LC2650
Level controller

Description

The Spirax Sarco LC2650 is a level controller for conductive liquids.

It provides on/off or modulating control of liquid levels in boilers, tanks, and vessels operating up to 32 bar at 239 °C.

It has two alarm channels that can be independently configured either high or low.

The controller is suitable for use with liquids having an electrical conductivity as low as 5 µS/cm or 5 ppm (when used with an LP20, PA20 or PA420 capacitance probe).

The front panel has an LCD screen and a five-button keypad. The LCD display screen can show either operating information (in run mode), or a trend graph that displays a record of the variation in level over a set time.

In run mode the general data is shown on several consecutive screen displays.

A test function provides the operator with a diagnostic feature.

Inputs can be measured and outputs can be set from the front panel.

To prevent unwanted or inadvertent changes being made, all commissioning parameters are protected with a pass code.

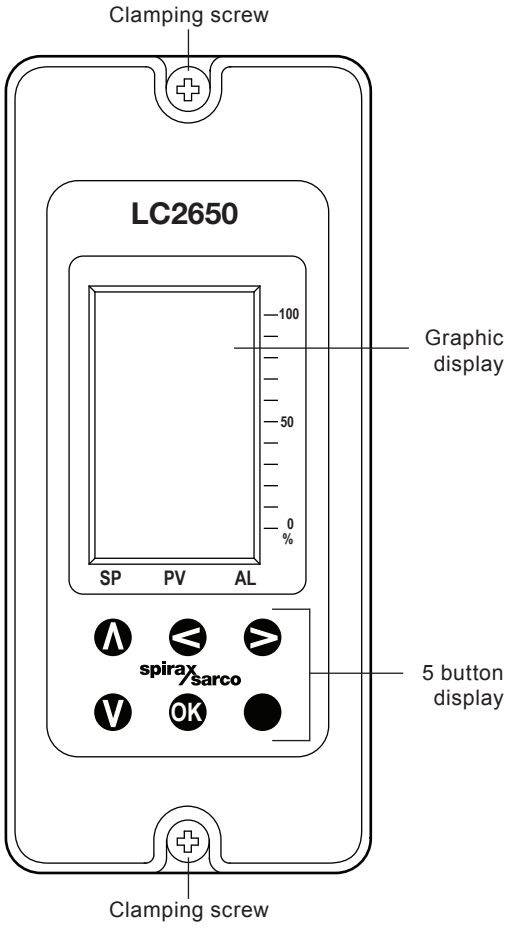
The LC2650 can communicate via an infrared link between adjacent controllers.

It can be designated as either a master unit or a slave unit.

The LC2650 can be panel, DIN rail or chassis mounted.

Principal features:

- Modulating or on/off control of boiler water level using a capacitance probe.
- Switchable integral action.
- Single, two or three-element control.
- LCD graphics display and five-button keypad.
- Graphic display of status, PV percentage, and alarm, plus a trend graph.
- Infrared communication.
- EIA 485 / Modbus communications.
- UL and TÜV approved.



Approvals

This product complies with the Electromagnetic Compatibility Directive 2014/30/EU and all its requirements.

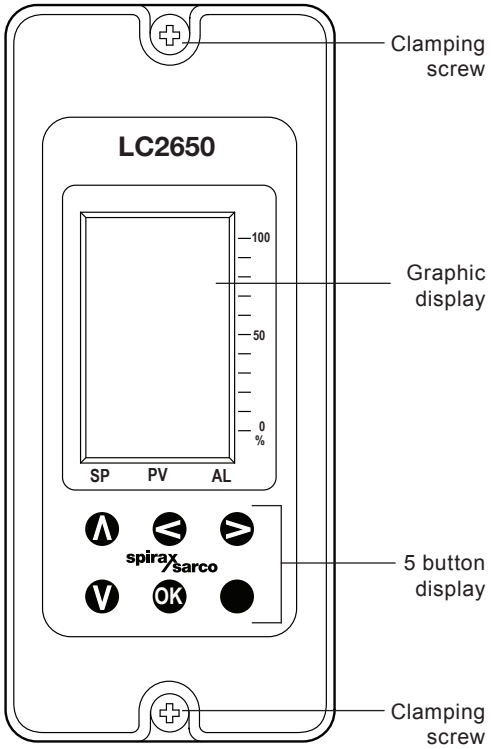
The LC2650 is suitable for Heavy Industrial environments. A fully detailed EMC assessment has been made and has the reference number UK Supply BH LC2650 2008.

The LC2650 complies with the Low Voltage Directive by meeting the standards of:

- EN 61010-1:2010 safety requirements for electrical equipment for measurement, control, and laboratory use.

The LC2650 has been type-tested as a level control by meeting the standard:

- Vd TÜV requirements for water level control and limiting devices, Water Level 100 (07.2010).
- UL listed (open)



Applications

The product can be configured to control the level of a boiler, tank or vessel, by operating a pump, valve or solenoid. Typical applications:
On / off control:

- Pump control.
- Two alarm outputs.
- 4 - 20 mA level output (isolated).

Note: A solenoid valve may be used instead of a pump.
Modulating control:
Modulating valve control using valve motor drive or 4 - 20 mA control signals.

- Two alarm outputs.
- 4 - 20 mA level output (isolated).

Two or three element modulating control:
Modulating valve control using a valve motor drive or 4 - 20 mA control signal.

- Two alarm outputs.
- 4 - 20 mA level output (isolated).
- Feedback from steam flowmeter.
- Feed forward from water flowmeter.

Inputs / Function
The product compares the input signals with the set point selected by the user. It then changes its output signal to control the water level in the boiler or tank.

Outputs
The product control signal can be configured / wired to work with a pump or a modulating control valve. It also provides relay outputs for high and low level alarms and can provide an isolated
0 - 20 mA or 4 - 20 mA retransmission output.

Parameters can be remotely accessed via the RS485 / MODBUS communications.

Other features
An additional filter can be selected to increase the damping effect for turbulent conditions.

Technical data LC2650

Power supply	Mains voltage range		110 Vac to 240 Vac at 50/60 Hz
	Power consumption		7.5 W (maximum)
Environmental	General		Indoor use only
	Maximum altitude		2 000 m (6 562 ft) above sea level
	Ambient temperature limits		0 - 55 °C
	Maximum relative humidity		80% up to 31 °C decreasing linearly to 50% at 40 °C
	Overvoltage category		III
	Pollution degree		2 (as supplied)
			3 (when installed in an enclosure) **-** Minimum of IP54 or UL50 / NEMA Type 3, 3S, 4, 4X, 6, 6P or 13.
	Enclosure rating (front panel only)		NEMA type 4 hose down only (UL approval) and IP65 (verified by TRAC Global)
	LVD (safety)		Electrical Safety EN 61010-1 UL61010-1, 3rd Edition, 2012-05 CAN/CSA-C22.2 No. 61010-1, 3rd Edition, 2012-05
	EMC	Immunity/ Emissions	Suitable for heavy industrial locations
	Enclosure	Material	Polycarbonate
	Front panel	Colour	Pantone 294 (blue)
		Material	Silicone rubber, 60 shore.
	Solder		Tin/lead (60/40%)
Mains and signal connector	Termination		Rising clamp plug-in terminal blocks with screw connectors. **Caution:** Use only the connectors supplied by Spirax Sarco Ltd. Safety and Approvals may be compromised otherwise.
	Cable size		0.2 mm² (24 AWG) to 2.5 mm² (12 AWG).
	Stripping length		5 - 6 mm
Level probe, feedback,steam meter and water cable/wire	Type		High temperature
	Shield type		Screened
	Number of cores		3 (LP20/PA20), 2 (LP20/PA420 4-20 mA Transducer
	Gauge		1 – 1.5 mm² (18 - 16 AWG)
	Maximum length		100 m (328 ft)
	Recommended type		Prysmian (Pirelli) FP200,
			Delta Crompton Firetuf OHLS
0/4-20 mA output(s) cable/wire	Type		Twisted pair
	Shield type		Screened
	Number of pairs		1
	Gauge		0.23 - 1 mm² (24 - 18 AWG)
	Maximum length		100 m (328 ft)
RS485 communication cable/wire	Type		EIA RS485 twisted pair
	Shield type		Screened
	Number of pairs		2 or 3
	Gauge		0.23 mm² (24 AWG)
	Maximum length		1200 m (4000 ft)
	Recommended type		Alpha Wire 6413 or 6414

LAN Cat 5 or Cat 5E ScTP (screened), FTP (foil) or STP (shielded) cable can be used, but limited to 600 m.

Technical data LC2650 (continued)

Input technical data	**Level voltage**	Minimum voltage 0 Vdc or 1 V (with OUTRANGE function selected)	
		Maximum voltage	6 Vdc (absolute maximum = 7 Vdc)
		Input impedance	28 kΩ
		Accuracy	5% FSD over operating range
		Repeatability	2.5% FSD over operating range
		Resolution	14 bit (0.15 mV approx)
		Sample time	260 Hz
	4 - 20 mA	Minimum current	0 mA
		Maximum current	20 mA
		Input impedance	110 Ω
		Accuracy	5% FSD over operating range
		Repeatability	2.5% FSD over operating range
		Resolution	14 bit (1 µA approximately)
		Sample time	260 Hz
	Level 'out of range' alarm-voltage	Minimum alarm level	< 0.2 Vdc
		Minimum recovery level	> 1 Vdc
		Maximum alarm level	> 6.5 Vdc
		Maximum recovery level	< 6 Vdc
	Level 'out of range' alarm-current	Minimum alarm level	< 2.5 mA
		Minimum recovery level	> 4 mA
		Maximum alarm level	> 21 mA
		Maximum recovery level	< 20 mA

Technical data LC2650 (continued)

Output technical data	**24 Vdc supply**	Maximum voltage	24 Vdc (nominal)
		Maximum current	25 mA
		Ripple voltage	10 mV, full load
	4 - 20 mA	Minimum current	0 mA
		Maximum current	22 mA
		Open circuit voltage (maximum)	19 Vdc
		Resolution	1% FSD
		Maximum output load	500 ohm
		Isolation	100 V
		Output rate	10 / second
	Relays	Contacts	2 x single pole changeover relays (SPCO)
		Voltage ratings (maximum)	250 Vac
		Resistive load	3 amp @ 250 Vac
		Inductive load	1 amp @ 250 Vac
		ac motor load	¼ HP (2.9 amp) @ 250 Vac
			$^{1}/_{10}$ HP (3 amp) @ 120 Vac
		Pilot duty load	C300 (2.5 amp) - control circuit / coils
		Electrical life (operations)	3 x 10^{5} or greater depending on load
		Mechanical life (operations)	30 x 10^{6}
	RS485	Physical layer	RS485 4-wire full or 2-wire half duplex
		Protocol	Modbus RTU format
		Isolation	60 Vac / dc
		Receiver unit load	⅛ (256 devices - maximum)
		Output rate	Up to 10 frames / second
	Infrared	Physical layer	IrDA
		Baud	38 400
		Range	10 cm
		Working angle	15°
		Eye safety information	Exempt from EN 60825-12: 2007 Safety of laser products - does not exceed the accessible emission limits (AEL) of Class 1

Safety information, installation and maintenance

Warning: This document does not contain sufficient information to install the unit safely. The unit operates at a potentially fatal mains voltage. Before attempting to install the unit read the Installation and Maintenance Instructions supplied with it.

Caution: before installing and connecting the power ensure there is no condensation within the unit. The product may be installed on a DIN rail, on a chassis plate, or in a panel cutout. A bezel is supplied.

The product must be installed in a suitable industrial control panel or fireproof enclosure to provide impact and environmental protection. A minimum of IP54 (EN 60529) or Type 3, 3S, 4, 4X, 6, 6P and 13 (UL50/NEMA 250) is required. Spirax Sarco can provide suitable plastic or metal enclosures

Do not install the product outdoors without additional weather protection.

Do not attempt to open the product - it is sealed and has no replaceable parts or internal switches.

Do not cover or obstruct the infrared beam between products.

Your attention is drawn to IEE Regulations (BS 7671, EN 12953, EN 12952 and EN 50156). Elsewhere, other regulations will normally apply.

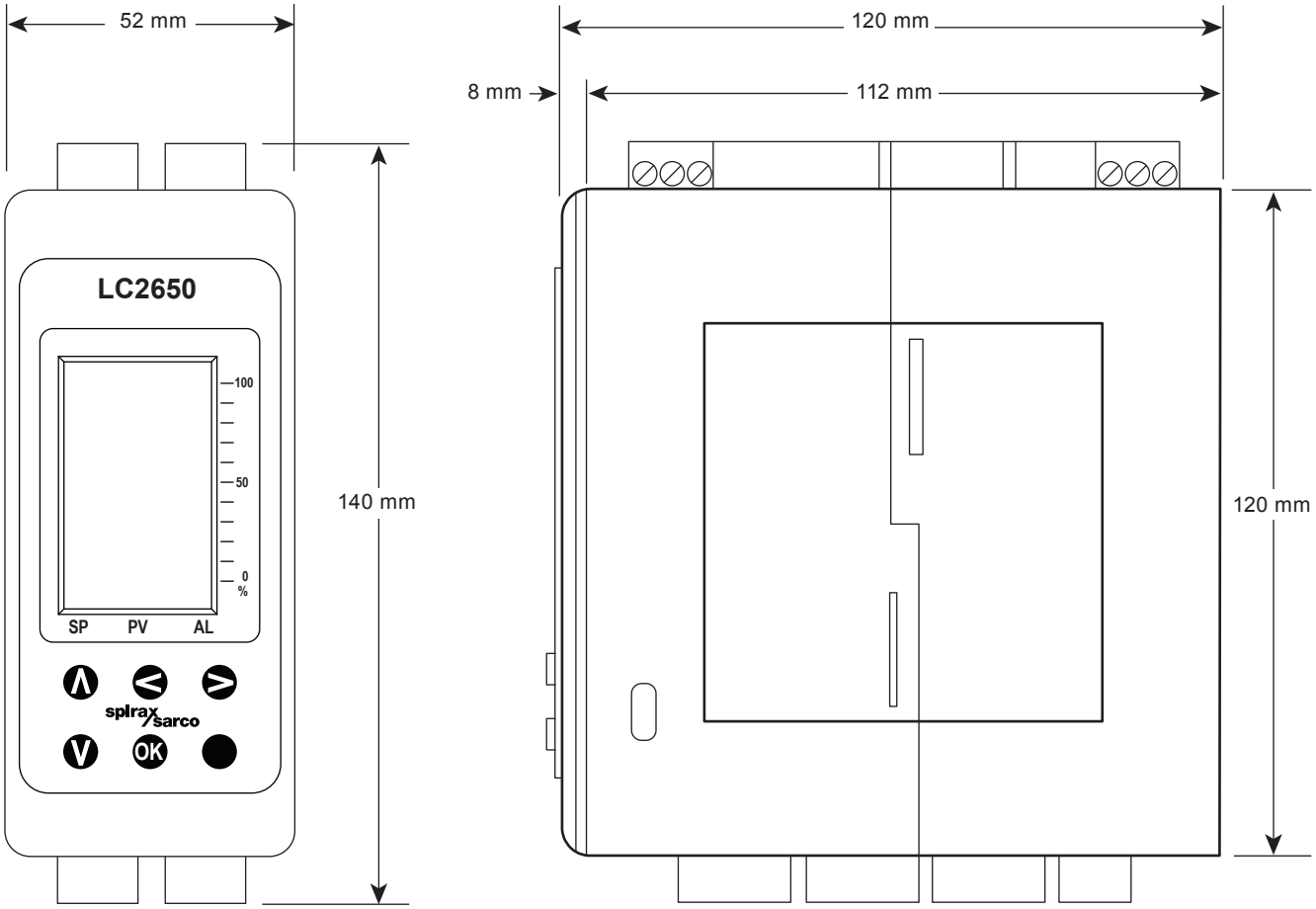
All wiring materials and methods shall comply with relevant EN and IEC standards where applicable.

No special servicing, preventative maintenance or inspection of the product is required.

Boiler water level controls and level alarms do, however, require testing and inspection. General guidance is given in Health and Safety Executive Guidance Notes BG01 and INDG436.

Dimensions / weight **(approximate) in mm and g.**

Weight 550 g.



How to specify

Multi-voltage level controller having two alarms, configurable high or low, infrared communication as a master or slave unit.

How to order

Example: 1 off Spirax Sarco LC2650 level controller.