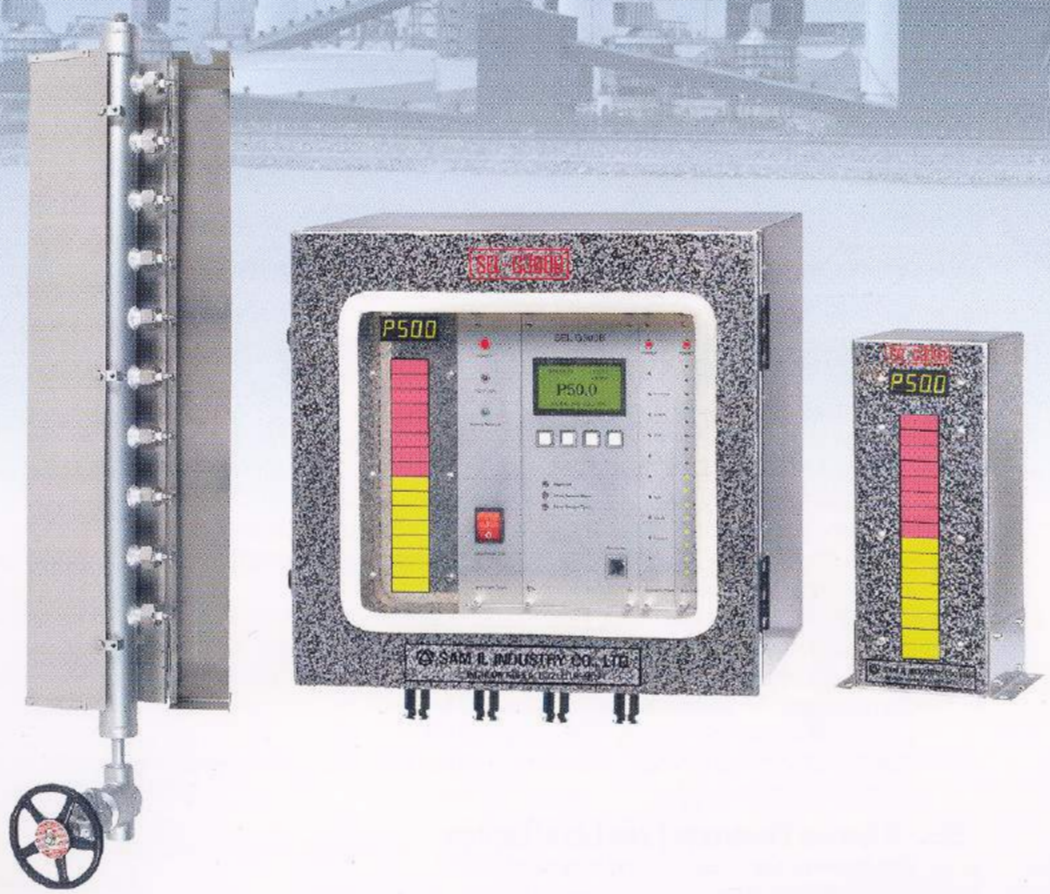
SAMIL INDUSTRY CO., LTD

Electrode Type Level Gauge, Level Transmitter & Level Switch

SEL Series



SAM IL INDUSTRY CO., LTD.

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DIN EN ISO 9001

CE



Electrode Type Level System SEL Series

Electrode type level system SEL series by Samil Industry Co., Ltd. is an electrode type level gauging, developed based on long experience and accumulated technology in the level gauging field. As an improved version from existing products, this item is the next generation electrode type level system for high temperature and high-pressure applications that offers multiple capabilities digital including complex functions by integrating modern and sofware application technologies.

Electrode Type Level System SEL Series

Electrode type level gauge indicates level status from the display equipment by identifying electric resistance of water and steam from electrode sensors.
The level of water portion displays each level in green and the steam portion displays it in red on the indicator of the Micro Processor controller Unit (MPU) installed at site and the Remote Indicator Unit (RIU) in control room etc.

Features of Electrode Type Level Gauge

- Useful for observing levels of water and detecting signals in high temperature and high pressure boiler drums or steam generators for in power plants.
- Possible to select and install electrode sensors in quantity and positions as per user demand. (Max. 32 Ports)
- Electrode sensors may be installed on water columns at 15~25mm minimum intervals.
- Transmits information on detection level and status to the communication signal(RS 485).
- Indicates detection levels and statuses on site and remote indicators by level points or percentage in letters and figures of red, green, and amber on LED.
- Indicates and sets alarm points up to a maximum of 10 points, and produces relevant contact output.(SPDT)
- Possible to change alarm points without wiring work, via a program.
- Capable of operating level gauge, transmitter, or level switch with one set of device.
- Supports Man Machine Interface(MMI) system for computer monitoring.
- Simple replacement of existing level gauges and level switches.
- Competitive pricing.
- Possible to view minimum level information with battery backup system during power interception or power interruption.

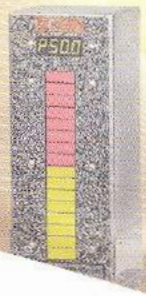
Application of Electrode Type Level Gauge

SEL-G Series Electrode Type Level Gauge

- Possible to use level information and contact points necessary in each electrode.
- Useful for observing water levels and detecting signals of boiler and etc. in high temperature/pressure thermal power plants.
- Used for observing water levels in high temperature/pressure equipment.
- Adopts static voltage/frequency device that can be used anywhere in the world.
  (Free Voltage 86-265V AC, 48-65 Hz)
- Indicates water levels and alarm, input/output board, on indicator of MPU and Remote Indicator.
- Capable of executing level gauge, level transmitter, and level switch functions with one device.
- Capable of providing transmitter functions using level gauge.(0-20 mA / 4-20mA Analog output)
- Compatible to 4-20mA analog input. (Max. 3 Inputs)
- Capable of supporting Remote Indicator Units (RIU).
  (Remote monitoring function utilizing more efficient communication signals than remote monitorings that use existing CCTV and etc.)

SEL-S Series Electrode Type Level Switch

- Use for level alarm contact and control of level.
- It is possible to output a maximum of 10 alarm relay contacts.
- Adopts constant voltage/frequency that can be used anywhere in the world.
  (Free Voltage 86-265V AC, 48-65 Hz)
- Capable of supporting Remote Indicator Units (RIU).
  (Remote monitoring function utilizing more efficient communication signals than remote monitorings that use existing CCTV and etc.)



Electrode Type Level System

Comparison of Characteristics between Electrode Type Level Gauge and Magnetic Float type and Direct Reading Level Gauge

Comparison items	Electrode type	Magnetic Float type	Gauge Glass type	Remarks
Level detection method	Electrode detection (Indirect observation by LED)	Magnetic Flapper Color (Indirect observation)	Direct reading (Visual direct observation)	Easy observation of water level Minimum gauging error
Maximum pressure	300 Kg/cm^2	180 Kg/cm2	150 kg/cm^2	Used in saturated vapor and ultra high temperature
Maximum temperature	560℃	380℃	380℃	Used at a maximum of up to 560℃
Maintenance cost	Almost none	Almost none	Frequent necessary costs consumed (labor cost)	Cost reduction effect
Control signal	Transmission signal (Communication type)	Transmission signal (Impossible for high temp)	None	Efficient remote transmission and monitoring
Remote observation	By transmission signal (RS485 communication signal)	By transmission signal (Impossible for high temp) or CCTV	CCTV	Cheap remote observation (up to 1.6km)
Leak	Almost none	Almost none	Concerns for leaking due to aging of glass, gasket, and etc.	Reduction of leak occurrence
Safety	Excellent safety for high temp./ pressure environments	Concerns for float malfunctioning	Concerns for glass and gasket witn corrosions	Excellent operation at high temp/ pressure environment
Amount	Medium	A little cheap	Medium	Maximum usability compared to cost
Component change	2 years	1.5 years	6 months	Extension of part change period

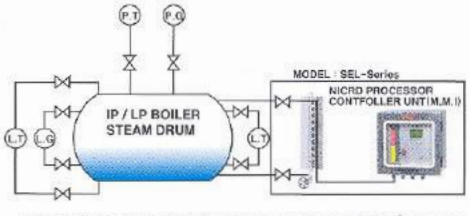
※ Reference

It was common to install 2 set of glass type level gauge (direct reading type) in existing high temperature/pressure boilers, but it has recently become more common to install 1 set of glass type level gauge (direct reading type) for a single boiler as a rule and to install 1 set of indirect level gauge.

Today, it is common to adopt electrode type level gauge to have all its the advantages in addition to direct reading type in order to control more efficiently and use as a stable and safe level gauge system.

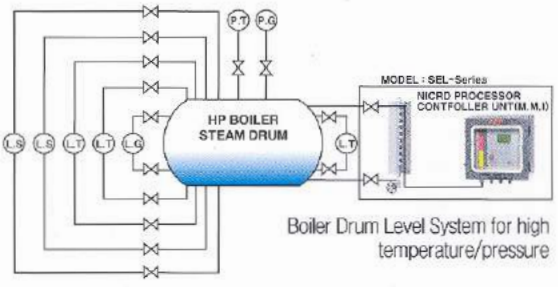
※ Examples of boiler drum installation at a thermal and complex thermal power plant

Boiler drum level system for medium low temperature/pressure
- Level Transmitter (2 Set)
- Direct Reading Type Level Gauge (1 Set)
- Electrode Type Level Gauge (1 Set)



Boiler Drum Level System for medium low temperature/pressure

Boiler drum level system for high temperature/pressure
- Level Transmitter (3 Set)
- Level Switch (2)
- Direct Reading Type Level Gauge (1 Set)
- Electrode Type Level Gauge (1 Set)



Boiler Drum Level System for high temperature/pressure



Electrode Type Level Gauge SEL- G Series

SEL-G Series Electrode Type Level Gauge

Composition of Electrode Type Level Gauge SEL-G Series

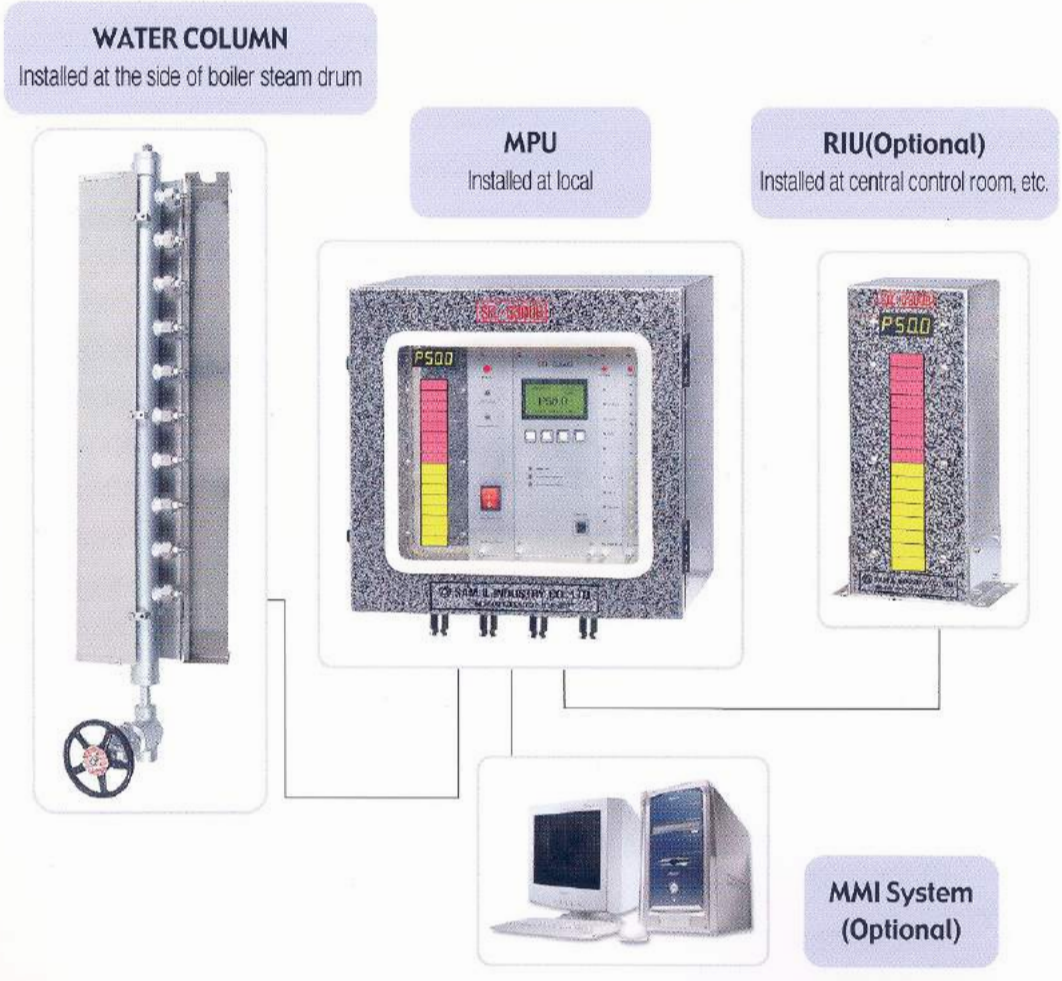
Detection Part

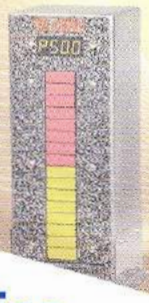
Micro Processor controller Unit (MPU)

Remote Indicator Unit (RIU) – Optional

Computer monitoring – Man Machine Interface (MMI) System – Optional

Composition of electrode type level gauge





Electrode Type Level Gauge SEL-G Series

Detection Part

The detection part of SEL-G series electrode type level gauge is composed of a water column and some electrode sensors.

The electrode sensor is installed to a water column, a device connected to a high temperature/pressure vessel with different thermal conductivity in fluids.

The protection case is installed in order to avoid damage generated due to pressure eruption and etc.

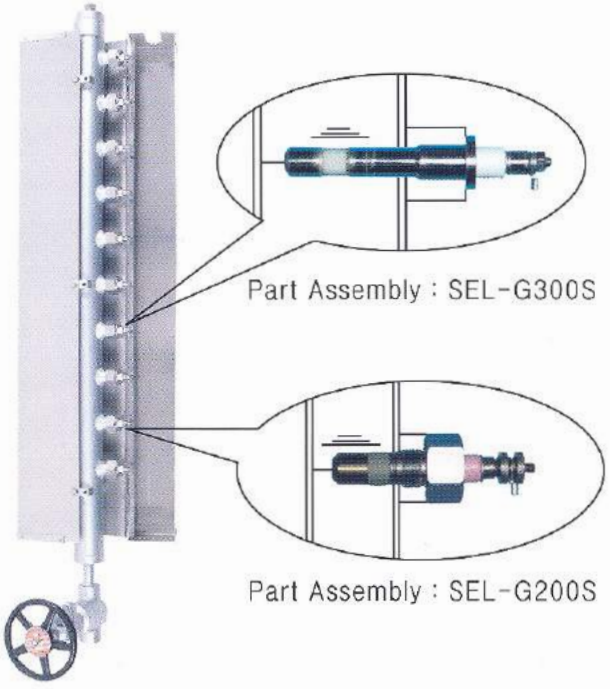
Maximum pressure: 300 Kgf/cm²

Maximum temperature: 560℃

※ **Reference**

Critical pressure: 22.1 Mpa

Saturation temperature: 374℃



Specification

		Medium/Low Temperature & Medium/Low Pressure Use	High Temperature/Pressure Use
Water Column Part Assembly		SEL-G200W	SEL-G300W
Electrode Sensor Part Assembly		SEL-G200S	SEL-G300S
Pressure Kg/cm²		50	300
Temperature℃		180	560
Material	WATER COLUMN	A106Gr.B / Sch 80 or customer specification	A106 Gr.B / Sch 160 or customer specification(A335 P11, P22, P91)
	ELECTRODE SENSOR	316SS+PTFE	316SS+ CERAMIC
Connection		Customer specification	Customer specification



Electrode Type Level Gauge SEL-G Series

Control Panel & Control System - Micro Processor controller Unit (MPU)

The electrode sensor and detection portions' control panel are connected by electric wire, and the level signal detected at an electrode sensor is sent to a Micro Processor control Unit (MPU) of the MPU panel.

Length of the Electric wire between detection portion and control panel is to be within 30m.

The MPU panel is equipped with a Micro Processor control Unit.

The MPU panel is composed of a level indicator, a CPU Module, a power supply Module, an input Module, an output Module, a terminal board, and etc.

Level Indicator – The part with water is displayed in green and the part with steam is displayed in red. And, abnormality or defect status are indicated in amber and relevant LED flickers.

CPU Module – Equipped with control defect detection and self diagnosis function of by each signal.
- Can select and indicate level point(LP) or percentage(P) of level status using a simple function key.
- Can change and set time, date, and operation mode using a function key.
- Can detect and diagnose LED abnormality, electrode disconnection, short circuit, and etcetera of each module.

Power Supply Module – Constant voltage, constant frequency circuit, and internal voltage supply. (Dual Power System)

Input Module – A maximum of 32 point electrode inputs and a maximum of 3 sets of 4~20mA signal inputs. (4~20mA signal from transmitter for temperature, pressure, flow rate, etc. around boiler.)

Output Module – A maximum of 10 relay contacts, analog output, RS 485 communication signal, and man machine interface(MMI) output.

Terminal Board – All external wires are connected.

Specification of the Micro Processor Controller Unit

Controller

Medium/low temperature and low pressure : Part Assembly SEL-G200C
High temperature/pressure : Part Assembly SEL-G300C
Size : 222(W) x 180(D) x 316(H) mm
Working Voltage: Free voltage – constant voltage and constant frequency(86~265V AC / 48~65 Hz)
Dual Power : DC 12V (For Recharging)
Operation temperature: -20℃~75℃

Enclosure

Standard: 400(W) x 250(D) x 400(H) mm
17 Points or more 400(W) x 250(D) x 550(H) mm
Material: Stainless Steel 304/ Wall Mounting / IP65 / NEMA 4

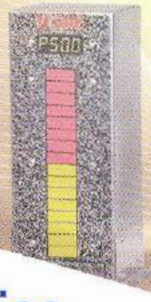
Features

Electrode input: Maximum 32 Points
Alarm indication: Amber
Alarm relay contacts : Maximum 10 sets(AC 250V 1A)
Can support communication signal for Remote Indicator Unit (RIU).
Can support Man Machine Interface(MMI).

Display example

LP08 – Level Point indication
P60.5 – Percentage indication





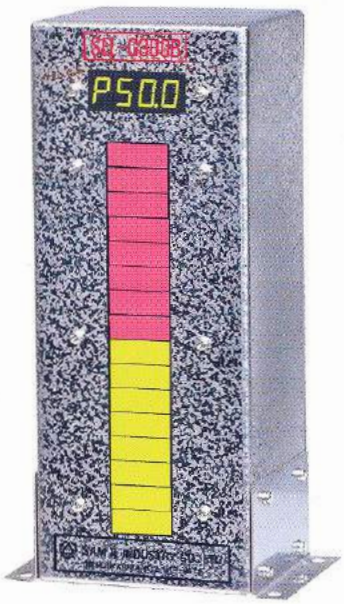
Electrode Type Level Gauge SEL-G Series

Electrode Type Level Gauge Remote Indicator Unit (RIU)- Optional

This is an indicator unit for remotely monitoring operation status of level gauge, installed at the control room and being connected with MPU panel.(Maximum 1.6km)

Water level part is indicated on LED in green color, steam part is indicated in red color and warning part is in amber color, and indicated in numerical figures.(Level point or percentage)

Specification of the Remote Indicator Unit



Medium/Low Temperature/Pressure : Part Assembly SEL-G200R
High Temperature/Pressure: Part Assembly SEL-G300R

Enclosure Material	Stainless Steel 304
Size	160(W) x 100(D) x 300(H) mm - Standard
	160(W) x 100(D) x 500(H) mm - 17 Points or more
Display	Red / Green / Amber
Power	DC 12V (Standard)
	Free Voltage (86 ~ 265V AC / 48 ~ 65 Hz)

Computer Monitoring MMI (Man Machine Interface) System - Optional

It is possible to adopt the Man Machine Interface system on a PC and etc. using communication signals transmitted from the micro processor control unit in order to view and control site situations for status of SEL-G series electrode type level gauge.

It is possible to look at operational status and site situation of level gauge through a computer and etc. at specific positions.

Part Assembly SEL-G200M / SEL-G300M



Electrode Type Level Switch SEL-S Series

SEL-S Series Electrode Type Level Switch

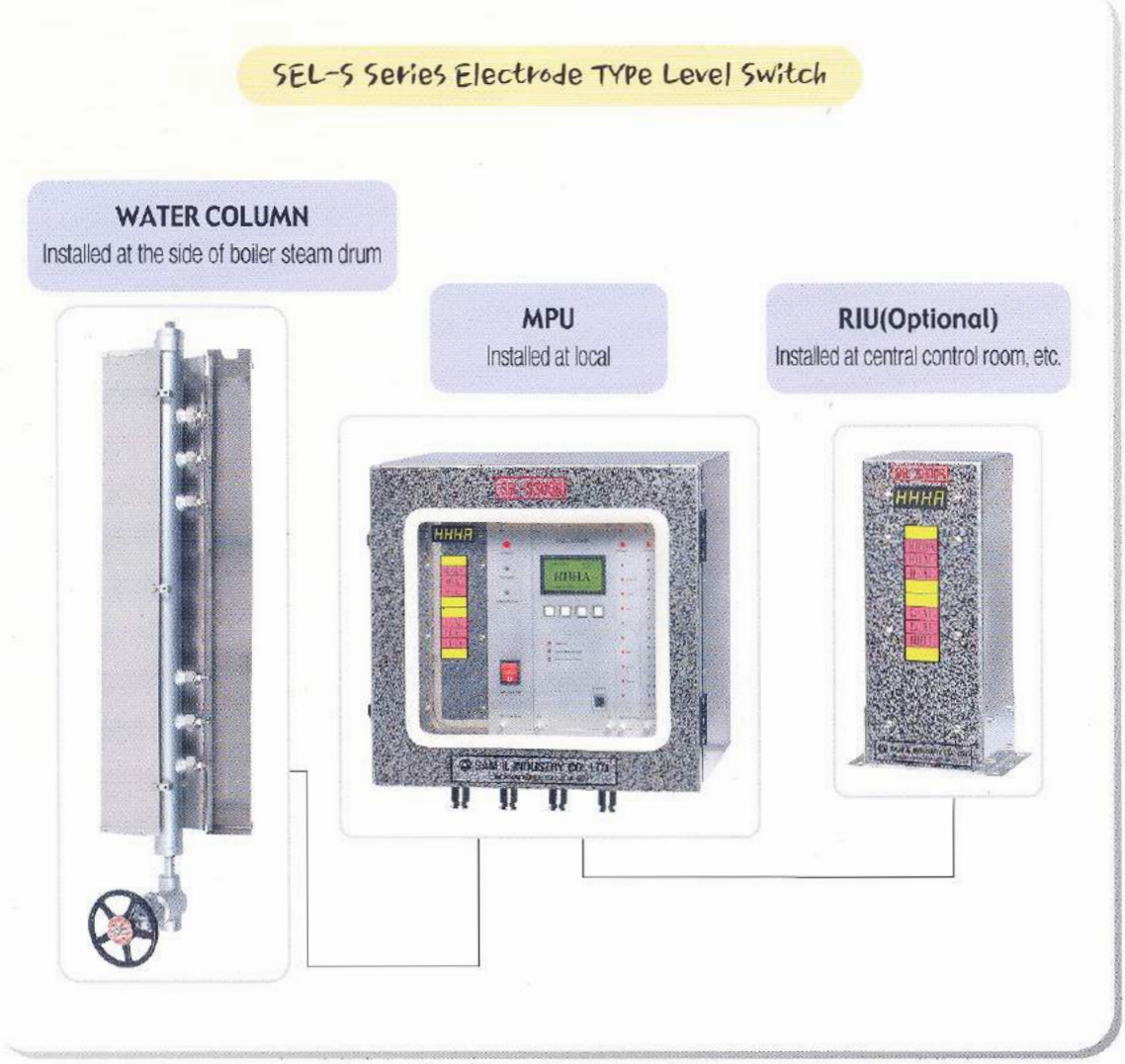
This is installed at high temperature/pressure boiler drums and steam generators to be used in observing or controlling water level statuses.

Composition

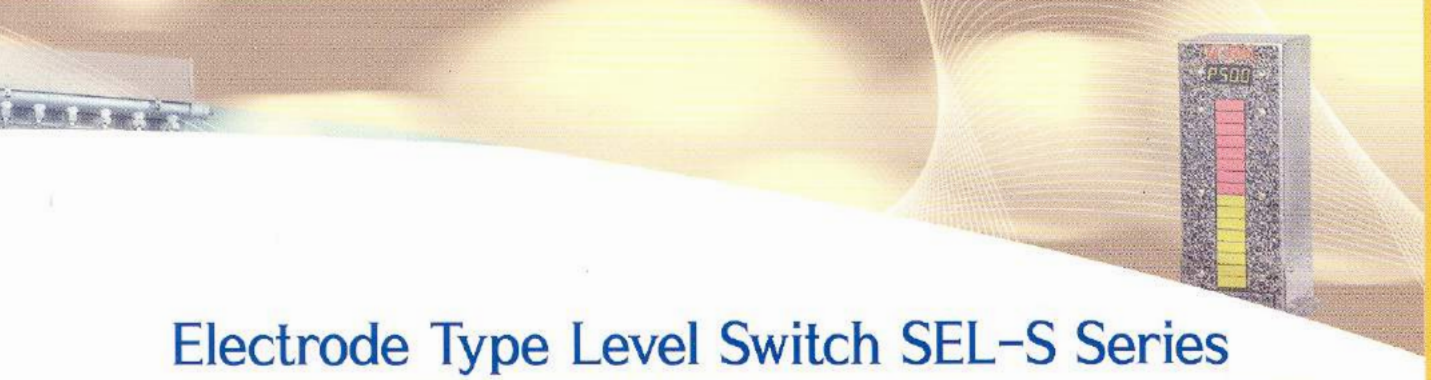
Detection Part

Control system – Micro Processor controller Unit (MPU)

Remote Indicator Unit (RIU) – Optional



Contact points of level switch can be outputted up to a maximum of 10 sets.



Electrode Type Level Switch SEL-S Series

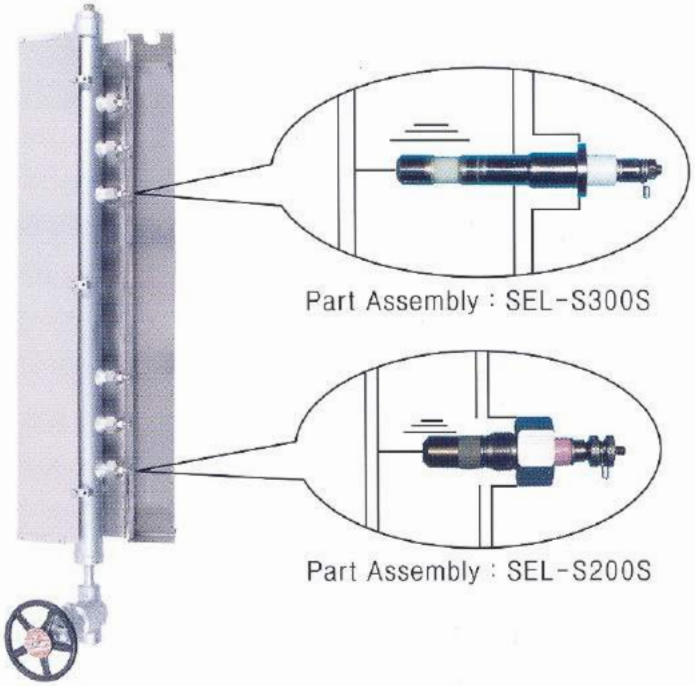
Detection Part

Electrode sensors of SEL-S series electrode type level switch must be appliance on process lines with desired quantity and position suitable for use by identifying it into low pressure and high temperature/pressure.

The appliance electrode sensor functions as a detector that detects liquid level and alarm.

Maximum Pressure: 300 Kgf/cm2

Maximum Temperature: 560℃



Specification

		Medium/Low Temperature & Medium/Low Pressure Use	High Temperature/Pressure Use
Water Column Part Assembly		SEL-S200W	SEL-S300W
Electrode Sensor Part Assembly		SEL-S200S	SEL-S300S
Pressure Kg/cm²		50	300
Temperature℃		180	560
Material	WATER COLUMN	A106Gr.B/Sch 80 or customer specification	A106 Gr.B / Sch 160 or customer specification(A335 P11, P22, P91)
	ELECTRODE SENSOR	316SS+PTFE	316SS+ CERAMIC
Connection		Customer specification	Customer specification



Electrode Type Level Switch SEL-S Series

Control Panel & Control system - Micro Processor controller Unit (MPU)

This receives and handles liquid level and other signals received from the electrode sensor at relevant position sets or installed position of the SEL-S series electrode type level switch through the Micro Processor controller unit. (MPU)

This displays relevant alarm points on the MPU's display window, together the color red on relevant LED's on Indicator.

This can output a maximum of up to 10 contacts for established alarm points.

Specification of Micro Processor controller Unit

Controller

Medium/Low Temperature/Pressure: Part Assembly SEL-S200C
High Temperature/Pressure: Part Assembly SEL-S300C
Size : 222(W) x 180(D) x 316(H) mm
Working voltage : Free Voltage constant voltage/frequency(86 ~ 265V AC / 48 ~ 65 Hz)
Dual Power : DC 12V (For Recharging)
Operation temperature: -20℃ ~ 75℃

Enclosure

Size : 400(W) x 250(D) x 400(H) mm
Material: Stainless Steel 304SS / Wall Mounting / IP65 / NEMA 4

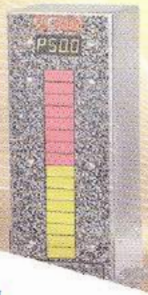
Features

Electrode input : Maximum 10 Points
Alarm indication : Red
Alarm contact : Maximum 10 sets(AC 250V 1A)
Can support communication signals for remote indication units (RIU).

Examples of alarm indication:

HHHA - High high high Alarm
HHAL - High high Alarm
H-AL - High Alarm
L-AL - Low Alarm
LLAL - Low low Alarm
LLLA - Low low low Alarm





Electrode Type Level Switch SEL-S Series

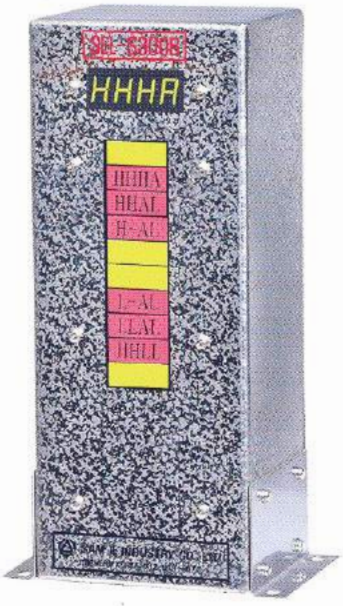
Remote Indicator Unit (RIU) - Optional

The remote indicator unit of SEL-S series electrode type level switch must be installed at a place requested by the user to make it interlock with the indicator system of micro processor controller unit.

Adopts static voltage/frequency device that can be used anywhere in the world.
(Free Voltage 86 ~ 265V AC, 48 ~ 65 Hz)

Installation distance of the remote indicator unit can be a maximum of up to 1.6km away from the micro processor controller unit.

Specification of the Remote Indicator Unit



Medium/Low Temperature/Pressure Part Assembly SEL-S200R
High Temperature/Pressure Part Assembly SEL-S300R

Enclosure material	Stainless Steel 304
Size	160(W) x 100(D) x 300(H) mm - Standard
Display	Red
Power	DC 12V (Standard) Free Voltage constant voltage/frequency (86~265V AC / 48~65 Hz)

※ Typical Applications of Electrode type Level Switch

Turbine water induction prevention.
Steam line drain control.
Boiler water high level protection.
Feedheater boiler low level protection.
Dearator level protection.

A SEL- S Series Level Switch installed on the drain port in the superheated steam line will detect the level of condensed water in the port.

A single electrode sensor can be used, but for better protection a two electrode sensor ensures trouble free, fault tolerant water detection.

ELECTRODE TYPE LEVEL GAUGE SYSTEM

ORDERING CODE

CODE NAME SEL - [G] [300] [B] [03] [B] [0] [B] [000]

- [000] SPECIAL OPTION
  - [0] NON SPECIAL
  - [1] REMOTE INDICATOR UNIT (RIU)
  - [2] MAN MACHINE INTERFACE (MMI)
  - [3] ANALOG INPUTS
- [B] CONNECTION TYPE
  - [F] FLANGE
  - [S] SOCKET WELDING
  - [B] BUTT WELDING
  - [O] OPTION
- [0] NUMBER OF OUTPUT (RELAY CONTACT)
  - [00] NONE
  - [10] 1 ~ 10 SPDT
- [B] C TO C LENGTH
  - [A] 100 ~ 500mm
  - [B] 501 ~ 1000mm
  - [C] 1001 ~ 1500mm
  - [D] 1501 ~ 2000mm
  - [E] 2001mm ~
- [03] NUMBER OF ELECTRODE SENSORS
  - [03] 1 TO 32
- [B] BASIC CONSIST OF
  MICRO PROCESSOR CONTROLLER UNIT(MPU)
  WATER COLUMN
- [300] TYPE OF RATING
  - [200] LOW TEMP. & PRESSURE
  - [300] HIGH TEMP. & PRESSURE
- [G] TYPE OF IMPLEMENT
  - [G] LEVEL GAUGE
  - [S] LEVEL SWTICH
  - [T] LEVEL TRANSMITTER

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