used to program the field parameters through handheld programmer and diagnosis the system.

**System Fault** - System fault occurs during following conditions. Any of the power supply / power pack failure, Probe cable short circuit / open circuit in each channel, Contamination or short circuit in probe, Ground failure in the probe column. RL8 DPDT sealed relay is used as system fault relay in Relay output card and activates in any other above system fault conditions. Contact rating: DPCO - 8 Amps, 250VAC / 30 VDC Switching Power: 2000 VA / 240W

**4-20mA Signal** - Two 4-20 mA DC analogue output signal whereby each probe channel contributes a step change of '16 / no of channel' mA. Selection of 4 mA to represent the all water or all steam state can be configured through the handheld programmer. Galvanic isolation is also available as option with both the 4-20mA outputs. Load impedance: 300-Ohm maximum for non-isolated output and 600-Ohm maximum for isolated output.

**Output Alarm / Trip relays** - 7 DPDT sealed relays are used for alarm and trip signaling and this can be extended to 15 relays by an add-on relay card. Relays can be configured to any channel as per plant requirement in the field through handheld programmer. On the configured channels any abnormalities will be indicated by 10 Hz blinking of that particular channel along with the activation/ deactivation of the relay. Spurious Alarm / trip action is prevented while fault occurs on respective alarm / trip configured channel. Trip logic ensures positive trip on plant fault as well as eliminates spurious trips through its voting logic. Each relay can be configured for normally energised or de-energised with time delay action for 1 to 10 secs.

Contact rating: DPCO - 8 Amps, 250VAC / 30 VDC Switching Power: 2000 VA / 240W

## REMOTE DISPLAY OPTIONS

Remote display unit indication is identical with the main display unit. Remote display will be connected through 2 nos. (one for ODD channels and one for EVEN channels) 8 core twisted pair cables. Total two remote display unit can be connected in cascade with main power supply. However, more remote display unit can be connected with local power supply unit as additional. Maximum cable length from main to last remote should not be more than 600 meters. Number of terminals: 2 nos. 6 way terminal (one for ODD and other for EVEN)

Panel Mounting Size: 238mm x 96 mm for 16 Channels.

Panel Cutout Dimension: 233mm x 91 mm for 16 Channels.

Enclosure protection class - IP20 OR IP65 (optional).

## KEY FEATURES

Upto 48 independent probe channels

System Fault feature for power supply failure or probe channel malfunction

Conductivity Settings for different water purity conditions

Dual Power Supply with 100% redundancy

Local Indication using Red & Green high visibility LEDs

Remote Display units for control room and plant use

Probe Validation for tripping logic

IP65 Rating of enclosure for external use

Upto 15 (7 standard) Relay outputs for alarms, trips and system fault

Handheld Programmer

RS485 Serial communication Port

## RELATED PRODUCTS

The 202B electronic unit is used in conjunction with the following:

- Water column
- Probes
- Probe Cable
- Remote Display

## OVERVIEW

As the primary element in sensing level signals, the conductivity probe is the heart of electronic level indicating systems. Probes are manufactured from stainless steel, with high purity ceramic insulators that exhibit a high degree of chemical inertness at elevated temperatures. Pressure sealing of the ceramic to metal body is achieved through a vacuum brazing process.

The braze joints are treated with a special gilding that protects it from the abrasive action of water.

All probes are Helium leak tested, Hydrostatically tested at twice rated pressure and electrically tested for correct resistance.

All probes are guaranteed for 8500 hours use in a controlled environment of pH7 to pH11. Conditions outside this range will effect the working life of the probe.

### TYPE 801 PROBE

The 801 probe is a low pressure probe designed exclusively for use in the Type 501 water column.

Fixture - M16 x 1.5mm screw thread  
Seal - Metaflex gasket (stainless steel and grafoil)  
Temperature Rating - 341 degrees C  
Pressure Rating - 150 bar



### TYPE 802 PROBE

The 802 probe is a high pressure probe designed exclusively for use in the Type 502 water column.

Fixture - 28mm A/F Compression sealing Nut  
Seal - 28mm A/F Compression sealing Nut  
Temperature Rating - 570 degrees C  
Pressure Rating - 207 bar



### TYPE 803 PROBE

The 803 probe is a high pressure probe designed exclusively for use in the Type 503 water column.

Fixture - Clamp Plate secured with 4 x M10 studs and bolts  
Seal - Metaflex gasket (stainless steel and grafoil)  
Temperature Rating - 370 degrees C  
Pressure Rating - 207 bar



## PROBE CABLE

Probes are connected to the electronic units by means for a high temperature resistant PTFE insulated multi-core Nickel cable. Cables come in standard lengths of 4 meters and 10 meters, but lengths upto 30 meters are available. All cores are colour coded for easy installation.



All cables are terminated with Ring crimps one end for connection to the probes and bootlace ferules at the other for connection to the electronic unit.



The probe cables are made up to suit the probe spacing on the water column, as the sight range can vary from 400mm to 3000mm.

## BLANKING PLUGS

We are able to supply blanking plugs for all probes. These can be inserted into the water column in place of the probes, to avoid damage during the course of blow down.



Part Numbers:  
5012201 - 801 probe blanking plug for 501 water column  
5022201 - 802 probe blanking plug for 502 water column  
5032201 - 803 probe blanking plug for 503 water column

## PROBE GASKETS

Type 801 and 803 probes use a gasket to make the seal between the water column and the probe. The gasket is a spiral wound stainless steel gasket that is filled with a graphite compound. This combination proves to be a very strong and reliable seal. All probes are supplied with a gasket, spares are also available.



Part Numbers:  
8013008 - 801 probe gasket  
8033008 - 803 probe gasket

## OVERVIEW

The Levelstate side arm water column is made from either large bore thick walled carbon steel extruded section conforming to ASTM A105, or thick walled seamless pipe in carbon steel or stainless steel. The seamless section design and fabrication meets the requirement of ASME B31.1 Power Piping Code.

The water columns are designed to promote condensation of saturated steam with minimum loss of temperature. Circulating condensate into the water column flushes the vessel and probes continuously. This prevents buildup of sediment and eliminates the need for periodic blowdown.

### TYPE 501 WATER COLUMN

The 501 is a low pressure water column manufactured from ASTM A105 carbon steel extrusion. The section was designed by Levelstate specifically for the application.

The rating is 150 bar @ 341 degrees C and pressure tested to 225 bar @ ambient temperature.

The probe seats are machined into the thick wall of the extrusion at custom spacing as determined by the customer. Probes are staggered odds on one side and evens on the other, this gives the greatest resolutions over smaller distances. Probes are secured by means of a screw thread and are sealed by way of a Metaflex gasket. The minimum probe spacing is 25mm.

Steam and water connection stubs are provided with either socket or butt weld finishes. The connections are sch 160 material and 1 inch standard O/D. The drain connection provided is 1/2 inch O/D standard with either socket or butt weld finish. We can provide alternative sizes as requested. The top of the column incorporates an eye bolt for hanging purposes, but this can be substituted for a vent connection.



### TYPE 502 WATER COLUMN

The 502 is a high pressure water column manufactured from ASTM A106 carbon steel or stainless steel seamless pipe.

The rating is 207 bar @ 370 degrees C and pressure tested to 310 bar @ ambient temperature. Or 570 degrees C for stainless steel pipe.

The probe are located using stainless steel inserts welded into the pipe at custom spacing as determined by the customer. Probes are staggered odds on one side and evens on the other, this gives the greatest resolutions over smaller distances. The minimum probe spacing is 25mm. Probes are sealed with a compression nut.

Steam and water connection stubs are provided with either socket or butt weld finishes. The connections are sch 160 material and 1 inch standard O/D. The drain connection provided is 1/2 inch O/D standard with either socket or butt weld finish. We can provide alternative sizes as requested. The top of the column incorporates an eye bolt for hanging purposes, but this can be substituted for a vent connection.



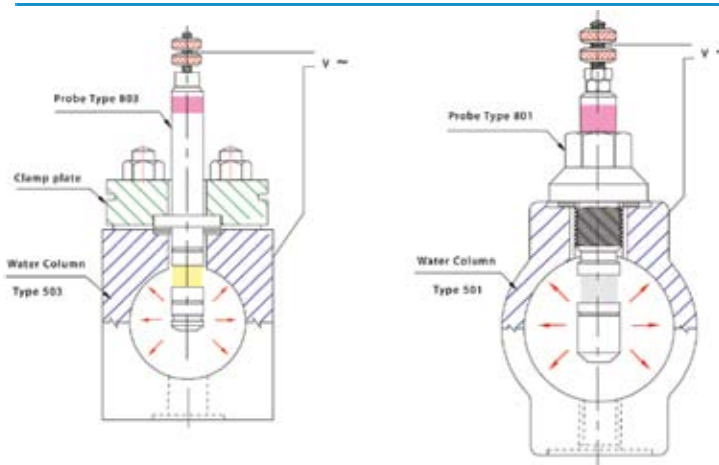
### TYPE 503 WATER COLUMN

The 503 is a high pressure water column manufactured from ASTM A105 carbon steel extrusion. The section was designed by Levelstate specifically for the application.

The rating is 207 bar @ 370 degrees C and pressure tested to 310 bar @ ambient temperature.

The probe seats are machined into the thick wall of the extrusion at custom spacing as determined by the customer. Probes are secured by means of a clamp plate held in place by 4 M10 studs and nuts. Probes are sealed by way of a Metaflex gasket. Probes are staggered odds on one side and evens on the other, this gives the greatest resolutions over smaller distances. The minimum probe spacing is 35mm.

Steam and water connection stubs are provided with either socket or butt weld finishes. The connections are sch 160 material and 1 inch standard O/D. The drain connection provided is 1/2 inch O/D standard with either socket or butt weld finish. We can provide alternative sizes as requested. The top of the column incorporates an eye bolt for hanging purposes, but this can be substituted for a vent connection.





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