De Sisti Ligthing S.p.a. Head Office & Factory
Via Cancelliera # 10a Cecchina, 00040 Albano Laziale (Rome- Italy).
Tel. **..39/(0)6/934991** Fax. **..39/(0)6/9343489**
INTERNET E-mail address: **desisti@desisti.it**
U.R.L. Address: **www.desisti.it**

DEB 2.5k/4k

Electronic Flicker Free Ballast

MOD. 2535.110

INSTRUCTION AND MAINTENANCE MANUAL

SECTION 1

1.1 - GENERAL

This new DEB range of electronic ballasts are designed to provide a compact, lightweight, flicker free power source for metal halide discharge lamps.
The control circuit are managed by microprocessors (PIC) to reduce the components number and improve performances. In the ballast front panel there is a 16 characters led display to give various information like: ballast correct operation, failure and more. New cooling system performed by double speed fans with heat sink inside the ballast body and overtemperature protection. New circuit with output short circuit and arc to ground protection. Dual power output with automatic selection. Power factor corrected input circuit to reduce the input current. Constant output power circuit to reduce the variations due to different lamp characteristics (different lamps brand and age). Low noise and flicker free mode. Safety mains breaker. Very small size and weight. CE approved.

1.2 - CONTROLS

The controls for the ballast are all mounted on the front plate and comprise on the left hand side from the top: the two green and red buttons for on and off, the 16 characters display with three command buttons, the three control knobs for local/remote/DMX, low noise/flicker free and dimmer, the mains breaker, the input mains connector and the output lamp connector.

SECTION 2

OPERATION & ROUTINE MAINTENANCE

2.1 - OPERATION

2.1.1 Ensure that a correctly sized connector has been fitted in relation to both the ballast output rating and the size of the mains supply. And the ground wire connected to a good ground.

CONNECTORS: 220 V – 20A

2.1.2. Ensure that the LOCAL – REMOTE - DMX switch is set for the control mode required.

LOCAL =Control is from the ballast or the lamp fixtures using the appropriate on / off buttons.
REMOTE = Lamp fixtures will operate immediately upon connection to the mains supply or operation of the MCB.
DMX = Lamp fixtures will operate accordingly with the commands received via DMX channel.

2.1.3. Ensure that the ballast should be put in a place with a good ventilation and possibly protect from the direct sun and rain and with the air inlets free.
2.1.4. Ensure that the lamp fixtures is fitted with an operational lamp.
2.1.5. Connect the lamp fixtures to the ballast using the cable supplied with the lamp fixtures, ensuring that the groove of the military specification connector along the inner body aligns with the pin on the internal face of the outer housing of the outlet, (on the face of the ballast) and push home. Take a grip of the outer sleeve of the cable connector and rotate clockwise. The

twist lock will rotate through approximately 90% and then come positively to a stop.

2.1.6. Connect the ballast to the power supply and switch the power supply on.

2.1.7. Lift the mains circuit breaker from the off position into the ON position. CAUTION If remote has been selected the lamp fixtures will operate after about two seconds, therefore ensure that the barn doors are open and that the lamp fixtures is not in proximity of any combustible material and not facing any persons, now the display after the start messages will show "READY"

2.1.8. If the ground connection isn't good the display will show "EARTH MISSING" for some seconds and after will go back to previous message.

2.1.9. The system is now ready for use and operation can be initiated from the on switch on the lamp fixtures or ballast.

2.1.10 The lamp fixtures will ignite irrespective of the dimmer setting and will reach its stable position after approximately 1 - 2 minutes from cold when it will automatically revert to the dimmer setting dialed up. Full clockwise rotation gives maximum rated output while full counterclockwise rotation will dim the light output by nominally 30% of its maximum rated value.

2.2 ROUTINE MAINTENANCE

2.2.1. Isolate the ballast from the mains supply.

2.2.2. Clean the ballast casing, removing all dust and grime, in particular from the air inlets.

2.2.3. Check the condition of the mains input cable and connector for signs of visible damage.

2.2.4. Check the multipin output socket for signs of damage or deformation.

2.2.5. Check for the free rotation of the dimmer control.

2.2.6. Ensure that the selector switch is set to local.

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SECTION 3

DISPLAY MESSAGES

FAULT MESSAGES:

SUPPLY TOO HIGH	MAINS VOLTAGE TOO HIGH
SUPPLY TOO LOW	MAINS VOLTAGE TOO LOW
EARTH MISSING	EARTH CONNECTION MISSING
OVERTEMPERATURE	OVERTEMPERATURE IN THE INTERNAL HEAT SINK
BALLAST FAIL	PFC CIRCUIT FAIL
HEAD FAULT	LAMP ON FAILED FOR PROBLEM IN THE HEAD
OUTPUT FAULT	OUTPUT FAULT
IGN. BREAKER OFF	IGNITER BREAKER OFF
LAMP VOLT. HIGH	LAMP VOLTAGE TOO HIGH
LAMP ON FAILURE	LAMP ON FAILED
LAMP OFF	IF THE LAMP SWITCH OFF ITSELF
BALLAST BLOCKED	BALLAST MUST BE SWITCHED OFF

OPERATIONAL MESSAGES

LAMP NOT CONN.	HEAD NOT CONNECTED OR LENS OPEN :
.. or LENS OPEN	.. THE BALLAST CANNOT SWITCH ON
READY 220V *	BALLAST READY
TURNING ON	IGNITER WORKING TIME
LAMP HEATING	LAMP HEATING TIME WITH DIMMER COMMAND INHIBIT
LAMP ON --- KW	BALLAST SWITCH ON WHILE LAMP TYPE DETECTION
LAMP DETECTION	BALLAST SWITCH ON WHILE LAMP TYPE DETECTION
LAMP ON 2.5 KW	BALLAST SWITCH ON WITH 2.5 KW LAMP
LAMP ON 4 KW	BALLAST SWITCH ON WITH 4 KW LAMP
FIRMWARE UPGRADE	FIRMWARE UPGRADE IN PROGRESS

LOG MESSAGES

TOT. HRS (2.5):	TOTAL HOURS WITH 2.5 KW LAMP
TOT. HRS (4):	TOTAL HOURS WITH 4 KW LAMP
HOURS (2.5 kW):	RESETTABLE HOURS WITH 2.5 KW LAMP
HOURS (4 kW):	RESETTABLE HOURS WITH 4 KW LAMP
STRIKES OK:	RESETTABLE SUCCESSFUL STRIKES NUMBER
FAIL. STRKS:	RESETTABLE FAILED STRIKES NUMBER

* The Mains voltage info (220V) is shown with the ready message if DMX operation is selected, the special character <> is shown in the right side position.
The <> will blink if the DMX stream is currently present.

Ballast Display Controller User Manual (v.5.7)

Display Brightness Change

The Display Brightness can be changed by acting upon the following keys:
- key → to increase
- key ← to decrease

The modified level of brightness is automatically saved permanently if the user enters and then exits the Setup menu (no action is required).

Main Menu

All menus are only operating while the Ballast is in READY status.
Press the **SEL** key. The following will display:

LOGS | setup | info

As in all other menus, the selection must be made by acting upon the keys → and ← : only one of the items is selected and will appear in UPPERCASE.

When the desired item is selected, press the **SEL** key:
either the **LOGS** or the **SETUP** menu or INFO data, will display.

Logs Menu

The LOGS menu can only be accessed by authorized personnel, who know the Personal Identification Number, made up by 5 digits and hereafter called **PIN5** (please note that PIN5 must be entered only one time, until the Ballast will be switched off).

The Enter PIN message will appear:

ENTER PIN5

Then the User must select, for five times, a digit in the following display:

0 1 2 3 4 5 6 7 8 9 → * * * * *

- the keys → and ← will select a digit, which will appear magnified
- the **SEL** key must be pressed
- an asterisk will appear in the right side. The default PIN value is (02468).

At the fifth digit, if the entered PIN is correct, the choice of viewing or resetting the logs data is displayed:

VIEW | clear

Select an item and then press **SEL.**

View Logs

The keys → and ← will allow the change of the log item displayed.
The **SEL** key will exit the Log display.
The following items are displayed:

1 - total Ballast hours @ 2.5 kW

TOT.HRS(2.5): nnnn

2 - total Ballast hours @ 4 kW

TOT.HRS (4): nnnn

3 - hours @ 2.5 kW since last clear

HOURS 2.5 kW:nnnn

4 - hours @ 4 kW since last clear

HOURS 4 kW: nnnn

5 - number of successful lamp strikes since last clear

STRIKES OK : nnnn

6 - number of failed lamp strikes since last clear

FAIL. STRKS : nnnn

Items 1- and 2- are total Ballast data and cannot be cleared.
Items 3 -, 4 -, 5 - and 6 - can be cleared by user as explained below.

Clear Logs

A confirmation request is displayed:

SEL to clear log

If the user presses the **SEL** key, logs are cleared and then is displayed the confirm message:

Logs cleared !

Setup Menu

The Display Setup purpose is to allow the choice of selecting user preferred options.
The current display brightness level is automatically saved.
The Setup menu currently offers tree choices:

LANG | dmx ch | freq

Lang Setup

The available languages are shown:

EN | it | fr | es | de

and one of them can be selected: English, Italian, French, Spanish, German

DMX channel Setup

The DMX channel can be selected (range 1 – 512):

DMX CHAN: 2

The DMX channel can be changed by acting upon the following keys:
- key → to increase selected channel number
- key ← to decrease selected channel number

The number will advance / decrease continuously by keeping pressed the key → or the key ←

Freq Setup

AUTO | 50 Hz | 60 Hz

The output frequency can be chosen between:
- AUTO : output frequency will adjust automatically based on input mains frequency
- 50 Hz : output frequency always at 50 Hz
- 60 Hz : output frequency always at 60 Hz

Info Menu

One of that INFO data is shown, depending on current operating mode and status.

DMX operation selected:

DMX channel current value (useful for installation and test purposes)

LOCAL/REMOTE operation, READY status:
MAINS VOLTAGE current value (Volt)

LOCAL/REMOTE operation, LAMP ON status:
LAMP voltage current value (Volt)

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BALLAST FAULT ANALYSIS

SYMPTOM	POSSIBLE CAUSE	REMEDY
• Lamp fixtures fails to light up and make one flash for a short time. And the display message is "LAMP ON FAILURE".	• Lamp not fitted or blown. • Connector not mated correctly or with oxidation in the contacts. • Ballast fails to operate	• Fit operational lamp • Re-make connection. • Clean the oxidation from the contacts .
• The lamp fails to light up and a noise is audible inside the housing of the lamp fixtures. And the display message is "HEAD FAULT".	• Igniter in the lamp fixtures failed. • High voltage cable damaged. • Lamp holder damaged. • Inverter circuit failure	• Replace igniter. • Replace high voltage cables. • Replace lamp holder. • Check the inverter circuit
• Red button light fails to light up when is all the system is connected and is in " ON " position the Main Breaker. And the display message is "LAMP NOT CONN.".	• Failed termination within the mains cable connector • Indicator red lamp failure. • Safety circuit failure(lens door switch in the lamp fixtures)	• Re-make terminations- • Replace either the MAIN BREAKER Mains switch. or the mains filter. • Check into the lamp fixture if the safety circuit is close perfectly.

SECTION 4

SPECIFICATION & MAIN FEATURES OF DESIGN AND OPERATION.

4.1 TECHNICAL SPECIFICATION.

4.1.1 Electrical Performance.

Input voltage	185 – 265 V
Nominal effective input current	20 A (4kw) - 12.5 A (2.5kw)
Efficiency (Average)	> 0.93
Power factor (Average)	> 0.95
Dimmer range	30 %
On/Off control	Local. Remote or DMX

4.1.2 Dimensions and Weight

Dimensions	Width 270 mm. Height 320 mm. Depth 375 mm.
Weight	22 kg.
Working position	Ballast with control panel facing front.
Ambient temperature & Humidity allowed	-20….+45° C IP23

4.2 - GENERAL

4.2.1 Electronic ballasts have been designed to power Metal Halide Discharge and equivalent type discharge lamps.
4.2.2 Such lamps after the ignition and warm up period, work similarly to a bi-directional Zener diode, i.e. they fix the voltage at a constant value irrespective of the current they receive. Therefore to operate stability they require a current generator, a BALLAST.
4.2.3 The lamps steady (optimum) working voltage is lower than at the cold strike ignition and warm up period and is achieved approximately 2 minutes after a cold strike.
4.2.4 - A special igniter circuit is used to provide HIGH VOLTAGE (in the range of 15KV to 70KV dependent upon the lamp size) pulses for a few seconds to generate the arc between the lamps electrodes.

4.3 – BALLAST STRUCTURE

4.3.1 The structure of the DEB electronic ballasts can be sub-divided into three major elements, being :

(a) Power Factor Corrector (PFC circuit)

(b) Current Generator (Chopper circuit)

(c) DC - AC Converter (Inverter circuit)

4.4 – SUMMARY PFC CIRCUIT

4.4.1 The function of the PFC circuit is to transform the A.C. mains voltage (185V – 265V - 50/60Hz) input, to a continuous voltage of about 385V at the output. With a sinusoidal mains current.
4.4.2 A special mains filter to prevent ballast generated noise from entering the mains for respect the CE normative, is inserted in the input circuit.
4.4.3 The PFC circuit works at high frequency and uses as switch power Mosfet.

4.5 – SUMMARY CHOPPER CIRCUIT DESCRIPTION

4.5.1 The chopper is the circuit regulating the current supplied to the lamp. It works at high frequency and uses as switch, power Mosfet.

4.6 – SUMMARY INVERTER CIRCUIT DESCRIPTION

4.6.1 The DC - AC converter is a square wave inverter working at 100 or 120 Hz in accordance with the mains frequency automatically. The frequency is generated from a 4 MHz quartz oscillator. The power switch used are the power IGBT, and the circuit is protected from short circuit and arc to ground.

4.7 – COMPARATION WITH MAGNETIC BALLAST

4.7.1 Compared with conventional wire wound magnetic ballasts, electronic ballasts offer considerable advantages :
4.7.2 Flicker Free performance, lamp power and frequency stabilization (the lamp is properly supplied independent from mains fluctuations).
4.7.3 The possibility to regulate (dim) the light intensity by approximately 30% from its maximum value.
4.7.4 The size and weight of these units is considerably less than those of conventional units.