Super ECO Mode

GE Consumer & Industrial
September 2004

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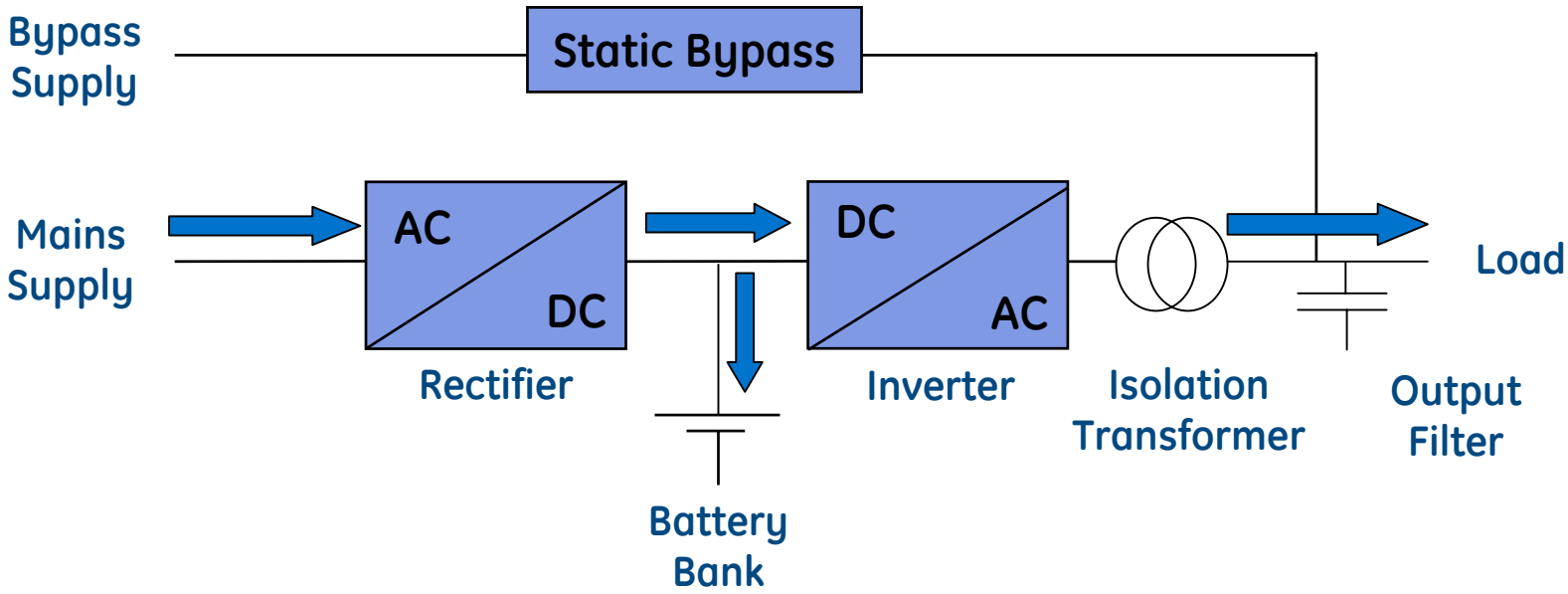
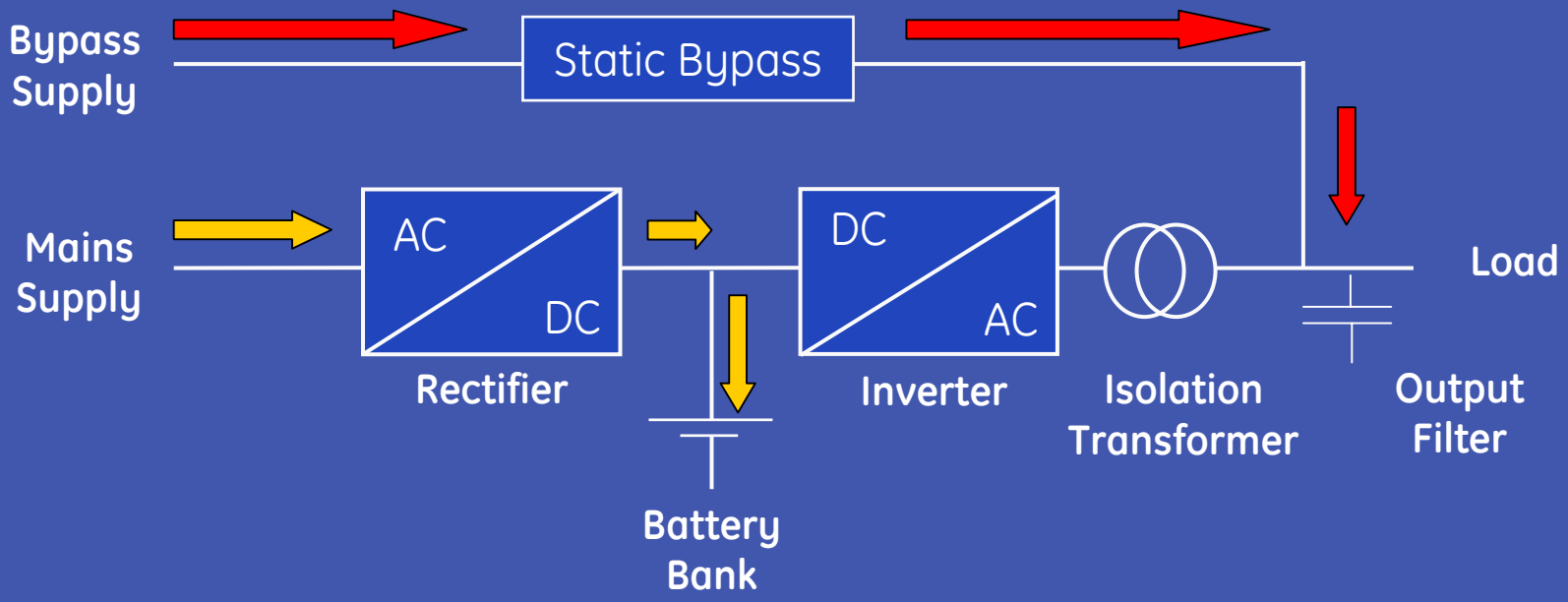
VFI Concept – Voltage Frequency Independent



- The output voltage is newly generated, independently from the input voltage.
- Voltage and frequency variations at the input are not present at the output.
- Heat losses are present in Rectifier, Inverter and in the Inverter Isolation Transformer

Principle of Super ECO Mode

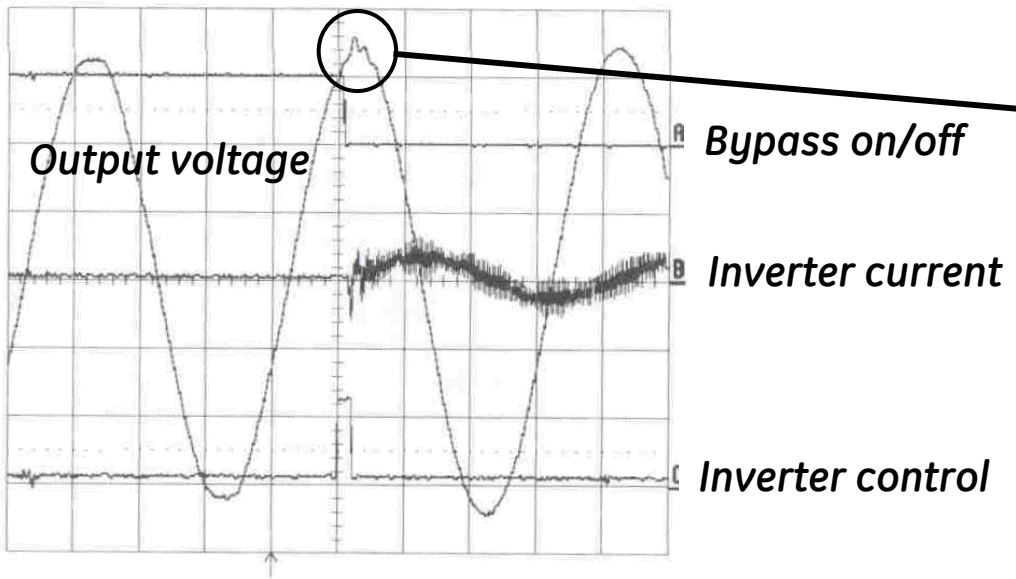
Supply the load via the bypass circuit in order to prevent heat losses. This can be done only in case the bypass supply is in tolerance



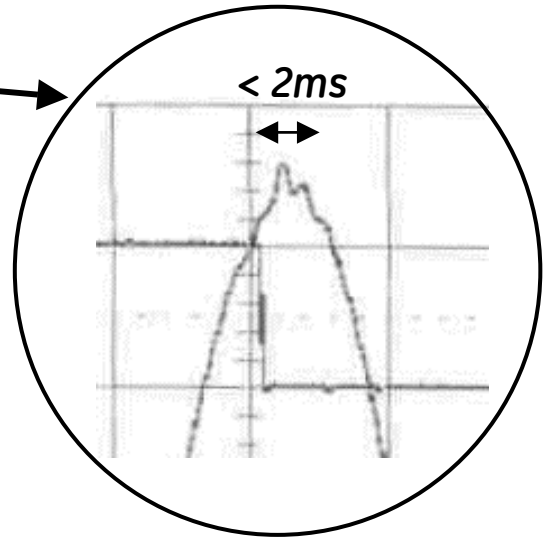
- Load is supplied via the bypass
- The rectifier keeps the batteries charged
- The inverter is switched off (no heat losses)
- The transformer is kept magnetized by the bypass (neglectable losses)

Performance of Super ECO Mode

Simulation of transfer back to inverter



Fast Transfer to Inverter



- In case the bypass supply is out of tolerance the inverter will start immediately
- This transfer is done within 2 ms, which is more than sufficient for most loads
- Bypass supply voltage tolerance: +/- 10% (adjustable)
- Bypass supply frequency tolerance: +/- 5% (adjustable)
- Output filter provides mains filtering and power factor correction from 0.8 to 0.9 (dep. on load)
- Efficiency up to **98%**

User Definable Scheduling

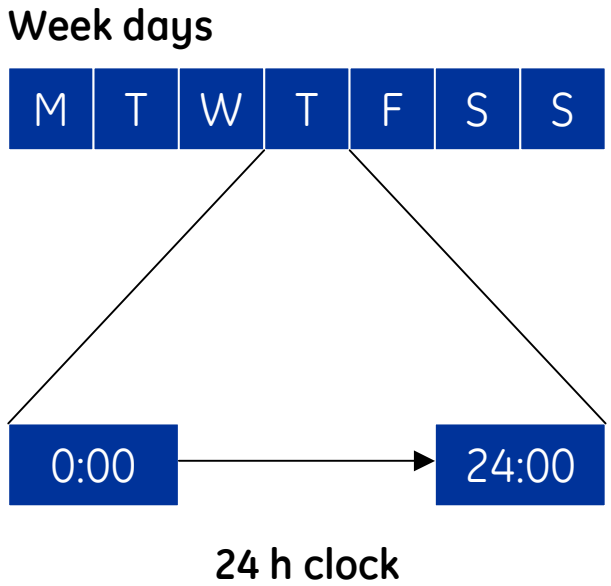
Super ECO can be scheduled by user

The UPS can be in ECO Mode always or only at certain times defined by the end user

Example

During the day all critical loads are up and highest level of protection is required. The UPS is then in normal VFI mode.

During the night and weekends most critical loads are down and Super ECO Mode can be switched on, providing energy savings



Super ECO can be scheduled per hour on week day basis

Error Detection

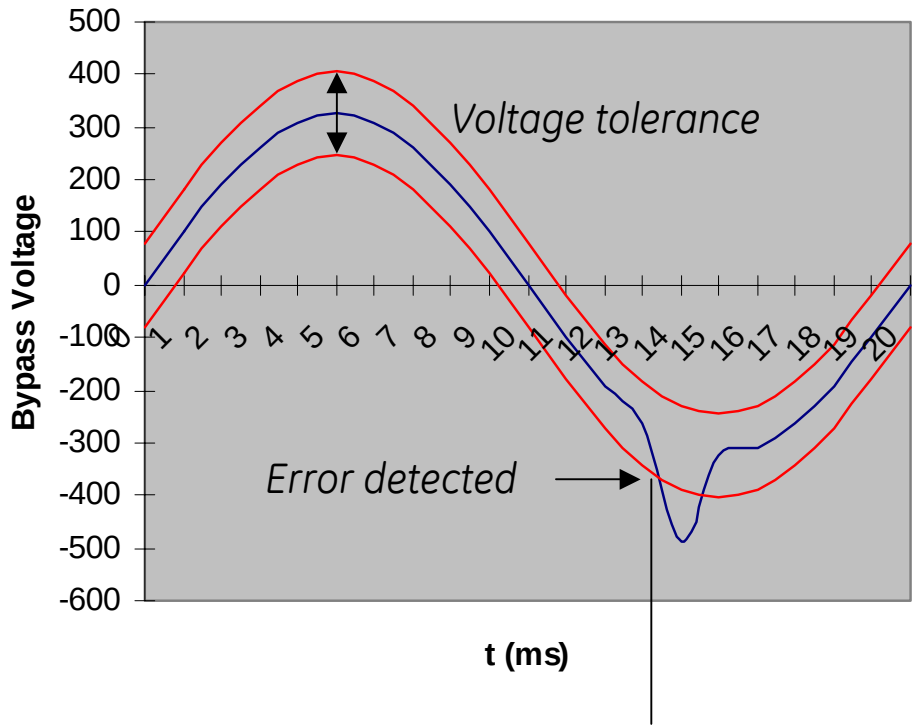
Whilst on Super ECO Mode the UPS will continuously monitor the bypass voltage.

The tolerance of the bypass voltage is +/- 10V (ph-n) RMS

In case of a fast error (more than 50V deviation from the target sinewave) the UPS will initiate a transfer to inverter within 500 microseconds (completed within 2 ms)

The load will remain on inverter at least for 30 seconds

Only if the bypass is in tolerance the UPS will return to Super ECO Mode



Transfer to inverter initiated after 500 microseconds

Savings

Savings obtained by Super ECO Mode can be modest for small rated units (kVA) but can become huge for high rated units.

Also the level of load is a factor of importance, as well as how often and how long Super ECO Mode is activated

In addition by activating Super ECO Mode less air conditioning capacity is required to exhaust the heat generated by the UPS.

Rule of thumb:

Required air conditioning power is 140% of the power that is dissipated by the UPS

Total Annual Savings: $ 22,837 - $ 4,625 =

$ 18,212

Case 1 (VFI Mode)

Load: 100kW

Efficiency of UPS: 91%

Dissipated power: 9.9 kW

Air conditioner: 13.8 kW

Total cost: 23.7 kW * 365 *24 * $0.11 =

annual : $ 22,837

Case 1 (Super ECO Mode)

Load: 100kW

Efficiency of UPS: 98% (on SEM)

Dissipated power: 2.0 kW

Air conditioner: 2.8 kW

Total cost: 4.8 kW * 365 *24 * $0.11 =

annual : $ 4,625

Savings - without air conditioner savings

	Super ECO Mode energy savings as function of load percentage at powerfactor 0.8 (in kWh per year)				
UPS Rating (kVA)	10%	25%	50%	75%	100%
10	2'846	2'980	3'616	4'703	6'270
15	4'732	5'232	5'424	7'151	9'535
20	5'439	5'468	6'356	8'251	11'002
30	7'747	7'484	8'251	10'493	13'991
40	9'175	8'490	9'327	12'756	17'008
60	12'420	13'285	13'248	19'134	25'512
80	15'320	15'711	17'664	25'512	34'016
100	19'503	20'996	24'565	28'835	38'446
120	22'979	22'226	24'042	34'602	46'136
150	28'024	26'126	21'635	39'622	63'779
200	37'366	34'834	28'847	52'829	85'039
250	46'707	43'543	36'059	66'036	106'299
300	56'049	52'251	43'271	79'243	127'559
400	87'222	79'456	65'634	84'174	157'030
500	109'027	99'320	82'042	105'218	196'287

1- Select UPS Power

2- Select Load level

3- Multiply number by cost per kWh

4- Multiply by percentage of time SEM is activated

Example:
300kVA UPS at
75% load

79,243 * $0.11 * 70%

Savings: $ 6,102

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Savings - with air conditioner savings

AirCon Rule 140%	Super ECO Mode energy savings as function of load percentage at powerfactor 0.8 (in kWh per year)				
UPS Rating (kVA)	10%	25%	50%	75%	100%
10	6'831	7'151	8'678	11'286	15'048
15	11'358	12'558	13'016	17'162	22'883
20	13'053	13'124	15'256	19'803	26'404
30	18'593	17'961	19'803	25'184	33'579
40	22'020	20'376	22'386	30'614	40'819
60	29'808	31'884	31'796	45'921	61'228
80	36'767	37'707	42'395	61'228	81'638
100	46'807	50'391	58'955	69'203	92'271
120	55'151	53'343	57'701	83'044	110'725
150	67'258	62'702	51'925	95'092	153'070
200	89'678	83'602	69'233	126'789	204'094
250	112'097	104'503	86'541	158'486	255'117
300	134'516	125'403	103'849	190'183	306'141
400	209'332	190'694	157'521	202'018	376'872
500	261'665	238'367	196'901	252'523	471'090

1- Select UPS Power

2- Select Load level

3- Multiply number by cost per kWh

4- Multiply by percentage of time SEM is activated

Example:

300kVA UPS at 75% load

190,183 * $0.11 * 70%

Savings: $ 14,644

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Conclusion

Super ECO Mode provides
important energy savings
still providing sufficient protection
for less sensitive loads

Indirect savings (air conditioning) can
be bigger than direct savings

Super ECO Mode is available on:
*Site*Pro UPS, range: 10–500 kVA CE
SG Series UPS, range: 80-200 kVA CE
in single mode

SEM

Super Eco Mode


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