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**Technical Specification for “Add-on components for the DC Electronics rack, for low-noise transport measurements”**

**A Small Instrumentation Modules Mainframe**

1. Rugged, compact design with a rackmount kit
2. 8 module slots
3. 9th port for remote module
4. 10 MHz reference input
5. Cascade multiple mainframes
6. GPIB and RS-232 interfaces
7. Start-up script memory
8. Mainframe voltages  $\pm 15$  VDC,  $\pm 5$  VDC,  $+24$  VDC
9. Current limits 5 A (max.) for  $+5$  VDC
10. 3 A (max.) for  $-5$  VDC,
11.  $\pm 15$  VDC and  $+24$  VDC
12. Power limit 70 W total of all voltages
13. Voltage regulation  $\pm 0.5\%$
14. Internal timebase 10 MHz VCXO,  $\pm 10$  ppm
15. Host interfaces RS-232/DCE; GPIB
16. Interface RS-232, GPIB
17. Timebase Internal/External Lock, Fault
18. Activity 8 slots, Remote SIM, Aux A, Aux B, Mainframe, Data Send, Data Receive, Data Error
19. Start script Enabled
20. Power On, Standby, Overload, Trip
21. Dimensions Mainframe:  $17.0'' \times 5.3'' \times 9.0''$  (WHL)
22. Weight (empty):  $< 6$  kg

**B. Precision Current preamplifier**

1. Input offset voltage  $< 10 \mu\text{V}$
2. DC bias current  $< 2 \text{ pA}$
3. Current gain of 106 to 108 V/A
4.  $15 \text{ fA/VHz}$  input noise (108 V/A)
5. Autozero feature
6. Bias voltage input
7. Bias Input Range  $\pm 5$  VDC
8. Frequency response 0.2 Hz
9. Input impedance  $10 \text{ M}\Omega$

10. Input BNC shield      Ground or float
11. Output Range  $\pm 10$  V
12. Max. current 100 mA
13. Autozero
14. Function select On or Hold
15. Int. switching freq. 0.5 Hz
16. Ext. sync in/out 1 pulse per second (pps), TTL level.
17. Functions as a 1 pps sync output in internal mode.
18. Sync capture range  $\pm 10$  % of 1 pps
19. Operating temperature 0 °C to 40 °C, non-condensing
20. Interface      Serial via SIM interface
21. Connectors      BNC (3 front, 2 rear)
22. DB15 (male)      SIM interface Power supplied by the suitable Mainframe, or optionally by a user-supplied DC power supply ( $\pm 15$  V and +5 V).
23. Dimensions      1.5"  $\times$  3.6"  $\times$  7.0" (WHL)
24. Weight > 1Kg

### **C. JFET Preamplifiers**

1. Frequency range DC to 1 MHz
2. Gain                      1 to 100(1-2-5 sequence)
3. Gain accuracy  $\pm 0.5$  % (DC to 100 kHz),  $\pm 5$  % (<1 MHz)
4. Gain stability      200 ppm/°C
5. Input noise (typ.):      4 nV/ $\sqrt{\text{Hz}}$  @ 1 kHz
6. Input impedance:      100 M $\Omega$  // 35 pF
7. Input bias current (DC coupled): 0.5 pA (typ.)
8. AC coupling freq. (-3dB) 16 mHz
9. Input selection: A, A-B or GND
10. Input coupling: AC or DC
11. Input shields:      Floating or ground
12. Maximum input:  $\pm 1$  V differential,  $\pm 5$  V common mode
13. Maximum output:       $\pm 10$  V
14. Common mode rejection 85 dB @ 1 kHz
15. Operating temperature 0 °C to 40 °C(non-condensing)
16. Interface                      Serial via SIM interface
17. Connectors:      BNC (3 front, 1 rear); DB15 (male)
18. Power Power supplied by the compatible Mainframe, or optionally by a user-supplied DC powersupply ( $\pm 15$  V and +5 V)
19. Dimensions:      1.5"  $\times$  3.6"  $\times$  7.0" and Weight < 1kg

### **D. Rechargeable isolated voltage source**

1.  $\pm 20$  V isolated voltage source
2. Ultra-low noise output
3. Two switchable, recharging batteries for continuous operation
4. Battery lifetime: 1000 charge cycles
5. Output floats to  $\pm 40$  V
6. Short-circuit protected Output
7. Output range  $\pm 20$ V, 1mV resolution
8. Max. output current  $\pm 10$ mA
9. Floating output  $\pm 40$ V (common mode to ground)

10. Noise 10 $\mu$ Vrms (1 kHz bandwidth)
11. Current limit 15mA
12. Short-circuit duration indefinite
13. Batteries: Number of batteries 2 (1 operating, 1 charging/standby); Type Nickel metal hydride Charge time 5 hrs, Discharge time 12 hrs. (10mA load); Lifetime >1000 charge cycles, 2 yr. shelf life Battery switching Automatically switches batteries when active battery is fully discharged.
14. Operating temperature 0 °C to 40 °C, non-condensing
15. Power Powered by suitable Mainframe, or by user-provided DC power supply (+24V, -15V and +5V)
16. Dimensions 1.5"x3.6"x7.0" (WHD)
17. Weight > 1.5Kg

E. **Warranty:** One year from the date of acceptance or installation.

