The voltage test distributions and model prediction outputs of 100 batteries with the same current density, different assembly pressures, and other groups are shown in Fig. 6. It is worth noting that all of the subgraphs have a longitudinal span of 0.02V. The larger the graph fluctuation within the same variation range of the longitudinal axis, the worse the battery's consistency. In the experiment, two batteries are used as a collection unit because they have the same voltages. Figures a2, b2, and c2 in Fig.6. compare the model's predicted output to the experimental test results of 50 groups with two batteries. Under different assembly pressures, all model predictions can follow the experimental results closely, and the model prediction outputs are always higher than the experimental test results. The model could predict accurately when the assembly pressure is 14N. When the assembly pressures are 12N and 14N and the battery serial number is around 95, the model's prediction outputs deviate significantly from the experimental results. Also, as shown in the three figures above, when the assembly pressure is 12N, the graph has a smaller fluctuation range, whereas the graph fluctuation range in a2 and c2 fills the entire graph frame. The comparison of model prediction outputs and experimental test results in 100 groups are shown in Figures a1, b1, and c1. The model's productions are higher than the experimental test results and show more details. Compared with figures a2, b1, and c1, the voltage distribution shows greater volatility. For example, in the assembly pressure of 14N, figure b1 shows that the battery has a more considerable voltage fluctuation near the 70th battery. Figures a3, b3, and c3 show a comparison of model prediction outputs and experimental results from 20 groups of batteries, each with five cells. As the number of groups is reduced, the model's predicted outcome loses details of cell voltage distribution but retains the trend of cell voltage distribution. Furthermore, when the assembly pressure is 14N, the model predicts more consistent cell voltages. Comparison between figures a4, b4, and c4 and a5, b5, and c5 show that as the number of groups decreases, more details of cell voltage distribution are lost. It is can be inferred that when there is only one group, to show the average voltage of 100 batteries, the figure should be a straight line parallel to the X-axis. As shown in Figures a4, b4, and c5, when the assembly pressure is 14N, the model predicts that the output has only one slight fluctuation, whereas there will be two larger fluctuations when the assembly pressure is 12N and 15N.

Fig.7. a1, b1, and c1 show the U 下標 C e l l 結束下標 in model predictions and experimental tests under changing currents with different assembly pressure and grouping strategies. In D4 and D5, the model prediction outputs closely match the experimental results, but in D3, D2, or D1, the U 下標 C e l l 結束下標 of the model decreases as the number of the group decreases, which is due to the loss of details in cell voltage distribution as the number of groups decreases. Interestingly, at 14N assembly pressure, 500A to 600A current load, D3 has a higher U 下標 C e l l 結束下標 prediction than D4. This is possibly due to the overall consistency of every 5 neighbor cells is better than every 10 neighbor cells in this load current range. The above three figures also show that when the assembly pressure is 14N, the model prediction and experimental test results have the lowest U 下標 C e l l 結束下標 under different groups. For example, when the current load is 732A and the assembly pressure is 14N, both the experimental test and model prediction results are lower than 5.5, whereas when the assembly pressure is 12N and 15N, the experimental test and model prediction results are around 6.5. However, the assembly pressure of 15N is more consistent than that of 12N at low current loads. When the current load is 200A, the maximum values of the model prediction result and the experimental result of 15N are approximately 1.5, whereas when the current load is 12N, the maximum values are approximately 2. This is because …………… And it could be concluded from the three figures above that the battery's consistency deteriorates as the current load increases. In D5 and D4, the increase in consistency was exponential, while for D3, D2, and D1, the change in consistency was essentially linear, with the slope decreasing as the number of groups decreased. In the case of high load current and assembly pressure at 12N, D4 and D5 even show a logarithmic growth trend. This is because, under high current loads, the rapid flow rate of reaction gas in the reactor has distributed flow field can result in turbulent and unstable gas supply. The reaction flow rate and consumption are moderate in the middle range of the load current, and the fluid distribution of each cell is stable, which promotes uniform distribution of battery voltage.

Figures 7 a2, b2, and c2 depict the *Range* of model prediction and experimental tests when the load current, assembly forces, and grouping strategies are different. The *Range* has a similar growing trend to U 下標 C e l l 結束下標, but fluctuations in *Range* are smaller. The *Range* from model predictions and experimental tests in each group under different load currents is the smallest when the assembly pressure is 14N. When the assembly pressure is 12N and 15N, the maximum values of model prediction and experimental results are around 28, while when the assembly pressure is 14N, the model prediction output and experimental results are around 25. In D4 and D5, both the model prediction and experimental results of *Range* show an exponential growth trend with increasing current load; In D3, D2, and D1, they show a linear growth trend, but the slope is lower, and the change is gentler compared to the curve of U 下標 C e l l 結束下標. High *Range* values may trigger a drop in battery voltage, resulting in irreversible degradation of fuel cell stack components. As a result, high *Range* should be avoided even if U 下標 C e l l 結束下標values are low.