SHACMAN 汽车电器知识培训

F2000-F3000

陕汽进出口公司服务部培训科

第三十二课 取力器差速器电磁阀控制

1、电磁阀与取力器连接——QH50、QH70 取力器:

QH50、QH70 取力器是德龙奥龙自卸车最常使用的取力装置，气路控制连接主要有两种：

1. Connection of Solenoid Valve to PTO - QH50, QH70 PTO:

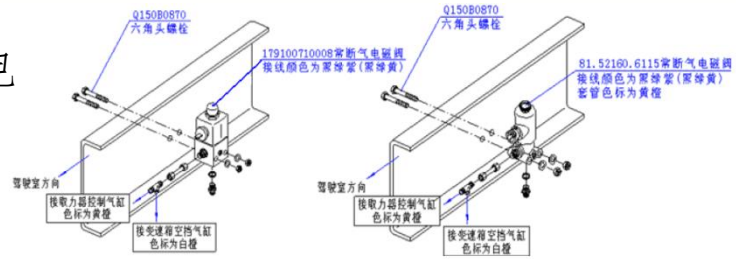
The QH50 and QH70 power take-offs (PTOs) are the most commonly used power take-off devices in Delong and Olong dump trucks. There are mainly two types of pneumatic control connections:

第一种：只有停车取力、没有行车取力时电磁阀装配如图（3-47）中所示，图中电磁阀均为常断气。

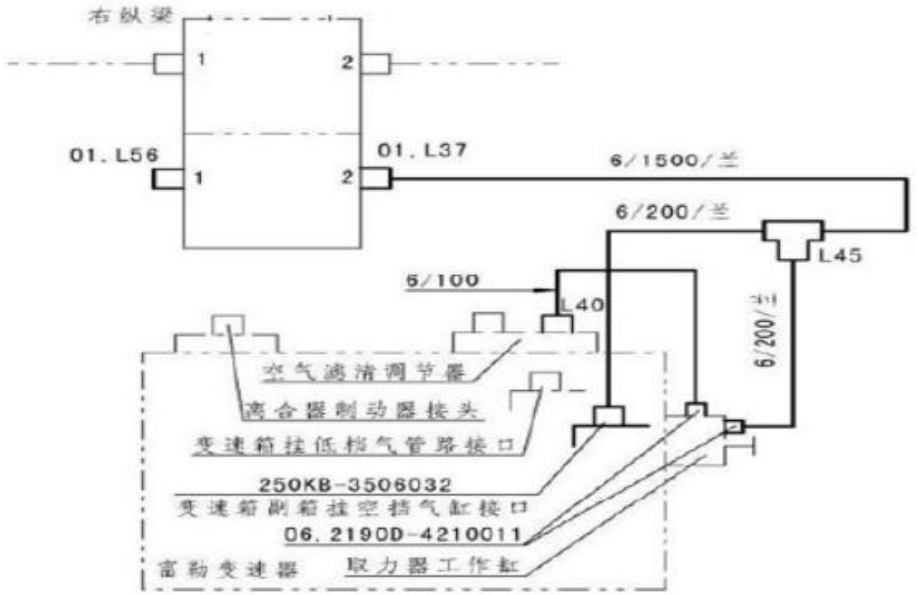
First Type: Solely for stationary power take-off without driving power take-off

In this configuration, the solenoid valves are assembled as shown in Figure (3-47), with all solenoid valves being normally closed solenoid valves.

[Note: Detailed assembly instructions and diagrams may be provided in the referenced figure.]



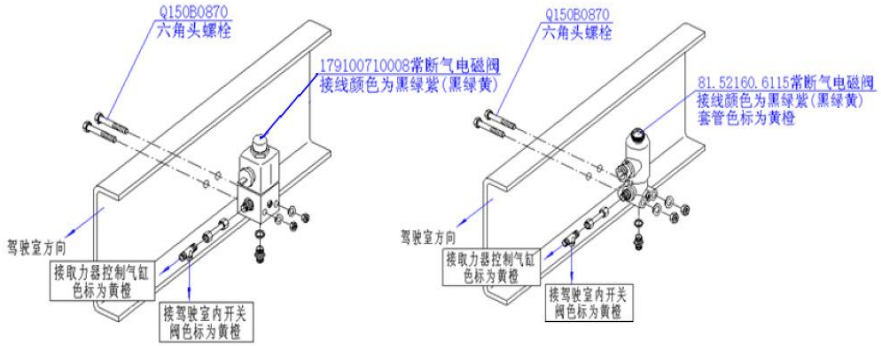
图（3-47）停车取力、行车不取力



图（3-48）气管路图

图（3-48）为电磁阀气管路连接示意图，当电磁阀不工作时，取力器不工作，当电磁阀得电后，压缩气同时输入到变速箱空档接口和取力器接口。

In Figure (3-48), the diagram illustrates the pneumatic connection of the solenoid valves. When the solenoid valves are not activated, the power take-off does not operate. However, when the solenoid valves receive electrical power, compressed air is simultaneously supplied to both the gearbox neutral interface and the power take-off interface.



图（3-49）停车、行车均取力（带开关阀）

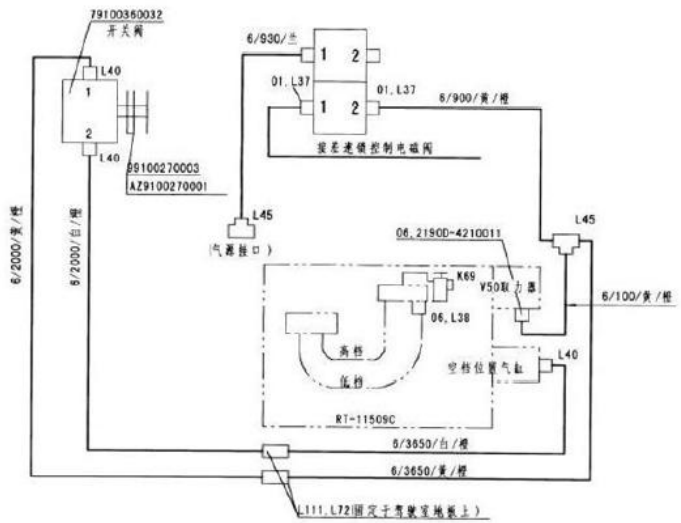
第二种：停车、行车均取力如图（3-49）所示，底盘装配一个电磁阀，驾驶室内装配开关阀（取力器手控开关阀，主要用于奥龙自卸车）

Second Type: Power take-off while stationary and in motion

In this setup, as illustrated in Figure (3-49), a solenoid valve is mounted on the chassis. Inside the cabin, a switch valve is installed (power take-off manual control switch valve), primarily used for Olong dump trucks.

管路连接示意图如图（3-50）所示：

Figure (3-50) illustrates the schematic diagram of the pipeline connection.



图（3-50）气管路图（带开关阀）

如果取力器开关打开，则取力器电磁阀得电，电磁阀输出的气路通过三通将气管分成两路，其中一路连接到取力器工作缸，如果这时变速箱挂低档，取力器气缸切换位置，这时取力器法兰盘已经开始转动。

另一路到驾驶室内开关阀，如果开关阀是接通气路的状态（旋钮水平），开关阀将压缩气输入到变速箱空档气缸，这时取力器为停车取力。

如果开关阀是切断气路的状态（旋钮垂直），此时将没有压缩气输入到变速箱空档气缸，这时取力器为行车取力。

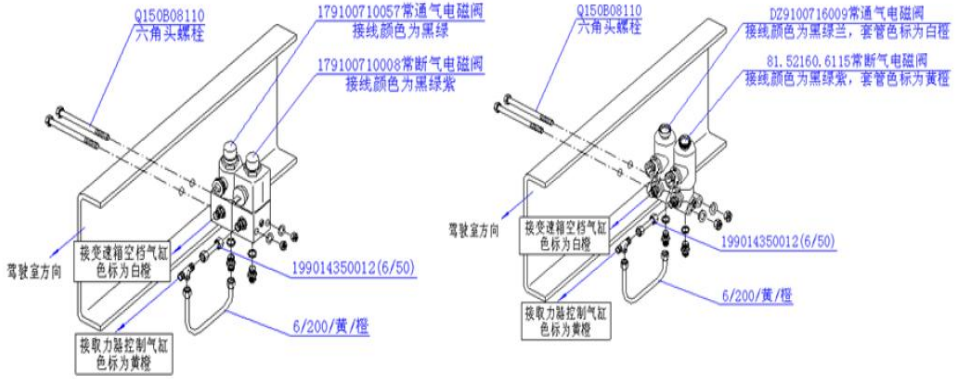
这种控制方式的特点是电路控制取力器工作，手动气路控制变速箱空档气缸。

If the power take-off switch is turned on, the solenoid valve of the power take-off receives power. The pneumatic output of the solenoid valve is divided into two paths through a three-way connector. One path is connected to the power take-off working cylinder. If, at this time, the gearbox is in low gear, the position of the power take-off cylinder switches, and the flange of the power take-off begins to rotate.

The other path leads to a switch valve inside the cabin. If the switch valve is in the open position (knob horizontal), it directs compressed air to the gearbox neutral cylinder, resulting in stationary power take-off.

If the switch valve is in the closed position (knob vertical), no compressed air is directed to the gearbox neutral cylinder, resulting in driving power take-off.

The characteristic of this control method is that the circuit controls the operation of the power take-off, while the gearbox neutral cylinder is manually controlled by the pneumatic circuit.

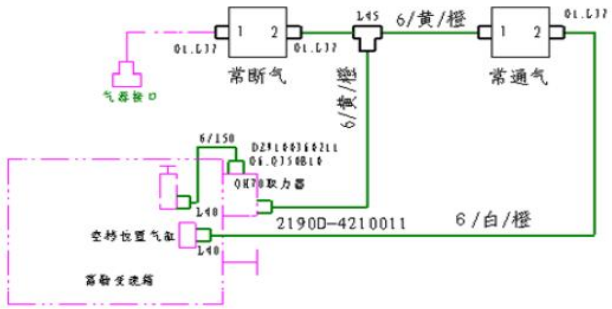


图（3-51）停车、行车取力（不带开关阀）

第三种：停车、行车取力全部由翘板开关控制，主要用于德龙F2000F3000M3000等车型，如图（3-51）所示，如果打开驾驶室取力器翘板开关，常用断气电磁阀得电，压缩空气连接至变速箱空档气缸、取力器工作气缸，两个气缸同时切换位置，此时为停车取力，如图（3-52）中所示：

Third Type: Both stationary and driving power take-off controlled by the PTO lever switch

This configuration is primarily used in Delong F2000, F3000, M3000, and similar models, as shown in Figure (3-51). When the PTO lever switch in the cabin is opened, the normally closed solenoid valve receives power. Compressed air is then directed to both the gearbox neutral cylinder and the power take-off working cylinder. Both cylinders switch positions simultaneously, resulting in stationary power take-off, as depicted in Figure (3-52).



图（3-52）气管路（不带开关阀）

如果打开取力器翘板开关后，再打开取力器选择翘板开关，常断气电磁阀和常通气电磁阀同时得电，压缩空气连接取力器工作气缸，取力器气缸切换位置，压缩空气切断与变速箱空档气缸的控制，变速箱空档气缸不工作，此时为行车取力。

注意：这两个常断气电磁阀和常通气电磁阀之间侧面的旁通气孔是堵住的，互相之间不通气。

If the PTO lever switch is opened first, and then the PTO selection lever switch is opened, both the normally closed solenoid valve and the normally open solenoid valve receive power simultaneously. Compressed air is directed to the power take-off working cylinder, causing it to switch positions. The compressed air supply to the gearbox neutral cylinder is then cut off, rendering it inactive. At this point, driving power take-off is engaged.

Note: The bypass air holes on the sides of these two solenoid valves, the normally closed solenoid valve, and the normally open solenoid valve are blocked, and they do not communicate with each other.

2.轮差、轴差、全轮驱动电磁阀连接;

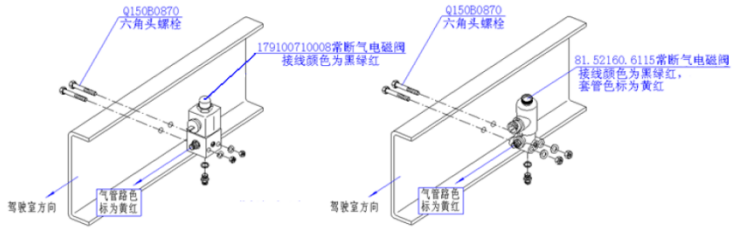
轮间差速锁装置（操纵气缸）位于中、后桥上，当车辆遇到泥泞、沙石路面时，这时需提高车辆的通过性时。

打开翘板开关，电磁阀工作后压缩气送入操纵气缸，将中、后桥两轮之间，以及两轴之间的差速装置关闭，这时提高了轮胎的通过性能。图（3-62）中注明了电磁阀连接线束和气管路的颜色，一般该电磁阀装配在变速箱与分动器之间的右纵梁上，在实际装配时轮差电磁阀经常与轴差电磁阀、全驱动电磁阀电磁阀套装，如图（3-63）中所示。

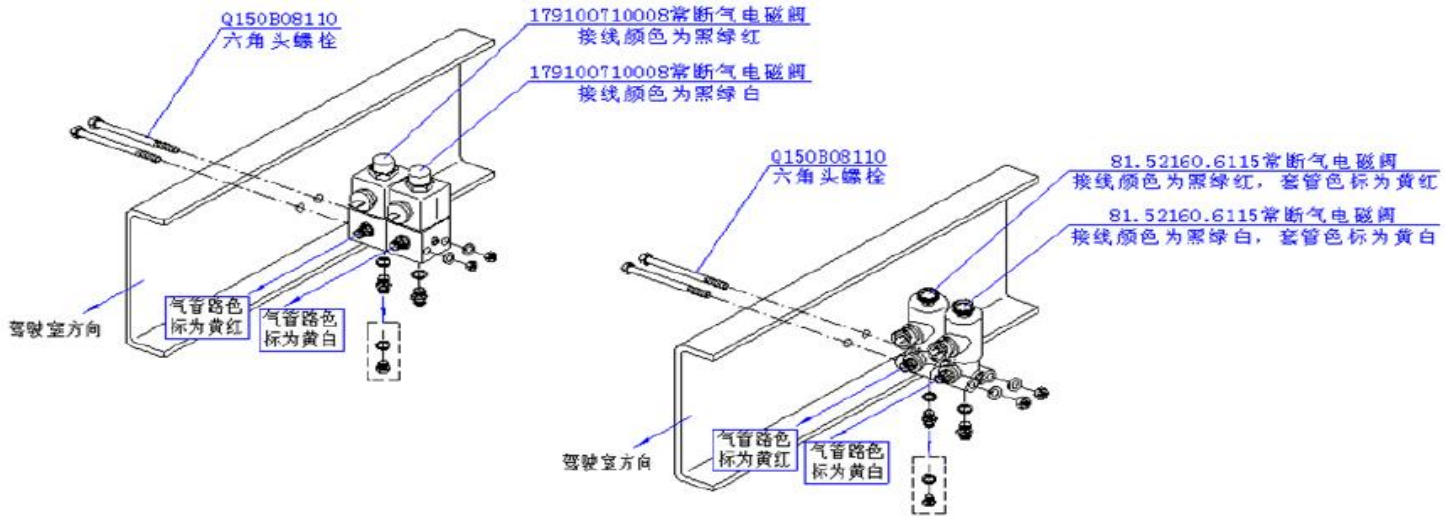
Wheel differential, axle differential, full-wheel-drive electromagnetic valve connection;

The wheel differential lock device (operating cylinder) is located on the middle and rear axles. When the vehicle encounters muddy or sandy roads, it needs to improve its passability.

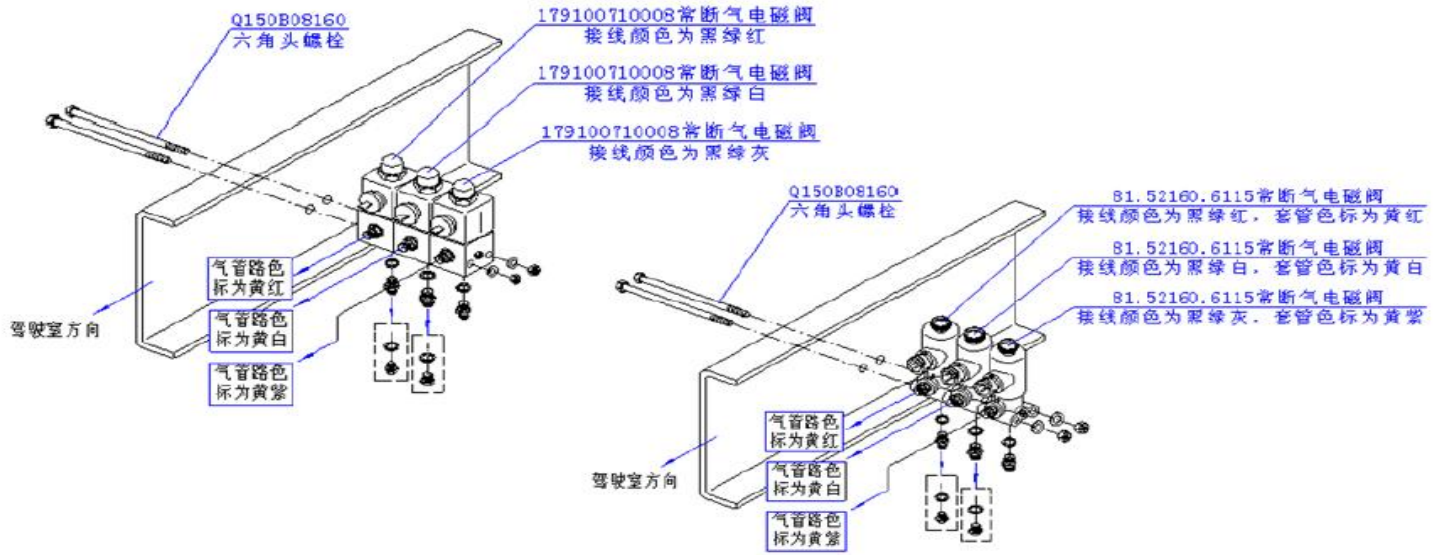
By opening the toggle switch, compressed air is sent to the operating cylinder after the electromagnetic valve works, closing the differential devices between the two wheels and between the two axles, thereby improving the tire's passability. The colors of the electromagnetic valve connection harness and air pipe are indicated in Figure (3-62). Generally, this electromagnetic valve is assembled on the right longitudinal beam between the gearbox and the transfer case. In actual assembly, the wheel differential electromagnetic valve is often equipped with the axle differential electromagnetic valve and the full-wheel-drive electromagnetic valve, as shown in Figure (3-63)."



图（3-62）轮轴差速锁电磁阀示意图



（a）轮轴间差速锁电磁阀



（b）轮轴间差速锁、全轮驱动电磁阀

图（3-63）电磁阀装配示意图

3.取力器、轮差、轴差、全轮驱动电磁阀控制电路连接;

由电器装置板分配的钥匙电，在24号保险丝输出连接到X362分电器，通过此分电器分配16000仪表类控制电源，另外此X362分电器还提供了取力器、轮差、轴差、等翘板开关的16000电源。

取力器翘板开关S222打开时输出的是40325线，连接到底盘是黑绿紫BFG线控制取力器电磁阀Y2的电路。

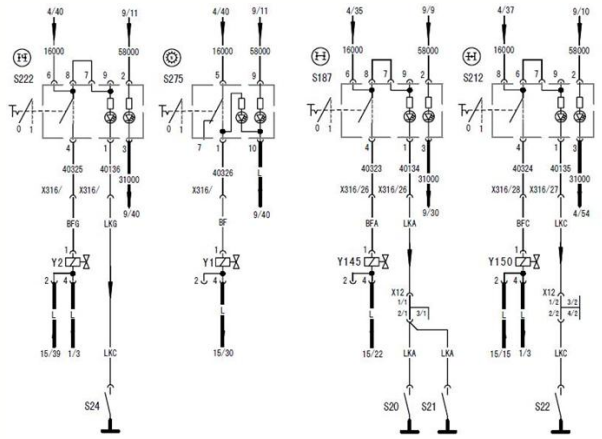
取力器空挡翘板开关S175打开时输出的是40326线，连接到底盘是黑绿BF线控制变速器空挡电磁阀Y1的电路。

Power take-off (PTO), wheel differential, axle differential, full-wheel-drive electromagnetic valve control circuit connection;

The key power allocated by the electrical device board is connected to the X362 distributor via the 24th fuse output. Through this distributor, it distributes a 16000 instrument-class control power. Additionally, this X362 distributor also provides a 16000 power supply for the power take-off (PTO), wheel differential, axle differential, and other toggle switches.

When the power take-off toggle switch S222 is opened, it outputs the 40325 line, which, connected to the chassis black-green-purple BFG line, controls the circuit of the PTO electromagnetic valve Y2.

When the power take-off neutral toggle switch S175 is opened, it outputs the 40326 line, which, connected to the chassis black-green BF line, controls the circuit of the transmission neutral electromagnetic valve Y1."



轮差翘板开关S187打开时输出的是40323线，连接到底盘是黑绿红BFA线控制轮差电磁阀Y145的电路。

轴差翘板开关S212打开时输出的是40324线，连接到底盘是黑绿白BFC线控制轴差电磁阀Y150的电路。

When the wheel differential toggle switch S187 is opened, it outputs the 40323 line, which, connected to the chassis black-green-red BFA line, controls the circuit of the wheel differential electromagnetic valve Y145.

When the axle differential toggle switch S212 is opened, it outputs the 40324 line, which, connected to the chassis black-green-white BFC line, controls the circuit of the axle differential electromagnetic valve Y150.