



Insight of Intelligent Backup Functions in the DRS Series: Wake_Up, Time_Buffering, and Battery Testing

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MEAN WELL's DRS Series DIN rail power supplies integrate power supply, battery charging, and system monitoring functions. They are widely used in intelligent security, fire protection, and related systems. To meet the growing demand for smart applications, the DRS series continues to optimize its product features. The latest version introduces new features such as the Wake_Up mechanism and Buffering time settings, enabling the power system to provide stable power delivery while offering flexible, comprehensive solutions tailored to different system architectures and application scenarios.

To help users quickly master the latest features and application advantages of the DRS series, this article combines the DRS user manual to detail the Wake_Up mechanism, Buffering time settings, and practical functions such as Force Start.

■ Wake_Up Mechanism Explanation

To meet the application requirements of lithium battery BMS, the DRS series establishes the rated output voltage upon powering on. After maintaining this for 5 seconds, the output voltage drops to 70% of the rated value and then gradually ramps up. When a battery is connected to the BAT terminal: The output voltage ramps up to the current battery voltage. Once a wake-up current is detected on the battery side, the system determines that the BMS has successfully started and enters the normal charging process. At this stage, the main output voltage and BAT terminal voltage are basically aligned. When no battery is connected to the BAT terminal: The output voltage ramps up to a maximum of 130% of the rated value before returning to the rated output voltage. Concurrently, output at the BAT terminal is cut off, retaining power delivery only to the load side.

The figures below show the output voltage waveforms during the Wake_Up process under two conditions: with and without a battery connected to the BAT terminal. The yellow trace represents the main output voltage waveform, while the blue trace represents the output voltage waveform at the BAT terminal.



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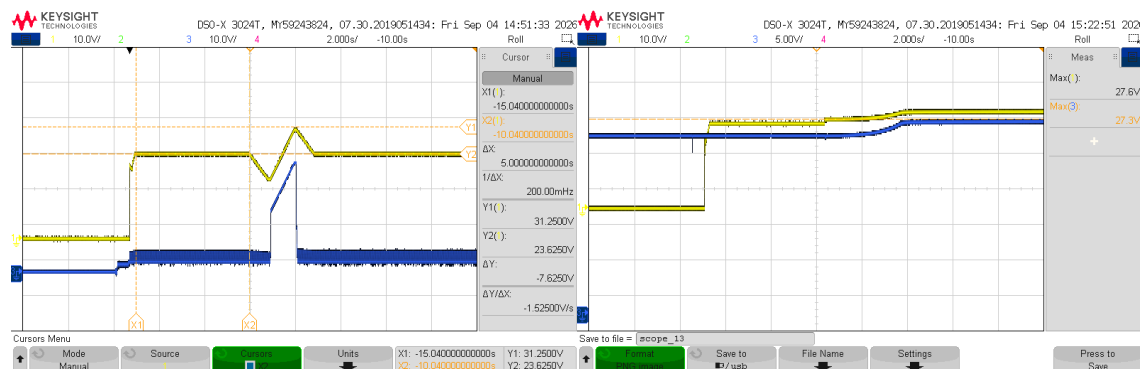
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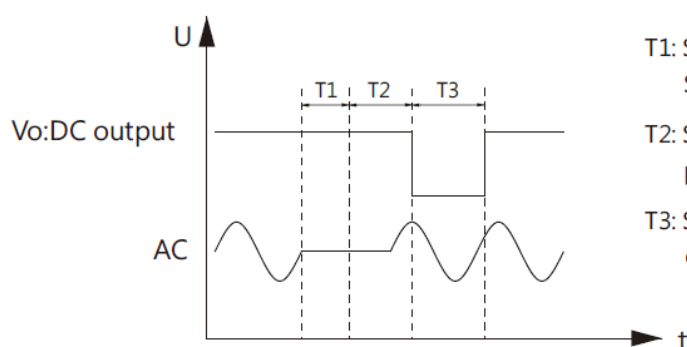
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In cases where no battery is connected, the Wake_Up process repeats every 5 minutes. For deployments without batteries that are sensitive to output voltage fluctuations, periodic wake-up can be disabled via communication command (UPS_CONFIG: Wake_UP_EN=0), keeping only the initial wake-up at startup.

■ TIME_BUFFERING Function Explanation

In practical applications, simple "discharge immediately upon power outage" hardware logic can no longer satisfy complex grid requirements and unmanned intelligent operations. Therefore, the DRS series introduces three configurable parameters—TIME_BUFFERING (backup time setting), UPS_Delay_Time (backup shutdown delay setting), and UPS_Shutdown_Time (backup restart delay setting).



T1: Set the time from the AC off to the Start of the shutdown process

T2: Set the time of the shutdown process.

T3: Set the restart delay time after the output turns off.

Command Settings Overview :

Command Code	Command Name	Factory Default	Setting Range	Description
0x00E4	TIME_BUFFERING	600 min	60~64800 min	Backup time setting
0x00E8(Modbus) 0x00E7(CANBus)	UPS_Delay_Time	60 sec	60~300 sec	Backup shutdown delay time setting
0x00E8(Modbus) 0x00E9(CANBus)	UPS_Shutdown_Time	15 sec	0~60 sec	Backup restart time setting



1. TIME_BUFFERING (Preventing Battery Deep Discharge):

During prolonged utility power outages, allowing the battery to continuously discharge into a deep discharge state severely impacts battery life. Using TIME_BUFFERING, users can customize the maximum discharge duration T1 for the DC-UPS. When the discharge time reaches the set value, the system automatically terminates discharging to prevent over-discharge at the source.

2. UPS_Delay_Time and UPS_Shutdown_Time (T2 Shutdown Delay & T3 Restart Timing):

After the DRS completes the full T1 discharge process, it enters phase T2 (UPS_Delay_Time), during which the DC-UPS continues to maintain output. Notably, if AC power recovers during T2, the system will not switch back to grid power immediately; instead, it continues battery power delivery until T2 completes before shutting off output. Subsequently, the system enters phase T3 (UPS_Shutdown_Time). Once the T3 countdown finishes, the UPS re-establishes output. T2 Design Purpose: Avoids frequent UPS switching caused by grid power fluctuations early in the recovery phase. It restores utility power only after the grid has stabilized, enhancing system reliability. T3 Design Purpose: Introduces a cooling/recovery period after full battery discharge, preventing repetitive system restarts from grid instability and ensuring equipment comes back online only when utility power is steady.

3. Application Configuration:

By default, these three parameters are inactive. Users must enable TIME_Buff_EN, UPS_Delay_EN, and UPS_Shutdown_EN via the UPS_CONFIG command to activate their respective functions.

- **Enable TIME_Buff_EN only:** Activates T1 (basic backup protection).
- **Enable TIME_Buff_EN + UPS_Delay_EN:** Activates T1 + T2 (recommended for environments with frequent power grid fluctuations).
- **Enable all three:** Activates the full T1 → T2 → T3 procedure (recommended for unmanned sites).

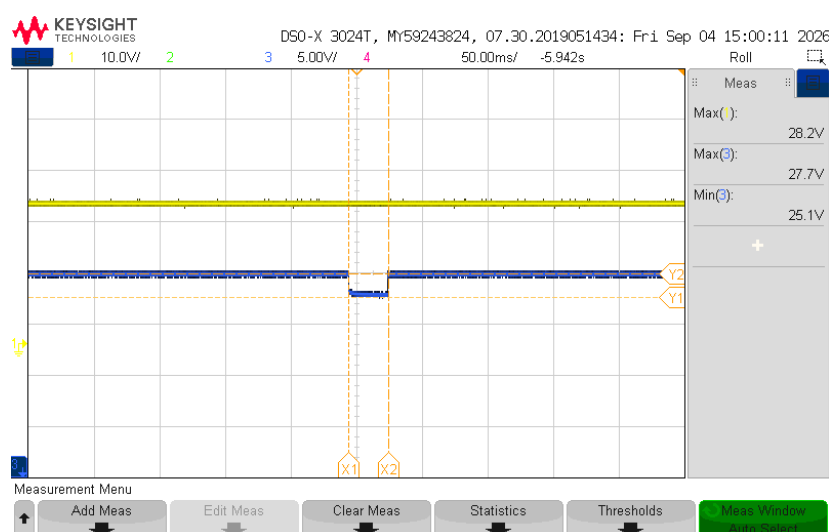
■ BAT_Test (Battery Test) Function Explanation

The DRS series is typically paired with batteries. To ensure backup reliability, it includes a built-in BAT_Test function to periodically check if the battery is over-discharged or abnormal.

When a battery is connected and charging normally, the DRS automatically executes the battery test routine every 30 seconds, discharging the battery for a brief 30 ms interval. If the battery voltage drops below the BAT_LOW threshold (91% of the PSU model voltage, e.g., 22V for a 24V model) during this 30 ms period, the battery is judged as abnormal. The main output then adjusts to the rated voltage, and the charging circuit output is disabled.

Once an abnormal condition is determined, the BAT_Test program switches to running every 5 minutes to monitor battery status continuously. If this feature is not needed, it can be disabled via communication commands (UPS_CONFIG: Life_Test_EN=0).

The figure below shows the output voltage waveforms during the battery test procedure. The yellow trace represents the main output voltage, while the blue trace represents the output voltage at the BAT terminal. During the default charging process, the BAT terminal stops outputting for 30 ms, allowing the oscilloscope to measure the actual battery voltage. This test procedure is performed every 30 seconds.



■ Supplementary Features

AC Priority: When AC grid power is present, the system prioritizes supplying power via AC to conserve battery energy. Force Start cannot switch power supply to the battery while AC power is available.

Force Start: When AC power is absent, Force Start can switch system power to the battery so the DRS functions normally, catering to construction commissioning and testing scenarios. **Via Button:** Long-press the Battery Start button on the DRS panel to discharge down to 85% of the PSU model voltage (e.g., 20.4V for a 24V model). **Via Terminals:** Short-circuit pins 7 and 8 on the functional terminal block CN1 to discharge down to 70% of the PSU model voltage (e.g., 16.8V for a 24V model).



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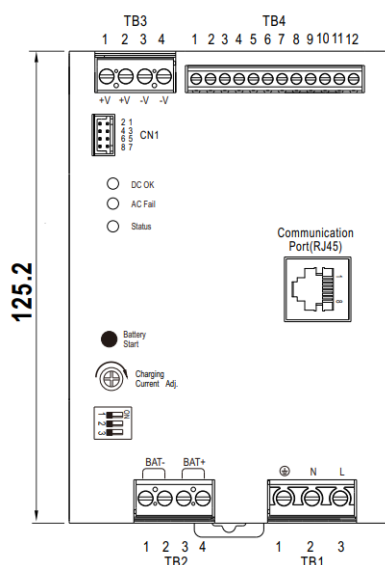
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Force button Connector (CN1):
JS-2008R-4*2-T or equivalent

Pin No.	Assignment
1	3.3V
2	GND
3	RTH+
4	RTH-
5	A0
6	A1
7,8	Open: Normal Short: Force start

When downstream equipment starts up or operates under high load, causing a sudden spike in main load current, the DRS automatically prioritizes supplying the main load and reduces battery charging power to avoid triggering OLP (Over Load Protection). As main load power demand decreases, the DRS reallocates released power back to the battery charging circuit, significantly improving overall power supply utilization.

MEAN WELL is actively expanding the DRS family with the design of the [DRS-960 \(a 960W security power supply\)](#), which is scheduled for official release in the first half of 2027.

For related product and application requirements, please contact MEAN WELL distributors or technical support directly, and stay tuned for product updates and online solution courses at MEAN WELL's Virtual Exhibition.

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