The load set-up was selected to provide the following features:

a) Typical real life load
b) The capacity of the APSS is fully utilized without over-compensation of reactive power

From the test, it is observed that APSS successfully reduced load current by 50%. Reactive-power loading has dropped to 20% of its original demand (11.1kvar) .Power factor has improved closer to unity (0.92) and is still lagging (*no overcompensation*).

Test IV: **Loaded IM**:

In this test, a typical AC Chiller Unit is the load. Again, measurements are taken at the supply *with and without* the APSS(9.1kvar).

Quantity	Without APSS	With APSS
V, volts	223	223
I, amps	62.5	53.2
VA, kVA	24.2	20.5
Q, kvar	13.1	4.0
P.f	0.83 lag	0.98 lag

Again, this test proves the effectiveness of the APSS in reactive power compensation where Q dropped by 70% and almost all load current is to supply active-power component. Power factor is (0.98) which is close to unit

Test V: **Loaded IM Parallel with Two APSS Units**

In this test, a typical AC Chiller Unit is the load. Again, measurements are taken at the supply *with and without* the APSS(9.3+3.98 kvar).

Quantity	Without APSS	With APSS
V, volts	226	227
I, amps	61.3	51
VA, kVA	23.9	19.9
Q, kvar	13.3 lag	0.2 lag
P.f	0.83	0.99

This test is similar to the previous one. However, two APSS units are used to provide full Q-compensation where reactive power becomes negligible (0.2 kvar).Power factor is almost unity (0.99).Supply current dropped to active-power component only.

Conclusions

From the conducted tests, it is evident that APSS can compensate load reactive power (power factor corrector). In this way, the following benefits are gained:

1) Supply current drops
2) Power factor improves.
3) Lower source current means lower active power losses(i.e. less energy loss in the distribution network *cables+ transformers*).
4) Again, this leads to longer lifetime of distribution network .
5) Higher loadability of the network.

الباحث الرئيس

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Test II: **Unloaded IM**:

In this case, a 20-HP unloaded IM is connected to the 127/220 Volts supply. Measurements were taken at the supply point with and without the APSS.

Quantity	Without APSS	With APSS
V, volts	223	224
I, amps	18.4	6.05
VA, kVA	7.15	2.33
Q, kvar	7.1	2.0
P.f.	0.12 lag	0.27 lead

Again, reactive power demand is overcompensated by the APSS. This is the case since Q-generation of APSS at 224-Volts is fixed at 9.1 kvar.
The current dropped to 30% of its original value. Power consumption at no-load feeds losses only(mechanical + electrical).

Test III: **Mixed Static-Dynamic Load**:

In this test, a static 3- Ø R-L load is connected parallel to the unloaded IM. Again, measurements are taken the 3- Ø 127/220 Volts supply with and without the APSS.

Quantity	Without APSS	With APSS
V, volts	220	220
I, amps	32.9	16.4
VA, kVA	12.5	6.2
Q, kvar	11.1	2.2
P.f.	0.46 lag	0.92 lag