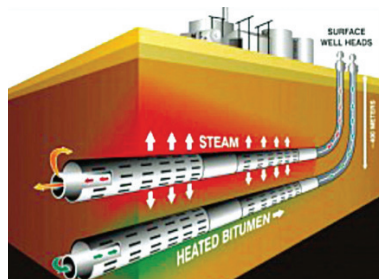


OUR BUSINESS

Downhole Drilling (MWD, LWD)

Vitrocell's high temperature batteries are used in devices that require high power demands under harsh usage conditions such as high shock and vibration. These batteries are typically used in extreme oil and gas exploration conditions where power cannot be interrupted. Vitrocell provides technology to the oil and gas industry with reliable, durable batteries that empower operations in range of oilfield applications. We work to design the best solution for size, capacity and temperature requirements. Our batteries enable the advanced drilling technologies that are driving efficiency in the downhole drilling industry.



FEATURE

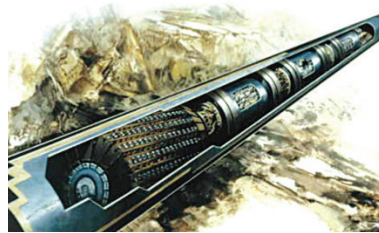
- \ EXTREME (TORSIONAL) SHOCK & VIBRATION RESISTANCE
- \ MAX OPERATING TEMPERATURE UP TO 150°C~180°C
- \ 3.6V Li/SOCl₂
- \ HIGH RATE / MODERATE RATE CAPABILITY
- \ VERY HIGH POWER AND ENERGY DENSITY
- \ NON-BULGE DESIGN
- \ STABLE DISCHARGE

APPLICATION

- \ MWD (MEASUREMENT WHILE DRILLING)
- \ LWD (LOGGING WHILE DRILLING)

Pipeline Inspection Gauge (PIG)

Collecting critical integrity information during pipeline inspection requires a battery that can deliver dependable, continuous high energy power in extreme environmental conditions while flowing long distances in the pipeline. Vitrocell's lithium battery takes on the demanding requirements of pipeline inspection and deliver performance for our customers' critical applications. Our batteries for this industry are very competitive for its higher capacity and low temperature performance compared with its rivals.



FEATURE

- \ OPERATING TEMPERATURE -30°C~100°C
- \ VERY HIGH POWER AND ENERGY DENSITY
- \ EXTREME SHOCK & VIBRATION RESISTANCE
- \ ATEX APPROVED
- \ 3.9V Li/SO₂Cl₂
- \ NON-BULGE DESIGN

APPLICATION

- \ ILI (IN-LINE INSPECTION) / INTELLIGENT PIGGING

Ocean Equipment

In today's market, batteries for ocean and subsea operate in a variety of high current-pulse applications that require low background currents and brief periods of high-current pulses over an extended period of time. Vitrocell's batteries are currently used in subsea monitoring, subsea navigation, underwater surveillance systems, hydrographical survey equipment, acoustic release, mini beacons and etc.



FEATURE

- \ OPERATING TEMPERATURE -30°C~100°C
- \ VERY HIGH POWER AND ENERGY DENSITY
- \ EXTREME SHOCK & VIBRATION RESISTANCE
- \ ATEX APPROVED
- \ 3.9V Li/SO₂Cl₂
- \ NON-BULGE DESIGN

APPLICATION

- \ OCEAN EQUIPMENT SUCH AS BUOY, TSUNAMI DETECTOR, SEISMIC DEVICES

WHY VITZROCELL?

- ✘ World's most automated production line
- ✘ Vertically integrated production processes from core parts to battery
- ✘ Well verified ruggedized cell design for harsh conditions
- ✘ World's best and largest Reliability Test Center

01 SAFETY

- ✘ EXTREME(TORSIONAL) SHOCK & VIBRATION RESISTANCE
- ✘ NON-BULGE DESIGN & WELL VERIFIED IN THE FIELD
- ✘ HERMETIC GLASS-TO-METAL SEAL ENGINEERED FOR LEAK FREE OPERATION
- ✘ INTEGRAL SAFETY FUSE AND PARALLEL DIODE
- ✘ THE WORLD MOST SAFE FACTORY (SMART CAMPUS)

02 (TECHNICAL) SERVICES

- ✘ TEST CAPABILITY(170 CHAMBERS / 12,000 DISCHARGE CHANNELS / TORSIONAL SHOCK & VIBRATION / 3D X-RAY ANALAYSIS)
- ✘ TECHNICAL SEMINAR
- ✘ ANALYSIS OF FIELD PROBLEMS AND REPORTS
- ✘ ON-SITE ENGINEERING SUPPORT FOR CUSTOMER APPLICATION

03 QUALITY

- ✘ RELIABILITY TEST CENTER (WORLD BEST & LARGEST TEST FACILITIES)
- ✘ VERTICALLY INTEGRATED PRODUCTION PROCESSES FROM CORE PARTS TO BATTERY
- ✘ ISO 9001/14001/MSDS/RoHS
- ✘ UN/DOT CERTIFIED:
CLASS 9 TRANSPORT, UN3090 LITHIUM METAL BATTERIES
- ✘ ATEX (ATmosphere EXplosibles) CERTIFIED

04 OVER 30 YEARS EXPERIENCE

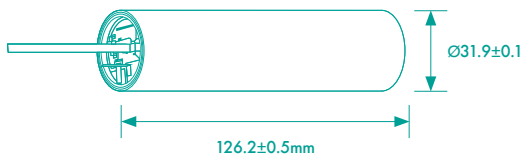
- ✘ OVER 30 YEARS OF ACCUMULATED LEADING-EDGE TECHNOLOGY OF LITHIUM BATTERY(SINCE 1987)
- ✘ TIMELY, CLEAR, UNDERSTANDABLE AND SYSTEMATIC APPROACH TO RELIABILITY, QUALITY AND SAFETY
- ✘ OVER 70 EXPERIENCED RESEARCHER(PH.D, MASTER)

BATTERY FOR MWD/LWD

MAIN CHARACTERISTICS

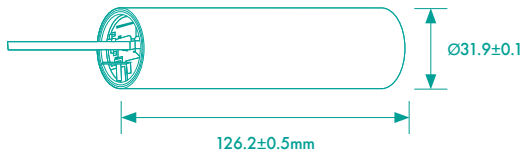
- ∨ 3.6V Li/SOCI₂ (Lithium Thionyl Chloride)
- ∨ Gallium Electrolyte
- ∨ High Capacity
- ∨ Extreme Shock and Vibration resistance

DD-HR 150



Capacity	26Ah~28Ah
OCV at 20°C	3.65V
CCV at 25°C, 320mA	3.2V
Constant Current Discharge	580mA, 1300mA
Temperature	-40°C to 150°C
Diameter	31.9mm (1.26 in)
Height	126.2mm (4.97 in)
Weight	230g
Lithium Metal Content	8.02g

DD-HR 165



Capacity	22.0Ah
OCV at 20°C	3.65V
CCV at 25°C, 320mA	3.2V
Constant Current Discharge	580mA, 1300mA
Temperature	-40°C to 165°C
Diameter	31.9mm (1.26 in)
Height	126.2mm (4.97 in)
Weight	230g
Lithium Metal Content	7.10g

DD-HR 100



Capacity	30.0Ah
OCV at 20°C	3.65V
CCV at 25°C, 320mA	3.2V
Constant Current Discharge	580mA, 1300mA
Temperature	-40°C to 100°C
Diameter	31.9mm (1.26 in)
Height	126.2mm (4.97 in)
Weight	230g
Lithium Metal Content	8.70g

NOTE

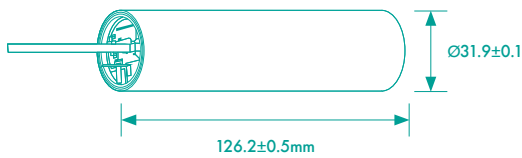
- ∨ Storage cells in a cool (<30°C) and dry condition.
- ∨ Any information given here is for reference only.
- ∨ Information is also dependent on actual conditions and subject to change without notice.

BATTERY FOR MWD/LWD

MAIN CHARACTERISTICS

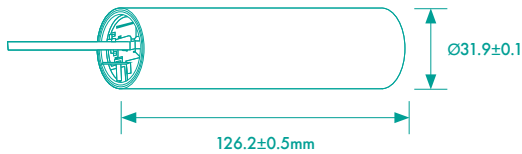
- ∨ 3.6V Li/SOCI₂ (Lithium Thionyl Chloride)
- ∨ Gallium Electrolyte
- ∨ High Capacity
- ∨ Extreme Shock and Vibration resistance

DD-MR 165



Capacity	26Ah~29Ah
OCV at 20°C	3.65V
CCV at 25°C, 320mA	3.2V
Constant Current Discharge	300mA, 600mA
Temperature	-40°C to 165°C
Diameter	31.9mm (1.26 in)
Height	126.2mm (4.97 in)
Weight	225g
Lithium Metal Content	8.60g

DD-MR 180



Capacity	22Ah~25Ah
OCV at 20°C	3.65V
CCV at 25°C, 320mA	3.2V
Constant Current Discharge	225mA, 320mA
Temperature	75°C to 180°C
Diameter	31.9mm (1.26 in)
Height	126.2mm (4.97 in)
Weight	225g
Lithium Metal Content	8.30g

NOTE

- ∨ Storage cells in a cool (<30°C) and dry condition.
- ∨ Any information given here is for reference only.
- ∨ Information is also dependent on actual conditions and subject to change without notice.

BATTERY FOR MWD/LWD

MAIN CHARACTERISTICS

- ∨ 3.6V Li/SOCI₂ (Lithium Thionyl Chloride)
- ∨ Gallium Electrolyte
- ∨ High Capacity
- ∨ Extreme Shock and Vibration resistance

CC-MR 165 (21MM)



Capacity	7Ah-8Ah
OCV at 20°C	3.65V
CCV at 25°C, 64mA	3.2V
Constant Current Discharge	120mA, 200mA
Temperature	-40°C to 165°C
Diameter	20.85mm (0.82 in)
Height	102.1mm (4.02 in)
Weight	80g
Lithium Metal Content	2.80g

CC-MR 165 (25MM)



Capacity	11Ah-13Ah
OCV at 20°C	3.65V
CCV at 25°C, 80mA	3.2V
Constant Current Discharge	150mA, 225mA
Temperature	-40°C to 165°C
Diameter	24.75mm (0.91 in)
Height	102.1mm (4.02 in)
Weight	115g
Lithium Metal Content	4.00g

CC-MR 165 (26MM)



Capacity	13Ah-14Ah
OCV at 20°C	3.65V
CCV at 25°C, 80mA	3.2V
Constant Current Discharge	150mA, 225mA
Temperature	-40°C to 165°C
Diameter	25.55mm (1.00 in)
Height	102.1mm (4.02 in)
Weight	120g
Lithium Metal Content	4.30g

NOTE

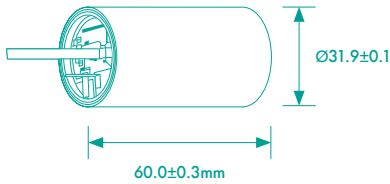
- ∨ Storage cells in a cool (<30°C) and dry condition.
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BATTERY FOR MWD/LWD

MAIN CHARACTERISTICS

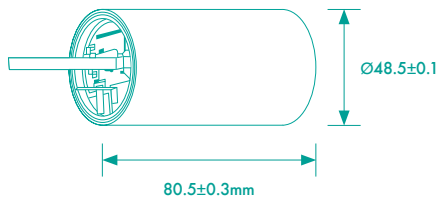
- ∨ 3.6V Li/SO₂Cl₂ (Lithium Thionyl Chloride)
- ∨ Gallium Electrolyte
- ∨ High Capacity
- ∨ Extreme Shock and Vibration resistance

D-HR 165



Capacity	10.0Ah
OCV at 20°C	3.65V
CCV at 25°C , 400mA	3.2V
Constant Current Discharge	320mA, 650mA
Temperature	-40°C to 165°C
Diameter	31.9mm (1.26 in)
Height	60.0mm (2.36 in)
Weight	115g
Lithium Metal Content	3.30g

FAT-D 150



Capacity	37Ah-40Ah
OCV at 20°C	3.65V
CCV at 25°C , 400mA	3.2V
Constant Current Discharge	580mA, 2,000mA
Magnetic Characteristics	≤40 nano Tesla@7inch
Temperature	-40°C to 150°C
Diameter	48.5mm (1.91 in)
Height	80.5mm (3.17 in)
Weight	337g
Lithium Metal Content	11.90g

NOTE

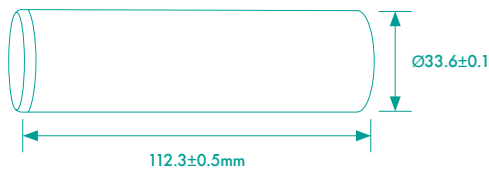
- ∨ Storage cells in a cool (<30°C) and dry condition.
- ∨ Any information given here is for reference only.
- ∨ Information is also dependent on actual conditions and subject to change without notice.

BATTERY FOR PIGGING & OCEAN EQUIPMENT

MAIN CHARACTERISTICS

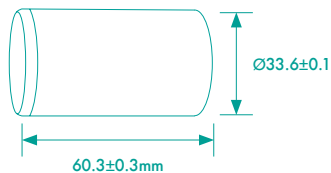
- ∨ 3.9V Li/SO₂Cl₂ (Lithium Sulfuryl Chloride)
- ∨ High Rate Capability
- ∨ High Capacity
- ∨ 100°C Operational Temperature
- ∨ ATEX approved

DD-SC 100



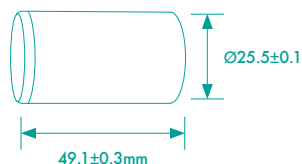
Capacity	27Ah~32Ah
OCV at 20°C	3.91V
CCV at 25°C, 425mA	3.4V
Constant Current Discharge	580mA, 2,000mA
Temperature	-30°C to 100°C
Diameter	33.6mm (1.32 in)
Height	112.3mm (4.42 in)
Weight	213g
Lithium Metal Content	9.60g

D-SC 100



Capacity	12Ah~15Ah
OCV at 20°C	3.91V
CCV at 25°C, 200mA	3.4V
Constant Current Discharge	280mA, 1000mA
Temperature	-30°C to 100°C
Diameter	33.6mm (1.32 in)
Height	60.3mm (2.37 in)
Weight	122g
Lithium Metal Content	4.70g

C-SC 100



Capacity	4Ah~7Ah
OCV at 20°C	3.91V
CCV at 25°C, 80mA	3.4V
Constant Current Discharge	175mA, 600mA
Temperature	-30°C to 100°C
Diameter	25.5mm (1.00 in)
Height	49.1mm (1.93 in)
Weight	59g
Lithium Metal Content	2.40g

NOTE

- ∨ Storage cells in a cool (<30°C) and dry condition.
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CAUTIONS FOR THE LITHIUM BATTERY USE

! Do NOT charge the Battery.

If you reverse the current flow with an external power supply (connect the higher voltage power supply with the reverse direction of the discharge flow or connect 3 batteries with one reverse connected battery, etc), the battery starts to be charged and the electrolyte is dissolved, then the heat generation or inner pressure rising could be caused by a gas generation, or the danger of leakage, breakage, firing could be happened by an inner short circuit generation.

! Do NOT execute the compulsory discharge of the battery.

If you execute the compulsory discharge until the battery shows the voltage reversion (the condition that the voltage shows below 0V), the electrolyte would be dissolved and the gas could be generated, then the leakage, breakage, firing could be happened by a heat generation or the inner pressure rising.

! Do NOT mix-Batteries.

If you connect the used and new batteries together or mix different type of batteries, difference of discharge performance could cause the electrolyte dissolving by old battery's over-discharge, and could be a reason of leakage, breakage, firing by a heat generation and inner pressure rising.

! Do NOT heat battery or throw it into the fire.

If the battery temperature would rise over 100°C, electrolyte could be boiled or the resin part could be melted, then the leakage, breakage or firing could be happened. And, if the battery would be put into the fire, electrolyte's organic solvent or Lithium metal firing could cause a dangerous situation.

! Do NOT make the short-circuit condition (to the metal part, etc) with the positive and negative pole of the battery.

If the battery temperature would rise over 100°C, electrolyte could be boiled or the resin part could be melted, then the leakage, breakage or firing could be happened. And, if the battery would be put into the fire, electrolyte's organic solvent or Lithium metal firing could cause a dangerous situation.

! Do NOT solder the battery directly.

If you solder the battery directly, the heat could cause the Lithium melting then the battery inner part would be a short-circuit condition, and there is a possibility of electrolyte boiling, resin part melting which could cause a risk of leakage, breakage or firing.

! Do NOT make a reverse-connection of the positive and negative pole.

If the battery's positive and negative terminal would be a reverse-connection condition, the battery could consists the short circuit depends on the machine, and the electrolyte could be boiled or the resin part could be melted and there is a risk of leakage, breakage or firing.

! Do NOT dissolve the Battery.

If you dissolve the battery, the battery could consists the short circuit or battery's inner Lithium metal is opened and the moisture in the air could cause the reaction. And, there could be a risk of heat generation, firing or the breakage by a leaked electrolyte.

! Do NOT modify or reconstruct the Battery.

If you make a mold work with the resin or other materials, the safety vent could be blocked, and if the inner pressure would be rose then there is a risk of breakage because the safety vent will not work. So, do not modify or reconstruct the battery for an efficient and safe use of the battery.

! Please see the below cautions for keeping batteries.

If you keep batteries without packages, please pay attention not to contact and short each other. Keep batteries in the ventilated, dry and moderate temperature condition (before or after use for the intended purpose). The high temperature or humidity could cause the heat deterioration or leakage of the battery.

SUMMARY OF PRODUCT LINE-UP

Model Name	Part Number	Code Name	V	Ah	mm	°C
DD-HR 150	32-126-H150G	HGDD15A	3.6	28.0	Ø 31.9 x 126.2	-40~150
DD-HR 165	32-126-H165G	HGDD16A	3.6	22.0	Ø 31.9 x 126.2	-40~165
DD-HR 100	32-126-H100G	HGDD10A	3.6	30.0	Ø 31.9 x 126.2	-40~100
DD-MR 165	32-126-M165G	MGDD16A	3.6	29.0	Ø 31.9 x 126.2	-40~165
DD-MR 180	32-126-M180G	MGDD18A	3.6	25.0	Ø 31.9 x 126.2	75~180
CC-MR 165 21mm	21-102-M165	MG2116A	3.6	8.0	Ø 20.85 x 102.1	-40~165
CC-MR 165 25mm	25-102-M165	MG2516A	3.6	13.0	Ø 24.75 x 102.1	-40~165
CC-MR 165 26mm	26-102-M165	MG2616A	3.6	14.0	Ø 25.55 x 102.1	-40~165
D-HR 165	32-60-H165G	HGD016A	3.6	10.0	Ø 31.9 x 60.0	-40~165
FAT-D 150	48-80-H150G	HLFD15A	3.6	40.0	Ø 48.5 x 80.5	-40~150
DD-SC 100	34-111-H100G	PGDD10A	3.9	32.0	Ø 33.6 x 112.3	-30~100
D-SC 100	34-59-H100G	PGD010A	3.9	15.0	Ø 33.6 x 60.3	-30~100
C-SC 100	26-49-H100G	PGC010A	3.9	7.0	Ø 25.5 x 49.1	-30~100

CONTACT INFORMATION

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PACKING INFORMATION

PRODUCT NAME	CELL WEIGHT (kg)	PACKING QTY (EA)	NET WEIGHT PER CASE(kg)	GROSS WEIGHT PER CASE(kg)	PACKING CASE SIZE (mm)
DD-HR 150	0.230	64	14.7	15.8	427mm x 302mm x 210mm
DD-HR 165	0.230	64	14.7	15.8	
DD-HR 100	0.230	64	14.7	15.8	
DD-MR 165	0.225	64	14.4	15.5	
DD-MR 180	0.225	64	14.4	15.5	
CC-MR 165 21mm	0.080	100	8.0	9.1	
CC-MR 165 25mm	0.115	80	9.2	10.3	
CC-MR 165 26mm	0.120	80	9.6	10.7	
DD-SC 100	0.213	64	13.6	14.7	
D-HR 165	0.115	80	9.2	10.2	
FAT-D 150	0.337	36	12.1	13.1	
D-SC 100	0.122	80	9.8	10.8	
C-SC 100	0.059	150	8.9	9.9	

