

# Mobrey electronic probes for level control on steam boilers and associated plant

## Introduction

Mobrey Measurement offers a comprehensive range of electronic level probes for steam boiler control covering both point and continuous level applications.

The range consists of general purpose, high integrity and capacitance level controls. The probes are designed for use on steam boilers and fully comply with European and international standards and legislation applicable in these markets.

The equipment is also approved for application within the marine environment. For information on the complete scope of approvals please contact Mobrey Measurement.

All probes may be used in non-metallic tanks provided an earth electrode is used in connection with the media.

## Application

The range of ERAB probe controls may be used on any application where level control and alarm is required. The only restriction is that the fluid has the properties of conductance above 10mSeimens/cm and is not flammable.

The capacitance probes are not suitable for use on solids.

## Situations to be avoided

Electronic probes should not be used where the liquid foams, or has a tendency to leave a thin conductive surface earthed to the tank wall. The equipment will also stop working if the liquid has a tendency to leave an insulating film on the electrode tip e.g. oil suspended in water.

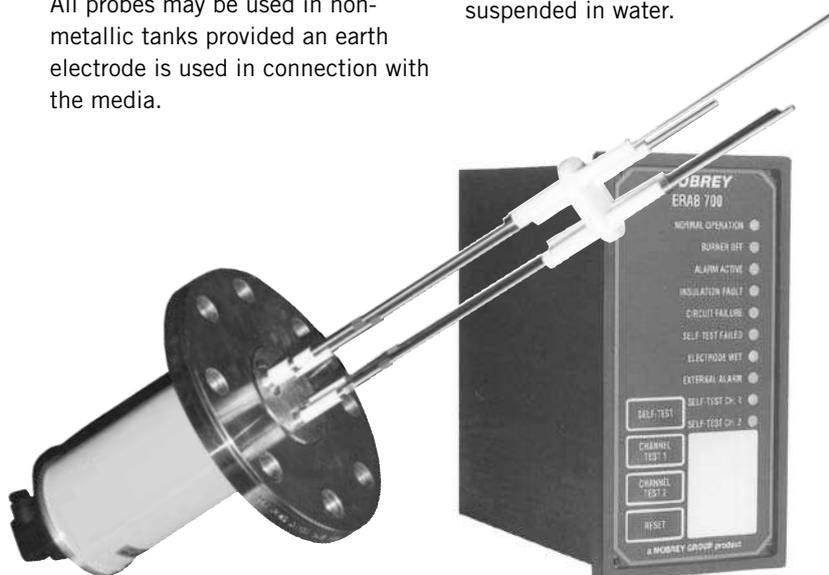
## Description

There are three basic types of level probe in the range:-

- ▶ A point level probe for ordinary non critical alarm and control applications, consisting of a single central electrode and PTFE insulating sleeve with a threaded metallic body.
- ▶ A high integrity point level probe for critical alarm applications. The probe consists of a central electrode screened by a second electrode sleeve, both of which are insulated from each other and the threaded metallic body.
- ▶ A continuous level probe consisting of a PTFE covered rod fitted to a threaded metallic body. No part of the central rod is exposed to the liquid.

The above probes may be used on their own or in various combinations and attachments to give a variety of level control capabilities.

Level probes are normally fitted within protection tubes to protect the probes from mechanical buffeting caused by steam release from the heating surfaces, and for dampening any level surges that could cause a false alarm to occur.



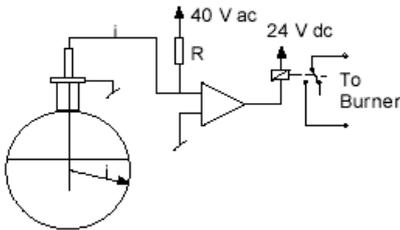
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# The complete Mobrey Erab electronic probe range

## Operation

### Point level



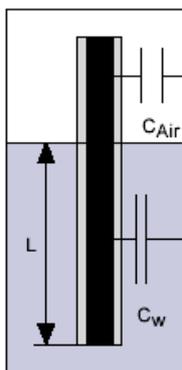
Point level probes work on the principle of the conduction of electricity through the water. The ac-current  $i$  flows from the **40V ac** supply through the resistor **R** to the electrode, through the water to the drum shell, then to the grounded side of the supply. The voltage drop across **R** is much bigger than the voltage drop through the water. The amplifier senses a low voltage on the input and keeps the output relay energised. When the water level drops and the probe tip is exposed, the voltage drop across **R** reduces and the relay is de-energised.

To ensure the probe tip is kept free of metallic based particles, and to ensure no cathodic reaction takes place, the probes operate at 40V ac.

### Continuous level

Continuous level probes work on the principle of electrical capacitance measured when the liquid rises and falls over the length of the probe. The dielectric constant of air is different from that of water, and consequently the detected capacitance alters with the amount of water covering the probe.

**Probes are the sensing element of the equipment and will only operate when connected to the appropriate ERAB controller. They should not under any circumstances be connected to other proprietary equipment.**



## Selection

To ensure the safety of steam boilers, level controls are fitted to control liquid level and give alarms and shutdown response to low level. Most boiler legislation worldwide requires two independent low levels, the first to shut off the burner and the second to lock out the burner.

Selection of the level combination on steam boilers is dependent on the application and manning of the boiler. The equipment will already exist on the end user's boiler but the customer may be concerned that he has been advised to change the types of controls which have served well for many years.

The following questions and answers may be a useful guide, however if any question persists on the application of equipment on steam boilers, please talk directly to Mobrey Measurement or its agents for advice.

### **Should I change from float type level controls to probe type level controls?**

A difficult question.

Mobrey Measurement has both types of equipment and therefore is in a unique position to give an unbiased answer. This question is often asked when the customer de-mans the boiler house and needs to comply with unmanned legislation.

The end user with level equipment positioned on an existing boiler in chambers has major advantages over direct mounted controls, and therefore our advice would be to stay with the existing controls. Instead of moving to direct mounted probes, use Mobrey Measurement's ACCS equipment (see leaflet BP203). This retains the potential for control isolation in case of maintenance problems, which has significant cost implications. The ACCS complies with all current unmanned boiler regulations and requires minimum down time on installation. The ACCS can also be used on external chambers that are fitted with probe controls.

NOTE: The only reason for other manufacturers to give advice on fitting probes is they have no other alternative in order to comply with unmanned boiler regulations.

The Original Equipment Manufacturer (Boilermaker) will tend to use direct mounted controls due to cost purposes and ease of application.

If the decision has been made to change to direct mounting of the level controls the following should be considered:

### **What type of level control - pump control or modulation?**

The normal recommendation is that pump control should be used on steam boilers up to 5000Kg/hr. For pump control applications ENT111 electrodes are used for the pump on/off positions. Levels are set by adjusting the probe length. For boilers in excess of this evaporation rate, modulation of the level should be considered and therefore ENC type capacitance electrodes should be used. See page 5.

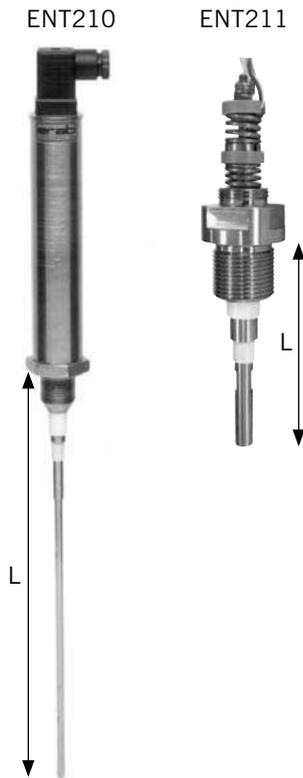
### **Low level alarm**

For all low level applications on steam boilers continuously, partially or totally unsupervised, the high integrity self monitoring probes type ENT210 should be used, they are capable of ensuring correct operation on a continuous basis and conform to all major unmanned boiler legislation. See page 4.

### **High level alarm**

It is recommended the high level alarm is fitted to all boiler applications. Normal integrity probes ENT111 may be used for this application. If a capacitance probe is used, the high alarm can be derived from this signal. See page 6.

# Mobrey ERAB high integrity electrode 210/211



N.B: Length of probe to be specified from the sealing surface

### Features

- ▶ Self-monitoring - ENT 210/211 uses a screen electrode for fail-safe operation
  - ▶ No electronics in the head
  - ▶ Compact robust design
  - ▶ Suitable for pressures up to 32 bar
  - ▶ Simple connection - 3 wires only with plug-in connector
  - ▶ Smart - No start if wiring is incorrect
  - ▶ Detachable electrode
  - ▶ Easy to install - 3/4" BSPP connection
- The probe length can be shortened on site to suit the application.

### Electrode stand

ENT210/211 probes are used for 1st and 2nd low level applications and are normally used in conjunction with other probe types depending on the control parameters of the boiler.

Level probes are normally fitted into flanges with a protection tube, called an electrode stand. This protects the probes from mechanical buffeting and dampens any level surges that could allow false alarms to occur.

Mobrey Measurement has many types of different electrode stands on offer from DN65 to DN100 for different combinations of probes.

A maximum of 6 electrodes may be fitted to one stand. See page 8.

### Description

Mobrey ERAB ENT 210/211 is a high-integrity, conductive level probe for use in open or closed vessels and is well suited for applications in steam boilers, feed water tanks, condensate tanks, expansion vessels and other pressurised or non-pressurised containers. It is normally used with a high integrity controller from the Mobrey Erab product range to give fail-safe boiler protection and alarm functions.

### Safety first

The ENT210/211 electrode is used on critical low level applications.

The design of the probe and the control circuits used require that a special high temperature cable between the probe and the instrument is monitored at all times. Should one of the three conductors (screen included) go open circuit, or if there is a short between cable core and screen, the controller will switch off the burner. The insulators in the probe are also monitored and the controller will alarm if the insulation fails. This system gives complete protection from short circuits, ensuring the probe is of high integrity fail safe design.

### Specification

Type	ENT 210	ENT211
Pressure class:	PN 40	PN 40
Max working pressure:	32 bar	32 bar
Max temperature:	250°C	250°C
Mounting:	3/4" BSPP	3/4" BSPP
Isolating material:	PTFE	PTFE
Body material:	SS DIN 1.4301	SS DIN 1.4301
Electrode material:	SS DIN 1.4301	SS DIN 1.4301
Electrode diameter:	6 mm	6 mm
Max electrode length:	2000 mm	2000 mm
Electrical connection:	4-pin connector	4-pin connector
Housing	Used with D&G stands or stand alone, see Pg. 9	Used with C & H stands see Pg. 9
Integral housing	Yes	No

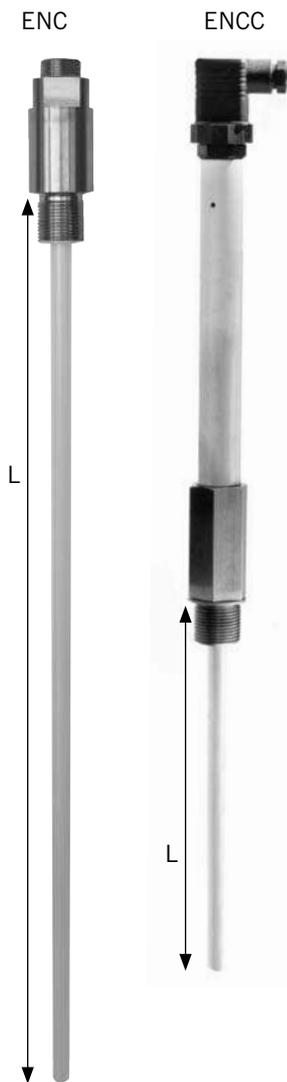
**Note:** High integrity, self-monitoring applications may only be installed directly into the pressure vessel. Mounting externally will negate the self-monitoring functions.

This probe type should be used in conjunction with VSK wire to give complete system protection. This is available from Solartron Mobrey or its agents Type No ER217.

If the electrode is to be mounted directly in the shell of a boiler, it is recommended that a suitable protective tube is used.

The ENT210/211 may be cut to length at site.

# MOBREY ERAB Capacitance Electrode Type ENC



### Features

- ▶ Compact robust design
- ▶ Suitable for pressures up to 32 bar
- ▶ 3 wires with plug-in connector
- ▶ 24V version with mast mounted electronics available for marine applications

### Description

Level probes of type ENC consist of a PTFE-coated stainless steel rod specially designed to work in high pressure applications. The probe cannot be cut to length on site, it can either be supplied in standard length or custom-made.

### Operation

The capacitance level probe type ENC combined with the level transmitter CLT (see page 15) measures the water level continuously in steam and hot water boilers, feed water tanks, condensate tanks, expansion vessels etc.

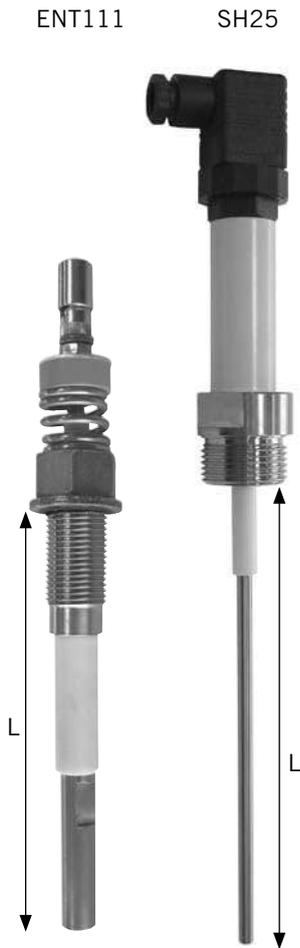
The principle is based on measuring the capacitance between the isolated probe in the steam space and the depth of probe immersion in boiler water. The capacitance changes with the rise and fall of the water level and the change in capacitance is directly proportional to the change in water level. The output from the transmitter can be used to continuously indicate, record and control. This can be achieved by either modulating a feedwater valve, or alternatively varying the speed of the pump using an inverter, dependent on the load required. The system can support the traditional Mobrey modulating valve or may be used with a motorised valve for level control applications. For details of valves contact Mobrey Measurement.

N.B: Length of probe to be specified from the sealing surface

### Specification

	ENCC	ENC	ENCCT	ENCCH38	ENCCH51
Pressure class	PN40	PN40	PN40	PN40	PN40
Maximum working press	32 bar	32 bar	32 bar	32 bar	32 bar
Maximum working temp	250°C	250°C	250°C	250°C	250°C
Isolating material	PTFE	PTFE	PTFE	PTFE	PTFE
Body material	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301
Electrode material	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301	SS DIN 1.4301
Probe length	2000mm	2000mm	2000mm	2000mm	2000mm
Electrical connection	3 pin connector	3 pin connector	3 pin connector	3 pin connector	3 pin connector
Mounting	¾ BSPP	¾ BSPP	¾ BSPP	38mm Hygenic Tri Clamp	51mm Hygenic Tri Clamp
Housing	Single use only or with D & G stands (see p9)	Multi use only Used with C & H stands (see p9)	Single use only or with D & G stands (see p9)	Single use only	Single use only
Integral housing	Yes	No	Yes	Yes	Yes
Feature	Remote CLT	Remote CLT	Mast head CLT mounted	Remote CLT	Remote CLT

# Mobrey ERAB Electrode Type ENT 111



### Features

- ▶ No electronics in the head
- ▶ Compact robust design
- ▶ Suitable for pressures up to 32 bar
- ▶ Detachable electrode
- ▶ Easy to install – M14 connection
- ▶ May be grouped in head with up to 6 other electrodes

### Description

The ERAB ENT 111 is a general purpose conductive level probe for use in open or closed vessels and is well suited for applications in steam boilers, feed water tanks, condensate tanks, expansion vessels and other pressurised or non-pressurised containers. It is normally used for pump control and high level alarm applications on steam boilers.

May be used for first and second low level alarm, where local legislation permits the use of non self-monitoring controls or where the manning level is sufficient.

**However, the ENT210 is the recommended type for this duty.**

### Electrode stand

Level probes are normally fitted into flanges with a protection tube, called an electrode stand. This protects the probes from mechanical abuse and dampens any level surges that could cause false alarms. Mobrey Measurement has many types of different electrode stands on offer, from DN65 to DN100 for different combinations of probes. A maximum of 6 electrodes can be fitted to one stand. See page 8.

N.B: Length of probe to be specified from the sealing surface

### Specification

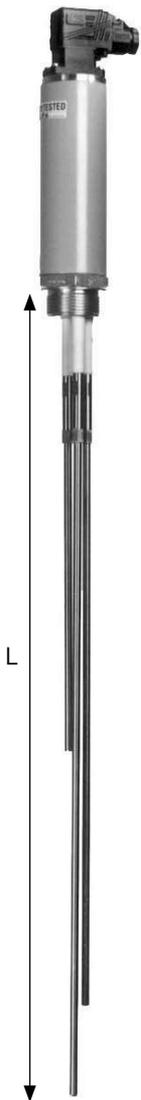
Type:	ENT 111	SH 25
Pressure class:	PN 40/PN100	PN 40
Max working pressure:	32 bar/64 bar	10 bar
Max temperature:	250°C	250°C
Mounting:	M14 x 1,25mm	1" BSPP
Isolating material:	PTFE	PTFE
Body material:	SS DIN 1.4301	SS DIN 1.4301
Electrode material:	SS DIN 1.4301	SS DIN 1.4301
Electrode diameter:	6 mm	6 mm
Max electrode length:	2000 mm	2000 mm
Electrical connection:	Screw	4-pin connector
Housing	Multi use only used with C & H stands (see p9) Cannot be used as stand alone probe	Single use only
Integral Housing	No	Yes This type is used for non boiler applications

**Note:** If the electrode is to be mounted directly in the shell of a boiler, it is recommended that a suitable protective tube is used.

These probe types should not be used to indicate 1st and 2nd low water level unless the site is permanently manned with a competent person and the probes are subject to testing every shift change or 8 hours. This will comply with the requirements of a manned boiler site.

ENT111 probes can be cut to length on site.

# Mobrey ERAB Electrode Type ENK



### Features

- ▶ No electronics in the head
- ▶ Compact robust design
- ▶ Suitable for pressures up to 32 bar
- ▶ Detachable electrode
- ▶ Easy to install – 1¼" BSPP connection
- ▶ Simple plug in connections
- ▶ 2 low levels, pump control and high level alarm in one compact unit. Ideally suited for tank level control.

### Description

ERAB ENK series multi probes are a general purpose conductive level probe set for use in open or closed vessels. They are well suited for use in feed water tanks, condensate tanks, expansion vessels and other pressurised or non-pressurised containers. Typically a four electrode ENK would provide the functions of low alarm, pump control and high alarm. This equipment is not designed for use on steam boiler applications. The ENK electrode can be supplied ready assembled or in kit form for easier transportation. See options in ordering details on page 10.

N.B: Length of probe to be specified from the sealing surface

### Specification

Type:	ENK10/20/30/40/50
Pressure class:	PN 40
Max working pressure:	32 bar
Max temperature:	250°C
Mounting:	1¼" BSPP connection
Isolating material:	PTFE
Body material:	SS DIN 1.4301
Electrode material:	SS DIN 1.4301
Electrode diameter:	6 mm
Max electrode length:	1500 mm
Electrical connection:	7 Pin connector

The electrodes used in this product have the same specification as the ENT111 probe shown on page 7. The close proximity of the electrodes precludes the use of this equipment on steam boiler applications.

# Mobrey ERAB combination electrode types C, D, G and H



### Features

- ▶ Combines any ERAB electrodes that are required to meet the control functions subject to the note below.
- ▶ High integrity, self monitoring electrodes available.
- ▶ Reduces the number of boiler entries to two for a typical system
- ▶ Flange mounted from the factory, easy to install
- ▶ Electrode supports as standard.
- ▶ Detachable electrodes – except capacitance
- ▶ Suitable for pressures up to 32bar  
Alternative connections available

### Description

The ERAB combination electrode assembly enables the user to combine the various electrodes mentioned previously into a single multi head unit.

The combination can consist of pump control and high level together with high integrity electrodes, or the capacitance probe for continuous level operation. This is particularly useful for application onto steam boilers.

### Specification

Pressure class	PN40, PN64, PN100
Maximum working pressure	With ENT111 electrodes 100bar With ENC and ENT 210 electrodes 32bar
Maximum working temp.	With ENT 111 electrodes 285°C With ENC and ENT 210 electrodes 250°C
Mounting	DN50,65,80,100 – PN 40,64,100
Flange material	SIS 1432 and DIN HII
Height of head housing	259mm
Electrical connections	Gland, multiple 4 pin connecting plugs and transmitter head mounted with plug
Max. number of electrodes	6 - Refer to the ordering information
Lengths	Refer to ordering information
Models available	C & D Integral protection tube and vibration support G & H No protection tube fitted but complete with vibration support

### Note

Local legislation determines the combination of electrodes and their application to the steam boiler. It is strongly recommended that 1st and 2nd low water limiters are not combined on the same electrode assembly. In Europe this is a legal requirement.

High integrity, self-monitoring applications must be installed directly into the pressure vessel. Mounting externally will negate the self-monitoring functions.

### Notes

- ▶ For units requiring a capacitance probe the length of probe should be specified.
- ▶ To conform with boiler regulations the stand is manufactured 120mm longer than the longest probe
- ▶ For type C & D tubes, the probe length must be specified at time of order
- ▶ For type G & H stands the conducting probes can be cut to length on site. Capacitance electrode length must be specified at time of order and cannot be altered.
- ▶ Integral protection tubes must have a baffle fitted and be vented above high water
- ▶ Check with Mobrey Measurement the combination required, some combinations are not available as standard.
- ▶ When ordering combination heads, the length of the stilling tube and any ENC capacitance probe has to be exactly specified.
- ▶ Conductive probes can be cut to length on site.
- ▶ All probe lengths to be specified from the top of the mounting flanges

## Type numbering and ordering details

Code	Electrode stands:						
E							
	Code	Stand type	Multiple cover	Individual cover	Protection tube	Vibration support	Stud support
	C		Yes	No	Yes	Yes	No
	D		No	Yes	Yes	Yes	No (ENT210 &/or ENCC only)
	G		No	Yes	No	Yes	Yes (ENT210 &/or ENCC only)
	H		Yes	No	No	Yes	Yes
	Code	Flange					
	A	DN100/PN40	E DN100/PN64#	J DN100/PN100			
	B	DN 80/PN40	F DN80/PN64#	K DN80/PN100#			
	C	DN65/PN40	G DN65/PN64#	L DN65/PN100#			
	D	DN50/PN40	H DN50/PN64	M = DN50/PN100#			
	# NON STOCK FLANGES						
	Code	Probe type and position Numbered in order of priority, see examples below					
	2300	One digit = 1 way (1 x 3/4") (all sizes)					
		Two digits = 2 way (2 x 3/4") (DN100 only)					
		Three digits = 3 way (3 x 3/4" non PED) (DN100 only)					
		Three digits = 3 way (3 x m14) (DN65 only)					
		Four digits = 4 way (2 x 3/4", 2 x m14) (DN100 only)					
		Four digits = 4 way (1 x 3/4", 3 x m14) (DN80 only)					
		Five digits = 5 way (1 x 3/4", 4 X m14) (DN100 only)					
		Five digits = 5 way (5 x m14) (DN80 only)					
		Six digits = 6 way (6 x m14) (DN100 only)					
		1st Digit = 1st position					
		2nd Digit = 2nd position ETC.					
		1 = ENT111 (last priority) (M14)					
		2 = ENT211 (first priority) ( 3/4" )					
		3 = ENC (second priority) ( 3/4" )					
		5 = ENT210 ( 3/4" )					
		6 = ENCC ( 3/4" )					
		0 = BLANK (unused tapings) (M14)					
	Code	Stud					
	S	Stud (Suffix for stud support G & H stands only) Note order of priority.					
	Code	Electrical connection					
	P	4 Pin connecting plug					
	G	Gland					
	T	Transmitter head mounted (with plug)					
	Code	Stand length	Stands C & D	Stands G & H (no tube)			
	C	Length SL = up to 810mm					
	D	Length SL = up to 1160mm					
	E	Length SL = up to 1560mm			Length L = 1450mm only		
	F	Length SL = up to 2060mm					
	G	Length SL = up to 2660mm					
	E	C	A	2310	P	C	Typical ordering information

### Examples:

- ECA2310PC C Type Stand, DN100/PN40, 1 x ENT211, 1x ENC, 1xENT111, plug connectors, SL = 810 max.
- ECB11100GC C Type Stand, DN80/PN40, 3 x ENT111, glands, SL = 810 max.
- ECA21110PE C Type Stand, DN100/PN40, 1 x ENT211, 3 x ENT111, plug connectors, SL = 1560 max.
- ECA31000TE C Type Stand, DN100/PN40, 1 x ENC, 1 x ENT111, transmitter (CLT+Plugs), SL = 1560 max.
- EDA56PF D Type Stand, DN100/PN40, 1 x ENT210, 1 x ENCC, plug connectors, SL = 2060 max.
- EGA56SPE G Type Stand, DN100/PN40, 1 x ENT210, 1 x ENCC, plug connectors, L = 1450. Fitted with support stud

NOTE: Not all combinations of stands are available. Please check with Mobrey Measurement before ordering.  
G & H stands are supplied with electrode rods for cutting and fitting on site.

## Type numbering and ordering details

Code	Probe type
ENT111	For fitting in C or H stands
ENT211	For fitting in C or H stands
ENT210	For fitting in D or G stands or individual fitting
ENC	For fitting in C or H stands
ENCC	For fitting in D or G stands or individual fitting
ENCCCT	ENCC fitted with transmitter CLT used with D or G stands or individual fitting
ENCCH38	ENCC with hygienic type fitting size 38mm
ENCCH51	ENCC with hygienic type fitting size 51mm
SH25	Similar ENT111, fixed length electrode for individual fitting – 10bar
	Code Pressure
	A Standard 32bar
	B High pressure 64bar (ENT111 only)
	Code Electrode length
	A Length L= 150mm (SH25)
	B Length L= 250mm (SH25)
	C Length L= UP TO 700mm
	D Length L= UP TO 1050mm
	E Length L= UP TO 1450mm
	F Length L= UP TO 1950mm
	G Length L = UP TO 2550mm
	Z No Electrode fitted (ENT111, ENT211 & ENT210 only)
<b>ENT210</b>	<b>A D</b> <b>Typical ordering information</b>

### Examples:

ENT111/AD	ENT111 Type probe, standard pressure, probe length up to 1050mm.
SH25/AB	SH25 Type probe, standard pressure, probe length 250mm.
ENT210/AZ	ENT210 Type probe, standard pressure, no electrode fitted.
ENCCCT/AD	Type probe with transmitter, standard pressure, probe length 1050mm.

ENK sensors are multiple probes and will be treated in a similar way to single probes.

Code	Probe type
ENK	
	Code Number of electrodes
	20 2 Electrodes
	30 3 Electrodes
	40 4 Electrodes
	50 5 Electrodes
	21 2 Electrodes (Kit form)
	31 3 Electrodes (Kit form)
	41 4 Electrodes (Kit form)
	51 5 Electrodes (Kit form)
	Code Pressure
	A Standard 32bar
	Code Electrode length (longest)
	D Length L= up to 1050mm
	E Length L= up to 1450mm
	F Length L= up to 1950mm
	Z No electrode fitted (ENK20, 30, 40, 50 only)
<b>ENK</b>	<b>41 A D</b> <b>Typical ordering information</b>

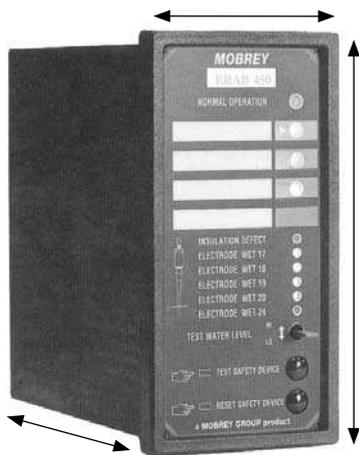
### Example:

ENK40/AE	ENK Type probe, 4 electrodes, standard pressure, probe length up to 1450mm.
ENK30/AZ	ENK Type probe, 3 probes, standard pressure, no electrodes fitted.
ENK41/AF	ENK Type probe, 4 electrodes, standard pressure, probe length up to 1950mm. (Supplied in kit form, electrodes cut and fitted on site).

### Cables

ER217	VSK Cable for use on all high integrity 210 type probes
ER218	Tri – axial cable for use on the capacitance probe applications

# Mobrey Measurement ERAB 400 level and alarm controller



### Features

- ▶ LED indication of liquid position
- ▶ Simple fault finding
- ▶ High standard of safety and quality
- ▶ Plug-in terminal strips
- ▶ Spaces for user label provided
- ▶ Standard DIN housing

### Description

The ERAB 400 controller is a modern and versatile instrument that provides several level functions in one compact unit. The Controller accepts up to four general purpose ENT111 type probes to give a configuration of switch functions depending on the model chosen. A fifth probe may be added for the earth electrode in non metallic tanks. The controller unit should not be used for low level operations on steam boilers, it should be used for pump control and high level only.

### Operation

The electrode probes (maximum 4) sense the level in the vessel, one for each level. If the level moves out of bounds, the controller will go into alarm and trigger the appropriate relays. The corresponding LEDs on the front panel will indicate the alarm condition. The alarm relays are de-energised in the alarm condition. When the level is restored to normal the relays are reset automatically. A fixed time delay is provided of 5 to 10 seconds on all inputs to eliminate level change due to surface turbulence.

A spring loaded rocker switch is provided on the front panel to simulate either wet or dry probe conditions.

### Indications

An LED for each electrode is illuminated when the probe is wet. This allows the user to know where the liquid level is in relationship to the probes, as well as being a useful feature during commissioning, fault finding and installation. It is also easy to check that the correct relay functions are triggered by the correct probe. For every relay an indicating LED is illuminated when the relay is in its active state. A free area is provided next to the LED for the user to make notes.

Symbols on the front panel show what functions are fitted.

### Pump or valve control

The ERAB400 can be used for pump or valve control, either filling or emptying. Normally the relay is energised to switch the pump on and an LED on the front panel illuminates when the pump operates. The on and off levels are set by the respective length of probe.

There are various combinations of switch function available on the ERAB 400 controller which are fully described on the model selection page 17.

### Specification

Supply voltage	230V +/- 15% 50/60Hz (115V optional)	
Power consumption	Approximately 5VA	
Alarm relays	SPCO, max 5A @ 230V ac De-energised in alarm	
Pump relay	SPCO, max 5A @ 230V ac	
Fuse	2amp recommended	
Protection class	IP 40 (IP54 optional)	
Ambient temperature	60°C Max	
Electrode voltage	0.1 – 10 VAC Wet 34 – 48 V ac Dry	
Water conductivity	10microsiemens/cm minimum	
Material housing	Self extinguishing Noryl	
Terminals	Plug in 2.5 mm <sup>2</sup>	

# Mobrey Measurement ERAB 500 Level and alarm controller



### Features

- ▶ Self monitoring safety device, pump control and high alarm available in one controller
  - ▶ Dual channel design
  - ▶ LED indication of liquid position
  - ▶ Simple fault finding
  - ▶ High standard of safety and quality
  - ▶ Plug-in terminal strips
  - ▶ Spaces for user label provided
- Standard DIN housing

### Description

The ERAB 500 controller is a modern and versatile instrument combining a safety device with a built in level and high alarm controller that provides several level functions in one compact unit. The instrument can accept up to 5 conductive probes, one of which is a high integrity type ENT210 that is used for 1st low water application. This option must be specified at time of order.

### Indications

An LED for each electrode is illuminated when the probe is wet. This allows the user to know where the liquid level is in relationship to the probes. It is also a useful feature during commissioning, fault finding and installation. It is also easy to check that the correct relay functions are triggered by the correct probe. For every relay an indicating LED is illuminated when the relay is in its active state. A free area is provided next to the LED for the user to make notes.

Symbols on the front panel show what functions are fitted.

### Operation

The electrode probes (maximum 5) sense the level in the vessel, one for each level. If the level moves out of bounds the controller will go into alarm and trigger the appropriate relays. Corresponding LED's on the front panel will indicate the alarm condition. The relays are de energised in the alarm condition. When the level is restored to normal the relays are reset automatically, but the safety device can be provided with a latching relay as an option. A fixed time delay of 5 – 10 seconds is provided on all inputs to eliminate level change due to surface turbulence. This controller may have a high integrity ENT 210 type probe connected. This will allow the unit to be used on a boiler but only in fully or partially manned applications providing a competent person is on site.

The system does not comply with unmanned boiler regulations.

The controller tests the probe's circuit integrity. If an ENT 210 type is fitted the unit should be used on 1st low application.

A spring loaded rocker switch is provided on the front panel to simulate all probes are wet or dry.

### Pump or valve control

The ERAB500 can be used for pump or valve control, either filling or emptying. Normally the relay is energised to switch the pump on and an LED on the front panel illuminates when the pump operates. The on and off levels are set by the respective length of probe.

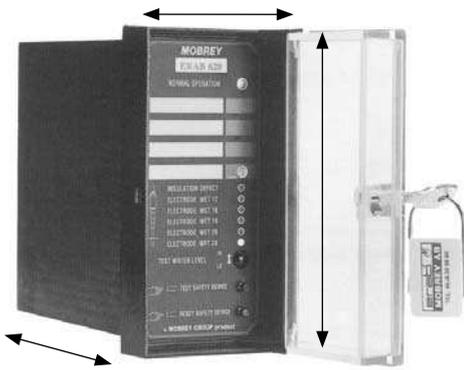
### Specification

Supply voltage	230V +/- 15% 50/60Hz (115V optional)
Power consumption	Approximately 5VA
Alarm relays	SPCO, max 5A @ 230V ac de-energised in alarm
Pump relay	SPCO, max 5A @ 230V ac
Fuse	2amp recommended
Protection class	IP40 (IP54 lockable door fitted)
Ambient temperature	60°C Max
Electrode voltage	0.1 – 10V ac wet 34 – 48V ac dry
Water conductivity	10microsiemens/cm minimum
Material housing	Self extinguishing Noryl
Terminals	Plug in 2.5 mm <sup>2</sup>

### Note

When used in association with a high integrity ENT 210 probe it is essential to use VSK cable to ensure the safety circuit is not compromised. Specify cable ER217 at time of order. See page 10.

# Mobrey Measurement ERAB 620 safety device



### Features

- ▶ Self monitoring safety device
- ▶ Dual channel design
- ▶ Indicates the actual level
- ▶ High standard of safety and quality
- ▶ Plug-in terminal strips
- ▶ Spaces for user label provided
- ▶ Standard DIN housing

### Description

The ERAB 620 is an electronic safety device for boilers. It is used with a conductive high integrity ENT 210 probe and is intended for low level alarm and burner cut out duty only. The ERAB 620 is designed for 2nd low water application on steam boilers in fully or partially manned applications. The system does not comply with unmanned boiler regulations.

### Operation

The electrode senses the level. The safety device goes into alarm when the level drops too low, stops the burner and switches the independent alarm output. The green LED goes out and the red LED comes on. As standard the unit is reset by using the front panel push button. A version with automatic reset upon restoring the water level is available. A built in time delay of 10 seconds eliminates interference from a turbulent water surface.

The safety device can be checked with a test button.

The controller tests the probes circuit integrity and the dual channel gives redundancy of operation on the alarm circuit. The unit is normally used on 2nd low application where the boiler is fully manned.

### Indications

An LED is lit when the probe is in water. Another LED is lit if there is a fault in the cable or in the self monitoring electrode. This is very helpful when commissioning the instrument and subsequently during maintenance work. A dual LED is lit during normal operation and red in alarm.

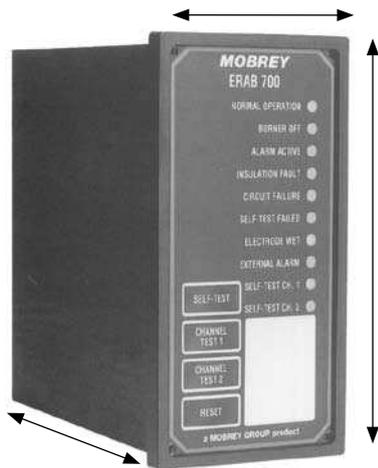
### Note

When used in association with a high integrity ENT 210 probe it is essential to use VSK cable to ensure the safety circuit is not compromised. Specify cable ER217 at time of order. See page 10.

### Specification

Supply voltage	230V +/- 15% 50/60Hz (115V optional)
Power consumption	Approximately 5VA
Alarm relays	SPCO, max 3.5A @ 230V ac De-energised in alarm
Fuse	2amp recommended
Protection class	IP40 (IP54 lockable door fitted)
Ambient temperature	60°C Max
Electrode voltage	0.1 – 10V ac Wet 34 – 48V ac dry
Water conductivity	10 microsiemens/cm minimum
Material housing	Self extinguishing Noryl
Terminals	Plug in 2.5 mm <sup>2</sup>

# Mobrey Measurement ERAB 700 Safety Device



## Features

- ▶ Dual channel design
- ▶ Supervises the integrity of the probe wiring
- ▶ Monitors the probe insulation
- ▶ Self test performed every 30 seconds
- ▶ Checks operation of control relay contacts
- ▶ Individually test each control relay
- ▶ Constant monitoring of water levels, even during self test operation
- ▶ Inputs available from auxiliary alarm devices
- ▶ Approved (see below)

## Description

The ERAB 700 is a highly sophisticated, high integrity, self monitoring and self testing safety device offering the highest degree of safety and reliability. It is used for 1st and 2nd low level protection on steam boilers. It is approved for use on demanded boiler houses in compliance with the PED

## Operation

Under normal operation the green LED displays showing “Normal Operation” and the “Wet electrode”. Every 30 seconds one of the other two LEDs “Self Test 1” or “Self Test 2” light up for the duration of the test period of the appropriate channel. The self test does not effect the operation of the other channel so no loss of supervision is encountered during the test period and the burner will continue to fire. Only a circuit fault or low water condition will cause the boiler to be shut down during normal operation. The controller can also be manually tested by pushing the self test button without waiting for automatic time out.

## Power failure

The ERAB 700 has an internal clock which allows it to come back on line automatically if power is restored to the unit within 60 seconds, provided the levels and all other parameters are normal. If power is not restored within 60 seconds the unit will require to be manually reset. 'A' versions automatically reset if the level and other inputs are normal.

## Approvals

All versions are approved as low level limiters for use on steam boiler under the Pressure Equipment Directive. Approved to TRD604 -1 and PM5. Approved by TUV and fully compliant with SAFed PSG2.

## Note

This equipment is designed and approved for use in conjunction with the ENT210 type probe only when connected using VSK type cable. An auxiliary input is provided for any number of other limiters provided that each outputs normally open (alarm) voltage free contacts are all connected in series. This input will cause the ERAB 700 to shut down and switch off power to the burner supply when the input goes to open circuit. The input is checked by the self test routine. A remote reset input for a normally open voltage free contact is provided to make it possible to effect an instrument reset from one remote site. The pulse must not be longer than 5 seconds otherwise the system will shut down and switch off power to the burner. (Not applicable in 'A' versions). Specify cable ER217 at time of order. See page 10.

<b>T</b>	Automatic reset up to 60 seconds TUV approved
<b>S</b>	Automatic reset up to 12 seconds DNV approved
<b>A</b>	Automatic reset always (UK version)

## Specification

Supply voltage	230V +/- 15% 50/60Hz (115V optional)
Power consumption	Approximately 5VA
Alarm relays	SPCO, max 3.5A @ 230V ac de-energised in alarm
Fuse	2amp recommended
Protection class	IP40 (IP54 optional)
Ambient temperature	60°C Max
Electrode voltage	0.1 – 10V ac Wet 34 – 48V ac dry
Water conductivity	10microsiemens/cm minimum
Material housing	Self extinguishing Noryl
Terminals	Plug in 2.5 mm <sup>2</sup>

# CLT Continuous level transmitter



### Features

- ▶ Non Interactive Zero and Span
- ▶ 24V and 110/240V Versions
- ▶ No potentiometer
- ▶ No range switches
- ▶ 4-20mA or 20-4mA proportional to level
- ▶ 3 Keys up/down and mode
- ▶ Non volatile memory

### Description

The ERAB CLT Continuous Level Transmitter is a solid state amplifier, which measures capacitance and gives a continuous 4-20mA current output directly proportional to the capacitance. Normally the capacitance input is sourced from a suitable probe, designed to measure the level of a liquid in a tank or vessel.

### Applications

The CLT level transmitter will operate in conjunction with any capacitance level probe detailed on page 5 and provides a 4-20mA output of liquid level change. The transmitter is housed in a robust aluminium enclosure, IP65 rated.

Typical uses include pressurised and non-pressurised water tanks, boilers, expansion vessels, tanks for feed water, condensate, fresh water, wastewater etc. Other uses are chemicals, oils and fats, paint, foodstuffs and many more liquids.

### Operation

The CLT has no potentiometers, it is microprocessor based and uses 3 buttons, one SET and two UP/DOWN keys for setting the measuring range. It has a non-volatile memory, which eliminates battery back-up. Once it has been set it will retain its calibration during interruptions in electrical supply.

The CLT is DC-powered with an isolated 4-20mA output. Not only is the output isolated from the input but also from the DC supply, giving a 3-fold isolation. This ensures that the CLT will give an accurate output and will not be affected by intermittent signal deterioration due to earthing problems.

The output signal of the CLT may be reversed to give 20-4mA output proportional to level.

The cable between the CLT and the capacitance probe is a tri-axial cable, where the outer screen is used for connection to ground and the inner screen, screens the center electrode wire. Maximum length 5m.

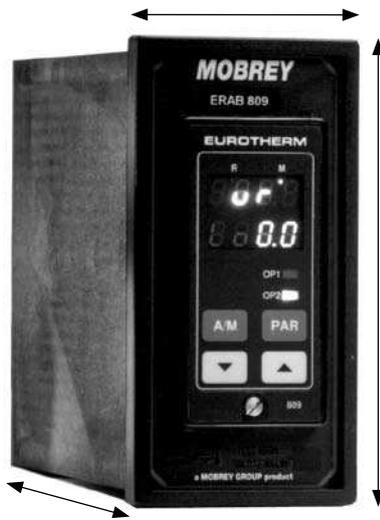
The CLT is designed to suppress the cable capacitance, which otherwise would be added to the measured capacitance.

For stand alone transmitters specify cable ER218 at time of order. See page 10.

### Specification

Input	Capacitance, 0-1000 pF	Temperature drift	<0.1% FS/°C
Max turn-down	100:1	Linearity	<0.5% FS
Max zero offset	1000pF	Supply voltage drift	<0.25% of reading over full voltage range
Supply voltage	18-32V dc 110-240V ac	Repeatability	<0.2% of reading
Output current	3-21 mA DC isolated	Resolution	0.1% FS
O/P time constant	2 seconds	Long term drift	<1% FS/year
Maximum load	750ohms @ 24V dc	Case	Painted aluminium
Output drift	<0.1%of reading with load from 0 to 750ohms	Protection	IP65
Ambient temperature	-20 to +60°C	Isolation voltage	440V ac RMS overall

# ERAB 809 Valve Controller



### Features

- ▶ True valve algorithm
- ▶ Water level position indicator 0 – 100%
- ▶ Calculated valve position indication 0 – 100%
- ▶ Self tuning
- ▶ Available with relay outputs
- ▶ 4 Button operation with user selectable security for every parameter
- ▶ Compatible with existing hydraulic or motorised valves
- ▶ Fully configured for boiler level operation

### Operation

The controller receives the 4–20mA signal from the CLT unit and uses this to calculate the required valve position. The motor travel time must be set to time at full speed for the full range of motion. The cycle time is set much shorter than the motor travel time less than 5%. The unit then proportionally controls the valve by switching relays which apply power to drive the valve open and closed. The unit is fully configured for this operation prior to dispatch and requires minimal setup.

The controller is fitted with a relay which can be positioned within the 4–20mA input range to give a high alarm output. The relay output can be used for low level alarm but is of low integrity and therefore must only be used in this configuration for manned boiler houses.

### Description

The ERAB 809 is a microprocessor based valve controller and is used in conjunction with the CLT transmitter to control the feed water valve on steam boilers. Dual LED displays allow simultaneous viewing of both water level and valve position.

### Application

The ERAB 809 controller operates in conjunction with the CLT probe controllers, ENC capacitance probes and the control valve on steam boilers. The control algorithm offers proportional plus derivative control of the valve motor speed, which when integrated with the action of the motor provides true proportional plus integral control of the valve position. Thus the operation does not depend on potentiometer feedback of the valve position, so the complexity of the valve motor can be reduced with consequent increase in reliability. The output may also be interfaced with an inverter to control the pump motor direct, therefore saving significant energy if driving against a partially closed valve.

The unit can be applied to any existing application provided the boiler is fitted with a motorised valve. The controller can also be used with an existing Solartron Mobrey electro-hydraulic modulating valve, which can save considerable investment.

### Specification

Supply Voltage	100 - 240V +10%/-15% 50/60Hz
Input	4 – 20 mAmp
Output	Volt free contacts 1 Amp rating
Protection Class	IP40 (IP54 optional)
Ambient Temperature	50°C Max
Material Housing	Self extinguishing Noryl
Terminals	Plug in 2.5 mm <sup>2</sup>

**This controller may be used with the existing Mobrey control valve.**



## Associated boiler products

### TDS Controls

Mobrey Measurement manufactures a state of the art TDS system with full temperature compensation to give an accurate reading. The unit will work in non-conducting tanks.

### Automatic control check system (ACCS)

This product has been designed to provide high integrity and self-monitoring to float operated controls in compliance with the latest boiler standards.

### Steam and water flow

Flow meters are available for steam, water and fuel flow measurement using orifice and low energy loss averaging pitot tube technology. Non intrusive meters are available for liquid flow.

### General level

Mobrey Measurement is a level, flow, pressure, density and viscosity measurement instrument company. If you have a problem we will have the solution.

### Smoke density

Self-calibrating, obscuration meters available on request.

TDS Control, timed bottom blowdown, Remote alarm & shut down panels

## For UK and Republic of Ireland markets only – Full customer service provision

Mobrey Measurement is able to provide a full design, installation, commissioning and maintenance service for site installed instrumentation through its **Service Division**. This organisation is able to provide a full boiler house installation and maintenance service and provide turnkey installation solutions for all control and instrumentation functions. The following gives a typical list of operations carried out by engineers and technicians directly employed by the company and operating through five regional offices throughout the UK

- ▶ Total compliance with unmanned boiler regulations, Health and Safety guidance note PM5, SAFed PSG2, and BS prEN12953-9 and BS prEN12952-11 for both existing Mobrey float controls and electronic probe installation
  - ▶ Steam and water flow monitoring, heat and mass flow calculation
  - ▶ Tank and level monitoring solutions
  - ▶ Complete automation solutions bringing together major manufacturers equipment into a single turnkey solution
- Mobrey Measurement Service Division** is an engineering company providing engineering solutions.



Insurance inspection



High integrity, self-monitoring float controls



Electronic probe installation



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