# SPECIFICATION TABLES

| | | | | Canopy | Cab |
|---|---|---|---|---|---|
| Operating mass | Rubber crawler | Middle arm | kg (lb.) | 3880 (8555) | 4070 (8975) |
| | | Long arm | kg (lb.) | 3890 (8570) | 4080 (8990) |
| | Steel crawler | Middle arm | kg (lb.) | 3985 (8785) | 4175 (9205) |
| | | Long arm | kg (lb.) | 3995 (8805) | 4185 (9220) |
| Engine output | Net (ISO 14396) kW/min.$^{-1}$ (hp/rpm) | | | 26.7/2200 (35.8/2200) | |
| | Net (ISO 9249/SAEJ1349) kW/min.$^{-1}$ (hp/rpm) | | | 25.3/2200 (33.9/2200) | |
| Bucket capacity | Heaped capacity | | m$^3$ (ft.$^3$) | 0.12 (4.24) | |
| | Struck capacity | | m$^3$ (ft.$^3$) | 0.09 (3.18) | |

**Performance**

| | | | | | |
|---|---|---|---|---|---|
| Standard loading mass | | | kg (lb.) | 160 (357) | |
| Slew speed | | | min.$^{-1}$ (rpm) | 9.6 (9.6) | |
| Travel speed | Rubber crawler | 1st | km/h (mph) | 2.9 (1.8) | |
| | | 2nd | km/h (mph) | 5.3 (3.29) | |
| | Steel crawler | 1st | km/h (mph) | 2.6 (1.62) | |
| | | 2nd | km/h (mph) | 4.8 (2.98) | |
| Maximum tractive force | Rubber crawler | | kN (lbf) | 42.4 (9530) | |
| | Steel crawler | | kN (lbf) | 43.8 (9850) | |
| Gradeability | | | % | 58 | |
| | | | deg. | 30 | |
| Ground pressure | Rubber crawler | | kPa (psi) | 30.1 (4.37) | 31.6 (4.58) |
| | Steel crawler | | kPa (psi) | 31.4 (4.55) | 32.9 (4.77) |
| Noise level | Sound-power level | | dB (A) | 96 | |
| | Sound-pressure level | | dB (A) | 76 | |

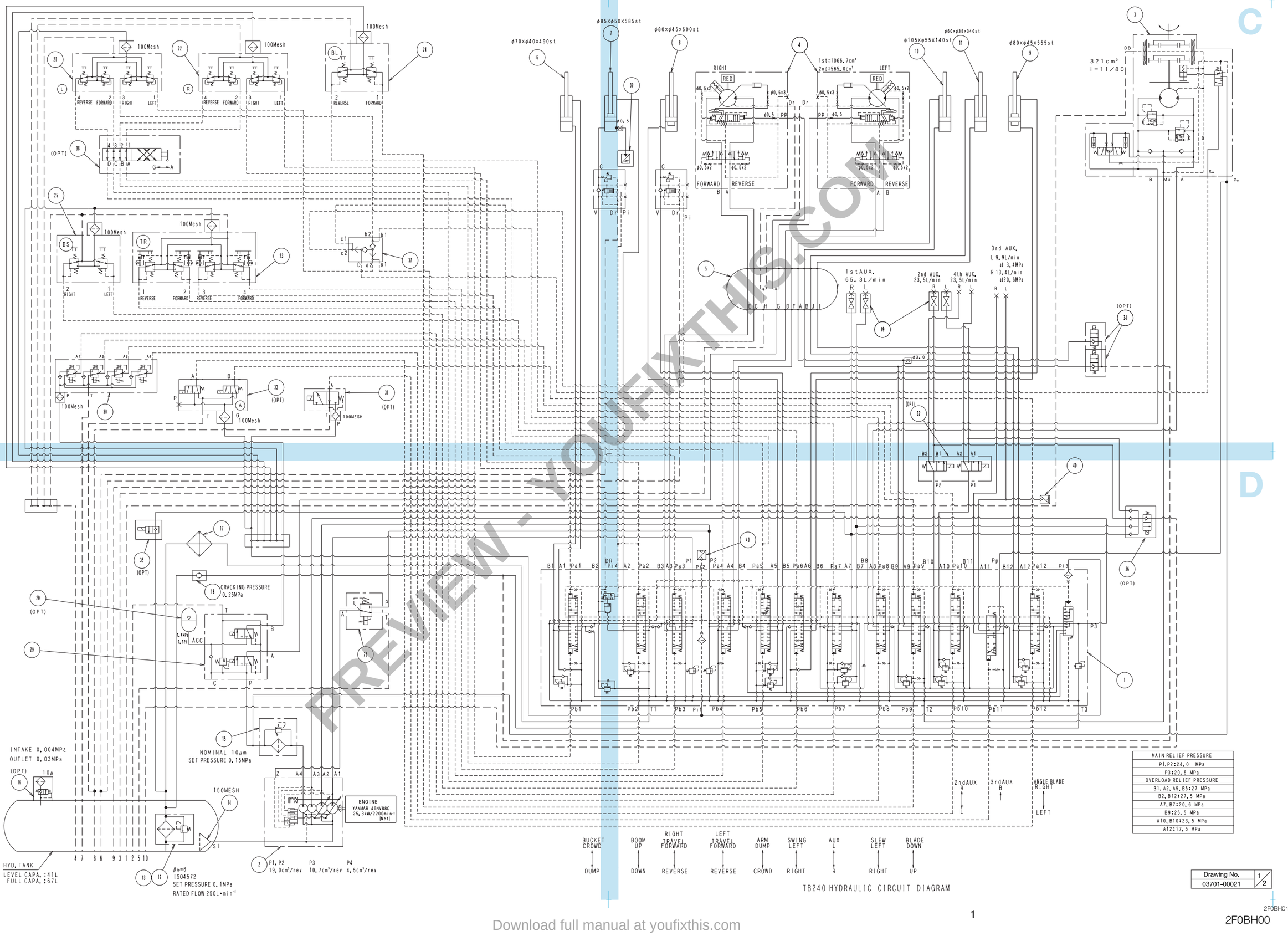
**Dimensions of complete machine**

| | | | | |
|---|---|---|---|---|
| Overall length | Standard arm | | mm (in.) | – |
| | Middle arm | | mm (in.) | 5370 (211.4) |
| | Long arm | | mm (in.) | 5380 (211.9) |
| Overall width | During normal operation | | mm (in.) | 1740 (68.5) |
| Overall height | Rubber crawler | Canopy | mm (in.) | 2505 (98.7) |
| | | Cab | mm (in.) | 2490 (98) |
| | Steel crawler | Canopy | mm (in.) | 2520 (99.2) |
| | | Cab | mm (in.) | 2505 (98.5) |

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# HYDRAULIC CIRCUIT DIAGRAM




| MAIN RELIEF PRESSURE |
|---|
| P1,P2:24.0 MPa |
| P3:20.6 MPa |
| OVERLOAD RELIEF PRESSURE |
| B1,A2,A5,B5:27 MPa |
| B2,B12:27.5 MPa |
| A7,B7:20.6 MPa |
| B9:25.5 MPa |
| A10,B10:23.5 MPa |
| A12:17.5 MPa |

TB240 HYDRAULIC CIRCUIT DIAGRAM

| Drawing No. | 1/2 |
|---|---|
| 03701-00021 | |

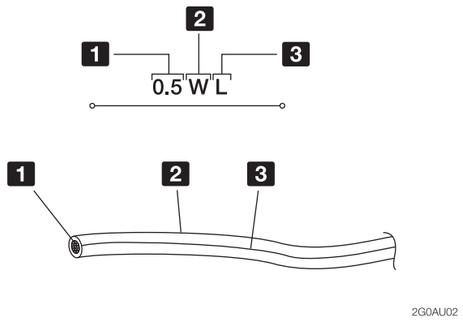
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# ELECTRICAL CIRCUIT DIAGRAM

## Wire/cable color symbols




2G0AU02

Wiring/cable Colors

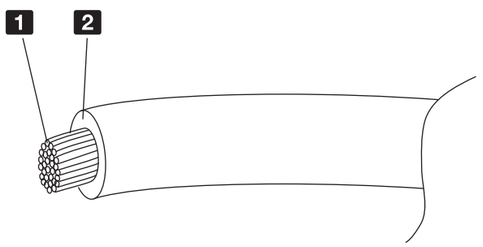
| Symbol | Color | Symbol | Color | Symbol | Color |
|---|---|---|---|---|---|
| B | Black | W | White | V | Violet |
| G | Green | Y | Yellow | Dg | Dark green |
| L | Blue | P | Pink | Ch | Chocolate |
| R | Red | O | Orange | | |

1 Cross-sectional area ($mm^2$)
2 Base color
3 Stripe color*
* There may be wires of solid color with no stripe.

## Types of wire to use

- Use AVSS wire for cross-sectional areas of 2 $mm^2$ or less.
- Use AV or AVS wire for cross-sectional areas exceeding 2 $mm^2$. (AVX wire can be used for wires of solid color.)

| Symbol | Overview | Characteristics | Temperature limit |
|---|---|---|---|
| AV | Low-voltage cables for automobiles | • Wire used in low-voltage circuits. | 80°C (176°F) |
| AVX | Heat-resistant, cross-linked, vinyl-insulated low-voltage cables | • A wire with dramatically improved heat resistance over that of AV wire, enabling it to provide high reliability while responding to rises in temperature in automotive wiring environments. | 100°C (212°F) |
| AVS | Thin-insulation low-voltage cables for automobiles | • A thinner wire than the AV wire with equivalent electrical characteristics. | 80°C (176°F) |
| AVSS | Thin-insulation low-voltage cables for automobiles | • A wire with an even thinner insulator than AVS wire that has equivalent electrical characteristics. | 80°C (176°F) |




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1 Conductor: Annealed copper
2 Insulator: Vinyl

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A

100Mesh
21
L
4 REVERSE
2 FORWARD
3 RIGHT
1 LEFT
22
R
24
BL
2 REVERSE
1 FORWARD
(OPT)
38
4 3 2 1
D C B A
G A
25
BS
2 RIGHT
1 LEFT
TR
23
1 REVERSE
2 FORWARD
3 REVERSE
4 FORWARD
c1 b2 b1
c2 D a2 a1
37
A1 A2 A3 A4
P T
30
A B
P T G
33
(OPT)
31
(OPT)
100MESH
ϕ70×ϕ40×490st
6
ϕ85×ϕ5
7
C
V Dr

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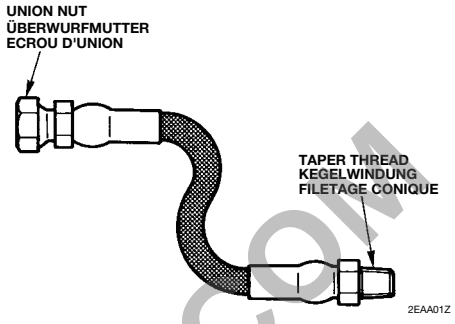
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# TIGHTENING TORQUE

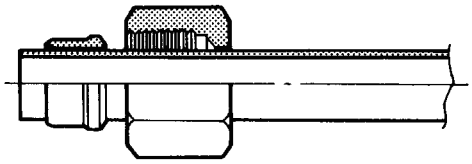
## Hydraulic hose

| Hose fitting size | Tightening torque | | | |
|---|---|---|---|---|
| | Union nut (G) | | Taper thread (R) | |
| | N·m | ft.-lb | N·m | ft.-lb |
| 1/8 | $9.8^{+4.9}_{0}$ | $7.3^{+3.5}_{0}$ | 11.8 ± 1.2 | 8.7 ± 0.8 |
| 1/4 | $24.5^{+4.9}_{0}$ | $18.1^{+3.5}_{0}$ | 29.4 ± 2.9 | 21.7 ± 2.1 |
| 3/8 | $49.0^{+4.9}_{0}$ | $36.2^{+3.5}_{0}$ | 53.9 ± 5.4 | 39.8 ± 3.9 |
| 1/2 | $58.8^{+4.9}_{0}$ | $43.4^{+3.5}_{0}$ | 88.3 ± 8.8 | 65.1 ± 6.4 |
| 3/4 | $117.7^{+4.9}_{0}$ | $86.8^{+3.5}_{0}$ | 147.1 ± 14.7 | 108.5 ± 10.7 |
| 1 | $137.3^{+4.9}_{0}$ | $101.3^{+3.5}_{0}$ | 196.1 ± 19.6 | 144.7 ± 14.3 |




## Bite-type pipe fitting for steel pipe

| Outer diameter of pipe (mm) | Tightening torque | |
|---|---|---|
| | N·m | ft.-lb |
| 8 | 34.3 ± 4.9 | 23.5 ± 3.5 |
| 10 | 41.7 ± 2.5 | 30.7 ± 1.7 |
| 12 | 58.8 ± 4.9 | 43.4 ± 3.5 |
| 15 | 88.3 ± 4.9 | 65.1 ± 3.5 |
| 16 | 93.2 ± 4.9 | 68.7 ± 3.5 |
| 18 | 132.4 ± 4.9 | 97.6 ± 3.5 |
| 22 | 205.9 ± 9.8 | 151.8 ± 7.2 |
| 27.2 | 245.2 ± 9.8 | 181.0 ± 7.2 |
| 28 | 313.8 ± 19.6 | 231.4 ± 14.3 |
| 32 | 313.8 ± 19.6 | 231.4 ± 14.3 |
| 35 | 411.9 ± 19.6 | 303.7 ± 14.3 |




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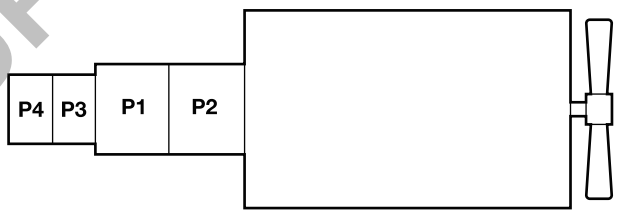

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# OVERALL MACHINE

## No operation is possible.

| | | | |
|---|---|---|---|
| 1 | Check the hydraulic oil level. | Insufficient | Add hydraulic oil. |
| | Sufficient | | |
| 2 | Check the hydraulic pump. | Faulty | • Repair or replace the hydraulic pump.<br>• Replace the coupling. |

1. Check the hydraulic oil level.
   Check the hydraulic oil tank level.
   ☞ "4. Disassembly and assembly, Hydraulic oil tank"
   When adding, use the same brand of oil currently being used.
   ☞ "2. Service data, Fuel and lubricant table"
2. Checking the hydraulic pump.
   • Checking the pump pressure
   ☞ "2. Service data, Performance criteria"



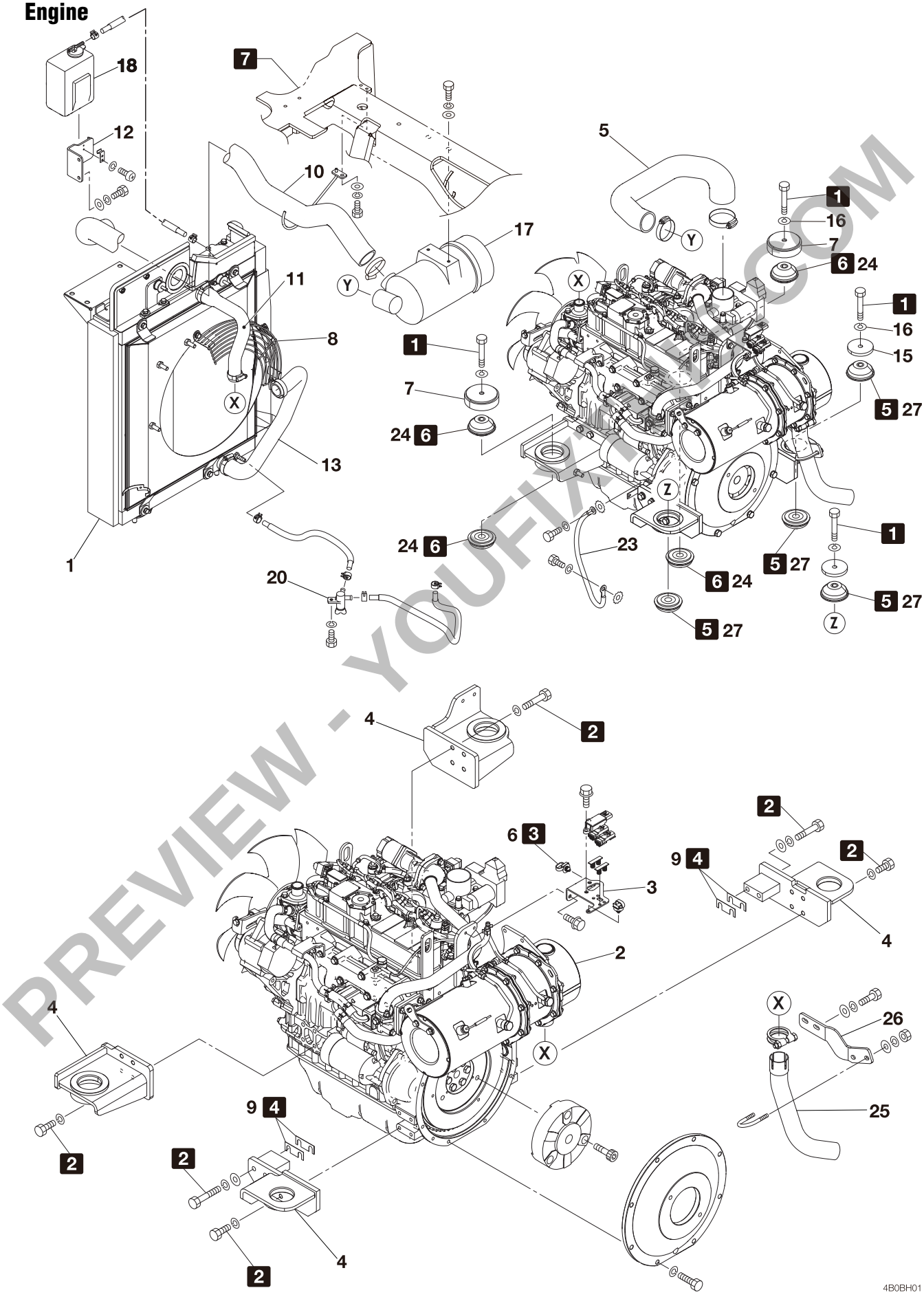

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# DRIVE SYSTEM

## Engine




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### Dimensions of base machine

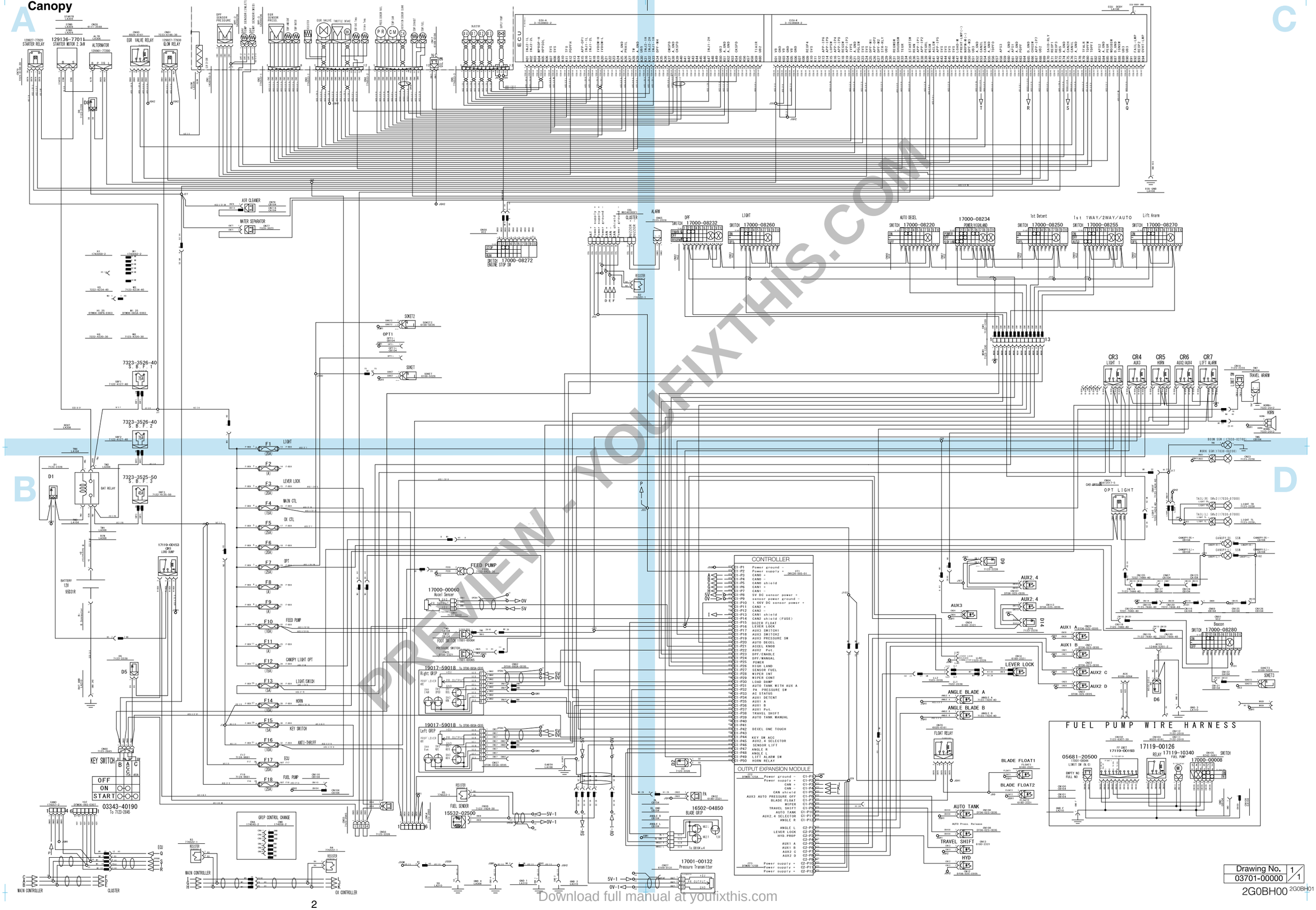
| | | | | |
|---|---|---|---|---|
| Overall length of base machine | | | mm (in.) | 2420 (95.3) |
| Overall width of base machine | During normal operation | | mm (in.) | 1740 (68.5) |
| Overall width of upper slewing structure | | | mm (in.) | 1720 (67.7) |
| Overall width of upper slewing structure | | Left | mm (in.) | 660 (26) |
| | | Right | mm (in.) | 660 (26) |
| Cab width | | | mm (in.) | 1040 (40.9) |
| Overall height of base machine | Rubber crawler | Canopy | mm (in.) | 2505 (98.7) |
| | | Cab | mm (in.) | 2490 (98) |
| | Steel crawler | Canopy | mm (in.) | 2520 (99.2) |
| | | Cab | mm (in.) | 2505 (98.5) |
| Swing radius | | | mm (in.) | 1365 (53.7) |
| Rearmost distance of slewing structure from the axis of rotation | | | mm (in.) | 1365 (53.7) |
| Clearance height under slewing structure | Rubber crawler | | mm (in.) | 570 (22.4) |
| | Steel crawler | | mm (in.) | 565 (22.3) |
| Crawler base | Rubber crawler | | mm (in.) | 1645 (64.8) |
| | Steel crawler | | mm (in.) | 1610 (63.4) |
| Crawler overall length | Rubber crawler | | mm (in.) | 2105 (82.8) |
| | Steel crawler | | mm (in.) | 2085 (82.1) |
| Undercarriage overall width | During normal operation | | mm (in.) | 1740 (68.5) |
| Track gauge | During normal operation | | mm (in.) | 1390 (54.7) |
| Track shoe width | | | mm (in.) | 350 (13.8) |
| Ground clearance of undercarriage | Rubber crawler | | mm (in.) | 295 (11.6) |
| | Steel crawler | | mm (in.) | 290 (11.5) |

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# Electrical Schematic Diagram

## Canopy



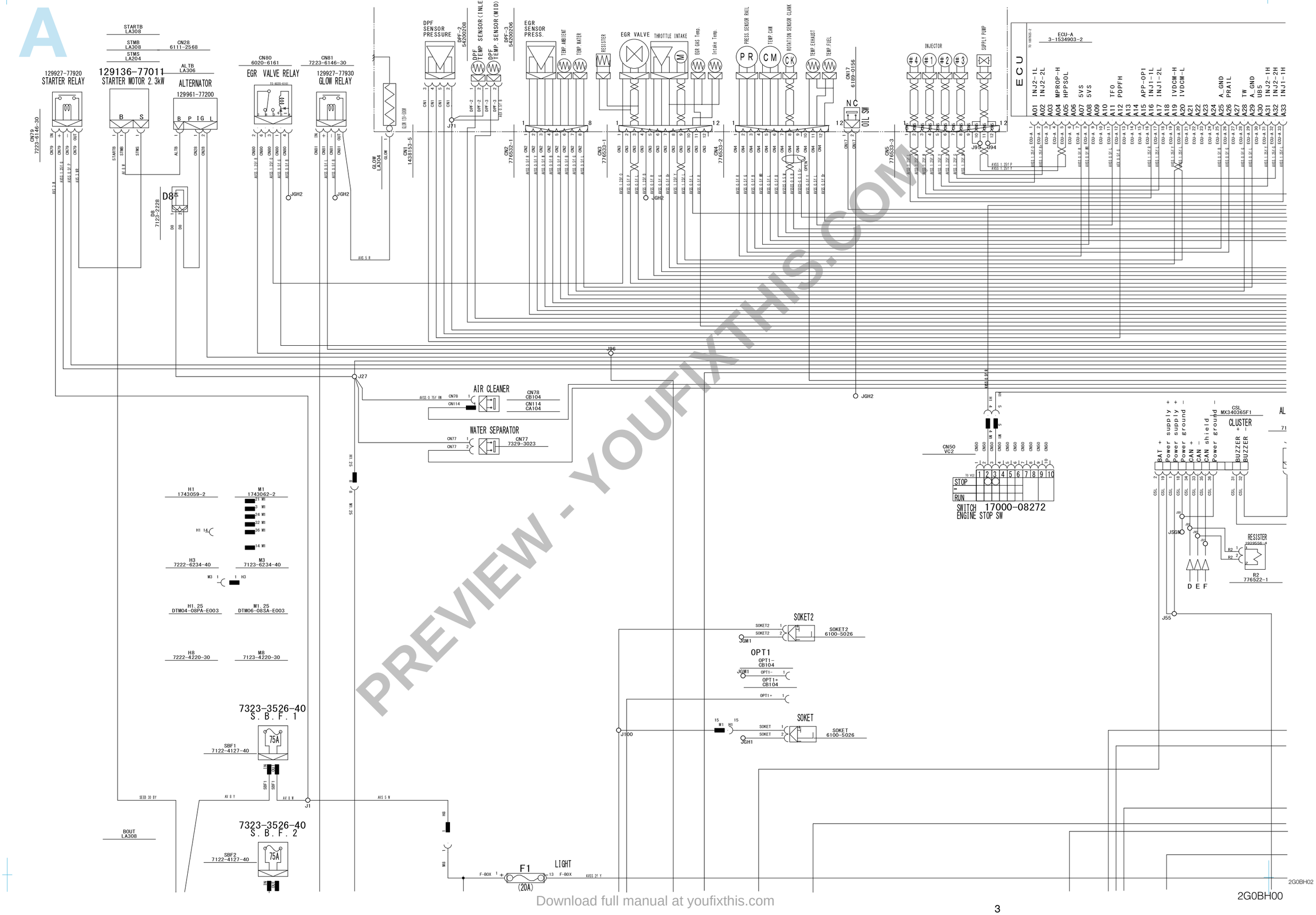

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| Drawing No. | 1/1 |
|---|---|
| 03701-00000 | |

2G0BH00 2G0BH01



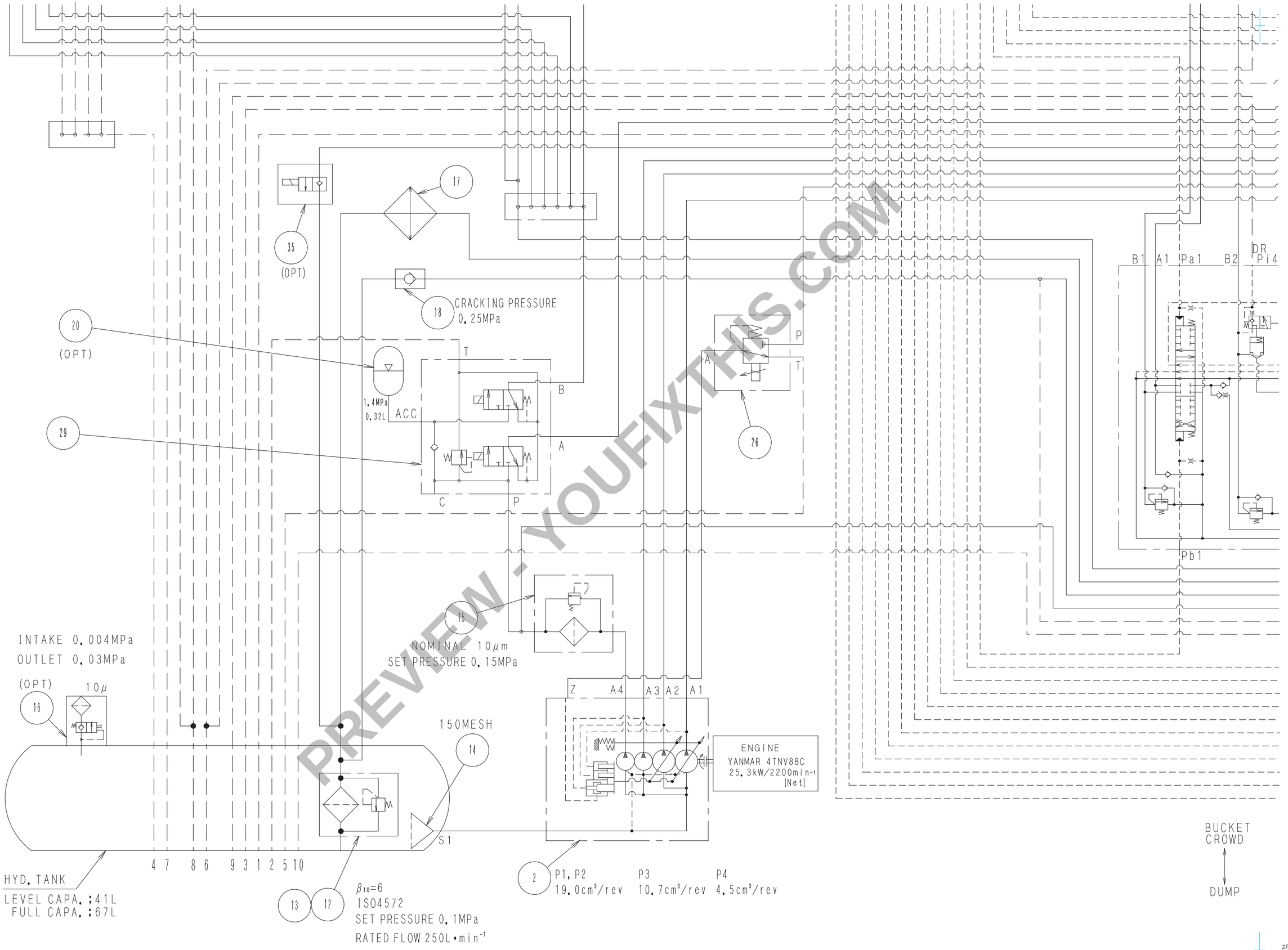
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B




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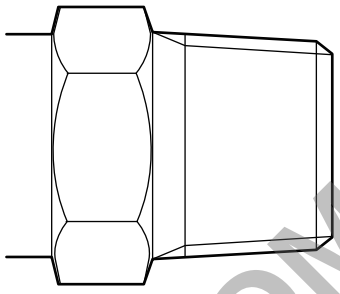
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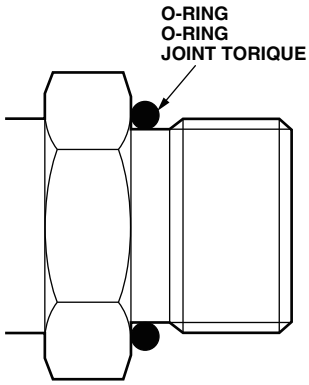
## Joint for piping

| Nominal thread diameter (R) | Tightening torque | | | |
|---|---|---|---|---|
| | Steel | | Cast steel | |
| | N·m | ft.-lb | N·m | ft.-lb |
| 1/8 | 11.8 ± 1.2 | 8.7 ± 0.8 | 10.8 ± 1.1 | 8.0 ± 0.7 |
| 1/4 | 29.4 ± 2.9 | 21.7 ± 2.1 | 24.5 ± 2.5 | 18.1 ± 1.7 |
| 3/8 | 53.9 ± 5.4 | 39.8 ± 3.9 | 49.0 ± 4.9 | 36.2 ± 3.5 |
| 1/2 | 88.3 ± 8.8 | 65.1 ± 6.4 | 73.5 ± 7.4 | 54.3 ± 5.3 |
| 3/4 | 147.1 ± 14.7 | 108.5 ± 10.7 | 127.5 ± 12.7 | 94.1 ± 9.3 |
| 1 | 196.1 ± 19.2 | 144.7 ± 14.3 | 171.6 ± 17.2 | 126.6 ± 12.5 |


2EAA03Z

## Joint for piping (O-ring seal type)

| Nominal thread diameter (G) | Tightening torque | |
|---|---|---|
| | N·m | ft.-lb |
| 1/8 | 19.6 ± 2.0 | 14.5 ± 1.4 |
| 1/4 | 34.3 ± 4.9 | 25.3 ± 3.5 |
| 3/8 | 53.9 ± 4.9 | 39.8 ± 3.5 |
| 1/2 | 63.7 ± 4.9 | 47.0 ± 3.5 |
| 3/4 | 93.2 ± 4.9 | 68.7 ± 3.5 |
| 1 | 107.9 ± 9.8 | 79.5 ± 7.2 |
| 1–1/4 | 117.7 ± 9.8 | 86.8 ± 7.2 |
| 1–1/2 | 137.3 ± 9.8 | 101.2 ± 7.2 |



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| Nominal thread diameter (UNF) | Tightening torque | |
|---|---|---|
| | N·m | ft.-lb |
| 7/19–20 | 16.7 ± 2.0 | 12.3 ± 1.4 |
| 1/2–20 | 22.6 ± 2.0 | 16.6 ± 1.4 |
| 9/16–18 | 31.4 ± 2.9 | 23.1 ± 2.1 |
| 3/4–16 | 59.8 ± 4.9 | 44.1 ± 3.5 |
| 1–1/16–12 | 102.0 ± 5.9 | 75.2 ± 4.4 |
| 1–5/16–12 | 135.3 ± 7.8 | 99.8 ± 5.8 |
| 1–5/8–20 | 181.4 ± 9.8 | 133.8 ± 7.2 |

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# TRAVELING

## No right or left travel.

| | | | |
|---|---|---|---|
| 1 | Check the operation of actuators other than the travel motor. | Abnormal | Check the main relief valve and pump. |
| | | Normal | |
| 2 | Check the pilot valve (travel). | Faulty | Repair or replace the pilot valve (travel). |
| | | Normal | |
| 3 | Check the control valve. | Faulty | Repair or replace the housing block. |
| | | Normal | |
| 4 | Check the swivel joint. | Faulty | Repair or replace the swivel joint. |
| | | Normal | |
| 5 | Check the travel motor. | Faulty | Repair or replace the travel motor. |

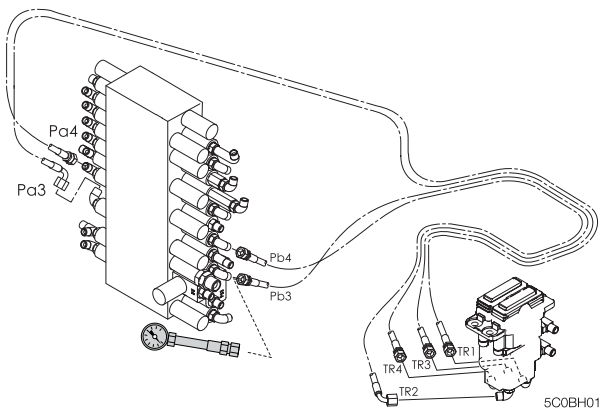
1. Check the operation of actuators other than the travel motor.
   - Check whether only the travel operation is faulty.

   If the operation of other actuators is also defective, see Overall machine.
   ☞"5. Troubleshooting, Overall machine"

2. Check the pilot valve (travel).
   - Disconnect the hose between the pilot valve and control valve (travel block) from the control valve. Attach a pressure gauge to the disconnected hose.
   - Operate the travel lever and measure the pressure.
   - The P4 pilot pressure is normal if it is within specifications.

   ☞ "2. Service data, Performance criteria"
   - If the measured pressure is abnormal, check the pilot valve.

   ☞ "5. Troubleshooting, Pilot valve"




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# TRAVEL SYSTEM

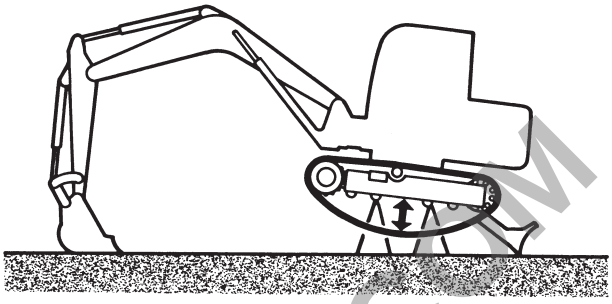
## Removing the crawler

**⚠ WARNING**

When working under the machine while it is raised up, be sure to use a stand to support the machine.

Important: When replacing crawlers, replace both the right and left ones at the same time.

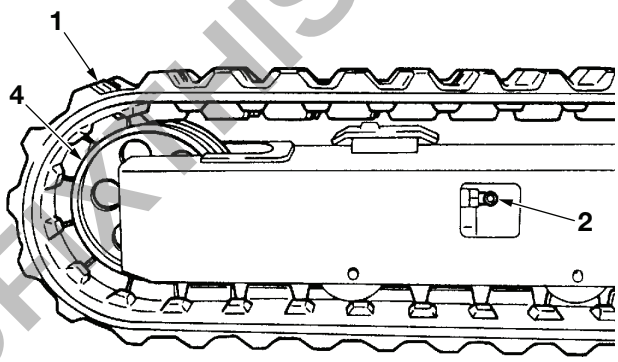
1. Lift up the machine.
   - Use the blade and hoe attachment to raise the machine.



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2. Loosen the crawler tension for the crawler (1).
   - When loosening the check valve (2), do it slowly. Stop loosening the check valve once grease starts to come out.
     If no grease comes out, slightly move the machine forward and backward.

   Check valve: 58.8 to 88.2 N·m (43.4 to 65.1 ft.-lb)

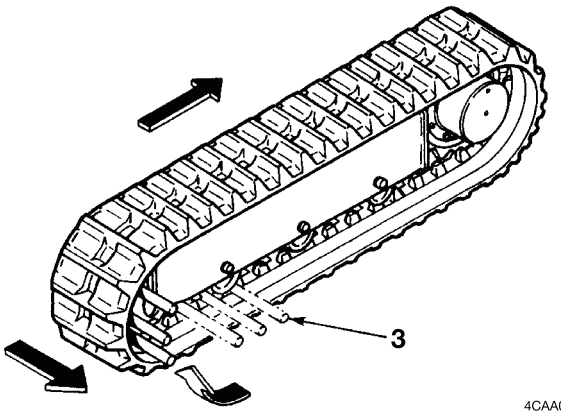



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3. Insert the iron pipe (3) into the crawler and then rotate the sprocket in the reverse direction.
4. Stop rotating the sprocket once the pipe reaches the side of the idler.
5. Slide the crawler over to the side and remove it.
   - Mass of the crawler: ☞"Service data"

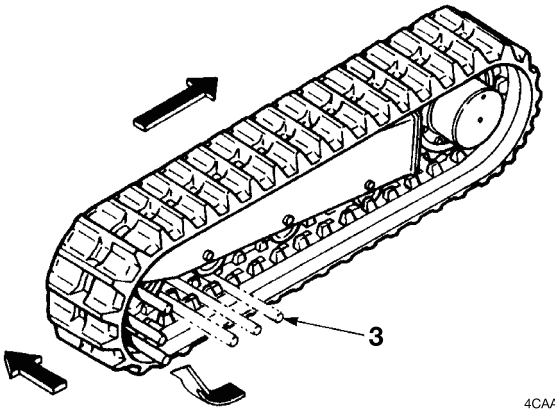
## Installing the crawler

1. Lift up the machine, and insert the crawler into the frame.
   - Set the crawler so that it is engaged with the sprocket.
2. Insert the iron pipe (3) into the crawler and then rotate the sprocket in the reverse direction.
3. Stop rotating the sprocket once the pipe (3) reaches the side of the sprocket.




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4. Slide the crawler into a position where it can be properly fitted to engage with the idler.
5. Position the crawler so as to ensure that it is securely engaged with the sprocket and idler and then adjust the crawler tension.
   ☞ "2. Service data, Performance criteria"




4CAA03Z

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### Engine

| | | | |
|---|---|---|---|
| Part Name | | | Yanmar diesel engine |
| Type | | | Yanmar 4TNV88C-STB<br>Yanmar 4TNV88C-STB1 |
| Number of cylinders – Internal diameter × stroke | | mm (in.) | 4-88 (3.46) × 90 (3.54) |
| Total displacement | | mL (cu. in.) | 2189 (133.6) |
| Maximum torque | | N·m (ft.-lb.) | 133.3 to 144.9 (98.3 to 106.9) |
| | | $min^{-1}$ (rpm) | 1430 (1430) |
| Specific fuel consumption (at rated output) | | g/(kW·h) (lb./hp-hr.) | 232 (0.382) |
| Fuel/air cleaner | | | Centrifugal, filter paper-type |
| Cooling system | Fan | | Suction |
| | Radiator | | Pressurized |
| Starting system | Voltage | V | 12 |
| | Output | kW | 2.3 |
| Generator | Voltage | V | 12 |
| | Output | kW | 0.66 |
| Battery | Voltage | V | 12 |
| | Capacity | Ah | 64 |
| | Quantity | | 1 |

### Hydraulic system

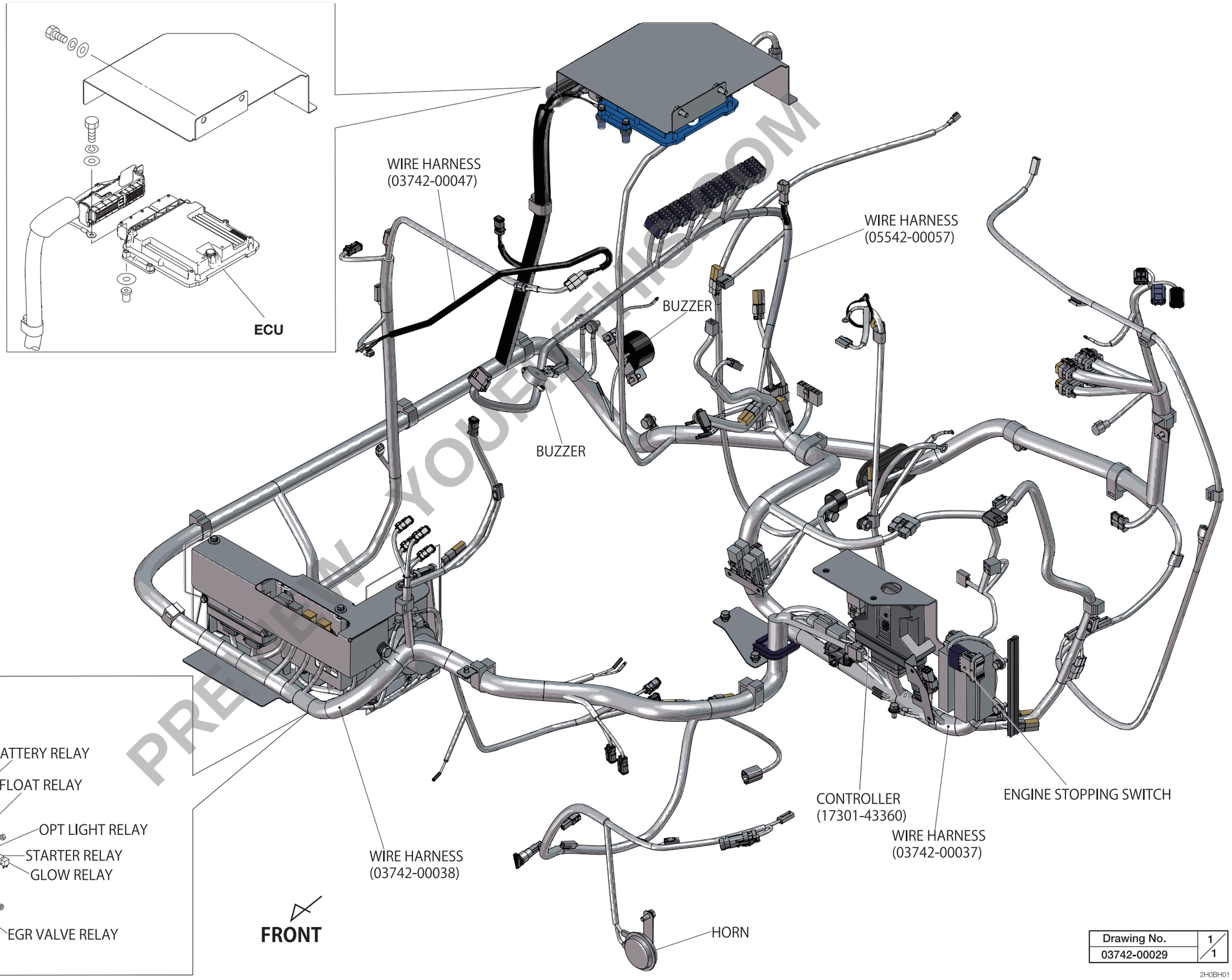
| | | | |
|---|---|---|---|
| Hydraulic pump drive system | | | Engine-linked |
| Hydraulic pump | Type | | Variable displacement double pump |
| | Quantity | | 1 |
| | Delivery | L/min. (US gal./min.) | 41.8 (11.04) |
| | | L/min. (US gal./min.) | 41.8 (11.04) |
| | | L/min. (US gal./min.) | 23.5 (6.21) |
| | | L/min. (US gal./min.) | 9.9 (2.62) |
| | Hydraulic pump control system | | Full power tilt angle control in concurrence with power shift |
| Main relief valve pressure setting | | MPa (psi) | 24 (3480) |
| | | MPa (psi) | 24 (3480) |
| | | MPa (psi) | 20.6 (2990) |
| | | MPa (psi) | 3.4 (490) |
| Hydraulic tank pressure | | | Pressure tank |
| Control valve | Type | | Directional control valve, with 11 valves in series (standard specifications) |
| | Operation type | | Hydraulic pilot-operated |
| Hydraulic oil filter | Type | | Glass fiber filter paper-type |
| | Filter precision | | BETA 10=6 |
| | Attachment position | | Return circuit (inside tank) |
| Hydraulic oil cooler | Cooling system | | Air-cooled |

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# WIRE HARNESS

**Wiring diagram:**
**03742-00029 (Cabin)**



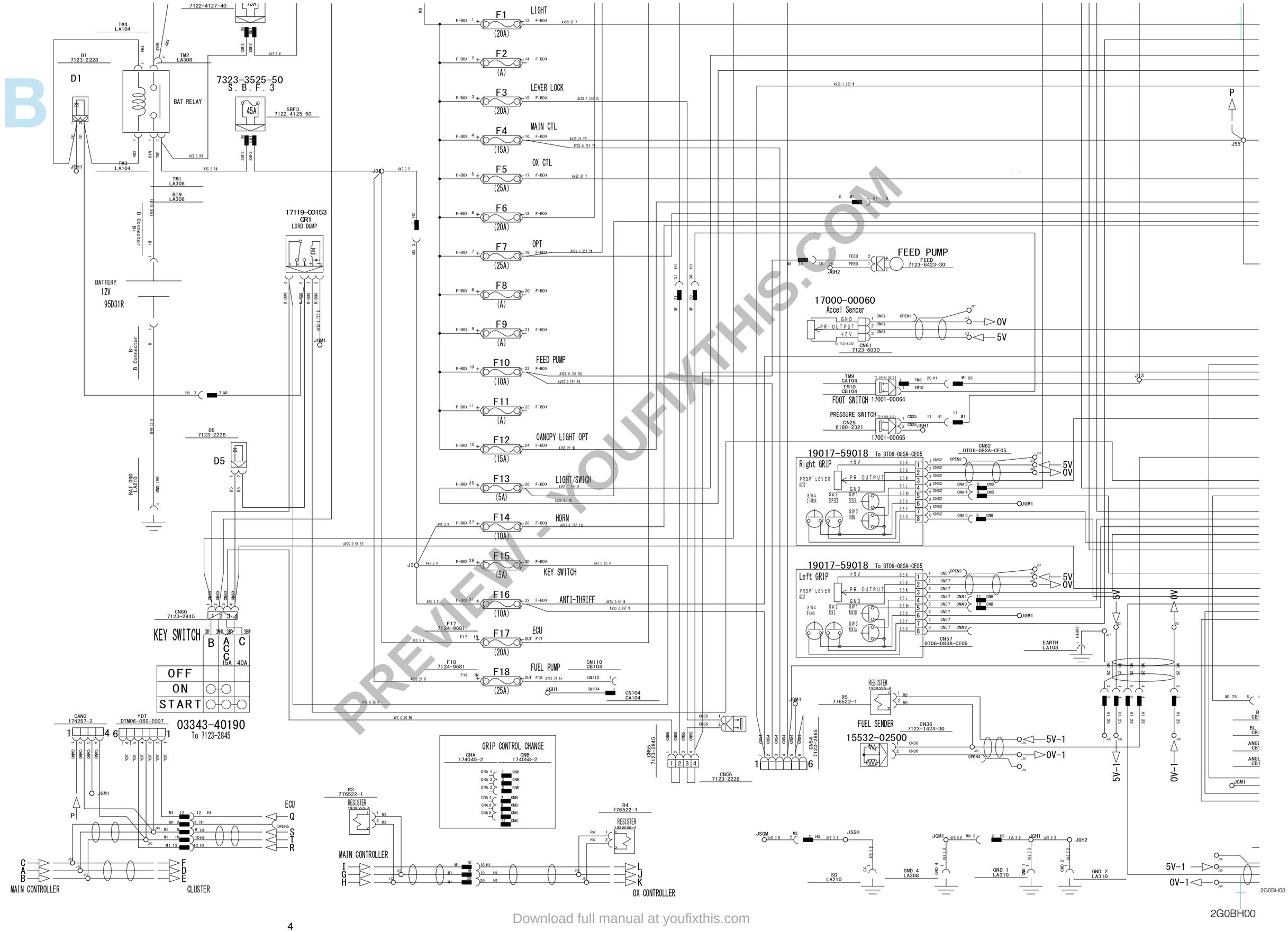

| Drawing No. | 1/1 |
|---|---|
| 03742-00029 | |

2H0BH01

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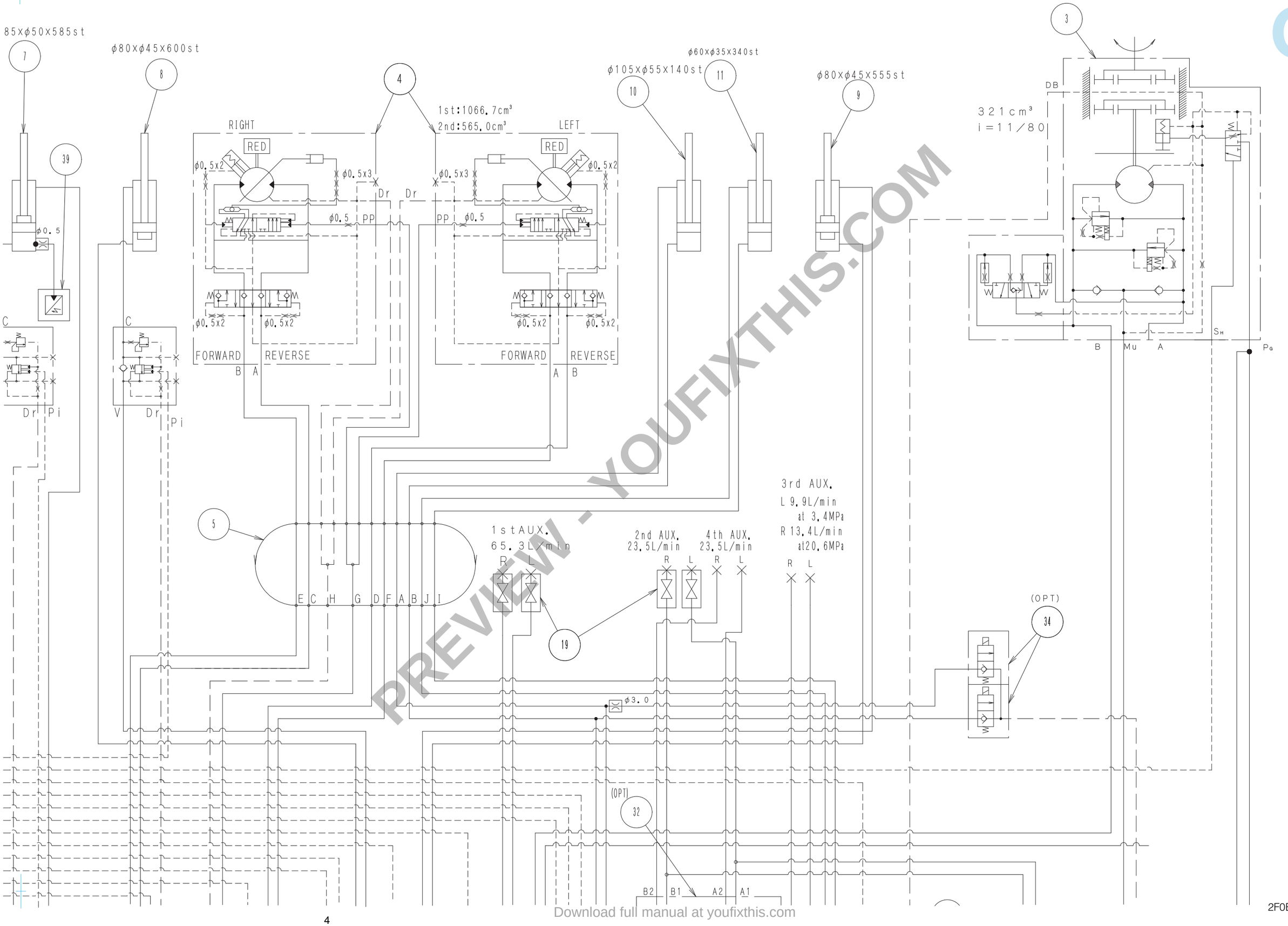


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## Bolts and nuts (JIS strength category 10.9)

| Thread | Size × pitch | Tightening torque | | | |
|---|---|---|---|---|---|
| | | General tightening points | | Special tightening points | |
| | | N·m | ft.-lb | N·m | ft.-lb |
| Coarse | M6 × 1.0 | 9.8 ± 0.5 | 7.2 ± 0.4 | 11.8 ± 1.1 | 8.7± 0.4 |
| | M8 × 1.25 | 22.6 ± 1.1 | 16.6 ± 0.8 | 26.5 ± 2.5 | 19.5 ± 0.9 |
| | M10 × 1.5 | 47.1 ± 2.4 | 34.7 ± 1.7 | 54.9 ± 4.9 | 40.5 ± 2.0 |
| | M12 × 1.75 | 83.4 ± 4.1 | 61.5 ± 3.0 | 97.1 ± 7.4 | 71.6 ± 3.5 |
| | M14 × 2.0 | 134.4 ± 6.7 | 99.1 ± 4.9 | 155.9 ± 12.7 | 115.0 ± 5.7 |
| | M16 × 2.0 | 207.9 ± 10.4 | 153.3 ± 7.7 | 241.2 ± 17.2 | 177.9 ± 8.9 |
| | M20 × 2.5 | 410.9 ± 20.5 | 303.1 ± 15.1 | 475.6 ± 23.7 | 350.8 ± 17.5 |
| Fine | M8 × 1.0 | 24.5 ± 1.2 | 18.1 ± 0.9 | 28.4 ± 1.4 | 21.0 ± 1.0 |
| | M10 × 1.25 | 50.0 ± 2.5 | 36.9 ± 1.8 | 58.8 ± 2.9 | 43.4 ± 2.2 |
| | M12 × 1.5 | 87.3 ± 4.3 | 64.4 ± 3.2 | 102.0 ± 5.1 | 75.2 ± 3.8 |
| | M14 × 1.5 | 135.3 ± 6.8 | 99.9 ± 5.0 | 157.9 ± 7.8 | 116.5 ± 5.8 |
| | M16 × 1.5 | 220.6 ± 11.0 | 162.7 ± 8.1 | 256.0 ± 12.7 | 188.8 ± 9.4 |
| | M20 × 1.5 | 452.1 ± 22.6 | 333.4 ± 16.6 | 524.7 ± 26.1 | 387.0 ± 19.2 |

1. General tightening points (non-lubricated)
   All securing points that have no special tightening torque specified in this manual and that are not special tightening points.
2. Special tightening points (grease with molybdenum disulfide applied)
   Points where a specific tightening torque is specified in this manual.
3. Points where thread-locking compound should be applied (ThreeBond #1324).
4. If a tightening torque value is specified in this manual for a point not listed in the table above, follow the specification listed in the manual.
5. To tighten multiple bolts and nuts evenly, tighten opposite bolts/nuts alternately as a pair.

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# SLEWING

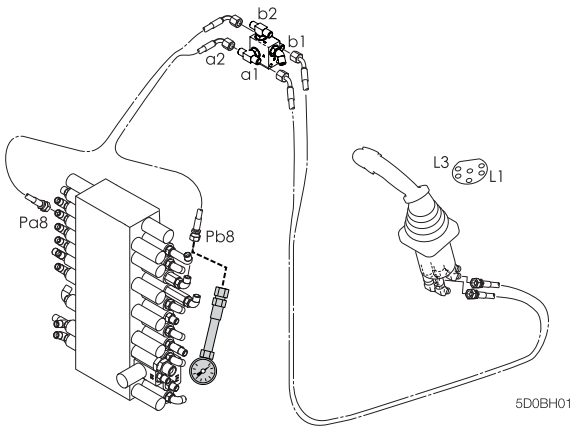
## No slew movement.

| | | | | |
|---|---|---|---|---|
| 1 | Check the pilot valve. | Faulty | | Repair or replace the pilot valve. |
| | | Normal | | |
| 2 | Check the spool operation. | Faulty | | Repair or replace the housing block. |
| | | Normal | | |
| 3 | Check the slew pressure. | Pressure too low | Adjust the slew relief valve pressure. | Adjust to the set pressure. |
| | | Normal | Pressure does not increase | Repair or replace the slew relief valve. |
| 4 | Check the slew motor. | Faulty | | Repair or replace the slew motor. |
| | | Normal | | |
| Slew bearing is faulty. | | | | Replace |

1. Check the pilot valve.
   Disconnect the control valve end of the hose connecting the pilot valve and control valve (slew). Attach a pressure gauge to the disconnected hose.
   - Attach plugs to the control valve ports.
   - Operate the lever (slew) and measure the pressure.
   - The P4 pilot pressure is normal if it is within specifications.

   ☞ "2. Service data, Performance criteria"
   - If the measured pressure is found to be abnormal, check the pilot valve.

   ☞ "5. Troubleshooting, Pilot valve"

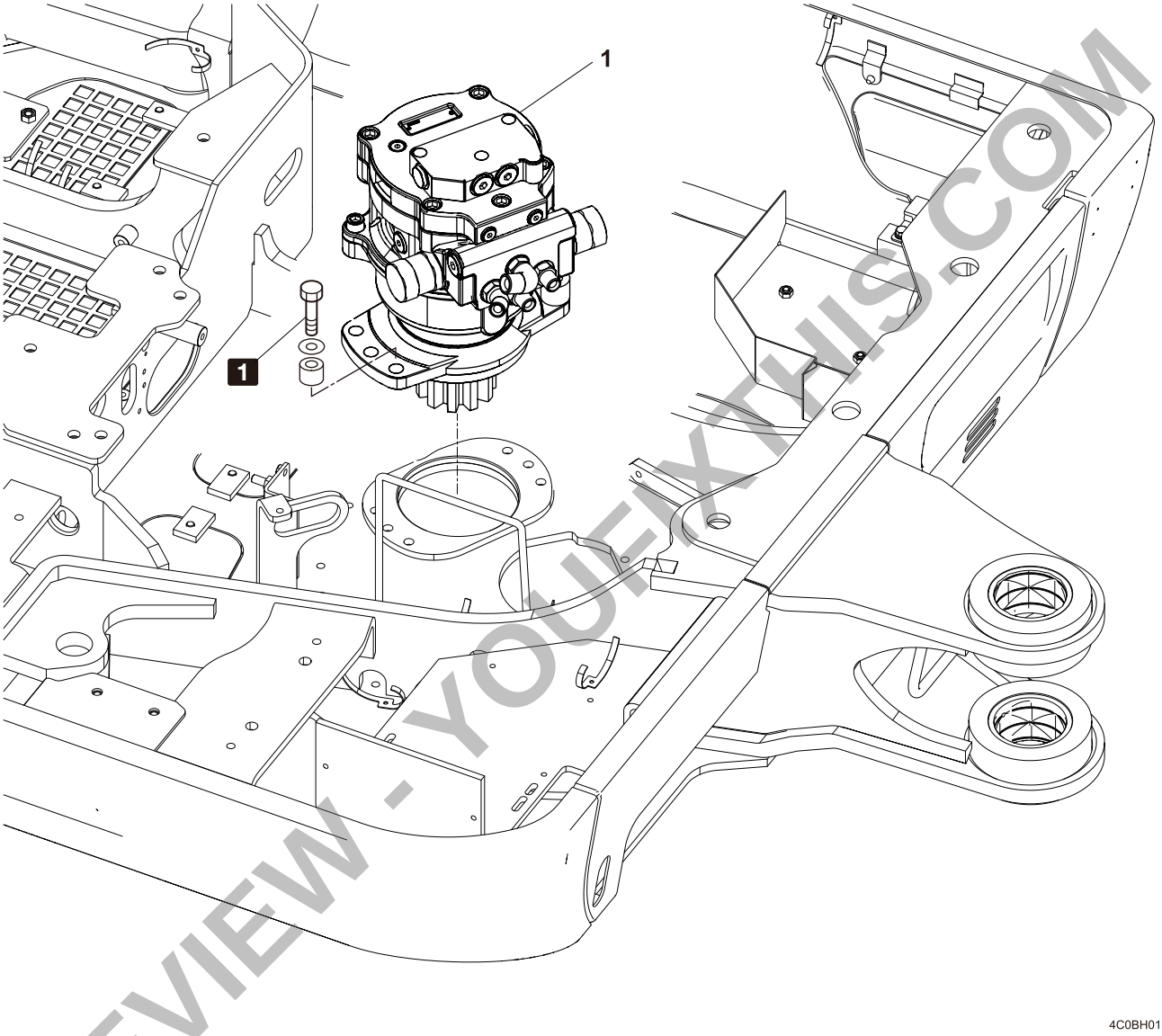



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# SLEW EQUIPMENT

## Slew motor




4C0BH01

**1** 158 N·m (117 ft.-lb.) Bolt: ThreeBond #1324

1. Slew motor

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# SAFETY ALERT SYMBOL



This symbol represents the safety alert.
The message that follows the symbol contains important information regarding human safety.
Read and understand the message to avoid personal injury or death.

## Safety label

Safety labels are used to alert operators or other people exposed to the risks of injury or damage. There are the following three types of labels.
Read the labels carefully as they are important for your safety.

**⚠ DANGER**

The word “DANGER” indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or death.

**⚠ WARNING**

The word “WARNING” indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.

**⚠ CAUTION**

The word “CAUTION” indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT: The word “IMPORTANT” is used to alert operators and maintenance personnel about situations which could result in damage to the machine and its components.

This manual is intended for trained and qualified personnel only. Warnings or cautions described in this manual do not necessarily cover all safety measures. It is also impossible to cover all hazards and risks which may be associated with the maintenance of the machine in every environment. For maintenance work, each person must take adequate safety precautions against possible hazards in the respective working environment.

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### Removing the slew bearing

1. Remove the hoe attachment.
   ☞ "Removing the hoe attachment"
2. Remove the upper frame.
3. Remove the fixing bolts for the inner race.
4. Raise the slew bearing (2), and remove it.
   - Mass of the slew bearing: ☞"Service data"

### Installing the slew bearing

To install, follow the same procedures as for removal but in the reverse order.

- Refer to the construction diagram for the positions of the reamer bolts and the grease supply port.
- Grease the tooth surfaces and grease bus with lithium grease EP-2.
- For instructions on which tightening torque to use and where to apply thread-locking compound, refer to the construction diagram.

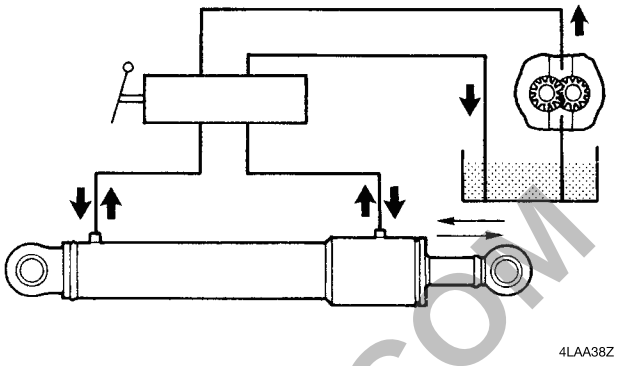
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## Inspection after assembly

### No-load operation test

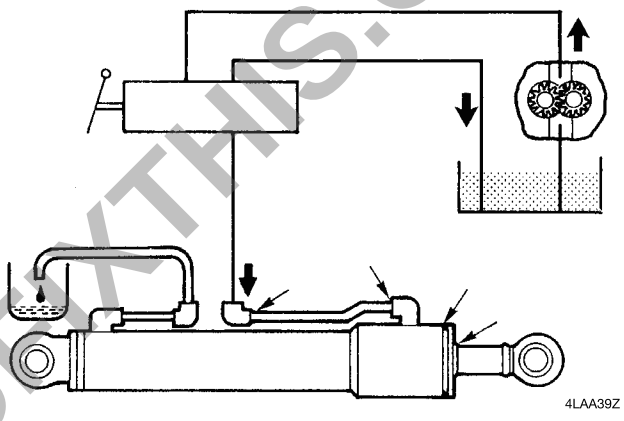
1. Place the cylinder horizontally, under no load.
2. Gently apply pressure alternately to the port at each end to operate the piston rod five or six times.
3. Ensure that the cylinder operates normally.




### Leak test

- External leak
  1. Apply the test pressure for three minutes each to the retraction side and the extension side.
  2. Ensure there are no abnormalities such as external leakage or permanent deformation in the rod seal, the rod cover mount, or any welded joint.

- Internal leak
  1. Disconnect the hose at the extension side.
  2. Apply the test pressure to the retraction side for three minutes.
  3. Measure the amount of oil that leaks from the extension side.
     - The leaked volume must not exceed 1 mL (0.034 fl. oz) in three minutes.




### Bleeding air from the hydraulic cylinder

Bleed the air from the cylinder after the cylinder has been removed or the hydraulic piping has been disconnected.

1. Start the engine and let it idle for approximately five minutes.
2. With the engine running at slow speed, extend and retract the cylinder four or five times.
   - Move the piston rod to a position 100 mm (3.94 in.) before the end of the stroke, being careful not to allow the air to escape.
3. With the engine at top speed, repeat the operation at step (2). Then run the engine at slow speed and move the piston rod to the stroke end to bleed the air.

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