10 POINT METER/MEGGER BOX

During installation of electrical systems: voltage checking, rotation testing, and meggering of cables are common practice. Within critical facilities and in particular facilities with data centers that cannot afford any down time it is imperative that the above testing be performed and often times documented or reconfirmed prior to placing critical load on an electrical device. With large data facilities having upwards of 10,000 cable whips within their data halls alone this can become a daunting task.

The 10 Point Meter/Megger Box has 5 fused inputs (L1, L2, L3, N, and G) and comes with four cables designed to fit into the 5 inputs. One cable can be used to test panel boards and switchgear; the other cables can be used to attach to any male plug in order to check any number of cable whip connections. There are two output connections that can be connected to any Voltage Meter and/or Megger device. Each of the 10 points that need to be checked on a three phase system with a neutral and a ground are labeled on the front of the box (L1/L2, L1/L3, L2/L3, L1/N, L2/N, L3/N, L1/G, L2/G, L3/G, and N/G). The test switch on the front of the box completes the circuit to allow voltage to start running through the metering or meggering device. The "TEST" switch held in the "N/G" position tests the Neutral to Ground against each other. The "TEST" switch is a momentary switch for optimum safety.

Safety, accuracy, and time/cost savings were considered when constructing the 10 Point Meter/Megger Box.

Safety

The cable whips that connect the panel board up to the data rack power strips are run either above or below the data rack. A female cord cap at the end of the whip is where voltage checking will take place. Without the 10 Point Meter/Megger Box and the cable provided to connect any male plug (the male plug that fits into the female cord cap) an electrician would be forced to extend the leads of his meter in order to place them inside the female cord cap to test voltage while a second person holds the spring cap open to the female receptacle. This is a dangerous process that requires rigging a device in the field for testing. With the male plug terminated to the cable that comes with the 10 Point Meter/Megger Box, only plugging the male plug into the female cord cap is required; no second person either. Also, when gear is energized voltage and rotation testing are performed to verify all is correct. This is normally performed by an electrician once the gear is energized. The electrician must stick the two leads of his meter on each of the five points to verify the 10 point test. Then place the rotation meter on the three phases and perform the rotation test. With the 10 Point Meter/Megger Box, voltage and rotation testing a panel board or switchboard is made safe also. The alligator-clip cable that is provided with the box allows the electrician to connect to the three phases, the neutral and the ground within a de-energized board. Once energized, the provided cable is 7' long which allows the electrician to stand a safe distance away from the energized gear. The voltage meter and rotation meter can then be connected to the box to take the voltage and rotation readings while standing up to 7' away from the energized equipment (most equipment you can even push the door back closed during the start-up testing). This eliminates hot suits in many cases; as well as exposure to live panelboards/switchgear bussing...Recap: 1.Hook alligator-clips up on de-energized bussing, and push door up closed. 2. Energize gear/switchboard and take reading(s). 3. De-energize gear/switchboard and remove alligator clips. Done.

Accuracy

An electrician performing meggering and voltage readings would normally have only two leads. Therefore it is up to the electrician to remember which of the 10 point tests has been performed... and which of the ten tests still remain. Within a female cord cap this task is further complicated by having equal spaced/sized holes placed in a circle (See figure 1.0 at end of document). The 10 Point Meter/Megger Box has 10 labeled positions on the front of the box. Therefore moving the knob to each position and taking the reading is all that is required. Once the male plug has been attached to the provided cable, it is not required that the electrician remember which way the female cord cap was rotated; this will eliminate a documenting a false reading due to the fact that the neutral hole looks exactly like the A-phase hole.

Savings/Efficiency



of Whips

The time analysis graph above shows a 1 to 6 ratio in time savings

# of Whips	No Box	Box
125	1	0.13
250	1	0.26
500	3	0.52
750	4	0.78
1000	6	1.04
1500	9	1.56
2000	12	2.08
3000	18	3.13
6000	35	6.25
10000	58	10.42



The cost analysis graph above shows an exponential growth in savings.

# of Whips	Вох	No Box
150	\$ 4,668.75	\$ 2,625.00
250	\$ 4,981.25	\$ 4,375.00
300	\$ 5,137.50	\$ 5,250.00
400	\$ 5,450.00	\$ 7,000.00
500	\$ 5,762.50	\$ 8,750.00
750	\$ 6,543.75	\$ 13,125.00
1000	\$ 7,325.00	\$ 17,500.00
1500	\$ 8,887.50	\$ 26,250.00
2000	\$ 10,450.00	\$ 35,000.00
3000	\$ 13,575.00	\$ 52,500.00
6000	\$ 22,950.00	\$ 105,000.00
10000	\$ 35,450.00	\$ 175,000.00

PICTURES



Overview of 10 Point Meter/Megger Box

Side view of 10 Point Meter/Megger Box



5 wire cable with male plug attached (Male adapter shown on cable to aid understanding; not included with cable)





5 wire cable with alligator clips attached (One of the included cables)

Standard meter lead extension (Required for use of this box, fits multi-meters and battery operated meggers. These will be sent with the box.)



Recommended Rotation Meter Type (Not included with box; demonstrative purposes only)





Figure 1.0 (Not included with testing box; demonstrative purposes only.)

