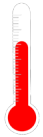
Reading and Interpreting Battery Float Currents for IEEE PES ESSB Summer 2023 mtg

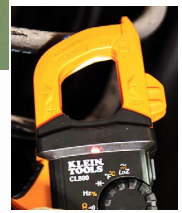
Pros and Cons of Reading Battery Float Current

- Pros
  - 1 of the Best Ways to Detect Battery Aging and Thermal Runaway
    - Latter can Also be Detected by Battery-Ambient Differential °
  - only requires One Monitoring Point / Measurement per String
    - Temperature Requires Comparing All Cells/Jars to Ambient
      - Although Thermal Runaway Can be Caught Early Enough with Just One Measurement / Monitoring Point per String
- Cons
  - Small DC Currents are Difficult to Measure Accurately
    - Clamp-on Ammeters / Split-Core CTs that will do it are Rare
  - need to Wait at Least 1 Day After Discharge to Measure Float Current
    - Allows Recharge Time



Hints on Proper Use of a DC Clamp-On Ammeter

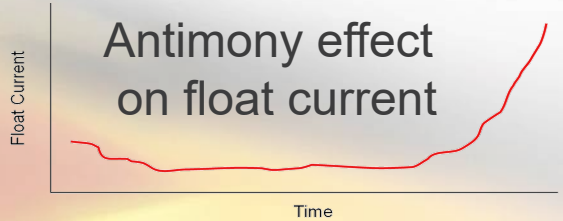
- Note the Direction of the Meter
  - 1 Side of the Jaws will have an Arrow and/or a “+” marking
    - The Arrow should Flow from Positive to Negative
    - + mark electrically Faces the more Positive end of the string



- Zero the Meter Right Next to the Conductor to be Measured
- Center the Cable(s)/Conductor(s) in the Jaws (if possible)
  - Closing the Jaws Completely
- Jaw Size and Accuracy
  - the Bigger the Jaw, the Less Accurate are Small DC Amp Measurements
    - Small Jaw sizes Won’t Fit Bigger Conductors carrying tiny float currents
    - when Battery Conductors have Multiple Cables / Intercell Connectors per Polarity, Measure and Add All of them in that single path

Typical Float Currents (@ 25°C/77°F)

Battery Type	typical µA/Ah (new)	typical µA/Ah (old)	typical µA/ W/cell (new)	typical µA/ W/cell (old)
vented lead-calcium long duration	55 - 130		110 - 245	
vented lead-selenium	130 - 200	260 - 435	45 - 70	85 - 140
vented lead-antimony	220 - 225	900 - 920	N/A	
VRLA gel	305 - 610			
VRLA 2V AGM	400 - 1,200		180 - 600	
VRLA monobloc AGM			120 - 400	



Some Meters That Will Measure Float Current

Meter Mfr	Model	DC Accuracy	Max Amps		Approx. Cost	Jaw & Cable Size
			DC	AC (true rms)		
GTC	CM100	1 mA	100	600	$150	½" (#2 AWG)
Uni-T	UT210E		100		$110	⅔" (2/0 AWG)
Amprobe	LH-41A		40		$400	⅞" (4/0 AWG)
Extech	380942		40	30	$300	
Yokogawa	CL220	10 mA	300		$250	1" (350 kcmil)
Extech	MA445		400		$100	1⅛" (500 kcmil)
Fluke	325				$200	
Klein	CL380				$90	
	CL800		1000		$210	1⅜" (750 kcmil)



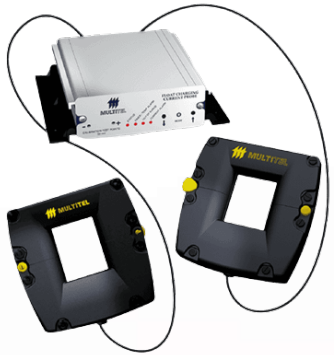






Some Commercial Products for Permanent Monitors that Will Measure Float Current

- Multitel FCCP
  - Measures 0.001 – 5.300 A with Hall Effect CT
  - up to 2,000 A Current Flow w/o Damage
  - Needs Powering w/ 24 or 48 VDC
  - Approximately $1,000?



- C&C Batt-Safe II Monitor
  - Float and Charge/Discharge Hall Effect Probes in Same Package
  - Monitors Other Stuff and Has Controls Too
  - Powered by 120 VAC (from UPS or Inverter?)
  - Approximately $2,000?

More Commercial Products for Permanent Monitors that Will Measure Float Current

- LaMarche FCM

  LaMARCHE ISO 9001:2015 CERTIFIED

  – Measures 0.005 – 300 A Through a Shunt
  – Needs Powering w/ 12 VDC

- Ohio Semitronics (OSI) LDCL Transducers
  – Units Can Measure a Max of 15-50 A (Depending on Which Hall Effect CT Chosen
    - Accuracy down to tens of milliAmps
  – Different CTs can Be Powered w/ Nominal 12 or 24 VDC

OSI OhioSemitronics, Inc.
What Can We Measure for You?

Full Blown Battery Monitors That Will Also Monitor Float Current

- Phoenix Broadband (PBT) – Owned by SENS
- Albér (Vertiv)
- EmSys CellSpy
- B-Tech
- EagleEye
- BatteryDAQ
- CellWatch (NDSL) Frontier

Chargers / Rectifier Systems that can Monitor Float Current

- some Hindle
- some LaMarche

When to Worry About Float Current Values

Battery Type	Worry Level	Increase over Baseline (@ similar °)
Lead-Calcium or Pure Lead	Minor	2x
	Major	3x
Traditional Antimony	Minor	6x
	Major	10x
Low Antimony (e.g., Lead-Selenium)	Minor	3x
	Major	5x