



Tel: +90-216 466 84 60  
Fax: +90-216 364 65 65  
datakom@datakom.com.tr  
<http://www.datakom.com.tr>

## APPLICATION NOTE

<b>BATTERY BACKUP OPERATION WITH DKG359</b>	
<b>WRITTEN BY:</b>	Tugay Okatan
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<b>Issue</b>	01

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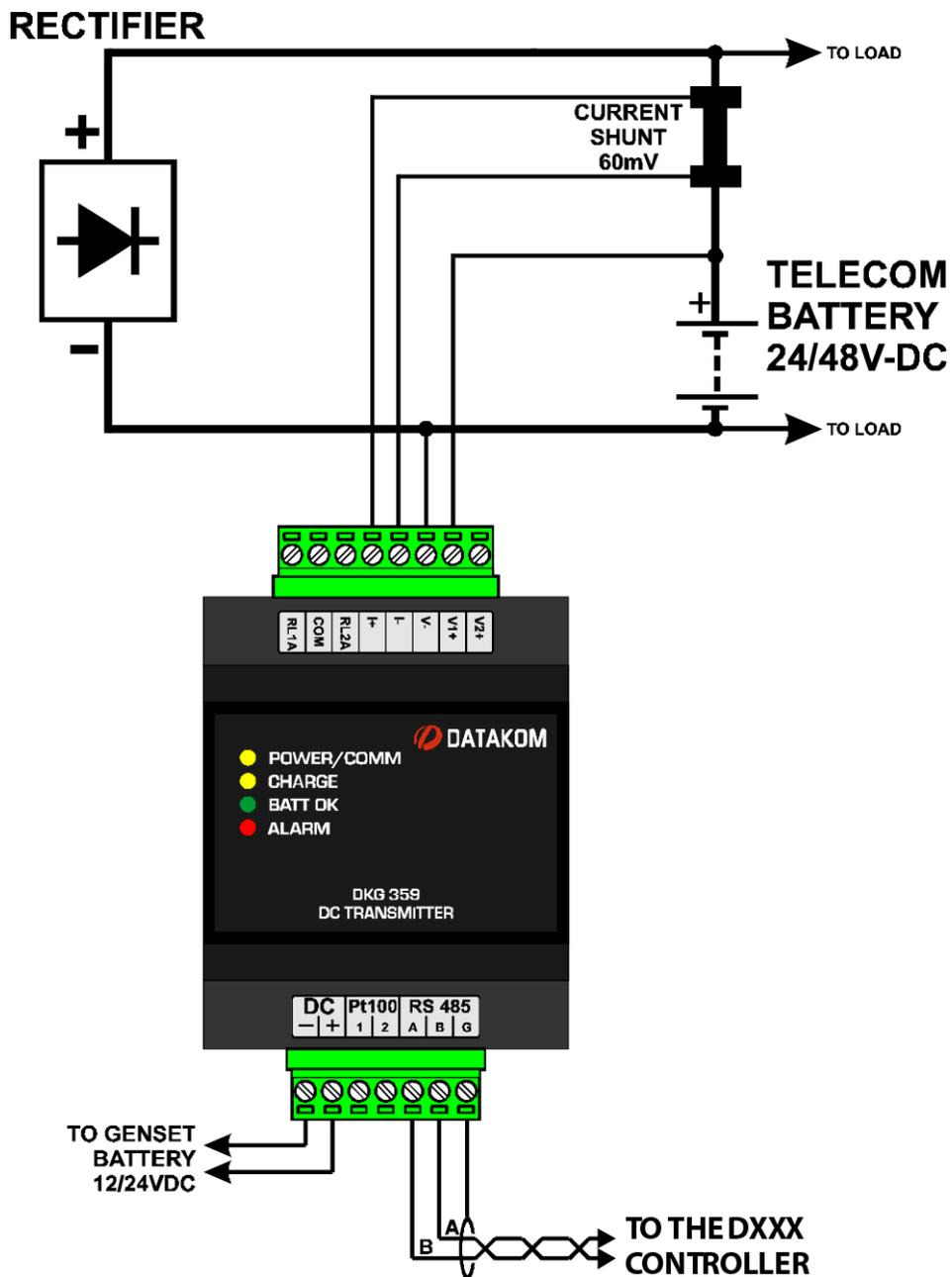
# 1. INTRODUCTION

This document describes a method for battery backup operation by using a D-xxx series controller and DKG-359. Necessary steps and methodology are explained with examples in detail.

For any technical queries please contact Datakom Technical Support Team.

[technical.support@datakom.com.tr](mailto:technical.support@datakom.com.tr)

# 2. INSTALLATION DIAGRAM



## 3. BATTERY BACKUP OPERATION

### 3.1. OVERVIEW

In simple telecom systems, gensets run during mains failure periods. Thus, the genset run-hour is equal to the sum of mains failure hours. On the other hand, DKG-359 allow users to build-up telecom systems so that load will be supplied from battery group, and genset will operate in order to charge telecom batteries, only when needed, with respect to predefined parameters such as battery group voltage, battery discharge counter and battery charge timer.

### 3.2. BATTERY GROUP VOLTAGE

Positive and negative terminals of battery group must be connected to the Vin+ and Vin- terminals of DKG359 respectively. DKG359 will measure voltage of battery group, which can be seen as **Vbat** on battery group parameters screen.

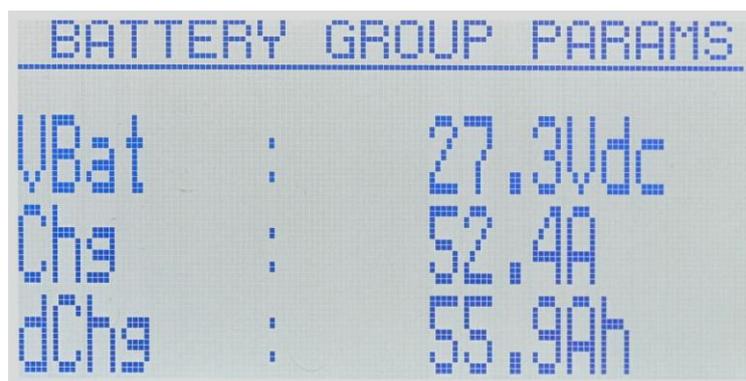


Figure 1 : Battery Group Parameters

### 3.2. CHARGE/DISCHARGE CURRENT

Charge and discharge current is measured through a shunt connected in series with the battery group. The shunt ratio is adjustable on the DKG-359 itself, and charging or discharging condition will be decided by the D-xxx controller depending on the position of MC and GC contactors;

- If both mains and generator contactor are off, the current will flow from the battery group to the load. Therefore, the current measured through the shunt will be considered as a **discharge** current.
- If either MC or GC is ON, the current will flow from power supply to the load, and to the battery group. Therefore, the current measured through the shunt will be considered as a **charge** current.

The current measured by the DKG-359 through the shunt can be seen as **Chg** on battery group parameters screen. A negative value means a discharge current.

### 3.3. BATTERY DISCHARGE COUNTER

Operation of the DKG-359 together with D-series controllers on telecom battery systems can be explained as follows;

#### **When both Mains Contactor and Generator Contactor are OFF:**

- The battery discharge counter on the controller increases with the consideration that the load is supplied from batteries, and batteries are discharging. The discharge counter is incremented using the measured current.

#### **When Mains Contactor OR Generator Contactor is ON:**

- The battery discharge counter on the controller decreases with the consideration that the load is supplied by mains or generator, and batteries are getting charged through the rectifier. The discharge counter is decremented using the measured current. It is 1.4 times slower than the discharging rate for safety.

The battery discharge counter calculated by the D-series controller can be read as **dChg** on battery group parameters screen.

### 3.4. OPERATION

#### **If mains is available:**

- MC will be on, the load will be supplied from mains, and the **discharge counter** decreases until it reaches 0, considering that batteries are getting charged by the rectifier.

#### **In case of mains failure:**

The load will be supplied by the battery group, and batteries will start discharging. Therefore, the discharge counter on the controller will start to increase.

- Once the **discharge counter** reaches the **Remote Battery Discharge Limit**, then the controller will run the genset, and energize the genset contactor. Since the GC is ON, **discharge counter** will start to decrease with a rate of the charge current divided by 1.4.
- If the **battery group voltage** drops down to **Remote Battery Charge Voltage** before the **discharge counter** reaches **Remote Battery Discharge Limit**, then the controller will start the genset and energize GC immediately.

#### **When genset is running:**

- After the expiration of **Remote Battery Charge Timer**, GC will be off, genset will stop, and the load will be supplied from the battery group. The discharge counter will start to increase from its latest value.

If **Remote Battery Charge Timer** is set to 0, then below conditions should be met in order to complete the charging cycle;

- **Discharge Counter** decreased to 0.
- Charge current decreased to 1/100 of **Remote Battery Discharge Limit**. When charge current decreases to 1/100 of **Remote Battery Discharge Limit**, the **discharge counter** will be reset to 0 automatically. Therefore, GC will be off and the genset will stop. The load will be supplied from the battery group with the assumption that batteries are now fully charged.

**When mains recovers:**

- Mains recovery has priority in this operation. Therefore, when mains recovers, GC will be OFF, the genset will stop, and MC will be ON regardless of any parameter or measurement related to the battery group.

## 4. PARAMETERS RELATED WITH OPERATION

Below parameters must be configured on D series generator controller for battery backup operation. They are in “**Controller Configuration**” parameter group in programming menu.

PARAMETER NAME	DESCRIPTION
Unit Functionality	Unit functionality must be selected as <b>remote start</b> for battery backup operation.
Modbus Master Active	Modbus master active must be set to 1 in order to establish connection between D series controller and DKG359.
Remote Battery Charge Voltage	If mains not available, and measured <b>battery group voltage</b> is less than <b>Remote Battery Charge Voltage</b> , then the controller will start the genset and energise the GC.
Remote Battery Charge Timer	Genset will run and GC will be on during this timer, unless mains recovers or the battery gets fully charged.
Remote Battery Discharge Limit	The battery group will discharge until reaching the <b>Remote Battery Discharge Limit</b> before the D-series controller runs the genset and energize the GC.