novergy

All-in-1 capability

Novergy TC 701A DC Power System/Energy Optimiser

A Solar + Wind + DC Power Plant with in-built microcontroller for optimized, uninterrupted power to critical loads.

Specially designed for rural telecom sites where grid supply is unreliable, the Novergy TC 701A is designed to enable the use and integration of renewable energy sources such as solar panels and wind generators.

Conceptualised and designed after extensive field research and R&D, the TC 701A incorporates digital technologies, algorithms and components that not only deliver optimized results but meet international norms for critical applications such as Telecom.

REVOLUTION IN DC POWER SYSTEMS

- **All-in-1 capability (convergence of different sources in one single device)**
- **Maximum utilization of renewable energy sources**
- **Reduction in Genset runtime by 50% or more**

Impeccable Lineage

Novergy is one of India's most respected and trusted companies in renewable energy products. Committed to making renewable energy solutions affordable and accessible for all, Novergy manufactures and offers a wide range of innovative solar and wind power solutions for various critical, non-critical and grid-connect applications.

Established in 1996, Novergy has developed into a leading provider of varied technical products and solutions. It is well known across India and abroad for its expertise and capability to deliver complete turnkey solutions for renewable energy applications including design, supply and supervision or installation & commissioning.

Novergy is registered with Electronics & Software Export Promotion Council of India and currently exports products to USA, Australia, Africa and the Middle East.

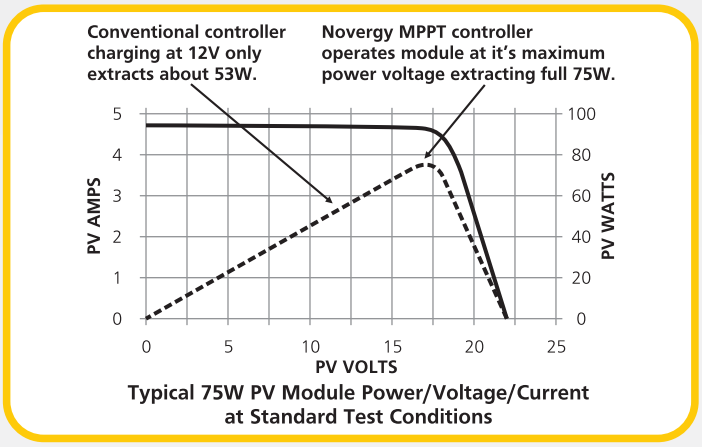
Unique Highlights

Maximum utilisation of renewable energy sources like solar and wind

The Novergy All-in-1 power system has got special algorithms to ensure that the renewable sources like solar and wind are having top priority and the TC701 always tries to derive maximum power from the renewable sources. Hence your investment into the solar and wind system gets you more results.

MPPT technology for maximising power generated from solar and wind as compared to conventional technologies or standard PWM charge controllers

In each iteration, the telecom charger voltage and current are measured and the input power is calculated. The input power is compared to its value calculated in the previous iteration and according to the result of the comparison, the sign of "Slope" is either complemented or remains unchanged. Then, the Telecom rectifier current setting is changed accordingly. The MPP tracking process is shown in the figure. The starting points vary, depending on the atmospheric conditions, while the duty cycle is changed continuously, according to the above-mentioned algorithm, resulting in the system steady state operation around the maximum power point.



Typical 75W PV Module Power/Voltage/Current at Standard Test Conditions

Savings in fuel, power and genset maintenance due to advanced algorithms in the controller to automatically operate the genset AND automatic DG operation on/off based on battery preset levels and also based on preset time of the day.

Fuel costs are rising every day and it is now a matter of utmost importance to reduce fuel consumption so as to achieve better savings, avoid fuel theft and losses. Also of importance is to be environmentally responsible and reduce your CO_2 footprint.

The Novergy All-in-One power system uses following features to reduce your Generator runtime :

- Tries to derive most power from renewable sources hence ensuring that power requirement from the genset reduces
- Continuously and accurately monitors the battery charge status to ensure that the genset is only switched on if the batteries are discharged. Genset is only switched on when the batteries reach below a preset level of charge.
- Once the generator is switched on, it is switched off automatically once the batteries reach a preset charge level.

All of the above ensure that your generator is running for lesser hours and your savings are increasing everyday!

Increased battery life and performance due to multi-stage battery charging and temperature compensated battery charging along with accurate battery charge status monitoring

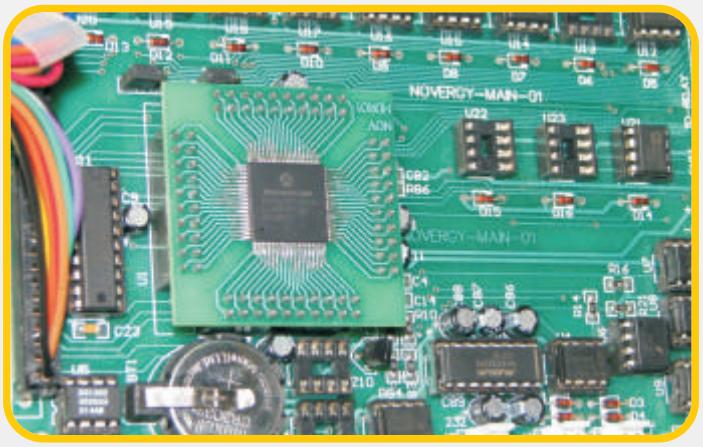
Batteries used in telecom applications in rural areas face frequent charge-discharge cycles due to erratic and unreliable power supply. Moreover, because of high diesel prices and availability problems, operators need to use batteries to tide over power shortages, often lasting up to 12 hours. Considering this scenario, more efficient battery charging patterns need to be adopted.

The system needs to take care of battery safety as well as life. Novergy system is designed to take care of both these fundamental requirements.

The specific aspects are:

- Battery charge discharge integrator function in built in the controller. This monitors current going in for charging as well as discharging. This controls the charger and prevents over charge which results in water loss and shortens life.
- A simple addition and subtraction does not give accurate status of charge but complex voltage base current control is needed.
- Temperature compensated float voltage is internally set to prevent under charge.
- Broadly charging process is broken up in two parts: constant current and constant voltage.

Digital Signal Processing and Controlling Core for greater accuracy, reliability and performance



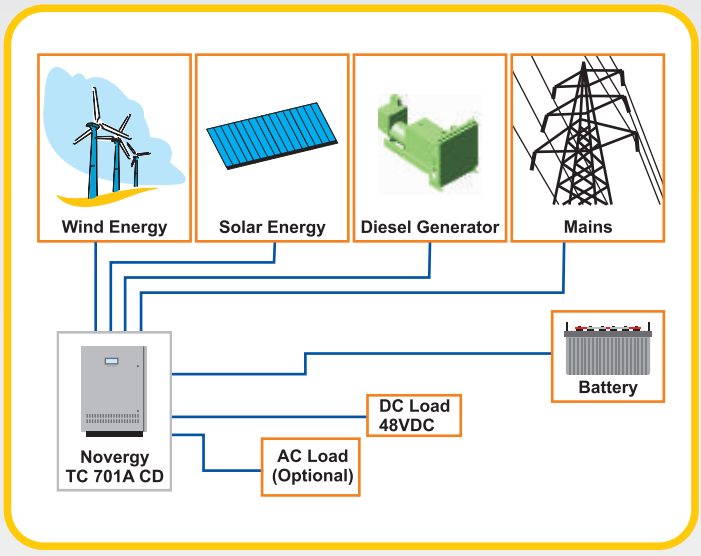
Digital Processor

Higher efficiencies (up to 97%) of power modules to ensure lower losses and more savings

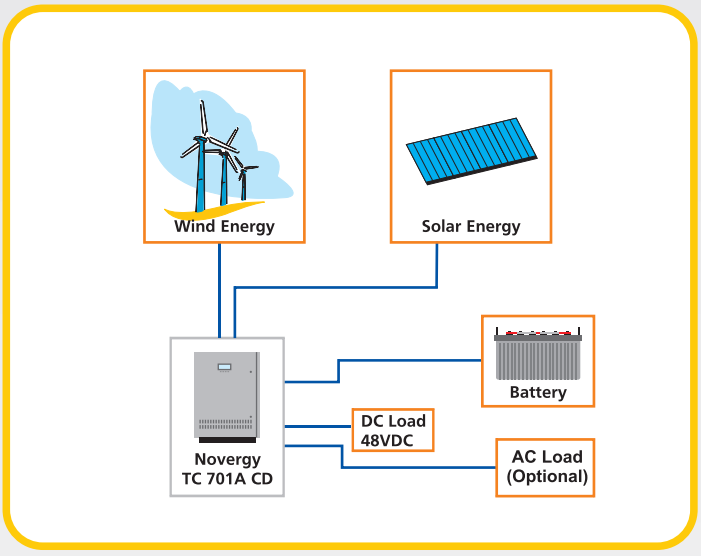
Single unit for all power sources, giving common DC power output as well as a modular design to allow for future expansion.

Telecom grade (power modules meeting IEC 60950, Ul60950, VDE 0805) with built-in redundancies and all necessary protections to ensure uninterrupted power output.

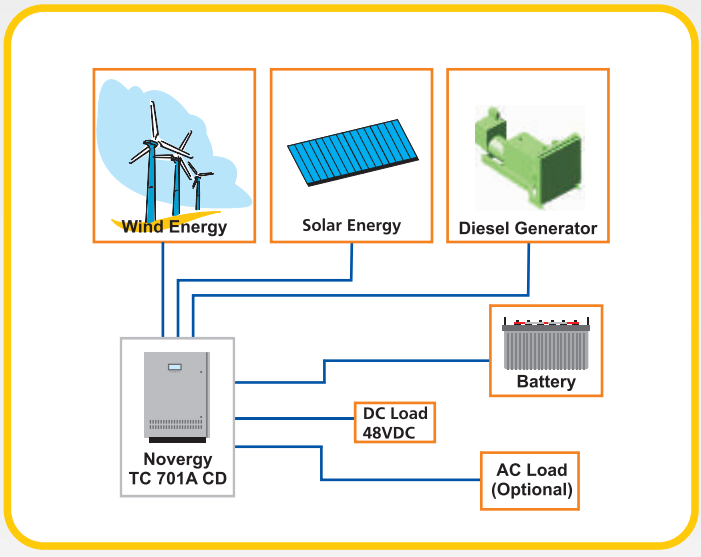
Configurations possible



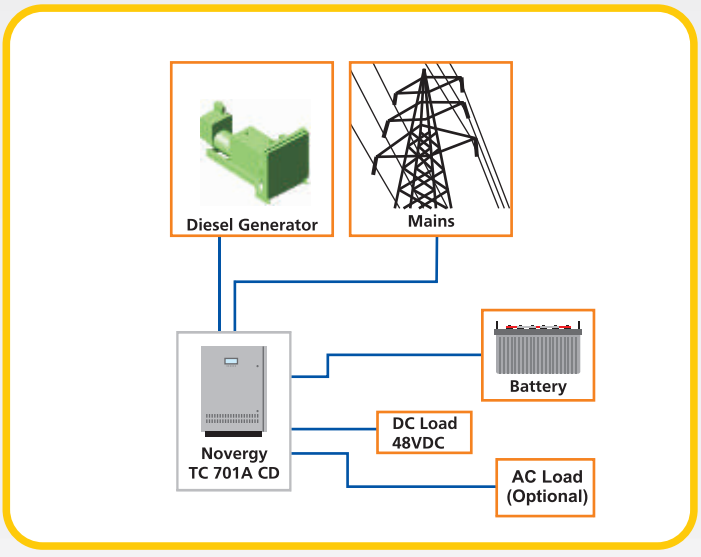
Wind+Solar+Genset+Mains



Wind+Solar



Wind+Solar+Genset



Genset+Mains

NOTE: Other configurations also possible.

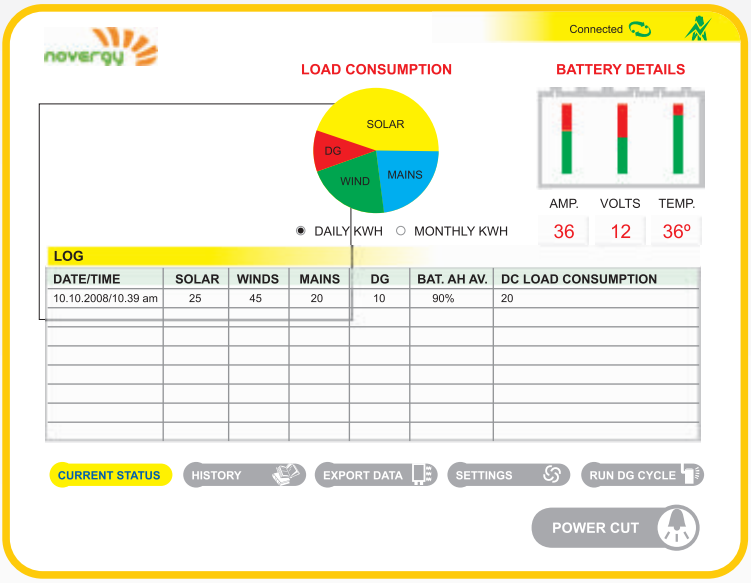
State-of-art yet user-friendly software

The software allows the user to access the machine status and control major parameters sitting in the office. The user has to hook up the GSM terminal at his PC and run the software (Windows based) and he can then access the following parameters :-

- Power generation from each source
- Last day power generation log
- Battery status
- Failure and alarm log
- Data log

The user can control the following settings:

- DG operation on preset time
- Battery levels at which DG should switch on and off
- MPPT tracking interval for solar and wind



Technical Specifications

PROPERTIES	UNITS	VALUES
Controller Core		DSP (Digital Signal Processor & Controller)
Power Rating (Output)	Watts	2000 to 21800 (Modular, Available in multiples of 2000 W)
SOLAR INPUT		
Technology		MPPT Algorithms (Maximum Power Point Tracking to derive up to 30% more power from solar panels as compared to standard charge controllers)
Input Voltage Range	Volts	134 to 385
Input Power	KW	12 (maximum)
WIND INPUT		
Technology		Dynamic Power Point Tracking
Input Type		3 Phase
Input Voltage	Volts	100 to 240
Input Power	KW	20KW (maximum)

INPUT AC		
Input Type		Single Phase or Three Phase
Input Voltage	Volts	85 to 275 (Per phase)
Permitted Excursions	Volts	300
Surges	Volts	325
Maximum Input Current (Per 2000W)	Amps	At 100 Vac : 13.3 At 120 Vac : 11.2 At 200 Vac : 11.8 At 240 Vac : 9.9
Power Factor		0.98 (50% to 100% load)
Input Frequency	Hz	47 to 63
Input Leakage Current	mA	1.5 (per 2000W)
Holdup Time	ms	15

OUTPUT DC		
Nominal Voltage	Volts	48
Output Voltage Range	Volts	44 to 58
Default Output Voltage	Volts	54
Maximum Output Current	Amps	53 to 424
Setpoint Accuracy	%	-1 to +1
Polarity		Positive or Negative Ground
Efficiency (Input to output)	%	97 (Peak)
Output Ripple (RMS 5Hz - 20MHz)	mVrms	250
Output Ripple (RMS 5Hz - 20MHz)	mVrms	250
External bulk load capacitance	µF	0 to 5000
Turnon Delay	sec	5
Turnon Rise time	ms	100
Over-voltage	VDC	60 (200msec delayed shutdown) 65 (Instantaneous shutdown)

OUTPUT AC (Optional)		
Output Type		Single Phase
Waveform		Pure Sinewave
Nominal Voltage	Volts	220 / 110
Output Frequency	Volts	50 Hz (220v) / 60 Hz (110v)

INDICATORS	
Display	20x4 Lines Alpha-Numeric LCD Display (Scrolling) with menu buttons Language : English
Audible	Yes
LED	LEDs showing system status

BATTERY

Type		VRLA / Gel / AGM
Nominal Battery Voltage	Volts	48
Battery Bank Rating (Total)	Ah	100 to 6000 (@48v)
Type of Charging		3 stage
Number of Battery Banks per System		1 / 2 / 3
Temperature Compensation		-0.120Volts/°C (48 volts bank)

SENSORS / SIGNAL INPUT

Battery State of Charge	Hall-effect Current Sensors
Battery Temperature	Battery Temperature Sensors
Room Temperature	Temperature Sensor Input (Optional)
Air-conditioner	Optically Isolated Digital Input (Optional)
AMF / ATS Panel (DG)	Optically Isolated Digital Input

OUTPUT SIGNALS

DG	Relay contact (On/Off) to AMF/ATS Panel
Alarms	Potential Free Contacts (upto 8)
Air-conditioner	Relay contact (On/Off)

COMMUNICATION

Local	USB based PC communication (Windows XP / Vista based PC)
Remote	GSM terminal (Optional) SCADA Software available on Windows XP / Vista/ 2003 server platform to remotely access the controller
SMS to Field Engineers	SMS to 2 field engineers prior to DC Power output shutdown
DATA LOGGER	Last 90 days operation (EEPROM)

PROTECTIONS (OPTIONAL)

Input (AC)		Short Circuit, Over Voltage, Under Voltage
Input (Solar)		Reverse Polarity, Over Voltage, Under Voltage
Input (Wind Turbine)		Excess Speed (rpm) Protection through transfer to dump loads
Battery		Low Voltage Disconnect (deep discharge) and Over Voltage Protection
Output (DC) Over Voltage	VDC	60 (200msec delayed shutdown) 65 (Instantaneous shutdown)
Lightning Surge		Class B

REDUNDANCY

Power Modules	Power modules are shared to allow for redundancy in case any 1 of them fails
Factory Default	In case of failure of controller, the power modules will switch to default setting of 54VDC

ENVIRONMENTAL

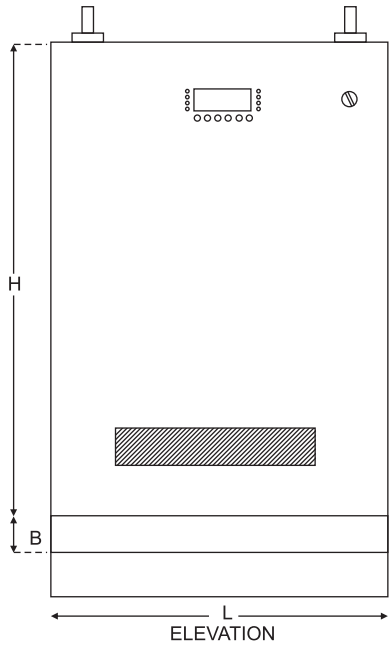
Ambient Temperature	°C	Normal: -5°C to +45°C Power Derating: 1%/ °C up to +55°C
Storage Temperature	°C	-40°C to +85°C
Humidity	%	5 to 95 (Relative humidity; non-condensing)
Acoustic Noise	dBA	45
Harmonic Emissions		Per EN/IEC61000-3-2
Radiated Emissions		FCC and CISPR22 (EN55022) Class B
Conducted Emissions - AC		FCC and CISPR22 (EN55022) Class B Telcordia GR-1089-CORE - Class A
Conducted Emissions - DC		Telcordia GR-1089-CORE - Class A CISPR22 (EN55022) Class A
ESD		Error free per EN/IEC 61000-4-2 Level 3
Radiated Immunity		Error free per EN/IEC 61000-4-2 Level 3
Electrical Fast Transient Burst		Error free per EN/IEC 61000-4-4 Level 3
Lightning Surge		Error free: EN/IEC61000-4-5 Damage free: ANSI C62.41

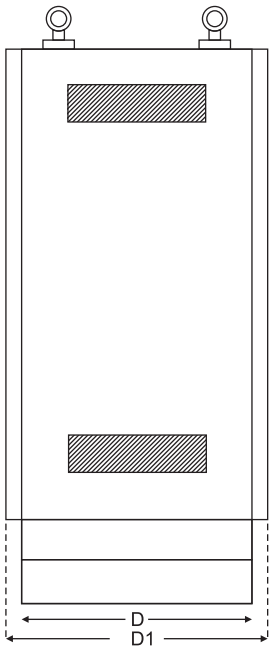
PHYSICAL

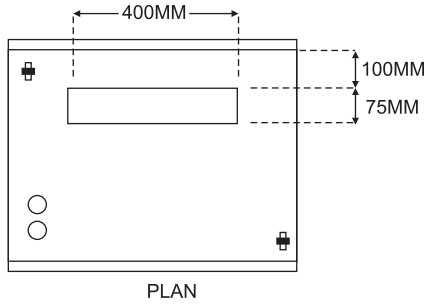
Dimensions (LxDxH)	mm	600 x 500 x 850
Weight	Kg	75 (Maximum)
Enclosure Rating		IP 20 (Option of Ip 65 available)
Mounting		Floor (Option of wall or pole mount available in IP65 enclosure)

Certification

The power modules used are IEC 60950 (3rd edition) and UL-60950, VDE 0805 certified and meet CE mark 73/23/EEC and 93/68/EEC







TYPE	DISCRIPTION	WIND	SOLAR	L	D	D1	H	B
1	8 RECTIFIER	4	4	680	500	540	1800	75
2	4 RECTIFIER	2	2	680	500	540	1200	75
3	2 RECTIFIER	0	2	680	500	540	975	75

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