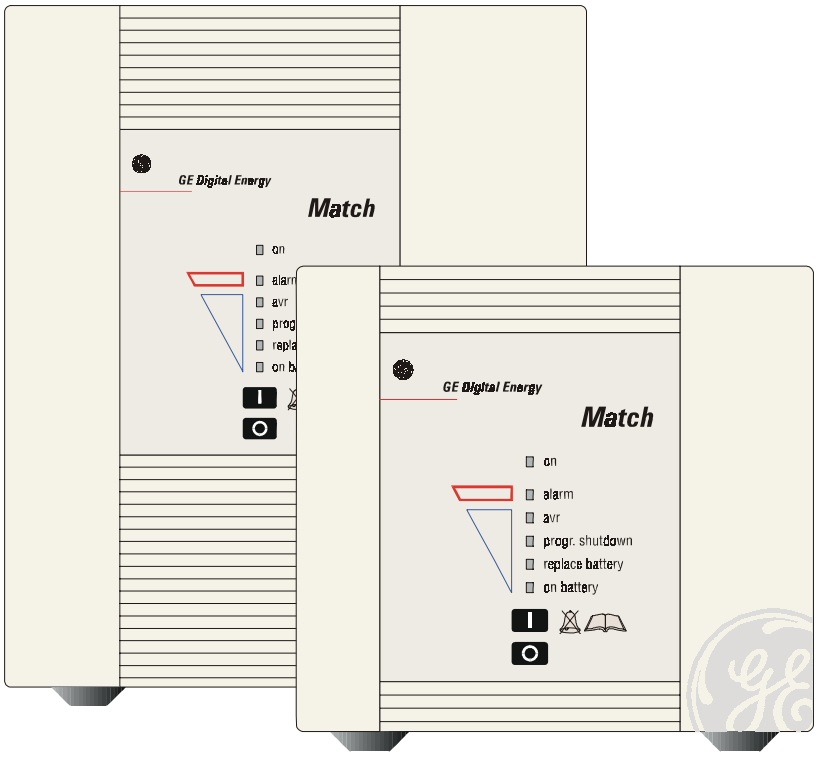
GE Digital Energy

Product Description

Match

Line-Interactive Uninterruptible Power Supply
500, 700, 700L, 1000, 1000L, 1500, 2200, 3000 VA



Certified Quality System
SQS
ISO 9001 / EN 29001
Reg. No. 10448

ISO 9001
KEMA CERT.NR 19167
01 - 02 - 1992
DESIGN, PRODUCTION OF UPS

Manufactured by:

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1 - Introduction

The ***GE (General Electric) Digital Energy Match UPS*** series is a compact, modern, line-interactive system which incorporates the most advanced power electronics technology to provide exceptional protection for electrical equipment.

Each ***GE Digital Energy*** UPS is thoroughly tested and conforms within tolerance to the following specifications. (Data are mean values and are subject to change without notice.) Information applies to all models unless otherwise specified.

2 - Functional Explanation

2.1 Principles of Operation

The ***Match*** UPS stores electric energy in batteries housed in the unit. This allows the UPS to supply output power even when the incoming mains power is cut off completely.
Energy is stored as Direct Current (DC), while input and output energy must be Alternating Current (AC). Therefore the UPS contains a rectifier (to convert from AC to DC) and an inverter (to change energy from DC to AC). (See fig.1)

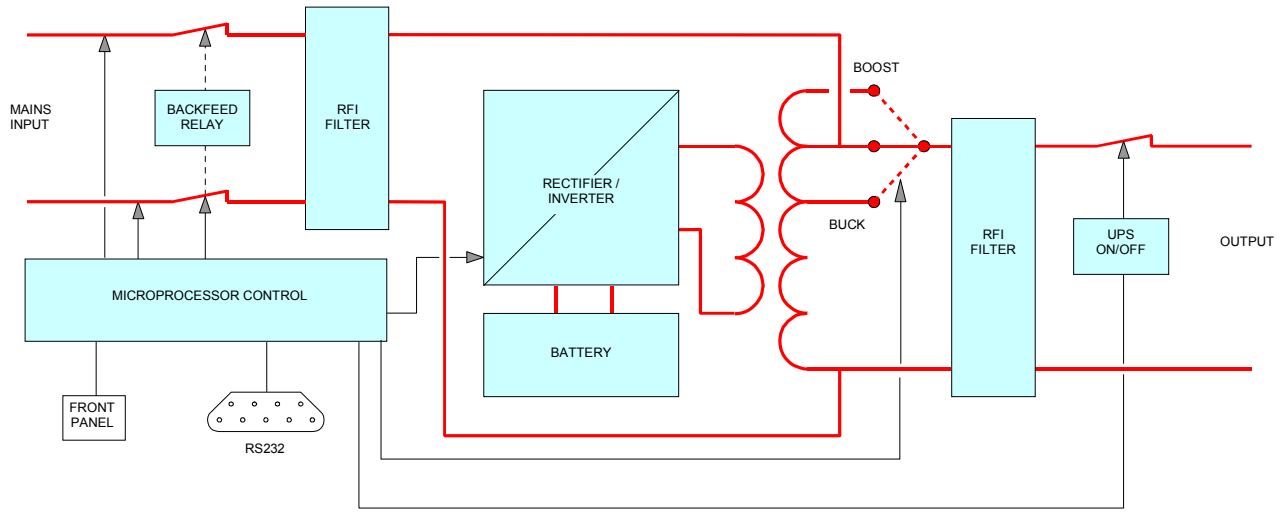

*Fig. 1 Block diagram **Match** UPS*

2.2 Normal Conditions

Under normal input conditions (see section 4.2) the load is supplied by the mains through a bypass circuit. Filtering capabilities guard against surges, spikes and high frequency interferences. The mains current also keeps the battery fully charged
The input voltage window is extremely wide: as long as the input voltage is between 165 – 275 Vac (***Match*** 500-1500VA) or even between 140 – 305 Vac (***Match*** 2200-3000), the Automatic Voltage Regulation (AVR) guarantees an output voltage that is between 190 - 254 Vac and acceptable for every modern ICT device.

2.3 Mains Failure

In the event of a mains power failure (i.e. absent or outside tolerance) the backfeed relay is opened and the load is supplied by the energy reserve stored in the battery. DC voltage from the batteries is transferred to the inverter which produces AC voltage for the load.

The transfer time is 4 milliseconds, sufficiently short for computers which therefore will continue to operate without interruption.

In the event of an extended mains failure, the inverter will stop when the battery energy has been used up. At this point, the UPS is no longer able to power the connected equipment.

When the mains is re-established within tolerance, the load will be supplied again by the mains and the batteries will be recharged, making them ready to support future power failures.

3 - External Description

3.1 Front and Rear Panel

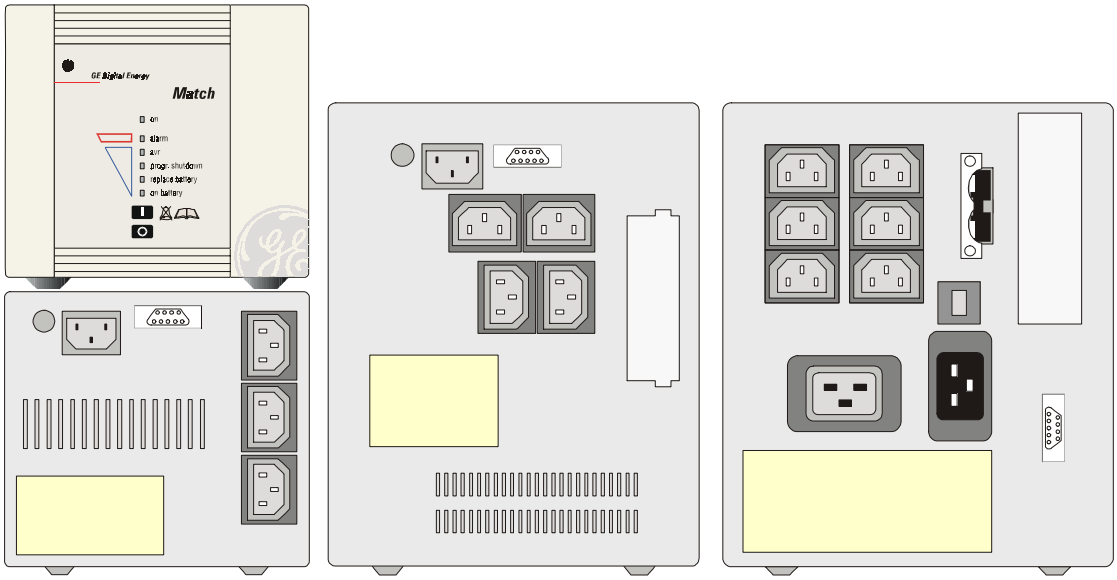

Fig. 2 *front panel and rear panels of 500-700 (left), 700L-1500 (middle) and 2200/3000 (right) (not shown: battery pack of **Match** 2200/3000*

FRONT

On	:	green LED
Alarm	:	red LED
AVR	:	yellow LED
Progr. shutdown	:	yellow LED
Replace batt.	:	yellow LED
On battery	:	yellow LED
Push-buttons		

REAR

ComConnect	:	9-pin Sub-D male
Input socket	:	IEC 320 C14 male IEC 320 C20 male [1]
Output sockets	:	IEC 320 C13 10A female IEC 320 C19 16A female [1]
Input fuse	:	IEC Ø5x20 Thermal Circuit Breaker [1]
CardConnect slot	:	for optional SNMP or relay card (not for ***Match*** 500-700)

[1] ***Match*** 2200/3000

3.2 Enclosure

Construction	:	steel/plastic
Finish (case + front)	:	RAL 7035 (light grey)
Protection	:	IP 20

3.3 Dimensions

Cabinet dimensions (h x w x d)

Match 500-700	:	144 x 155 x 350 mm (VMC 15)
Match 700L-1500	:	225 x 180 x 360 mm (VMC 22)
Match 2200-3000 [2]	:	225 x 187 x 485 mm (VMC 23)

Shipping dimensions (h x w x d)

Match 500-700	:	235 x 235 x 430 mm
Match 700L-1500	:	310 x 260 x 440 mm
Match 2200-3000 [2]	:	340 x 305 x 594mm

[2] batteries in separate cabinet with same (shipping) dimensions as UPS

3.4 Weight

Model	:	**500**	**700**	**700L**	**1000**	**1000L**	**1500**	**2200**	**3000**
Weight (kg)	:	7.2	10.0	20.8	16.5	20.8	20.8	18.0*	20.1*
Shipping weight (kg)	:	8.5	11.5	23.0	18.7	23.0	23.0	20.5*	22.6*

* separate battery packs ***Match*** 2200/3000: weight 21.3 / 26.5; shipping weight 23.8 / 29.0

4 - Electrical Specifications

Model	:	500	700	700L	1000	1000L	1500	2200	3000

4.1 Ratings

Voltage Amperes (VA) with computer type load	:	500	700	700	1000	1000	1500	2200	3000
Watts (W)	:	300	420	420	600	600	900	1540	2100

Ratings are for units with standard runtime. For ratings at extended runtime see 8.3.

4.2 Input

AC input voltage	:	220 - 240 V							
AC input voltage window									
Match 500-1500	:	165 - 275 V, mains operation							
Match 2200-3000	:	140 - 305 V, mains operation (if Iin < 16A)							
Max. AC input voltage	:	350V, battery operation above 275V (***Match*** 500-1500) 350V, battery operation above 305V (***Match*** 2200-3000)							
Minimum start-up AC voltage	:	187V (at any load)							
Input frequency	:	50 Hz or 60 Hz							
Input frequency range	:	nominal ± 5 Hz							
Typical no-load power consumption, normal operation (W)	:	7	7	12	12	12	12	15	15
Max. AC input current (A)	:	2.8	4.0	4.0	6.0	6.0	8.0	12.0	16.0
AC input fuse (A)	:	3.15	5.0	5.0	10	10	10	16	16

4.3 Output

AC output voltage	:	230 V nominal (suitable for 220-240 V loads)				
AC output voltage tolerance	:	190-254 V (230V ± 2% when operating on battery)				
Output frequency	:	50 Hz or 60 Hz, autosensing in case of battery start: equal to last input frequency				
Output frequency stability	:	< ± 0.1 Hz (battery operation)				
Output waveform	:	sine wave				
Crest factor handling	:	up to 6:1				
Power factor	:	0.6 (0.7 at 90% load) (***Match*** 500-1500)				
	:	0.7 (***Match*** 2200-3000)				
Buck/boost voltage regulation	:	at specified input voltage window, the output voltage varies between 190-254Vac				
					M500-1500	**M2200-3000**
Transfer/reverse transfer voltages	:	normal	⇔	boost	202 / 215	207 / 217
		boost	⇔	super boost	n.a.	172 / 182
		normal	⇔	buck	254 / 240	265 / 255
		boost	⇔	battery	165 / 175	140 / 150
		buck	⇔	battery	275 / 265	305 / 295
Transfer time	:	typically 4 ms.				

4.4 General Design Criteria

Safety	:	EN 50091-1-1 (EN 60950, IEC 950)
Electromagnetic compatibility	:	EN 50091-2 (EN 50081-1 + EN 50082-1)

Note: The UPS is intended for use in normal domestic and office situations

5 - Performance Characteristics

Model	:	500	700	700L	1000	1000L	1500	2200	3000

5.1 Efficiency

On mains	:	typical 98%							
On battery	:	typical 82%							
Max heat output @ 100% load, mains operation (W/h)	:	6.1	8.5	12.3	12.3	18.3	18.3	25	36.7

5.2 Environment

Ambient temperature	:	-10 to 40°C
Audible noise at 1 meter	:	less than 35 dB(A) (virtually inaudible)
Max. relative humidity	:	95% (non-condensing)

5.3 Runtimes (ratings given for 25°C)

	runtime in minutes							
At typical UPS load (75%)	*7*	*12*	*40*	*13*	*28*	*16*	*7*	*7*
Watts*								
60	42	84	190	120	190	190	210	263
180	10	26	70	41	70	70	82	104
300	4	13	41	23	41	41	50	69
420	-	8	30	15	30	30	35	47
600	-	-	-	8	20	20	22	30
900	-	-	-	-	-	10	11	17
1540	-	-	-	-	-	-	5	7
2100	-	-	-	-	-	-	-	5

* max. power factor: ***Match*** 500-1500: 0.6
Match 2200/3000: 0.7

5.4 Standard Features

Wide AC input voltage window
Minimises the need for battery operation

Automatic voltage regulation
The buck and boost function reduces the input voltage variations to acceptable levels for the load.

Excellent high voltage protection
Protects itself and the load up to 350Vac.

True RMS voltage and output power information
All monitored information is based on real values, not on mean- or estimated values which means accurate information on voltage, load and runtime.

Battery start
Allows you to switch on the unit whilst the mains input is absent.

Output frequency automatically set at 50 or 60 Hz (auto sensing)
Suitable for 50Hz and 60Hz mains systems.
No risk for wrong frequency on battery mode.

Sinewave output voltage
Normal electronic equipment is designed to operate from a true sinewave input. Some loads as frequency controllers or monitors could have problems with a blockshaped output voltage.

Low "green" power consumption during normal operation
Saves energy: 100% return on investment in 5 years, compared to other line interactive UPS's

Superior battery management:

- **Quick advanced battery test**
  UPS keeps running in normal operation while testing the battery, instead of switching to battery operation. This means no risk to interrupt the load if the battery is empty or damaged, or in case of overload.
- **Lowest battery temperature during mains operation**
  The design of the unit resulted in significantly lower battery temperature which increases battery lifetime.
- **Battery charging at 165V input**
  Fast recovery of back up power even in bad mains situation. Increases uptime and battery lifetime.
- **Autocharging**
  Charger is switched on automatically when mains input is present
- **Automatic boost/floatcharger**
  Reduces recharge time to 2 hours without overcharging. Increases uptime

Additional standard features for *Match* 2k2/3k:

High battery recharge current
Fast recharging of long runtime versions.

Deep battery calibration test
The actual battery capacity can be tested and calibrated ensuring accurate runtime prediction.

Load dependent end-of-discharge
Batteries may discharge deeper if the discharge time is shorter. This feature gives maximum runtime at any load, without the risk of damaging the batteries.

6 - Communications Port: ComConnect

6.1 Principles of Operation

Located at the back of the unit, the ComConnect is a plug-in interface port (9-pin, Sub-D, male) which enables advanced communication between the UPS and the computer (interface kit required).
The microprocessor controlled ComConnect sends information concerning power levels and UPS condition to the computer or network interface. In the event that batteries are near exhaustion, it sends commands for unattended controlled shutdown of computer systems. The ComConnect can also receive UPS shutdown signals from the computer or network interface.
Please note that the common of the ComConnect is connected to earth.

When signals are sent to the computer, a written message can appear on the screen to inform the user.
Monitored conditions include:

- mains voltage availability
- discharge level of batteries
- temperature of unit (during battery operation)
- interactive control- and diagnostic information for stand-alone and network systems
- current alarm status

Interface kits (cables and/or software) are available for operating systems supporting JAVA and most commonly used network operating systems, including Novell, UNIX, VMS, Windows, IBM AS/400, IBM OS/2, LINUX.
For specific information on ***GE Digital Energy's*** connectivity products please contact your local dealer or Internet: www.gedigitalenergy.com.

6.2 Pin Functions

Port description: male, 9-pin Sub-D

Pin #	Function
1	RS232 input
2	RS232 output
3	No function
4	PnP: Plug and Play
5	Common, protective earth
6	No function
7	Battery low
8	UPS connected
9	Mains failure

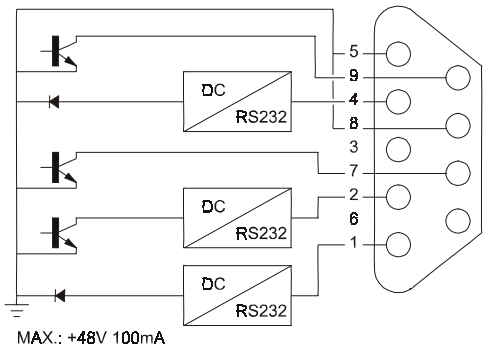

*Figure 3: ComConnect port **Match** 500-1500*

Pin #	Function
1	RS232 input (UPS shutdown)
2	RS232 output
3	No function
4	PnP: Plug and Play
5	Common
6	No function
7	No function
8	UPS connected
9	No function

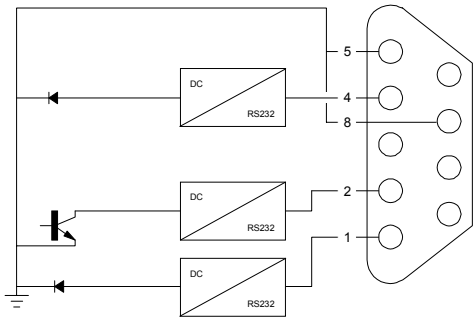

*Figure 4: ComConnect port **Match** 2200-3000*

The ComConnect port is available even when the UPS is switched off. If no mains is available the ComConnect port is turned off 10 hours after UPS shutdown to save battery energy.

7 - Batteries (ratings given for 25°C)

Model	:	500	700	700L	1000	1000L	1500	2200	3000
Nominal voltage (V)	:	12	24	36	36	36	36	36	48
Batteries (number * Ah)	:	1*7	2*7	3*12	3*7	3*12	3*12	6*7	8*7
Type	:	12V, sealed and maintenance free							
Service life	:	up to 6 years (depending on operating conditions)							
Autonomy	:	see section 5.2							
Battery recharge current									
Match 500-1500	:	3A							
Match 2200-3000	:	3.5 – 10A, depending on programmed battery capacity							
Battery recharge time	:	approx. 2 hours for 90% capacity							

Long term storage: see chapter 9

8 - Options (700L-3000)

8.1 SNMP Interface Card

An SNMP interface card can be mounted to the rear panel of the UPS, and allows the data interface to be connected directly to an Ethernet network When this option is installed the ComProt communication link is no longer available to the user.

8.2 Relay Interface Card

An interface card supporting ComConnect-05 can be mounted to the rear panel of the UPS. Potential free change-over contacts are available for the following alarms: mains failure, battery low.
The contacts are wired to a terminal strip and to a 9-pole sub-D connector.

8.3 Longer runtimes (*Match* 2200 / 3000 only)

Extended runtime can be obtained by connecting more than one battery pack. Using the DC socket of the battery pack you can install a second, third etc. battery pack.

Match 2200/3000	Total cap. Ah	Runtime (min.) 100%/50% load
1 additional battery pack	28	15/35
2 additional battery packs	42	26/55
3 additional battery packs	56	37/75
4 additional battery packs	70	48/100

For extended runtime at 25°C ambient temperature no derating is required. For extended runtime at 35°C, maximum load must be derated to 1.85kVA (***Match*** 2200) and 2.5kVA (***Match*** 3000).

9 - Transport / Storage

No liability can be accepted for any transport damage when the equipment is shipped in non-original packaging.
Store the UPS in a dry location with the batteries in a fully charged state. Storage temperature must be within -20 +45 °C. If the unit is stored for a period exceeding 3 months, optimal battery lifetime is obtained if the storage temperature does not exceed 25°C.
If the unit is stored for an extended period of time, the batteries must be recharged periodically. Be sure that the battery drawers are connected to the UPS. Subsequently connect the unit to a wall outlet and recharge the batteries for 24 hours:

- if the storage temperature is within -20 and +30°C: every 3 months,
- if the storage temperature is within -20 and +45°C: every month.