



RangePro® X8

*Using the Ultimate Duo 400W Charger with a
RangePro X8 RP6S24KHDA Battery Pack*

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1. Introduction

The Range Pro X8 RP6S24KHDA is a dual 6S2P, 24,000 mAh, high density, battery pack consisting of two independent 6S2P Lithium Ion Polymer battery packs installed in a single battery cage. The battery packs are impedance matched at the factory, placed in a common cage, and wired independently to a single connector.

On the aircraft the unit provides a blind mating power solution with easy insertion and extraction from the system using a dovetail rail system and latching mechanism. The power pins from both battery packs, though housed in the same connector, are independently routed to the aircraft power distribution board.

For charging, power and balance port connectors are separately wired for each battery pack and broken out for connection to a charger using a custom cable. To connect the RP6S24KHDA to the SKYRC Ultimate Duo 400W (D400) Balance Charger, use the RPBCCA400-12 twelve-inch cable that includes a battery mating connector on one end and two sets of power and balance ports on the other. Custom cable lengths are available upon request.

This document provides instructions on how to customize the D400 charger for use with the RP6S24KHDA battery as well as some common troubleshooting steps for addressing issues that may arise when the unit is not set up correctly. For additional details on how to use the D400, refer to the Ultimate Duo Instruction Manual provided with the charger.

2. Modify and Verify System Settings

Verify the correct system settings for BOTH charging channels using the following steps.

- a. Power on the Ultimate Duo 400W Charger (D400).
- b. Press the **STATUS “+”** or **“-”** button for the channel until the display screen reads:

**BATT/PROGRAM
SYSTEM SETTING->**

- c. Press **ENTER “▶”** to review the system settings.
- d. To scroll from one parameter to another, use the **STATUS “+”** or **“-”** buttons.
- e. To change the value of a parameter enter into editing mode by pressing **ENTER “▶”**.
- f. In editing mode, the value of the selected parameter will blink slowly. Press the **STATUS “+”** or **“-”** button to adjust the parameter value. When the value is set correctly exit the editing mode by pressing the **Enter “▶”** button. Some screens contain two parameters. In this case, pressing the **Enter “▶”** button will close editing for the first parameter and open editing for the second parameter. Pressing **Enter “▶”** a second time will close editing on the second parameter.

Parameter	Channel 1 Value(s)	Channel 2 Value(s)
Max Power Set	200W	200W
Synchronization*	OFF	N/A
Safety Timer	ON 150Min	ON 150Min
Capacity Cut-Off	ON 12600mAh	ON 12600mAh
Temp Cut-Off	ON 50C 122F	ON 50C 122F
Temperature Unit	Celsius	Celsius
Rest Time CHG\DCHG	10Min	10Min
NiMH Sensitivity	N/A	N/A
NiCd Sensitivity	N/A	N/A
Key Beep	ON	ON
Buzzer	ON	ON
DC Input Low Cut-Off	11.0 V	11.0 V
Balance Port	Enable	Enable
Load Factory Set	(See Manual)	(See Manual)

- g. When all system settings for the channel have been properly set and verified, press the **BATT/PROG “■”** button to return to the main menu.
- h. If not already completed, repeat steps 2.b through 2.g for the other charging channel.

**In most cases Synchronization can be set to ON but it is important to note that in rare cases Synchronization may prevent one side or another from charging properly if there is a significant mismatch between battery states. Also note that while Synchronization will ensure the same program is being used by both sides of the charger, in the case of custom Battery Memory programs it does not ensure that the programs for each channel are identical. Battery Memory programs must be independently set on each side of the charger.*

3. Program Battery Memory Charge Settings

Verify the correct Battery Memory settings for BOTH charging channels using the following steps.

- a. Power on the Ultimate Duo 400W Charger (D400).
- b. Press the **STATUS “+”** or **“-”** button for the channel until the screen reads:

**BATT/PROGRAM
BATT MEMORY**

- c. Press **ENTER “▶”** to gain access to the ten (10) battery memory locations.
- d. Use the **STATUS “+”** or **“-”** buttons to scroll through the locations until the screen reads:

**[BATT MEMORY 1]
ENTER SET->**

- e. Press **ENTER “▶”** to verify the correct setting for Battery Memory 1.
- f. To scroll from one parameter to another, use the **STATUS “+”** or **“-”** buttons
- g. To change the value of a parameter enter into editing mode by pressing **ENTER “▶”**
- h. In editing mode, the value of the selected parameter will blink slowly. Press the **STATUS “+”** or **“-”** button to adjust the parameter value. When the value is set correctly exit the editing mode by pressing the **Enter “▶”** button.

Parameter	Channel 1 Value(s)	Channel 2 Value(s)
BATT TYPE	LiHV	LiHV
BATT VOLTAGE	22.8V(6S)	22.8V(6S)
CHARGE CURRENT	6.0A	6.0A
DSCHG CURRENT	3.0A	3.0A
DSCHG VOLTAGE	3.2V/CELL	3.2V/CELL
TVC=YOUR RISK!	4.30V	4.30V
SAVE PROGRAM	(see below)	(see below)

- i. When all system settings for the channel have been properly set and verified it is necessary to save the programmed values. The last option in the parameter list is “SAVE PROGRAM”. To save the program press the **Enter “▶”** button. On the screen the word “ENTER” will disappear and be replaced with the word “SAVE...” When these memory settings have been saved the display screen will return to the Battery Memory screen and alternate between the following:

**[BATT MEMORY 1]
LiHV 22.8V(6S)**

**[BATT MEMORY 1]
C:6.0A D:3.0A**

- j. Press the **BATT/PROG “■”** button to return to the main menu.
- k. If not already completed, repeat steps 3.b through 0 for the other charging channel.

CRITICAL NOTE:

Anytime the BATT TYPE is changed and the program saved, the TVC (Terminal Voltage Charge) is reset to the default voltage for that battery type and will remain at the default value until manually changed by the user. Prior to saving the program always confirm the TVC is set to the correct value!

4. Balance Charge the Battery using Battery Memory #1

- a. Start up the Ultimate Duo 400W Charger (D400)
- b. Press the **STATUS “+”** or **“-”** button for the channel until the display screen reads:

BATT/PROGRAM
BATT MEMORY

- c. Press **ENTER “▶”** to gain access to the ten (10) battery memory locations.
- d. Use the **STATUS “+”** or **“-”** buttons to scroll through the memory locations until the top line of the display screen reads:

[BATT MEMORY 1]

- e. Press and hold **ENTER “▶”** until the unit beeps and the top line of the display screen reads:

LiHV BALANCE

- f. To select a different mode, Press the **STATUS “+”** or **“-”** buttons to cycle through the available modes. Available modes include
 - i. LiHV BALANCE
 - ii. LiHV CHARGE
 - iii. LiHV FAST CHG
 - iv. LiHV STORAGE
 - v. LiHV DISCHARGE
- g. When the correct mode is selected, Press and hold **ENTER “▶”** until the unit beeps. The unit will perform a battery check to ensure the correct type of battery is properly installed. Assuming there are no errors, the display screen will alternate between the following:

R: 6SER S:6SER
CONFIRM(ENTER)

R: 6SER S:6SER
CANCEL(STOP)

- h. Press **ENTER “▶”** to proceed to the next step or press **BATT/PROG “■”** to cancel. If continuing with charging the display screen will read:

WARNING For LiHV
Battery only [OK]

- i. Press **ENTER “▶”** to proceed to the next step or press **BATT/PROG “■”** to cancel.
- j. If not already completed, repeat steps 4.b through 0 for the other charging channel.
- k. If after the program has started it is necessary to stop the program, press the **BATT/PROG “■”** button to stop the current program and return to the main menu.

5. Troubleshooting Common Charging Errors

- a. The channel times out before charging is complete
 - i. Error Message: OVER TIME LIMIT
 - ii. In the system settings,
 - (1) set the Safety Timer to OFF to prevent this from ever happening, OR
 - (2) set the Safety Timer to ON and 150 minutes
 - (a) Each Range Pro X8 RP6S24KHDA battery pack requires approximately 12,000 mAH for a full charge. At 6 Amps this equates to two hours or 120 minutes.
 - (b) Another 30 minutes is added to support the extra time required to complete final balancing at lower currents.

- b. The channel stops charging due to an over charge capacity limit
 - i. Error Message: OVER CHARGE CAPACITY LIMIT
 - ii. In the system settings,
 - (1) set the Capacity Cut-Off to OFF to prevent this from ever happening, OR
 - (2) set the Capacity Cut-Off to ON and 12,600 mAH
 - (a) Each Range Pro X8 RP6S24KHDA battery pack requires approximately 12,000 mAH for a full charge.
 - (b) Another 5%, or 600mAh, is added to permit support for some more extreme battery drainage situations.

- c. The channel charges batteries to 4.35V per cell
 - i. Error Message: None – determined when checking battery cell voltages after charging is completed
 - ii. Within memory setup, anytime the BATT TYPE field is opened for editing, the TVC (Terminal Voltage Charge) is reset to the default voltage for that battery type. The user is not informed of this background change. If the program is then saved without ensuring the TVC is set correctly, the memory setup will overwrite the previous setting and use the default.
 - (1) The custom memory program for the Range Pro X8 RP6S24KHDA battery pack uses the LiHV setting, which has a default TVC value of 4.35 VDC.
 - (2) For the Range Pro X8 RP6S24KHDA battery pack the correct TVC value is 4.30 VDC.
 - (3) After changing the battery type and prior to charging, always confirm the TVC is set to the correct value.
 - iii. Why does this resetting of the TVC sometimes happen unexpectedly?
 - (1) To start a charging sequence using Battery Memory 1, the user needs to PRESS & HOLD the **Enter “▶”** key.
 - (2) To start editing setup for Battery Memory 1, the user needs to PRESS the **Enter “▶”** key.
 - (3) If a user is not careful and, starting at the [BATT MEMORY 1] screen, presses the **Enter “▶”** key twice in a row, the system enters edit mode for the Battery Type. Even if no change is made in this field, the TVC is updated to match the default TVC for the battery type selected. To prevent the default value from being saved either press **BATT/PROG “■”** to cancel without saving or prior to saving, adjust the TVC to the correct value.

- d. The charger will only charge the battery at 0.1A and it takes a long time.
 - i. This can happen when a battery is significantly drained beyond normal operating voltages and the cell voltages have fallen below a certain charging threshold.

- ii. When using the LiHV model as a basis for a customized program, if the total battery voltage is below 20.4 volts (3.4 volts per cell), the charger will only trickle charge at 0.1A until the battery reaches the minimum voltage threshold. After all cells exceed the minimum voltage threshold the unit will switch to charging at full current until the process nears completion. Near the end of the charging process the current will slowly decrease as the individual cells are finely balanced.
- iii. One way to accelerate the charging process when slow charging occurs is to start charging in the LiPO mode, being sure to set the channel to 6Amps and a 6S configuration, which has a lower charging threshold of 19.8 (3.3 volts per cell). After the battery voltage exceeds 20.4 volts per cell switch to the customized LiHV model to obtain a full charge of 4.30 volts per cell.