



LOCAL AREA NETWORKS (LAN)



SERVERS



DATA CENTRES



TELECOMMUNICATIONS DEVICES



E-BUSINESS (Servers Farms, ISP/ASP/POP)



INDUSTRIAL PROCESSES



INDUSTRIAL PLCS



ELECTRO-MEDICAL DEVICES



EMERGENCY DEVICES (Lights/Alarms)

# Flywheel Energy Storage

## Highlights

- High reliability
- Very low TCO
- Life expectancy of more than 20 years
- High energy density
- Parallelability with identical units or batteries
- Green Energy
- High efficiency



*Model with touch screen (optional)*

The VDC series of flywheel energy storage systems provide Riello Master Plus UPS with a source of dc power that can be used to ride through short mains power supply failures. The length of supply available can be used to cover the start-up time of a standby generator or prevent the initial discharge of a locally connected battery set.

The VDC flywheel connects directly to the UPS DC busbar and is a standalone device supplied in a matching cabinet. The VDC series of flywheels has been designed for UPS applications within datacentres, hospitals and industrial installations. The patented flywheel concept is a form of energy storage and provides a green, clean source of back up power by converting the kinetic energy



stored within a rotating mass to electrical power through a built-in IGBTbased converter.

Two sizes are available (VDC and VDC-XE) with a load-related back-up autonomy.

#### VDC flywheel concept

The Riello UPS VDC-series flywheel stores kinetic energy in the form of a rotating mass (spinning at 36,000 RPM) within a sealed container. The patented technology includes the flywheel hub, formed from aerospace-grade steel, a high speed permanent magnet motor generator, contact-free magnetic bearings that levitate and sustain the rotor during operation, and a superior touch-screen control system that provides vital information on system performance. A flywheel is also known as a 'mechanical battery' and energy storage system, and is used to perform the traditional role of battery sets within a standby power application.

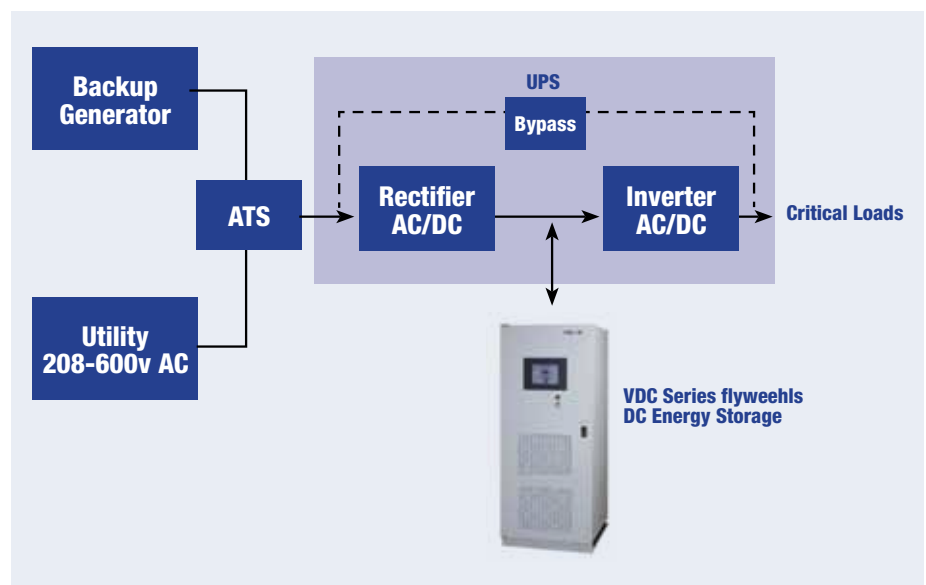
#### Benefits

- High reliability
- Lowest cost of ownership (TCO)
- High power density
- Small footprint
- High efficiency - 99.4%
- Minimal maintenance
- Simple installation

#### Battery hardening

For applications without Gensets or for those who still want to use batteries, the VDC and VDCXE can operate in parallel with batteries. In this configuration, the VDC is the first line of defense against power anomalies – saving the batteries for prolonged power outages.

By being first to provide the necessary energy to ride-through power glitches, the VDC system significantly increases battery life by absorbing over 98% of the discharges that would normally cause the batteries to be cycled. This innovative patented technology enables the flywheel to charge and discharge at high rates for countless cycles without degradation throughout its 20 year life – unlike traditional batteries.

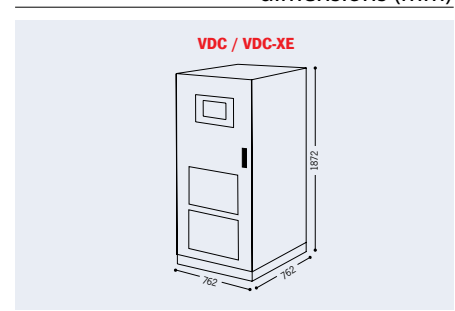


#### Options

The following options are available:

- Colour Touch Screen panel
- Remote Emergency Power Off (EPO) board
- Modbus communication board
- Dry contacts interface board

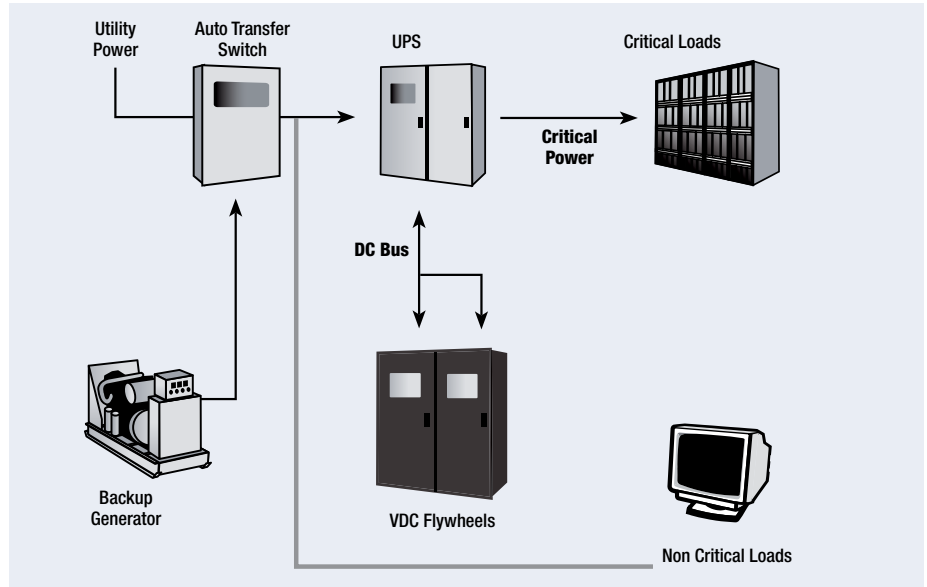
dimensions (mm)



# Configurations

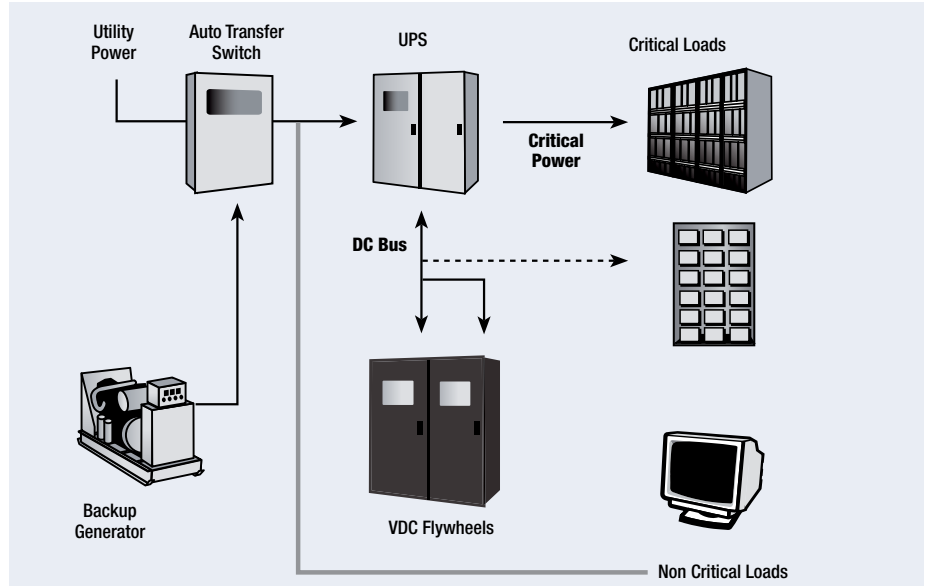
## Backup during auxiliary generator start-up phase

Genset Ride-Through: Generators must be able to assume critical loads quickly. While batteries can carry out this function, Riello UPS VDC series systems provide reliable energy storage instantaneously; assuring a predictable transition to the stand-by generator, all in a compact footprint.



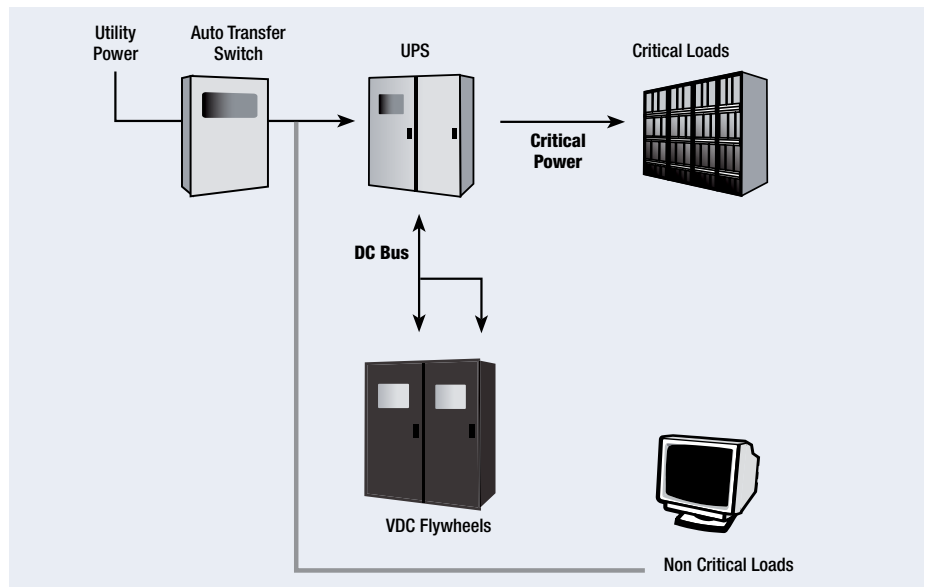
## Aid to batteries

For applications without Generators or for those who still want to use batteries, the VDC and VDC-XE can operate in parallel. In this configuration, the VDC is the first line of defense against power fluctuations – saving the batteries for prolonged power outages. By being first to provide the necessary energy to ride through power glitches, the Riello UPS VDC series significantly increases battery life by absorbing over 98% of the discharges that would have normally caused the batteries to be cycled.



## Protection for industrial applications

For applications in industrial markets where power disturbances can shut down sensitive process control equipment leading to lost productivity, the Riello UPS VDC series is the perfect solution. 98% of all power disruptions and outages are less than 10 seconds in duration; all of which can be covered by the energy stored in the flywheel. Because the VDC series can operate in harsh environments and occupies a compact space, it is also the ideal solution for industrial applications where space is limited.



## Run times \*

VDC	UPS OUTPUT POWER RATING (kVA)											
Number of flywheels	40	60	80	100	120	160	225	275	450	550	750	1100
1	99.8	67.0	50.3	40.3	33.6	21.9	11.7	6.4				
2				80.0	65.0	48.8	34.8	26.6	11.3	6.2		
3						72.3	51.5	42.2	23.2	16.8	8.5	
4								55.6	34.1	26.1	16.0	6.0
5										34.8	23.0	11.7

Runtime in seconds

VDC-XE	UPS OUTPUT POWER RATING (kVA)											
Number of flywheels	40	60	80	100	120	160	225	275	450	550	750	1100
1	133.3	88.9	66.7	53.3	44.4	32.9	20.5	14.1				
2				102.4	85.3	64.0	45.5	37.3	19.7	13.6	6.7	
3						95.0	67.6	55.3	33.6	26.3	16.2	6.9
4								72.9	44.6	36.5	25.3	13.3
5										45.6	33.3	20.0

Runtime in seconds

(\*) Backup Times are typical using 0.9 Output Power Factor, 80% Load Rating, 96% Inverter Efficiency

MODELS	VDC	VDC-XE
<b>POWER</b>		
Max Power	215 kW	300 kW
Max Energy Storage	3000kWsec@100kW	4000kWsec@100kW
Flywheel rotation speed	from 18500 to 36000 rpm	from 14500 to 36750 rpm
<b>INPUT</b>		
Input Voltage	400-600 Vdc	
Recharge Rate	15-50 A Adjustable for application	
Efficiency	99.2% at max. power	99.4% at max. power
<b>OUTPUT</b>		
Voltage Discharge	400-520 Vdc Adjustable for application	
Voltage Regulation	+/- 1%	
DC Ripple	≤ 2%	
<b>INFO FOR INSTALLATION</b>		
Operating Temperature	-20°C / +40°C	
Humidity	95% non-condensing	
Colour	Dark grey RAL 7016	
Noise level	≤ 68dBA a 1 m	
Dimensions (hwd) (mm)	1872 x 762 x 762	
Weight (kg)	705	
Protection level	IP 20	
Regulations	EMC EN 61000-6-4:2001; EMC EN 61000-6-2:2001; Safety EN 60204-1; Directives: 2004/108/EC; 98/37/EC	