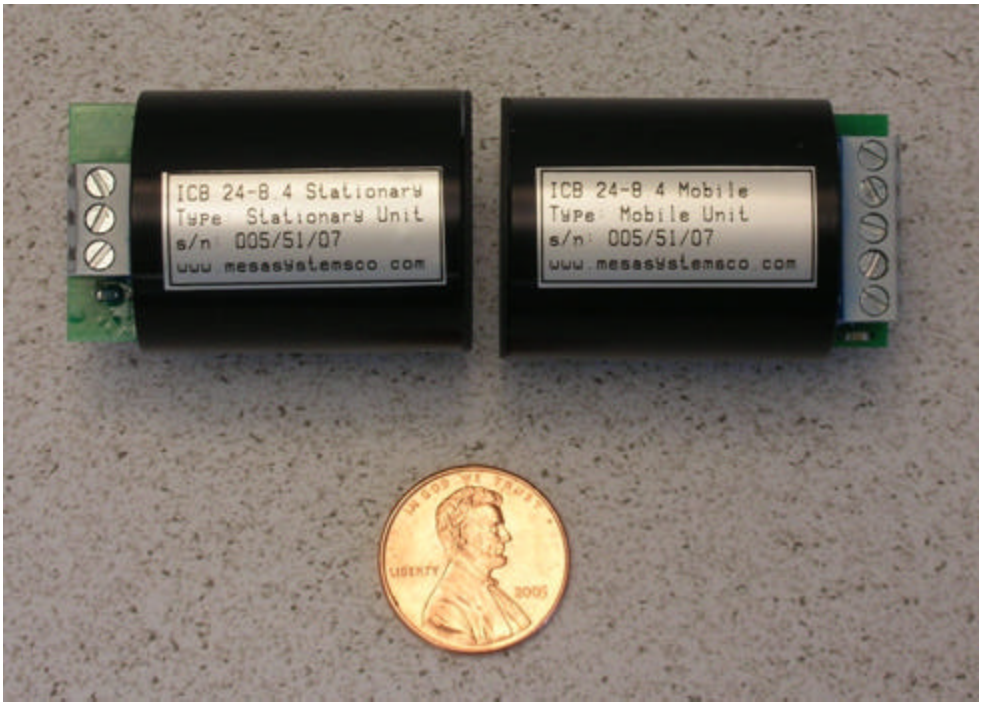
HANDBOOK
Rev. A
January 2008

Inductively Coupled
Lithium Polymer Battery Charging Control,
6.0 V and 4.5 V Regulation and Sense Signal Modules



Inductively Coupled Lithium Polymer Battery Charging Control, 6.0 V and 4.5 V Regulation and Sense Signal Modules
Handbook Rev. A. January 2008
MESA Systems Co.

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01. Fixed (Stationary) Unit
02. Mobile Unit
03. Lithium polymer battery 2 cell 480 mAh Type 118676 (Saehan)
04. Handbook PDF – file and print

2. Safety Precautions

Assure Correct Wiring

The applications of supply or battery voltage to other output connections will immediate burn the voltage regulators! Any wiring or changing of connecting **must not be** performed and verified while system is **energized.**

Short Circuit

Short circuit of lithium polymer batteries may be dangerous! Refer to standard lithium battery safety precautions.
The mobile unit voltage outputs (nominal 4.5 and 6.0 V) include an overload current protection circuit. Under overload condition, the voltage outputs are protected by a fold back circuit, reducing output power. The specified output current of 1 amp, can be drawn for a minimum time of 1 second, for each of the two voltage outputs.

3. System Description

The SSSI power coupling system is a contact free power link between a fixed (stationary) module and a receiving (mobile) module. The stationary module inductively couples electrical power to the mobile module. The mobile module includes a charge control circuit (Linear Technology LTC 1731-8.4) for two 3.7 V lithium polymer batteries and two separate voltage regulators for 4.5 V and 6.0 V. A stationary sense signal monitors when a pair of modules are aligned face-to-face and operating. The modules are line replaceable units (LRU), and any stationary units may be operated with any mobile units.

The system performance data is listed in the following table:

Input Voltage (stationary)	24 V DC +/- 1 V, (200mA)
Sense signal (stationary)	in charge position: 24 V
Sense signal (stationary)	not in charge position: 0 V
Sense signal LED (stationary)	in charge position: LED on
Output Voltage 1 (mobile)	6.0 V DC +/- 300 mV
Output Voltage 2 (mobile)	4.5 V DC +/- 250 mV
Output Voltage 3 (mobile)	8.4 VDC max (two serial-wired 3.7 V Li-Poly cell battery charging)
Steady Output current output 1 + 2	250 mA max
Peak Output current output 1 + 2	1 A for minimum duration 1 sec.
Battery charge current output 3	max. 200 mA

Battery control monitor	LED on during charge process
Operating Air Gap	0 to 3.5 mm max
Electrical connections	Locking screw terminals
Mechanical Outlines	Refer to drawing

The block diagram of the coupling system is shown below in figure 3 – 1.

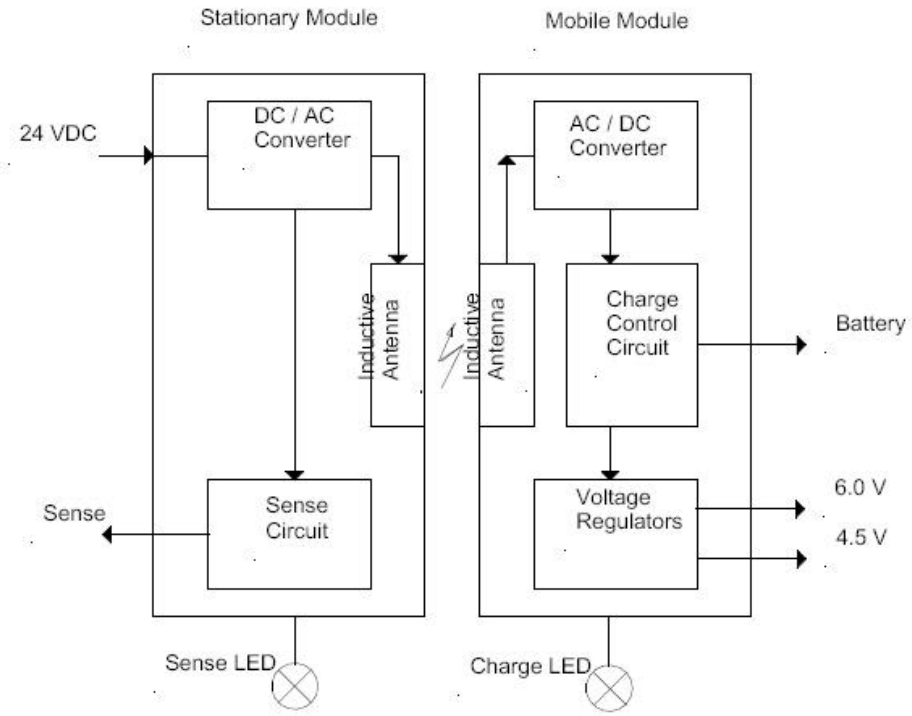


Fig. 3 – 1 Block diagram Coupling System

The stationary coupling unit incorporates a DC to AC converter an antenna for power coupling. The transfer of power is only possible as long as the stationary and mobile units are located within the specified distance range and alignment. In a mobile module, the transferred power is rectified and stabilized to charge the lithium polymer batteries. The battery bus (with or without charging current active) is stabilized to two (2) different output voltages of 4.5 V and 6.0 V. These two voltage outputs are current overload protected. A current of 1 A can be drawn for a minimum time period of 1 second. The sense signal (act.) of the stationary module monitors when the modules are in charge position. The signal is also connect to a LED on the stationary module. The charge control status is monitored by a LED on the mobile module

4. Interfaces

4.1 Mechanical Interfaces

The modules are designed to operate at a nominal distance of 0 to 3.5 mm. Efficiency and transferred power are sensitive to the distance and lateral alignment between stationary and mobile unit. The lateral alignment should be within 0.5 mm.

The Dimensions of the individual modules and battery are as follows:

Item	Weight	Dimensions
Stationary module	37 g	(ø1.0-in x 1.5")
Mobile module	37 g	(ø1.0-in x 1.5")
Lithium polymer battery (Saehan)	29 g	32 x 20 x 11-mm (LWH)

The module should be mounted mechanically by clamps. If thread mounting holes are required in the aluminium body of the modules, location and depths of specific thread holes must be clarified with the factory.

4.2 Electrical Interfaces

Power Supply Input:	24 VDC +/- 1 V current up to max. 0.2 A
Power Supply Output 1:	6.0 VDC +/- 0.3 V, steady current up to 0.25 A
2:	4.5 VDC +/- 0.25 V, steady current up to 0.25 A
3:	max 8.4 VDC batt. charge current up to 0.20 A

Connection allocations:

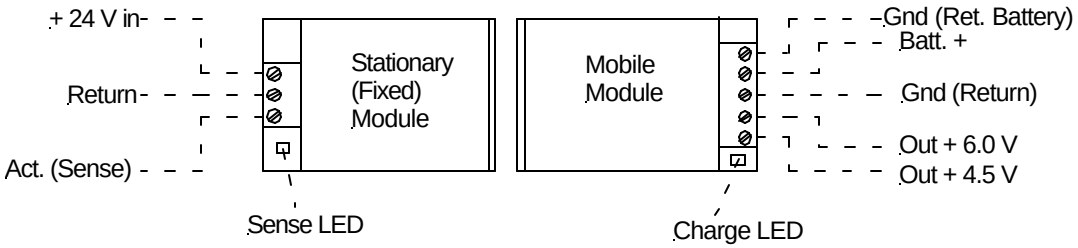
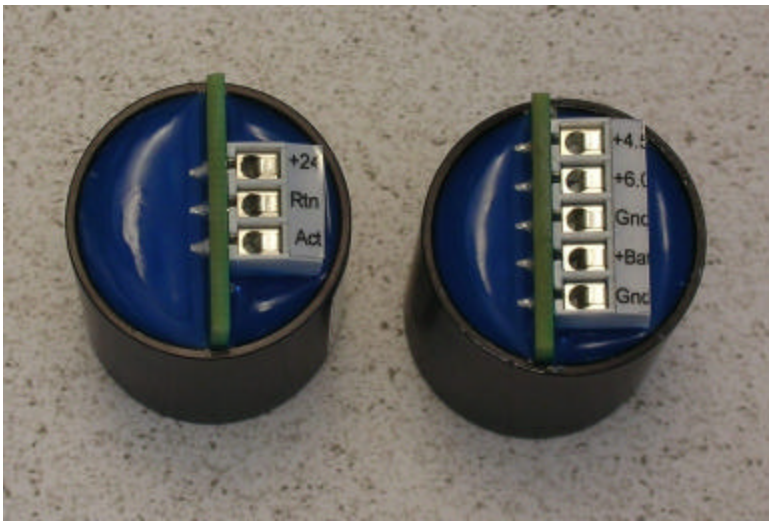


Fig. 4.2 – 1 Coupling System terminals



End view of Coupling System with terminal clamps

Pin allocations:

Stationary module interface

3 position thread terminal clamp

pin	**name**	**allocations**
1	+ 24 VDC in	power supply 24 V
2	Gnd (Return)	return power
3	Act. (Sense)	Sense signal level 0 to 24 V

Mobile module interface

5 pin thread clamp

pin	name	allocations
1	Gnd (Ret. Batt.)	return battery voltage
2	+ Batt.	battery voltage connection
3	Gnd (Return)	common return output voltages
4	Out + 6.0 V	+ 6 V output voltage
5	Out + 4.5 V	+ 4.5 V output voltage

5. Start up Procedure

After delivery and prior to integration, the coupling system should undergo a functional test. The recommended test set up is shown in Fig. 5 – 1. To complete this test, a 24 V DC power supply and DVMs are required.

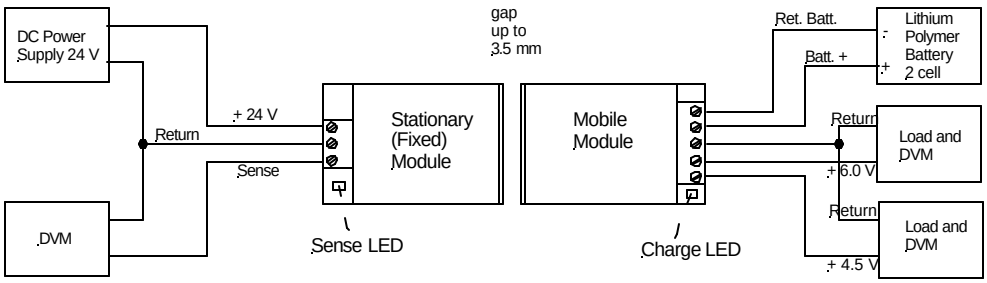


Fig. 5 – 1 Test Set Up

In this configuration power transfer and battery charging can be verified. During test, **correct distance range and alignment** between stationary and mobile module must be secured.

6. System Data Verification

In the Fig. 5 - 1 configuration, the systems performance can be checked. After two battery lines are connection to mobile module, the output voltages of nominal 6.0 V and 4.5 can be measured.

The typical load characteristic of the coupling system with different load currents is shown in Fig. 6 – 1. The overload protection cut off time, with 1 amp load current, can be verified with the use of a scope.

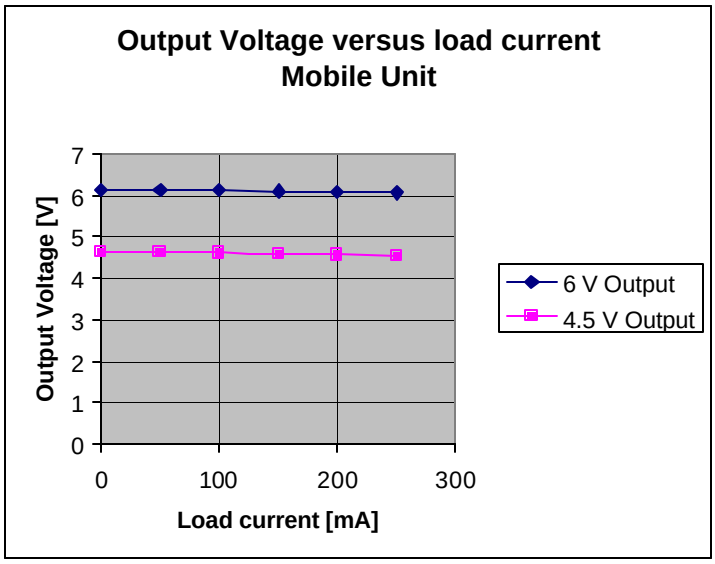


Fig. 6 – 1 Output Voltage Coupling System vs. Load Current

Coupling System with Li-Poly battery