Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

BULLETIN NO. IMH-B
DRAWING NO. LP0011
REVISED 3/97

RED LION CONTROLS

INTERNATIONAL HEADQUARTERS
20 Willow Springs Circle, York, Pa. 17402, (717) 767-6511 FAX: (717) 764-0839
Web site- http://www.redlion-controls.com E-mail- sales@redlion-controls.com

EUROPEAN HEADQUARTERS
892 Plymouth Road, Slough, Berkshire SL1 4LP
ENGLAND +44 1753 696888 FAX: +44 1753 696339

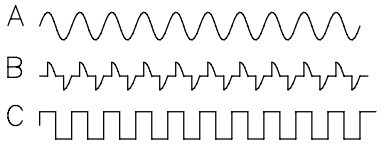
MODEL IMH - APOLLO 4½-DIGIT 5 AMP AC INTELLIGENT CURRENT METER

- *1 mA RESOLUTION (can be scaled to display ±99,999)*
- *OVER-RANGE INDICATION*
- *EASY, ONE-PASS SCALING*
- *STATE-OF-THE-ART DIGITAL ELECTRONICS FOR GREATER ACCURACY AND RELIABILITY*
- *FULL 6-DIGIT, HIGH VISIBILITY, 0.56" (14.2 mm) HIGH RED LED DISPLAY*
- *PROGRAMMABLE FRONT PANEL LOCK-OUT MENU*
- *DUAL ALARM RELAY OUTPUTS (optional)*
- *INTEGRATOR/(totalizer) AND LINEARIZER (optional)*
- *PEAK/VALLEY MEMORY AND TARE (re-zero) FUNCTION (optional)*
- *4 to 20 mA OR 0 to 10 VDC ANALOG OUTPUT (optional)*

- *NEMA 4/IP65 SEALED METAL FRONT BEZEL*

DESCRIPTION

The Apollo Intelligent 5 Amp AC Current Meter *(IMH)* accepts AC currents up to 5 amps and precisely scales them into engineering units with high resolution. With the use of an external 5 amp AC current transformer, of any ratio, currents of any magnitude can be measured and displayed. The meter is calibrated from the factory to display RMS value of a pure sinusoidal waveform. The input is AC coupled to eliminate any DC effects in the signal. True RMS readings are not obtained from complex waveforms, such as square waves, signals that have been rectified or chopped due to a circuit with an SCR or Triac output. These kinds of complex waveforms will cause average value readings. Examples of such waveforms are shown below.



Example A is an undistorted sinewave and the IMH will indicate TRUE RMS. With the complex waveforms shown in examples B and C, the meter will indicate average value.

State-of-the-art digital circuitry virtually eliminates errors due to drift. A full complement of option packages is available to fulfill many process applications.

The indicator features a choice of two different scaling procedures which greatly simplifies initial set-up. A full 6-digit display accommodates virtually any process engineering unit. English-style display prompts and front panel buttons aid the operator through set-up and operation. A front panel lock-out menu protects set-up data and operation modes from unauthorized personnel. A programmable remote input *"E1-CON"* can be utilized to control a variety of totalizing, alarm control, display hold and tare operations. All set-up data is stored in E^2PROM, which will hold data for a minimum of 10 years without power.

An optional integrator *(totalizer)*/linearizer can be used to totalize or integrate signals up to a maximum display value of 999999. It features independent scaling and a low signal cut-out to suit a variety of signal integration applications. Programmable remote input *"E2-CON"* pin is included with this option and can be utilized to control a variety of functions, such as totalizing, alarm control, peak/valley readings, display hold or tare operations, simultaneously with *"E1-CON"* pin. Additionally, nine slopes and offsets can easily be programmed to provide linear indication over the entire range. Peak/valley *(max/min)* reading memory, and a signal re-zeroing *(tare)* function are included and they are easily recalled and controlled by the front panel . All readings are retained at power-down.

Optional dual relays with parallel solid state outputs are fully programmable to operate in a wide variety of modes to suit many control or alarm applications.

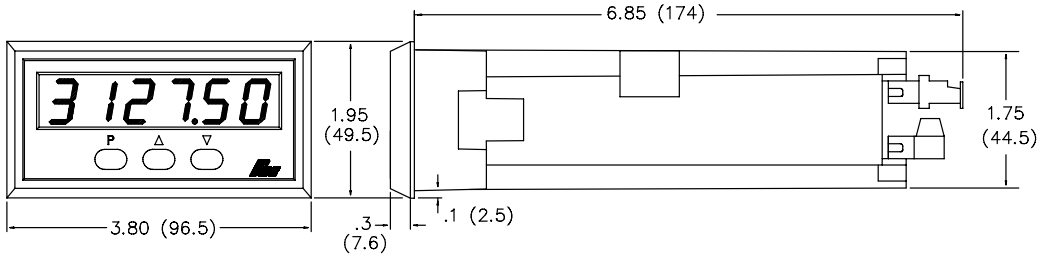
An optional 4 to 20 mA or 0 to 10 VDC re-transmitted analog output can be scaled by the user to interface with a host of recorders, indicators and controllers. The indicator has several built-in diagnostic functions to alert operators of most any malfunction. Extensive testing of noise interference mechanisms and full burn-in makes the indicator extremely reliable in industrial environments. The die-cast front bezel meets NEMA 4/IP65 requirements for washdown applications, when properly installed. Plug-in style terminal blocks simplify installation and wiring change-outs.

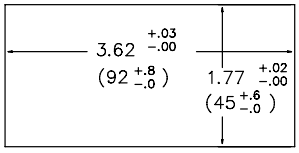
SPECIFICATIONS

1. **DISPLAY:** 6-digit, 0.56" *(14.2 mm)* High LED. Flashing display during totalizer overflow, and "....." during input display out of range. *"OLOLOL"* is displayed during input overload, which is any AC current greater than 5.3 amps AC.
2. **POWER:** Switch selectable 115/230 VAC, ±10%, 50/60 Hz, 14 VA.
3. **CONTROLS:** Three front panel push buttons for modifying alarm values and indicator set-up. Two external inputs for disabling the font panel and controlling programmable functions.

DIMENSIONS "In inches (mm)"

Note: Recommended minimum clearance (behind the panel) for mounting clip installation is 2.1" (53.3) H x 5.5" (140) W.





SPECIFICATIONS (Cont'd)

4. **INPUT RANGE:** 0.000 to 5.300 AMPS AC @ 25 to 400 Hz.
5. **INPUT RESISTANCE:** 0.02 Ω ; 2 WATTS
6. **MAXIMUM SHUNT CURRENT:** 50 AMPS for 1 second ; 10 AMPS continuous.
   CAUTION: In circuits where fault currents can exceed the maximum shunt current, a fast blow fuse should be installed in series with the input signal.
7. **ACCURACY:** *(23ºC, 85% RH) (45 to 500 Hz) ±(0.5% of reading + 5 digits)*
8. **RESOLUTION:** 1 mA
9. **PROGRAMMABLE DISPLAY READING RANGE:** -99999 to 999999
10. **SIGNAL CONNECTION:** 2-Wire
11. **READING RATE:** 2.5 readings/second
12. **RESPONSE TIME:** 2 seconds to settle for step input *(increases with programmable digital filtering)*
13. **TOTALIZER:** Front panel button for input/total display select. Programmable decimal point, time-base, scale factor *(0.001 to 100.000)* and low-end cut-out. Response Time = 0.2 sec. max.
14. **E1-CON AND E2-CON:** External remote inputs that allow activation of various functions *(reset total, peak indicator mode, trigger mode, etc)*. V_{IL} = 0.8 V_{MAX}; V_{IH} = 2.0 V_{MIN}. Response Time = 0.2 sec. max.
15. **ENVIRONMENTAL CONDITIONS:**
    Operating Range: 0º to 50ºC
    Storage Range: -40º to 80ºC
    Temperature Coefficient: ±200 ppm/ºC.
    Relative Humidity: Less than 85% RH (non-condensing)
    Altitude: Up to 2000 meters.
16. **ALARMS (Optional):**
    Solid State: Two, isolated, sinking open collector NPN transistors acting in parallel with relays.
    Imax: 100 mA; V_{SAT} = 1 V @ 100 mA; V_{MAX}: 30 VDC.
    Relays:
    Type: Form C (2)
    Max. Rating: 5 Amps 120/240 VAC or 28 VDC *(resistive load)*, 1/8 HP 120 VAC *(inductive load)*.
    Relay Life Expectancy: 100,000 cycles at Max. Rating. *(As load level decreases, life expectancy increases)*
17. **ANALOG OUTPUT (Optional):** Digital scaling and offsetting.
    4 to 20 mA:
    Accuracy: 0.1% of full scale
    Resolution: 12 bits
    Compliance Voltage: 10 VDC *(500 Ω max. loop impedance)*
    0 to 10 VDC:
    Accuracy: ±(0.1% of reading + 35 mV)
    Resolution: 12 bits
    Min. Load Resistance: 10 KΩ *(1 mA max.)*
18. **LINEARIZER/PEAK/VALLEY/TARE/E2-CON (optional):** 9-segment multiple slope scaling for non-linear inputs. Peak and Valley recording. Signal re-zero *(tare)*.
19. **CERTIFICATIONS AND COMPLIANCES**
    EMC EMISSIONS:
    Meets EN 50081-2: Industrial Environment.
    CISPR 11 Radiated and conducted emissions
    EMC IMMUNITY:
    Meets EN 50082-2: Industrial Environment.
    ENV 50140 - Radio-frequency radiated electromagnetic field [1]
    ENV 50141 - Radio-frequency conducted electromagnetic field
    EN 61000-4-2 - Electrostatic discharge (ESD)[2]
    EN 61000-4-4 - Electrical fast transient/burst (EFT)
    Notes:
    1. No loss of performance during EMI disturbance at 6 V/m.
    Permissible loss of performance during EMI disturbance at 10 V/m:
    Process signal deviation less than 2.5% of full scale.
    Analog output deviation less than 8% of full scale.
    2. Metal bezel of unit connected with ground lead from rear bezel screw to metal mounting panel.
    Refer to the EMC Installation Guidelines section of the manual for additional information.
20. **CONSTRUCTION:** Die-cast metal front bezel that meets NEMA 4/IP65 requirements for wash-down and/or dusty environments when properly installed. Case body is black, high impact plastic *(panel gasket and mounting clips included)*.
21. **CONNECTION:** Removable terminal blocks
22. **WEIGHT:** 1.2 lbs *(0.54 Kg)*.

TOTALIZER/LINEARIZER/PEAK/VALLEY/TARE/ E2-CON OPTION

The totalizer simply totals *(adds)* input readings together using a programmable time base and scaling coefficient. The decimal point position of the totalizer can be programmed independent of the input signal. The totalizer may be reset through a remote input or by the front panel. Alarms may be programmed to trigger from totalizer values. A programmable low signal level disable feature completes the totalizer features. At loss of power to the indicator, the contents of the totalizer are saved.

The linearizer feature is a series of programmable scaling points that are used to construct linear segments to linearize the input signal. A maximum of nine segments are available.

The other features of this option are peak/valley detection and a re-zero *(tare)* function. The indicator will record the lowest reading *(valley)* and the highest reading *(peak)*, automatically, for later recall. This information is valuable in monitoring the limits of the process over any length of time since these values are stored at power-down to span over shifts, days, etc. Remote input E2-CON can be programmed to reset or engage the unit into a peak/valley reading indicator. Additionally, the peak and valley can be viewed and reset from the front panel, if so programmed.

The re-zero *(tare)* function can also be controlled externally or by the front panel. This feature can quickly compensate for small shifts or drifts in the input signal.

ISOLATED ALARM OPTION

The alarm option consists of an additional printed circuit board with nine terminals. Six of these are the two Form-C relays and the other three are the two open collector transistors, which act in parallel with the relays. The two alarms are completely independent with programmable values, hysteresis *(deadband)*, high or low acting, auto or manual reset, triggering from input or total, and tracking one another, if desired. If the alarms are programmed to latch *(manual reset)*, then they will have to be reset either by the front panel or remote input. The alarms can be made to trigger from the totalizer instead of the input, to activate external alarms, control valves, etc.

Alarm #1 can be made to track Alarm #2 by enabling alarm tracking. This is useful in alarm set-ups where a pre-warning control activates before a second alarm shuts off the process when tracking is programmed. Changing the shut-off trip value *(Alarm #2)* automatically changes Alarm #1 so that the offset between Alarm #2 and Alarm #1 remains the same.

ISOLATED RE-TRANSMITTED ANALOG OUTPUT OPTION

4 to 20 mA

The re-transmitted analog output option transmits a digitally programmable 4 to 20 mA current to drive chart recorders, remote indicators and controllers. The compliance is 10 VDC. Non-standard current ranges within the 4 to 20 mA range can be supported by calculating the slope and intercept of the display/output and calculating the required display values at 4 and 20 mA.

0 to 10 VDC

The re-transmitted analog output option transmits a digitally programmable 0 to 10 VDC output signal to drive chart recorders, remote indicators and controllers. Non-standard current ranges within the 0 to 10 VDC range can be supported by calculating the slope and intercept of the display/output and calculating the required display values to 0 VDC and 10 VDC.

TOTALIZER EXAMPLE

An IMH is employed to indicate and totalize amp-hours of an electric heater element. A current transformer with a 5 amp AC output and the proper ratio is selected *(ex. 50:5)*. The input is scaled to indicate 0.00 to 50.00 amps AC. Knowing the heater element nominal current draw is 40 amps AC and the element should be serviced every 13,140 amp-hours, the following programming steps are followed:

BASIC SCALING

Pro 2".....”dECPNt” - 0.00
“round” - 0.10
“dSP 1” - 0.00
“INP 1” - 0.000
“dSP 2” - 50.00
“INP 2” - 5.000

TOTALIZER SET-UP

With an average signal input of 40 amps AC for the Process Display, the following formula applies:

$$S.F. = \frac{D.T.}{I.D.} \times \left[\frac{T.B.}{Time}\right]^{*} \times \frac{D.T.D.P.}{I.D.D.P.}$$

S.F. = Programmable Scale Factor
D.T. = Desired Total Value For A Fixed Time Duration
T.B. = Programmable Time Base

T.B. =	If Program Select Number Chosen Is:		Enter In Formula
	"0" for sec.	=	"1"
	"1" for min.	=	"60"
	"2" for hr.	=	"3600"

I.D. = Input Display Value
Time= Actual Time Period In Seconds

D.T.D.P. =	Desired Total Decimal Point	Enter In Formula
	0	1
	0.0	10
	0.00	100
	0.000	1000
	0.0000	10000

I.D.D.P. =	Input Display Decimal Point	Enter In Formula
	0	1
	0.0	10
	0.00	100
	0.000	1000
	0.0000	10000

$$S.F. = \frac{40}{40.00} \times \left[\frac{3600^{**}}{3600}\right]^{*} \times \frac{1}{100}$$

S.F. = 1 x 1 x 0.01
S.F. = 0.01

"Pro 5".....“dECPNt” - 0
“tbASE” - 2
“SCLFAC” - 0.010
“Lo-cut” - 0.50 (0.5 amp cut-out)

The totalizer will totalize up to 999999 *(999,999 Amp-Hours).*

* *This value is normally 1, but can be used as a coarse scale factor of 60 or 3600.*

** *Since the time period is in Hrs., the selected T.B. is 3600 (Program Select Value = 2) which equals per hour (3600 sec.).*

PROGRAMMABLE FUNCTIONS

Programming of the indicator is divided into modular steps. Each module is a short sequence of data entries. The front panel buttons *"UP"* and *"DOWN"*, *(shown as "arrows" on the front panel)* are used to change the data and set-ups, while the *"P"* button is used to ***save*** or ***enter*** the data. After pressing *"P"* which gains entry into the programming mode, the programming modules are identified by the message *"Pro"* and a number in the display. *"UP"* and *"DOWN"* are used to select the desired programming module and *"P"* is used to enter it. All of the subsequent programming steps follow the same procedure. The rear terminal labeled *"PGM. DIS."* must be ungrounded to gain access to programming. The following table lists the programming steps.

"Pro 0" - RETURN TO MEASUREMENT MODE

"Pro 1" - SCALE UNIT BY APPLYING SIGNAL

- “dECPNt” - Enter decimal point for scaled display
- “round” - Enter rounding factor and trailing zeros for scaled display
- “SCALE” - *
- “dSP 1” - Enter display reading for scaling point #1
- “INP 1” - Apply signal level for scaling point #1
- “dSP 2” - Enter display reading for scaling point #2
- “INP 2” - Apply signal level for scaling point #2
- “SEGt” - *

"Pro 2" - SCALE UNIT BY KEY-IN SIGNAL LEVEL

- “dECPNt” - Enter decimal point for scaled display
- “round” - Enter rounding factor and trailing zeros for scaled display
- “SCALE” - *
- “dSP 1” - Enter display reading for scaling point #1
- “INP 1” - Enter signal level for scaling point #1
- “dSP 2” - Enter display reading for scaling point #2
- “INP 2” - Enter signal level for scaling point #2
- “SEGt” - *

"Pro 3" - PROGRAM FUNCTIONS ACCESSIBLE WITH FRONT PANEL LOCKOUT ENGAGED

- “dSP AL” - Enable display alarms
- “ENt AL” - Enable enter alarms **
- “dSPHYS” - Enable display hysteresis
- “ENtHYS” - Enable enter hysteresis **
- “rSt AL” - Enable reset latched alarms
- “dSPbUF” - Enable display of peak/valley readings
- “rStbUF” - Enable reset of peak/valley readings **
- “SELdSP” - Enable switching display between input and total
- “rSttOt” - Enable reset total
- “tArE” - Enable re-zero *(tare)* of input signal

* *Entire sequence for this modular step is not shown (see manual for further details).*

** *This sequence may be subject to being locked-out due to other programmed sequences.*

"Pro 4" - PROGRAM DIGITAL FILTERING AND REMOTE INPUT FUNCTION

- “FILtEr” - Enter level of digital filtering
  - 0 - no digital filtering
  - 1 - normal filtering
  - 2 - increased filtering
  - 3 - maximum filtering
- “E1-CON” - Enter function of remote input
  - 0 - re-zero input
  - 1 - reset total
  - 2 - reset and gate totalizer
  - 3 - gate totalizer
  - 4 - display hold
  - 5 - reset peak/valley
  - 6 - reset peak and start peak indicator
  - 7 - reset valley and start valley indicator
  - 8 - reset latched alarms
  - 9 - reset all alarms
  - 10 - toggle display between input and total
  - 11 - re-zero input and totalize the tared values
  - 12 - display hold with tare
  - 13 - instrument reading synchronization
- “E2-CON” - Same function as E1-CON

"Pro 5" - PROGRAM TOTALIZER

- “dECPNt” - Enter decimal point for totalizer
- “tbASE” - Enter time base
  - 0 - second
  - 1 - minute
  - 2 - hour
- “SCLFAC” - Enter multiplying scale factor
- “Lo-cut” - Enter low-signal cut out

"Pro 6" - PROGRAM ALARMS

- “trAc” - Enable alarm value tracking
- “dISP” - Enable display alarm annunciators
- “LAtC-1” - Enable alarm #1 latching
- “ASN-1” - Enter alarm #1 trigger source *(input or total)*
- “AL-1” - Enter alarm #1 value
- “HYS-1” - Enter hysteresis value for alarm #1
- “Act-1” - Enter alarm #1 action *(high or low)*
- “LAtC-2” - Enable alarm #2 latching
- “ASN-2” - Enter alarm #2 trigger source *(input or total)*
- “AL-2” - Enter alarm #2 value
- “HYS-2” - Enter hysteresis value for alarm #2
- “Act-2” - Enter alarm #2 action *(high or low)*

"Pro 7 - NOT USED

"Pro 8" - PROGRAM RE-TRANSMITTED ANALOG OUTPUT

- “ASIN” - Select source of analog output *(input or total)*
- “AN-Lo” - Enter 4mA or 0 VDC display value
- “AN-HI” - Enter 20mA or 10 VDC display value

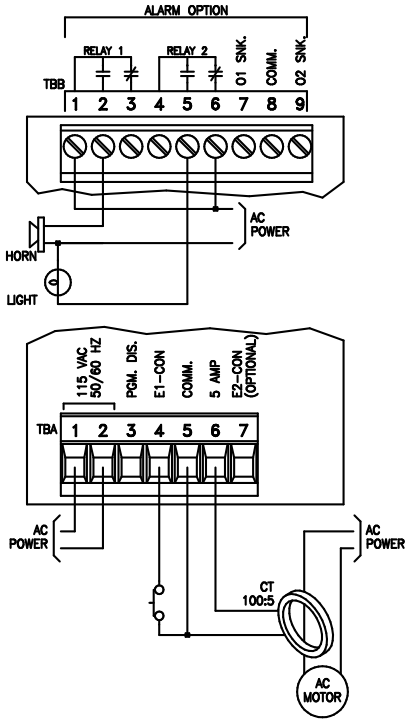
“Pro 9” - SERVICE OPERATIONS (Protected by access codes)

MOTOR MONITORING EXAMPLE

An IMH is employed to monitor AC current of a single-phase 10 horsepower 115 V AC motor. Also, the meter will be used to total current for preventative maintenance purposes. Knowing the maximum full load current is 100 amps AC, a current transformer *(CT)* of 100:5 ratio is selected.

The IMH is scaled to indicate 0.00 at an input of 0.000 amps AC and 100.00 at 5.000 amps AC. Alarm #1 is programmed to activate if the motor current exceeds 84.00 amps AC, which is a 40% increase in current draw from the nominal of 60 amps AC. Alarm #1 is disabled by external control pin during motor start-up due to current surges. Peak and valley *(max/min)* reading for each day are to be recorded.

The amount of current drawn by an electric motor gives a good indication of the overall condition of the motor. Using the totalizer to total current and knowing the nominal current draw is 60 amps AC, preventive maintenance can be performed on total amp-hours. Alarm #2 is programmed to latch when the predetermined amount of total amp-hours is reached *(ex. 4320 amp-hours)*. Totalization is disabled if the input is below 30 amps AC.



ORDERING INFORMATION

MODEL NO	DESCRIPTION	TOTALIZER/ LINEARIZER/ PEAK/VALLEY TARE/E2CON	DUAL ALARMS	ANALOG OUTPUT	PART NUMBERS FOR AVAILABLE SUPPLY VOLTAGES
					115/230 VAC
IMH	5 AMP AC Intelligent Current Meter	NO	NO	NO	IMH40060
		NO	YES	NO	IMH40062
		YES	NO	NO	IMH43060
		YES	YES	NO	IMH43062
		YES	YES	4 to 20 mA	IMH43066
		YES	YES	0 to 10 VDC	IMH43068

For more information on Pricing, Enclosures & Panel Mount Kits refer to the RLC Catalog or contact your local RLC distributor.