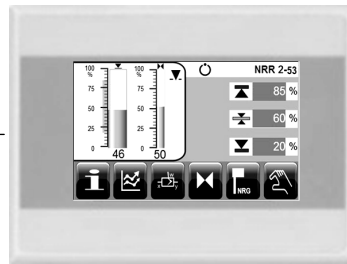


SMT32-50p - A New Generation of Advanced Boiler Water Level Control System with Pneumatic Feed Valve

The Flowserve *GESTRA* SpectorMODUL 'TOUCH' SMT32-50p system incorporates the very latest in high integrity SIL3 class water level limiters which are Self-Monitoring with Automatic Routine Testing (SMART), to provide a boiler water level control system (exceeding the latest SAFed BG01 boiler operation guidelines issued in October 2011). The system is suitable for applications to a maximum of 32 bar g.



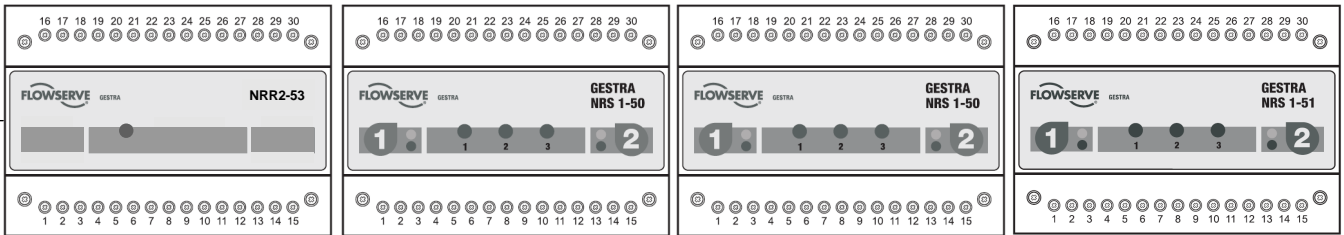
URB50
 HMI Panel
 (Touch Screen)

NRR2-53
 Valve Control & High Alarm

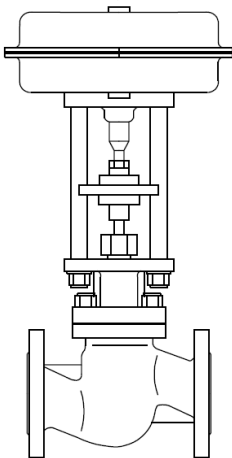
NRS1-50
 1st Low Alarm

NRS1-50
 2nd Low Alarm

(Optional)
NRS1-51
 2nd High Alarm



4-20mA
 Output



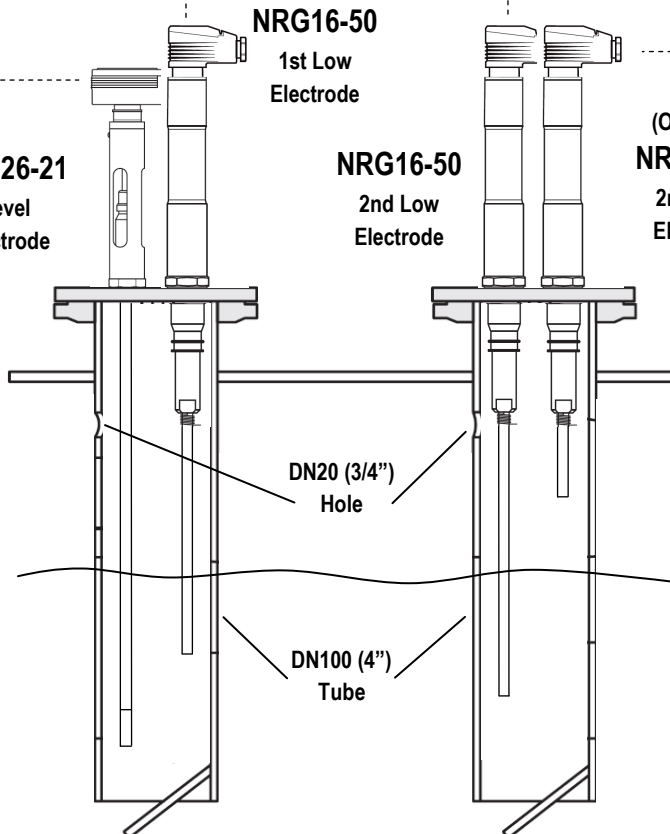
It is also possible to substitute the valve for an inverter driven feed pump (not of GESTRA supply)

NRG26-21
 Level Electrode

NRG16-50
 1st Low Electrode

NRG16-50
 2nd Low Electrode

(Optional)
NRG16-51
 2nd High Electrode



Water Level

For Illustration Only:
 Please refer to IOM documents for recommended installation guidance.

SYSTEM CONCEPT

The SpectorMODUL TOUCH level system uses three electrodes mounted directly into the boiler shell. These are protected from turbulence and foaming in the boiler by protection (or stilling) tubes. This arrangement precludes the need to have external chambers equipped with sequencing purge valves with interconnecting pipe work that is susceptible to blocking up or accidental isolation. As the high integrity electrodes have no moving parts, no daily testing is required when mounted directly in the boiler shell. Maintenance is therefore minimal.

Boiler water level is controlled by the well proven NRG26-21 together with a dedicated digital valve controller comprised of the DIN rail mounted NRR2-53 and panel mounted URB50 HMI panel. All parameters are entered via this colour screen.

This icon based system is intended to be easy to understand and simple to use. All set points and levels are shown clearly and concisely on the 'home' screen.

A 4-20mA output of the actual level is standard. An optional 3-element control module may be specified to operate with steam and feed water flow computers (not included).

Low level alarms are provided by the two innovative NRG16-50 self-monitoring level electrodes. These are used in conjunction with the NRS1-50 dual-channel level switches which have periodic self-checking circuitry to monitor the electrode, cable, safety output relay and internal components against malfunction. This arrangement provides an extremely reliable and fail-safe limiting system compliant with SIL3 requirements (far exceeding the minimum SIL2 rating outlined in BG01).

The robust NRG16-50 electrodes do not have any electronic circuitry on or within the electrode body and are therefore completely unaffected by heat or vibration from the boiler. The self-monitoring feature detects and gives an alarm if any scale or dirt

builds up on the tip, or if the seals of the electrode are not pressure tight.

OPERATION

During normal operation the boiler water level is maintained at the set-point defined by the NRR2-53 valve controller. The feed pump runs continuously and the NRR2-53 opens and closes the feed water control valve in a PI (Proportional & Integral) manner as it reacts to fluctuations in water level through steam demand.

This method of control ensures water level is controlled at a single defined set point rather than at various points within a control band especially during varying steam demand.

Should the water level fall below the desired operational level, the NRG16-50 1st low alarm tip is exposed and the associated NRS1-50 controller signals an alarm condition to shut the boiler down well before the danger level is reached. The burner is usually wired so that if the water level recovers, the burner may re-fire under automatic control.

If the water level continues to fall, the 2nd independent low level electrode tip is exposed and the associated NRS1-50 switch signals the second low alarm condition. The burner shutdown is endorsed by interruption of the burner circuit causing the boiler to 'Lockout'. Manual intervention is required to reset and re-fire the burner after restoration of water level.

In addition to constantly monitoring the boiler water level, the NRS1-50 switch also tests the integrity of the control circuit by the use of electronic logic every 40 seconds, without interrupting the burner circuit. These tests check the integrity of the connecting cable, short circuits, internal power supply and earth connections. For the first time in such a system, the NRS1-50 also self-checks the output relay for the burner safety circuit and also incorporates three self-diagnostic LEDs to assist in fault finding. The initiation of the periodic test is also monitored by a second built-in electronic device to ensure against

malfunction of the self-checking circuitry.

In the event of electrode or switch failure, damage to the interconnecting cable, the limiter system will signal an alarm and shutdown the boiler. A diagnostic LED will illuminate to indicate a possible reason of failure.

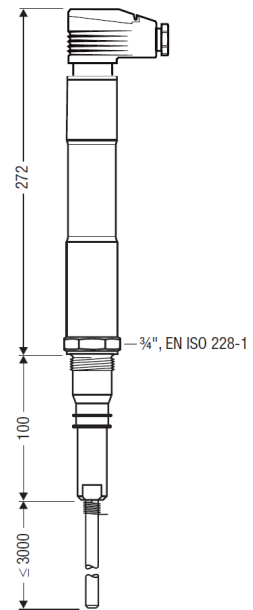
To avoid a boiler shutdown due to transient water level fluctuations, the low alarms operate after a delay of 3 seconds.

EQUIPMENT SPECIFICATION

SMT32-50p comprises of:

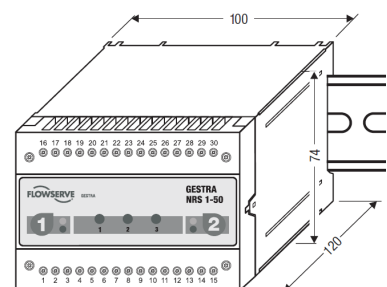
2 x Low Level Electrodes, NRG16-50

Self-monitoring conductivity electrodes with a rigid single stainless steel 7mm diameter tip for low level alarms. Tip is cut to length on site to suit the alarm level required. Lengths available: 500, 1000, 1500, 2000, 2500 or 3000mm.



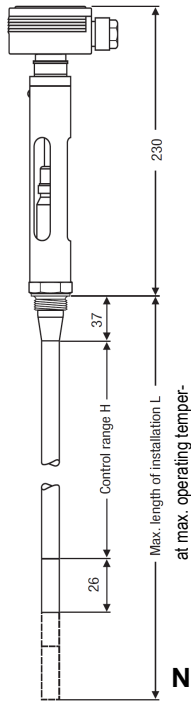
2 x Low Level Switches, NRS1-50

Fail-safe two channel level switch with periodic self-checking circuitry for use with NRG16-50 electrode. Test button to simulate low water level. Available as a DIN rail mounted design only.



1 off Level Electrode, NRG26-21

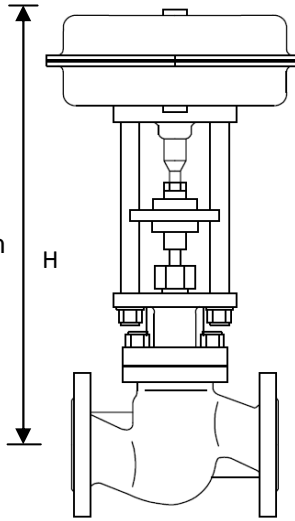
Single tip capacitance electrode for modulating level control and high alarm. Electrode must NOT be cut. Switch points are set via the URB50. Lengths available: 300mm to 1500mm in 100mm increments.



NRG26-21

1 off DN40 Pneumatic Control Valve

Cast steel body with integral cast PN40 flanges. Valve seat size is carefully chosen to match the boiler and feed pump conditions. Other sizes available upon request.



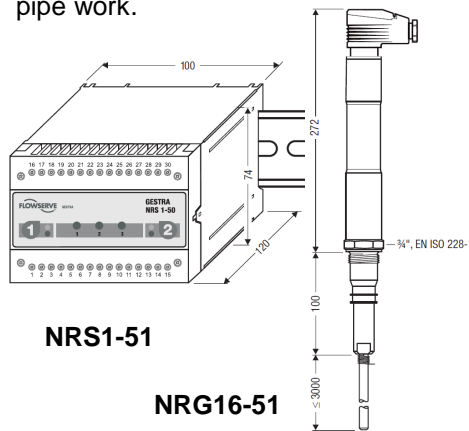
Face-to-face: 200mm
Typical H: 510mm

OPTIONAL EQUIPMENT

SMART High Level Alarm System

System comprises of NRG16-51 level electrode and NRS1-51 level switch to provide a fail-safe independent high level alarm with self-monitoring and automatic checking circuitry to SIL3 standard.

Applications for the high integrity High Alarm system include the operation of a 'slam-shut' valve in the feed water line to ensure fail-safe protection of steam plant and process from 'carry-over' into the steam mains pipe work.



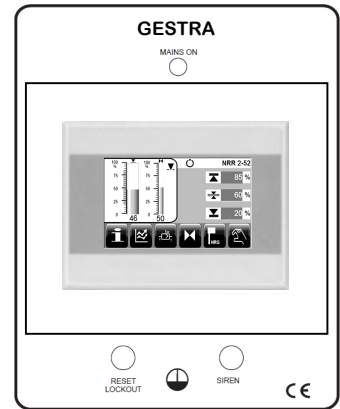
NRS1-51

NRG16-51

Enclosure for Level Switches

We can provide a metal enclosure for wall mounting. The controllers and switches are ready installed and pre-wired to a terminal strip complete with power isolator, breakers, & relays.

Just connect electrodes, power and alarm/safety circuits. Our engineers will be pleased to quote for specific requirements you may have.



Remote Alarm & Shutdown Panel

In accordance with SAFed BG01 boiler operation guidelines, this panel is an emergency device located remotely from the boiler house to shut off and isolate the burners rendering the boiler to a safe condition.

Electrode Mounting Flanges & Protection Tubes

GESTRA have been manufacturing and installing self-monitoring boiler water level controls for more than thirty years and can provide a wide range of flanges and protection tubes either from stock or engineered to your specific requirements.

Information required when ordering

- 1) Boiler maximum working pressure;
- 2) Boiler evaporation rate;
- 3) Electrode lengths required;
- 4) Feed pump pressures (closed head and operational);
- 5) Instrument air pressure;
- 6) Control system voltage: (24VDC, 115Vac or 230Vac). **NOTE: GESTRA controllers and switches require a 24VDC supply. Depending on your requirements, a voltage transformer can be supplied to reduce the 115/230Vac incoming supply accordingly.**

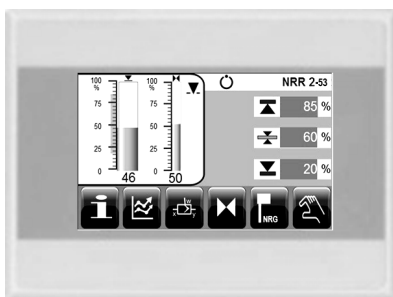
Installation & Service

GESTRA can provide full product support, installation, commissioning and servicing nationwide. Please refer to our Service Brochure for further details.

1 off Valve Control & Alarm Switch, NRR2-53 & URB50 HMI Panel

Valve controller with proportional and integral action for use with NRG26-21 electrode and actuated control valve with 4-20mA input signal. Additional relay outputs configurable as conventional High and Low alarm functions.

Intuitive operation and easy commissioning by colour touch screen interface. Large, clear display of water level and feed valve position (bar graph & '%'), together with alarm set points. Alarm relay test feature and local 'trend' plot display. 4-20mA level re-transmission is standard. Password protection feature is also included.



URB50

Think Flowserve *GESTRA* for your steam, condensate and boiler house products

Boiler Level Controls & TDS Blowdown Systems

Feed Water Tanks & Systems

Heat Recovery Systems

Pressurised Deaerator Systems

Condensate Pump Sets

Steam Traps

Manifolds

Trap Testing & Monitoring Systems

Non-Return Valves

Control Valves, Actuators & Controls

Pressure Reducing Stations

Separators

Stop Valves

Strainers

Safety Valves

Pressure & Temperature Gauges

Sight Glasses

Contamination Detection Systems

Flowmetering