PART NO. TODFX50-EN-00

HITACHI

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# Technical Manual
## Operational Principle

# ZH
# 210-6
# 210LC-6
## Hybrid Excavator

Service Manual consists of the following separate Part No.

| | |
|---|---|
| Technical Manual (Operational Principle) | : Vol. No.TODFX50-EN |
| Technical Manual (Troubleshooting) | : Vol. No.TTDFX50-EN |
| Workshop Manual | : Vol. No.WDFX50-EN |
| Engine Manual | : Vol. No.EDFX50-EN |

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## Hydraulic Component

| | | |
|---|---|---|
| Pump Device | Drive Gear Ratio | Main Pumps (P1, P2): 0.97, Main Pump (P3): 1, Pilot Pump: 1.12 |
| Main Pump | Type | Bent-Axis Type Variable Displacement Axial Plunger Pump |
| | Theoretical Displacement (Set-Capacity) | (P1, P2): 102.7 $cm^3$/rev ×2 |
| | | (P3): 100 $cm^3$/rev |
| | Rated Pressure | 34.3 MPa |
| Regulator | Type | Hydraulic Pressure Operated Type |
| Pilot Pump | Type | Fixed Displacement Type Gear Pump |
| | Theoretical Displacement | 16.8 $cm^3$/rev |
| | Maximum Flow (Theoretical Value) | 33.6 L/min (Travel HP Mode: 35.3 L/min) |
| Control Valve | Type | Pilot Pressure Operated Type (4-Spools + 4-Spools + 4-Spools) |
| | Main Relief Set-Pressure | Normal:<br>(P1, P2): 34.3 MPa at 60 L/min<br>(P3): 34.3 MPa at 50 L/min |
| | | Power Digging:<br>(P1, P2, P3): 38.0 MPa at 50 L/min |
| | Overload Relief Set-Pressure | 39.2 MPa at 50 L/min (Boom, Arm, Bucket) |



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### Pump Torque Limit Control (Relief)

Purpose:
The pump torque limit control (relief) reduces the pump drive torque when the relief time continues for a specified period of time. This is performed in order to reduce the fuel consumption and unnecessary discharge from lithium-ion battery.

Operation:

1. When all following conditions exist and a specified time has passed, MC (10) activates torque control solenoid valves (26, 27) and flow rate limit control solenoid valves (28, 35, 36).

- Pump 1, Pump 2, or Pump 3 Delivery Pressure: 32 MPa or more continues for 5 seconds.
- Power Digging Switch: OFF

2. The torque control solenoid valves (26, 27) and flow rate limit control solenoid valves (28, 35, 36) deliver the pilot pressure according to the signals to the regulators, and reduce the pump delivery flow rate to reduce the pump torque.
3. When any one of the following conditions exists, the pump torque limit control (relief) is deactivated.

- Pump 1, Pump 2, and Pump 3 Delivery Pressure: 25 MPa or less
- Power Digging Switch: ON

*NOTE: The pump torque limit control (relief) keeps the relief pressure even when the pump torque is reduced. Therefore, the digging force is kept.*

*NOTE: The pump torque limit control (Relief) can be deactivated temporarily by MPDr. (11). The pump torque limit control (Relief) is activated again when key switch (31) is turned OFF. (Relief Operation Temporary Deactivation)*



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## Power Electrical Circuit for Electric Components

### Outline

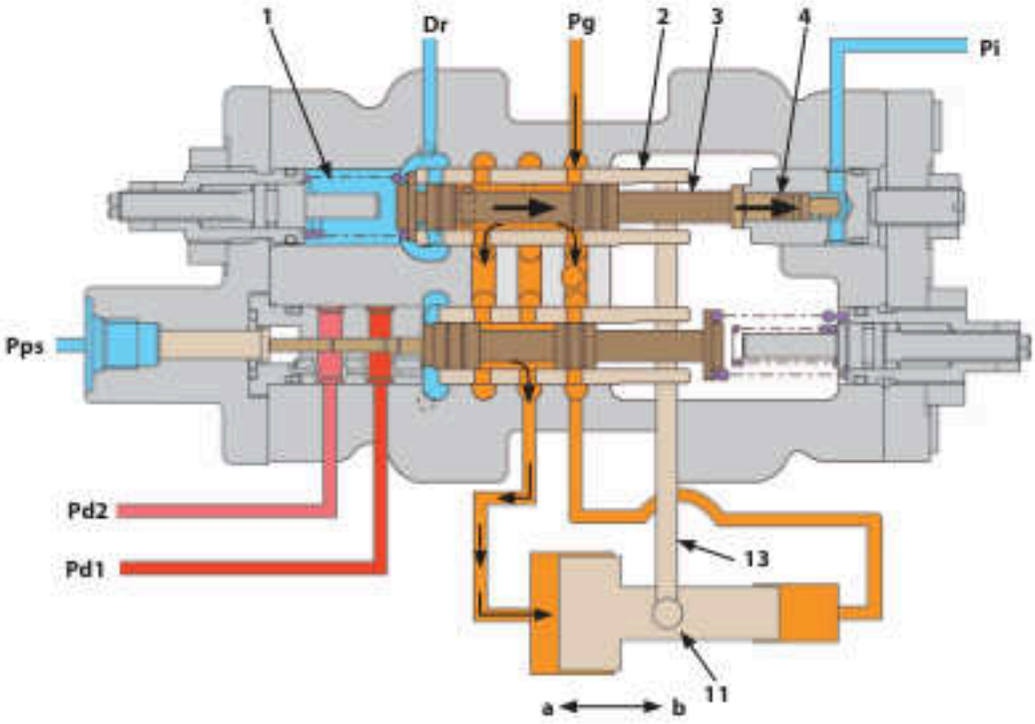
Lithium-ion battery (6) is connected to PCU-A (9) and PCU-S (11) with power line (8). In addition, PCU-A (9) is connected to assist alternator motor (10) and PCU-S (11) to swing electric motor (12), both with power line (8).
PCU-A (9) and PCU-S (11) monitor their unit state and, in case that malfunctions occur in the units, disconnect corresponding power line (8) and send the information on the malfunctions to HCU (13).
Lithium-ion battery (6) monitors its state with the built-in BCU (16) and, in case that malfunctions occur in the unit, sends the information on the malfunctions to HCU (13).
HCU (13) switches main relay (7) of lithium-ion battery to disconnect power line (8).
HCU (13) monitors the state of system and, in case that malfunctions occur, sends the signal to PCU-A (9) AND PCU-S (11) to disconnect corresponding power line (8).

**CAUTION: When working on the power electric circuits, confirm the precautions for inspection and maintenance in advance. (Refer to DIAGNOSING PROCEDURE/Troubleshooting.)**

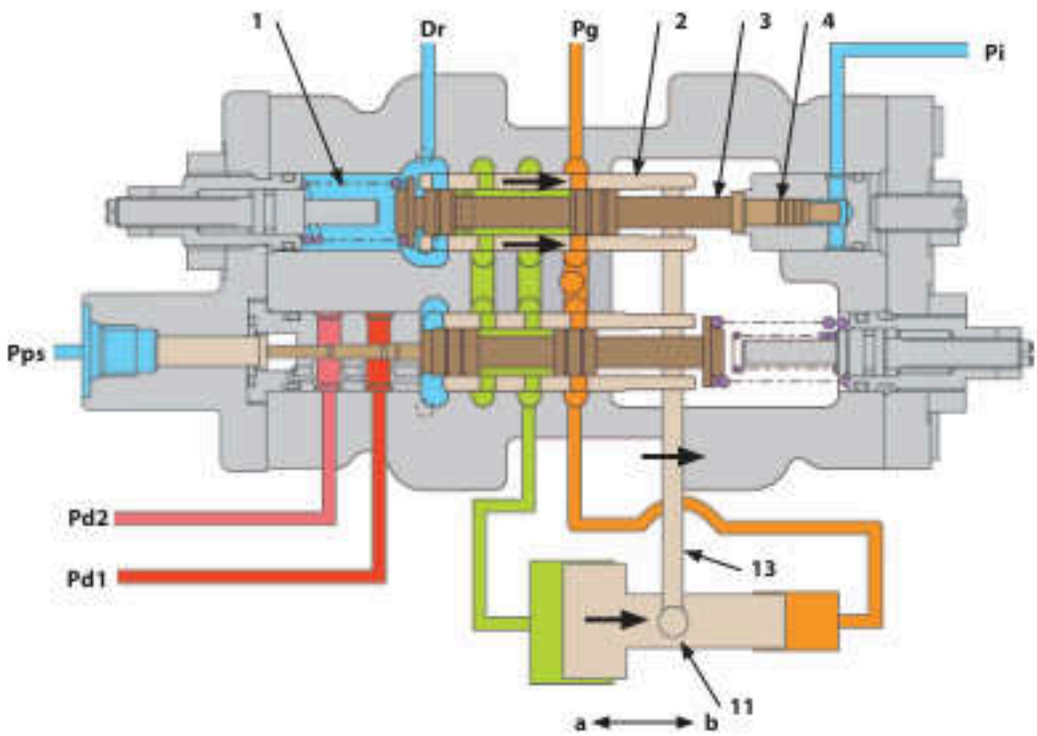


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*NOTE: The illustration shows the pump1 regulator.*




TPPP-03-01-018




TPPP-03-01-019

Pd1- Pump 1 Delivery Pressure
Pd2- Pump 2 Delivery Pressure

Dr- Returning to Hydraulic Oil Tank
Pi- Pump Control Pressure

Pps- Torque Control Pressure
Pg- Primary Pilot Pressure (From Pilot Pump)

a- Displacement Angle Increase
b- Displacement Angle Decrease

1- Spring
2- Sleeve A

3- Spool A
4- Piston

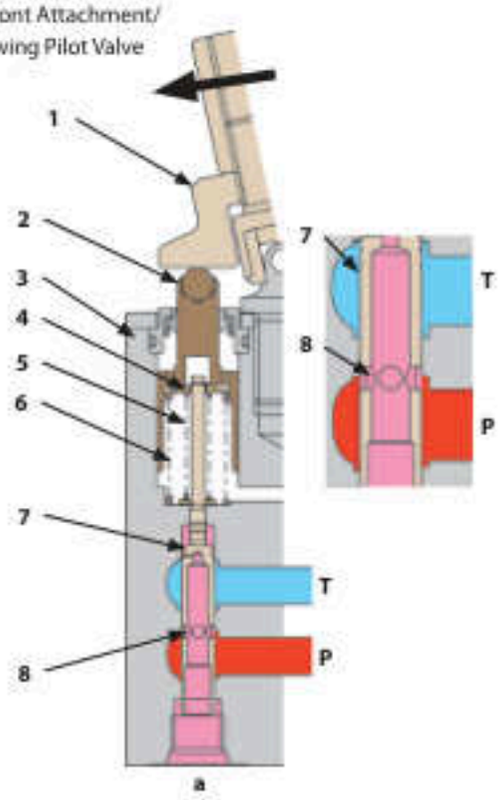
11- Servo Piston

13- Link

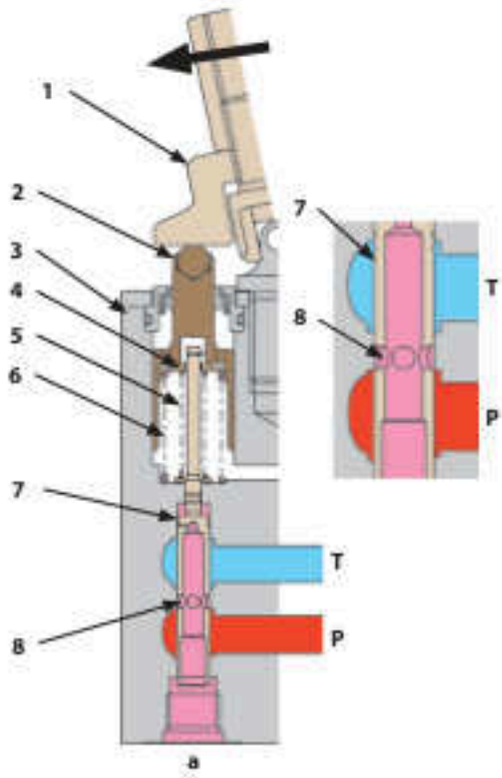


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Front Attachment/
Swing Pilot Valve

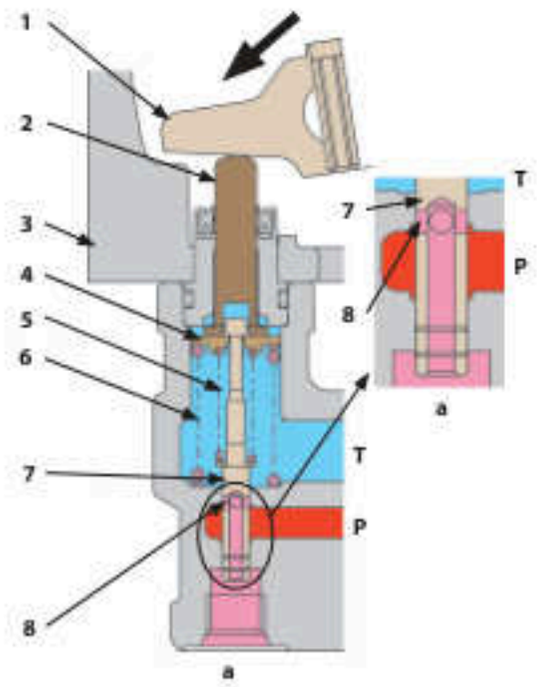



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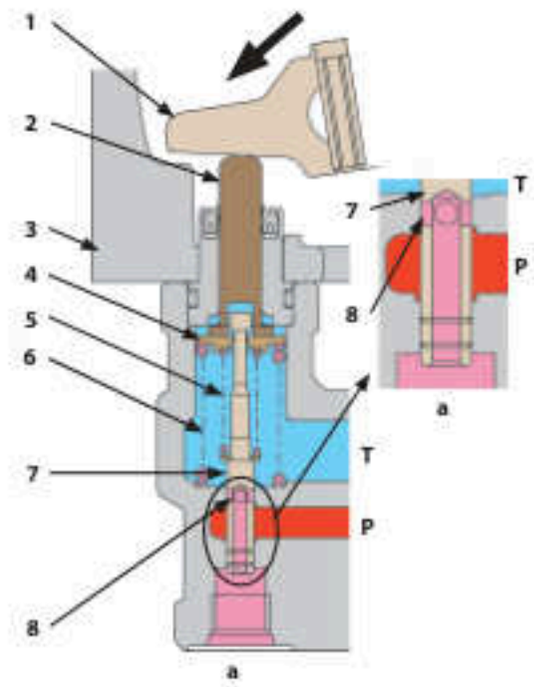



TPPP-03-04-008

Travel Pilot Valve




TPPP-03-04-012




TPPP-03-04-013

P- Port P
T- Port T
a- Output Port

1- Cam
2- Pusher
3- Casing
4- Spring Guide
5- Balance Spring
6- Return Spring
7- Spool
8- Hole



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