Clark·Reliance®

Section: R100
Bulletin: R100.50A
Date: 12/07
Supersedes: 08/06

ELECTRO EYE-HYE®
BOILER CONTROL SYSTEMS

FM APPROVED

CE

Clark·Reliance® CORPORATION

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THE ELECTROLEV (PROBE) COLUMN

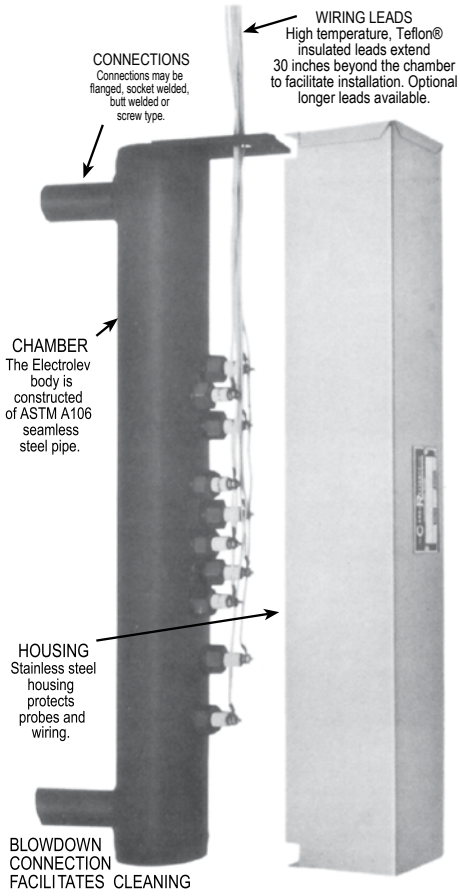


Figure 8
STANDARD ELECTROLEVS CONTAIN 10, 12 OR 20 PROBES

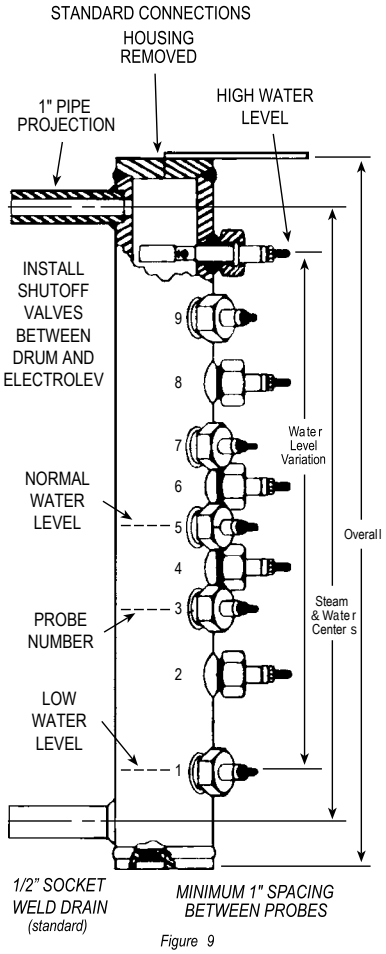


Figure 9
TYPICAL ARRANGEMENT AND DIMENSIONS FOR 10-PROBE ELECTROLEV

ITEMS TO CONSIDER WHEN SPECIFYING

- Vessel connection centers
- Probe locations – 1" (25mm) minimum centers
- Type of vessel connections
  - A) Flanged – size and type
  - B) Female socket-weld-size
  - C) Special drain connections
    - extended pipe (male) 1/2" or 3/4"
    - flange (size & type)
- Extended high temperature probe wires (30" extending from unit is standard)
- Integrally mounted (NEMA 4) weatherproof pre-wired junction box
- Flexpak insulation jacket designed for easy access to accommodate maintenance

OPTIONAL FLEXPAK® JACKET

For maximum system accuracy and personnel safety, the Electrolev should be insulated with the optional FLEXPAK jacket. The jacket provides a 2-inch thick insulation that is easily removed for routine inspections. The jacket is suitable for outdoor service and will withstand contact with surfaces as hot as 650˚F.

MODEL NUMBERS	PROBES
EL450-10, EL1000-10, EL1800-10, ELF3000-10, EZBZ-10, ESB3000-10	*10*
EL450-12, EL1000-12, EL1800-12, ELF3000-12, EZBZ-12, ESB3000-12	*12*
EL450-20, EL1000-20, EL1800-20, ELF3000-20, EZBZ-20, ESB3000-20	*20*

See Table A, to the right)

SPECIFICATION OPTIONS

- *Extra Electrolev Length Beyond 36"*
- *Flanged Steam & Water Connections*
- *Female Socket Weld Steam & Water Connections*
- *Special Drain Connection*
- *Electrode Lead Wire Longer Than 30"*
- *Models other than 10, 12, or 20 probes*

Contact your Clark-Reliance representative for additional specification information.

TABLE A ELECTROLEVS

Model Number	Max. System WSP			Max. Temp.		No. of Probes
	PSIG	BarG	Kg/cm²	˚F	˚C	
EL450-10	450	31	31.6	456	(236)	10
EL450-12	450	31	31.6	456	(236)	12
EL450-20	450	31	31.6	456	(236)	20
EL1000-10	1000	69	70.3	545	(285)	10
EL1000-12	1000	69	70.3	545	(285)	12
EL1000-20	1000	69	70.3	545	(285)	20
EL1800-10	1800	124.1	126.5	621	(327)	10
EL1800-12	1800	124.1	126.5	621	(327)	12
EL1800-20	1800	124.1	126.5	621	(327)	20
ESB3000-10	3000	206.9	210.8	695	(368)	10
ESB3000-12	3000	206.9	210.8	695	(368)	12
ESB3000-20	3000	206.9	210.8	695	(368)	20

MODEL NO.:

EL ___ ___ ___ ___ ___ ___ ___

- 10
  12
  20
  - other consult factory
- 450
  1000
  1800
  3000
- F (3000PSI only)

TABLE B PROBES

Part Number	Max. System WSP			Type Insulator	Electrolev Model	Replacement Probe Part No.
	PSIG	BarG	Kg/cm²			
T020	450	31	31.6	TFE	EL450	*T0202RK*
V020	1000	69	70.3	TFE	EL1000	*V020K*
ZG020*	1800	124.1	126.5	Zirc. Ox.	EL1800	*ZG020K*
FG031*	3000	206.9	210.8	Zirc. Ox.	ELF3000	*FG031RK*
ZBZ020*	1800	124.	126.5	Zirc. Ox	EL1800	*Z020BRZRK*
FSB030*	3000	206.	210.	Zirc. Ox	ELF3000	*FSB030RK*

**Probes - Factory Renew Service Available*

ELECTRO EYE-HYE STANDARD LOW VOLT CONTROL UNIT

MODEL ECIL
SHOWN IS A 10-LEVEL CONTROL UNIT IN A NON-METALLIC ENCLOSURE

ITEMS TO CONSIDER WHEN SPECIFYING

- SELF-DIAGNOSTICS (ECID-69 for 120 VAC) (ECID-70 for 240 VAC)
- Door mounted indicators
- Types of enclosures
- 220V Supply (115 VAC - 50/60 Hz Standard)
- 18 AWG multi-conductor cable
- Dead band relays
- Back-up DC power supply for 12 VDC source
- 4-20 mA. output signal
- Time delay relays for alarm or trip circuits
- Portable system exerciser switch for system diagnosis
- Voting logic (2 out of 3) circuitry for alarm or trip
- Bypass switch for trip circuits, which is used during blow

Contact your Clark-Reliance representative for additional information.

BASE SYSTEM INCLUDES:

- Independently fused relay modules for each probe level.
- One dry set of form C switch contacts rated @ 5 Amp @ 240 VAC or 30 VDC for all probe levels, prewired to terminal block for field selection.

OPTIONAL TEST SWITCH

A Test Switch can be furnished that provides rapid status of Control Unit circuitry and indicator lamps. The Test Switch may be a self-contained unit for independent mounting or contained within the Control Unit as an integral component. Specify ECTSLR (for 10 & 12 probe models) or ECTSLR-2 (for 20 probe models).

OPTIONAL DEAD BAND RELAYS

Dead Band Relays are available within the Control Unit that will actuate "on" and "off" signals to electrical devices at two "high" and two "low" liquid levels.

OPTIONAL 4-20 mA OUTPUT

May be used to interface with computers, or to power auxiliary analog level indicators. Specify PC-27.

CHOICE OF ENCLOSURES

Control Units are available in the following standard enclosures:

NEMA 1: Indoor
NEMA 4: Indoor/Outdoor
NEMA 4X: Indoor/Outdoor
NEMA 12: Indoor/Dirt, Noncorrosive Liquids
Specify stainless steel, epoxy coated steel, or non-metallic.
NEMA 7: Explosion Proof

MODEL NO.:

ECIL ___ ___ ___ *R*

- ___ # of probes = 10, 12 & 20 standard - other, consult factory
- ___ add "M" for 4-20 mA output option

OPTIONAL SYSTEM EXERCISER

Designed to plug into control unit receptacle for testing each level independently or cumulatively. Can be used to assist programming the 4-20 mA option, specify ECID-71.

TABLE C DOOR MOUNTED INDICATORS

Model Number	Style	No. of Lights	Color(s)	Width		Height	
				Inches	mm	Inches	mm
SMI-10BD	Sub-Min.	10	Red/Green	1.75	44	4.50	114
SMI-12BD	Sub-Min.	12	Red/Green	1.75	44	4.50	114
SMI-20BD	Sub-Min.	20	Red/Green	1.75	44	4.50	229

TABLE D CONTROL UNITS

Model Number	No. of Points	Use With Electrolev Models	Test Switch (Optional)	Est. Wt.	
				Lbs.	Kgs.
ECIL-10R	10	All 10 Probe Models	ECTSLR	21	9.5
ECIL-12R	12	All 12 Probe Models	ECTSLR	27	12
ECIL-20R	20	All 20 Probe Models	ECTSLR-2	37	17

TABLE E CONTROL UNIT OPTIONS

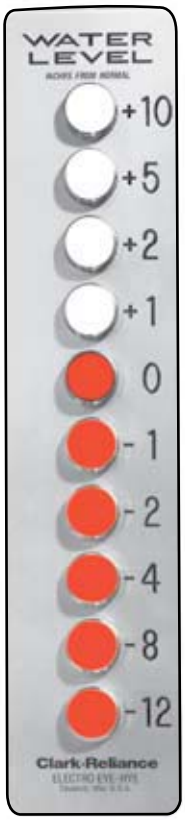
Component No.	Description
ECID-69	Fault Detector - 120 VAC Supply
ECID-70	Fault Detector - 240 VAC Supply
ECID-71	System Exerciser Switch
PC-27	4-20 mA Output Board
PSD-120	120 VAC Power Supply Diverter
PSD-240	240 VAC Power Supply Diverter
ECIV-13	Back-Up 12 VDC Supply

INDICATORS

MINIATURE RED

ALL INDICATORS ARE SHOWN APPROXIMATELY 1/3 ACTUAL SIZE
SEE TABLE D BELOW FOR SPECIFIC DIMENSIONS

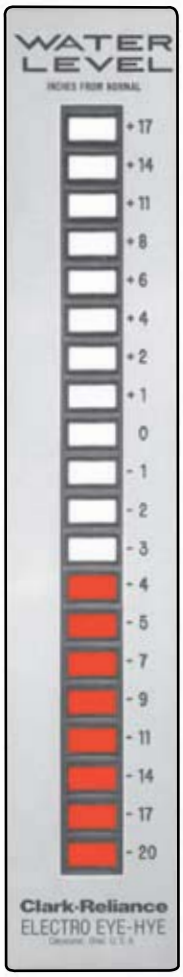
STANDARD RED



STI-SERIES

- Standard
- Incandescent lamp
- Red only
- Lights on for water, no lights for steam

STI - 10
12
20

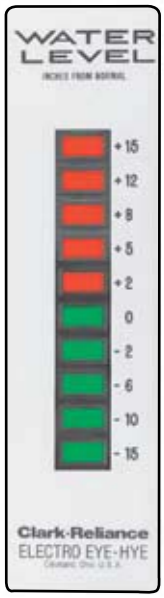


MTI SERIES

- Miniature LED
- Red only
- Lights on for water, no lights for steam

MTI - 10
12
20

MINIATURE BI-COLOR



MTI-BI-COLOR SERIES

- Miniature LED
- Green for water, red for steam

MTI - 10B
12B
20B

SUBMINIATURE BI-COLOR

SMI-BI-COLOR SERIES

- Subminiature LED
- Green for water, red for steam

SMI - 10BR
12BR
20BR

TCB TRI-COLOR SERIES

These models require the PC-27 (4-20mA) and fault detector control unit options, in order to operate on the 4 wire circuit. Can also be programmed in "Tri-Color" mode for green lights in normal level, yellow lights in warning area, and red lights in danger levels.

REMOTE INDICATORS

MODEL NO.	*STYLE*	*LIGHTS*
STI-10	*Standard*	*10*
MTI-10	*Miniature*	*10*
MTI-10B	*Miniature Bi-Color*	*10*
SMI-10BR	*Sub-Miniature Bi-Color*	*10*
STI-12	*Standard*	*12*
MTI-12	*Miniature*	*12*
MTI-12B	*Miniature Bi-Color*	*12*
SMI-12BR	*Sub-Miniature Bi-Color*	*12*
STI-20	*Standard*	*20*
MTI-20	*Miniature*	*20*
MTI-20B	*Miniature Bi-Color*	*20*
SMI-20BR	*Sub-Miniature Bi-Color*	*20*

(See Table F, right)

TABLE F INDICATORS

Model Number	Style	No. of Lights	Indicator Color(s)	Width		Height	
				inches	mm	inches	mm
STI-10	Standard	10	Red	3.62	92	16.62	422
MTI-10	Miniature	10	Red	3.00	76	11.75	298
MTI-10B	Miniature	10	Red/Green	3.00	76	11.75	298
SMI-10BR	Sub-Min.	10	Red/Green	1.75	44	4.50	114
STI-12	Standard	12	Red	3.62	92	19.38	492
MTI-12	Miniature	12	Red	3.00	76	11.75	298
MTI-12B	Miniature	12	Red/Green	3.00	76	11.75	298
SMI-12BR	Sub-Min.	12	Red/Green	1.75	44	4.50	114
STI-20	Standard	20	Red	3.62	92	30.62	778
MTI-20	Miniature	20	Red	3.00	76	16.44	418
MTI-20B	Miniature	20	Red/Green	3.00	76	16.44	418
SMI-20BR	Sub-Min.	20	Red/Green	1.75	44	9.00	229
TCBS-120V	Bargraph	N/A	Red/Gr/Yel	2.50	64	8.90	226
TCBL-120V	Bargraph	N/A	Red/Gr/Yel	4.50	114	16.50	419

LevelMax™ SYSTEMS

Clark-Reliance offers the ultimate choice in Boiler Drum Level instrumentation, with the LevelMax™ system. This combination Drum Level Instrument Assembly provides Local and Remote monitoring of the level in the boiler drum. This system utilizes the world renowned Electro Eye-Hye System (Remote Drum Level Indicator), with a water gage glass attached for local (direct) viewing of the drum level. The LevelMax™ system provides one of the most economical drum level systems for ASME code compliance, and compact assembly design for any application. This concept eliminates a portion of the field piping, welding, which is associated with the traditionally independent instruments. Thereby, reducing the installation cost. The Electro Eye-Hye System is the hub of the assembly, and is available with in the following design pressures: 450, 1000, 1800, & 3000 PSIG.

The photograph illustrates an actual unit for High Pressure service (up to 3000 PSI), including our Simpliport Bicolor type water gage glass. Optional Low Pressure models are rated up to 1500 PSI with Lever actuated water Gage isolation valves and an end stem connected water gage for easy maintenance. The High Pressure design for application pressures up to 3000 PSI include chain wheel actuated water gage valves and flanged connections to the water gage. The following types of water gage glass are available for your application maximum design pressures:

The Specification of these systems is quite easy. Begin by selecting the appropriate Electro Eye-Hye System (from this bulletin), to meet or exceed the design pressure of your application. Then, select the type of water gage glass to meet your specifications. Then, select one or two sets of water gage glass connections.

Additional installation considerations include the orientation of connections on the Electro Eye-Hye column for the probes, the vessel connections, and the water gage glass connections. A complete set application drawings and instruction manuals will be furnished for your approval prior to manufacturing.

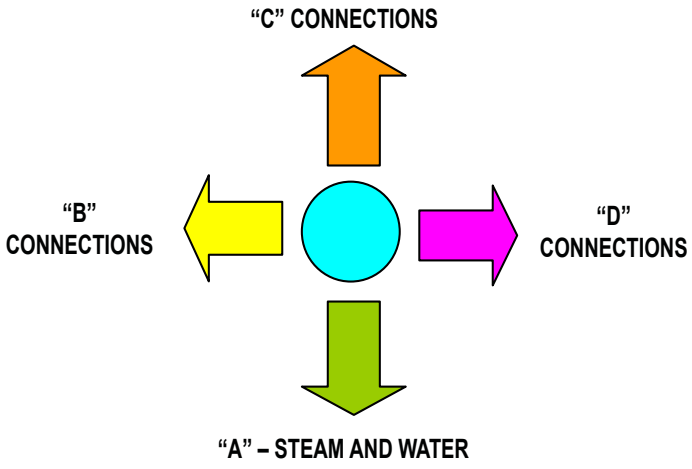
CUSTOMER SPECIFICATION OPTIONS

On LevelMax™ Assemblies, the Electrolev Column is serving as the water column to support one or two water gage glasses for a complete level indication assembly. The illustration below offers guidance for User selections to optimize the installation. The conductivity probes must be located on a different position than a water gage glass, in order to facilitate maintenance or for inspection purposes.

STEAM AND WATER (VESSEL) CONNECTIONS – LOCATION -"A"
Specify the connection size from one of the following (NPS): 1", 1-1/4", or 1-1/2"
Specify the type of connections: Male socket-weld, female socket-weld, or flanged (including the type and rating)

ELECTROLEV PROBE LOCATIONS – specify location - "B, C, or D"
1) Specify the number of probes: 10, 12, 20, or other
2) Complete the form drawing for the probe spacing and dimensional information.
3) MINIMUM SPACING BETWEEN PROBES 1" (25 mm). MINIMUM SPACING FROM TOP PROBE TO STEAM CONNECTION = 1-1/2" (40 mm).
MINIMUM SPACING FROM BOTTOM PROBE TO WATER CONNECTION = 1-1/2" (40 mm)
4) STANDARD DRAIN CONNECTION FOR LEVELMAX COLUMN ASSEMBLIES = 3/4" (20 mm) FEMALE SOCKET WELD.

WATER GAGE VALVE CONNECTIONS WITH GAGE – specify location - "B, C, or D"
The water gage connections are available with threaded flanged, or socket-weld connections on the column will accommodate a wide variety of Clark-Reliance valve sets and water gage glasses. Section1 of the ASME Boiler Code permits 3/4" threaded connections for applications up to 1500PSIG. Refer to Bulletin AB5.1C for additional details on Bronze and Steel Water Gage valves. Standard models include:
BG404 (Bronze construction, lever actuated, to 450 PSI)
SG854 (Steel construction, lever actuated, to 1500 PSI)
SG777* (Steel construction, Chain wheel actuated, to 2500 PSI)
SG677* (Steel construction, Chain wheel actuated, to 3000 PSI)
*Left or Right hand arrangement must be specified for these models.



WATER GAGE GLASSES
Select the type of water gage glass, from the following options:
PRISMATIC to350 PSI (Refer to bulletin R100.31)
FLAT GLASS to 2000 PSI (Refer to bulletin AB7.3A)
SIMPLIPORT Bicolor P4000 Series to 1500 PSI (Refer to bulletin AB7.5)
SIMPLIPORT Bicolor P4100 Series* to 3000 PSI (Refer to bulletin AB7.5)
*Viewing arrangement 1, 2, 3, or 4 must be specified for model P4100 Series Simpliport Water Gage Glasses, which is defined in the Simpliport bulletin AB7.5.
Specify the location from the centerline of the gage visibility to the water connection centerline on the vessel.

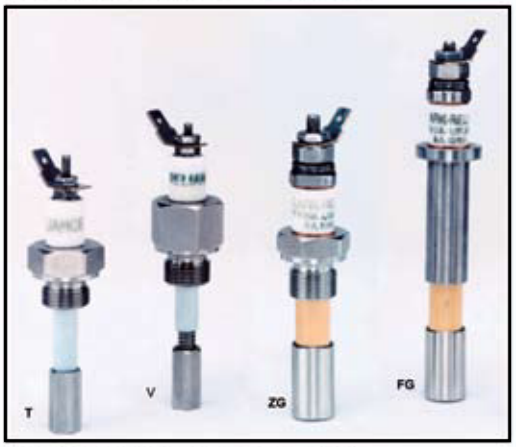
Modern technology LED Lighting accessories for the water gage glass can be located on bulletins AB7.4 for Flat Glass Gages and AB7.5C for Simpliport gages.

Consult with our Applications Engineering staff, with any questions concerning LevelMax™ systems. Local assistance is available, upon request.

THE PROBES:

HEART OF THE SYSTEM AND KEYS TO RELIABLE PERFORMANCE

Traditional Probes



The T Type has been designed for pressures up to 450 PSI
The V Type has been designed for pressures up to 1000 PSI
The ZG Type has been designed for pressures up to 1800 PSI
The FG Type has been designed for pressures up to 3000 PSI
("T" and "V" probes are Teflon insulated with an average service life of 5 to 15 years)
(ZG and FG series probes are zirconium insulated and are the industry's only repairable probes, with an average service life of 5+ years)

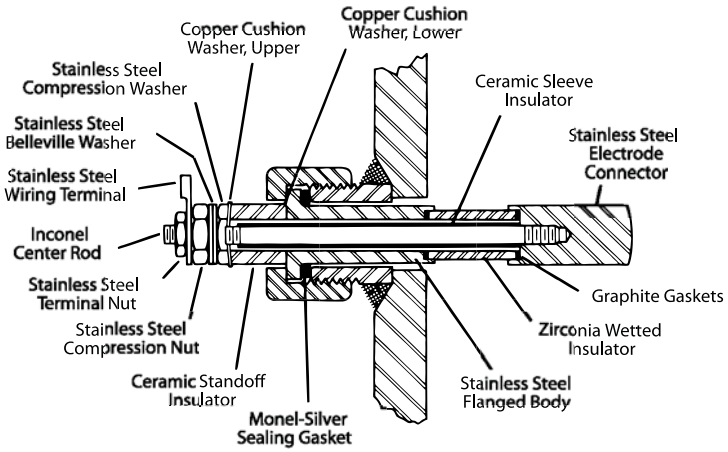
Patented Probes: U.S. 4,507,521 S.A. 83/664 U.K. 2,127,976 Canada 1,200,283
Plus Others World-Wide

Brazed Probes

The FBRZ type has been designed for specification or retrofit into any dark-Reliance instrument designed for 3000 PSI.
The FSB type has been uniquely designed and specified only for Clark-Reliance model instruments, without any sealing gaskets required.
The ZBRZ type has been designed for specification or retrofit to any Clark-Reliance instrument designed for pressures up to 1800 PSI.

PROBE REPAIRABILITY

System economy is enhanced by the availability of off-the-shelf Probe Repair Kits for ZG and FG probes. Replaceable parts include gaskets and other components that are susceptible to routine wear factors over extended periods of time. Factory repair services include pressure and electrical testing



DOOR MOUNTED INDICATORS FOR CONTROL UNITS

Sub-Miniature Bi-color Style Door Mounted Indicators are weather resistant and provide a wide viewing angle. The Door Mounted Indicators are retrofitable on all model ECIL-**R Control Units.

Optional enclosure door window kit available, for use with miniature or standard indicators.

MODEL NO.	STYLE	LIGHTS
SMI-10BD	Sub-Miniature Bi-color	10
SMI-12BD	Sub-Miniature Bi-color	12
SMI-20BD	Sub-Miniature Bi-color	20

For component information, or retrofit (upgrade), contact your local Clark-Reliance representative with the existing system serial number. Numbers begin with EE-__ __ __ __, located on probe housing nameplate, control unit door nameplate, and stamped directly on column.

SYSTEM POWER REQUIREMENTS

ECIL Systems: 120 VAC Supply 240 VAC Supply

Note: Most systems consume less than 75 watts of power. Consult factory for actual system combination power requirements, if required.

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