Service Guide for 85V4

IHI

SERIAL NUMBER WK020001-

PUB.1

1602

Introduction

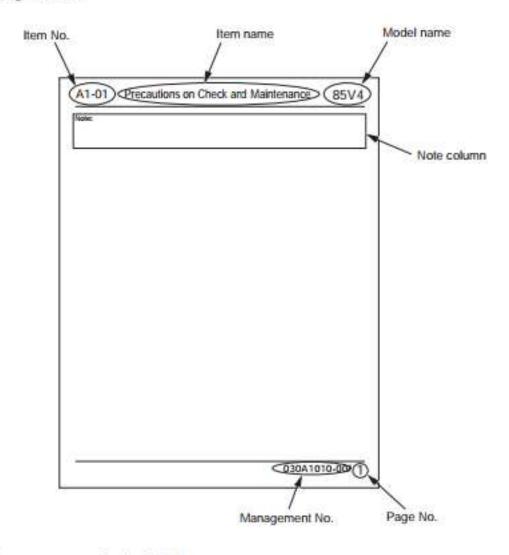
- This service guide covers check, adjustment, and maintenance of main parts on this machine.
- Chapter A describes the necessary numeric values and information for maintenance covered throughout the manual.
- Chapter B describes measurement, maintenance, adjustment required for troubleshooting and check.
- Chapter C describes installation of optional features and other items.
- For engine check, adjustment, and maintenance, please refer to the separate "Engine Maintenance Manual".

A CAUTION

- Audience of this manual is those who have basic skills and knowledge on hydraulic shovels. Other
 people without such skills and knowledge may not be able to achieve maintenance according to this
 manual.
- It is prohibited to transfer or sell this manual to any third party or prepare copies.

This document uses a form of loose-leaf to support machine improvements and maintenance techniques that evolve day by day. Sequential issue of revisions and additional items allows for always providing the latest maintenance information.

Page Organization



Item No.:

A 1 - 0 1 *

Chapter Section Sequential No. Variation of the Nem (Norw for the first, than A, B, C...)

Management No.:

0 3 0 A 1 0 1 0 - 0 0

Revision number of the flam

Local Chapter Section Hem no. Variation of the flam (0 for the first, then A, B, C...)

Page No.: Page for each item

Note column: The applicable machine number, specifications, and other precautions are entered.

It is provided on the first page only as required.

How to Issue Revisions/Additions

For this manual, additions/revisions are issued for each item.

Revisions are limited to the cases below.

- Correction of incorrect characters, sentences, contents, etc.
- · Addition to description, etc.

If description or instructions do not match the work contents as a result of design changes, new items are additionally issued.

In this case, the original item is followed by A, B, C... as a sequential code for easy understanding. The target machine number, specifications, etc. are entered in the Note column.

For items in and after Contents, a revision of Contents will be issued for both revision and addition. As a result, you can check the latest manual by viewing Contents.

For whether Contents are the latest version, advise with Product support Group about the revision number of the Contents management number.

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Revision No.

Contents 85V4

Item No. Revision No.

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A1 General Information

• Understand the check/maintenance method! Before starting check/maintenance, read and understand "Check/Maintenance Section" carefully. Paying attention to safety, perform check/ maintenance.

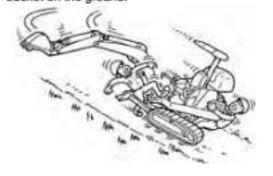


Do not perform maintenance for the moving machine.

To prevent from being crushed or caught, lower the bucket on the ground and stop the engine. If the work is required inevitably, keep full contact with the operator.

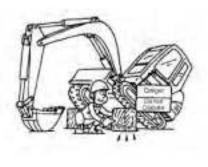


Perform check/maintenance on a flat ground.
If the machine is operated on a slope, turn and running may be activated by the dead weight and personnel may be caught. On a rigid and flat ground, lower the working devices such as bucket on the ground.



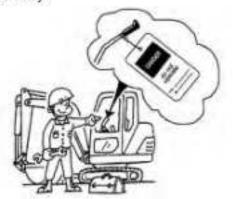
■ Maintenance under the machine

Simple jack-up of the working machine may cause the main body to catch personal body. Use supports and blocks under the crawler to secure the space.



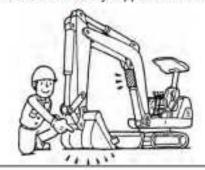
■Indication of check/maintenance

Post a "Check/maintenance" warning plate on a visible position of the door or operating lever so that other people will not touch the machine inadvertently.



Holding the working machine

Removal of the hydraulic hose or pin removal for repair while the working machine is up may result in a dangerous state such as oil jetting out or fall of the working machine. Be sure to lower the working machine on the ground or support the machine with safety supports or blocks.



Do not perform maintenance while the engine is running.

Touching the rotating or moving part such as the fan belt may catch or cut personal body. Be sure to stop the engine.





Relieve the internal pressure from the hydraulic system before maintenance.

If the pipe or hose is removed without removing the internal pressure from the hydraulic system, the pressurized oil may jet out. Before starting the work, relieve the internal pressure.



The engine is hot after the machine stops.
Do not touch the engine or muffler immediately after the machine stops. Each part is hot and therefore a burn may be caused. After each part is cooled down, start check/maintenance.





- Precautions on shoe tension adjustment
 - Since a high pressure is provided in the shoe adjusting device, grease or valve may jet out of the supply port and this is dangerous unless the maintenance procedure is followed.
 - When loosening the shoe tension, do not put your face, hand, leg, or body in front of the valve.





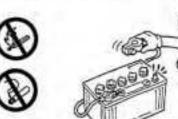
■Do not open the radiator cap when it is hot.

If the cap is removed when the radiator water temperature is high, hot steam may jet out and a burn may be caused. Therefore, do not open the cap. After the water temperature drops, loosen the radiator cap slowly to reduce the pressure.

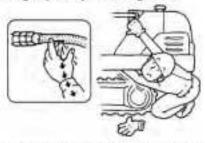




- Handling of battery, etc.
 - Before maintenance of the electrical system or welding, remove the (-) terminal of the battery.



 The battery generates combustible gas and ignition/explosion may be caused. Since diluted sulfuric acid is used as the battery liquid, special care must be taken to handling. Precautions on high-pressure oil
 High-pressure jetted out oil sticking on your skin or coming in your eyes is dangerous.



If the oil sticks to your skin, medical treatment is required immediately.

■ Precautions on fire

- · Do not put fire close upon fuel refilling.
- · Stop the engine before fuel refilling.
- Do not put fire close when you are using light oil for washing parts.



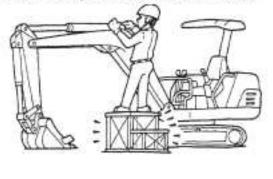
Use of protectors

During the grinding work or pin or tooth removal work, chips may come in your eyes and injury may be caused. Wear the protection glasses and protection helmet for the work.



Precautions on maintenance at a high place

- Do not climb on the boom of the working machine because the step position is bad and you may fall.
- · Use the stepladder, stool, etc. for the work.



■ Time of check/maintenance

For the time of check/maintenance, perform maintenance according to the time read from the hour-meter.

If any failure is found in daily check, etc., make a repair immediately.

This manual indicates the check/maintenance time in the normal running state.

For a bad work environment or severe running, perform check/ maintenance earlier.

Use genuine parts.

For replaceable parts and oils/greases to be used, be sure to use genuine parts.

Use oils and greases with viscosity matching the air temperature.

Perform important check/maintenance at a Sales and Services Shop.

Ask the Sales and Services Shop for the work requiring professional knowledge and skills such as replacement of electronic parts (e.g. controller) or oil pressure adjustment.

Wash the machine and then perform check/maintenance.

Wash the machine cleanly and then perform check/maintenance. Particularly, clean the pipe joint, grease nipple, and oil supply port and avoid entry of dust.

Precautions on car washing

Do not put water on electrical parts upon car washing.

- Monitor and electrical parts in the operator cab
- Do not apply steam, etc. directly to the battery, connectors, and sensors.

Be careful of entry of water and dust.

- · Use the clean oil, grease, and container.
- Do not refill with the fuel by removing the strainer from the fuel supply port.
- Refill with or replace the oil in a dust-free place to avoid dust entry.

Disassembly of electronic parts prohibited

Never disassemble electronic parts (e.g. controller).

Precautions on repair by welding

- If electronic parts such as the controller have been installed, remove them.
- Do not put a seal or bearing between the part to be welded and grounding.
- Avoid installing the grounding wire on the pin or hydraulic cylinder of the working machine. The best way is to provide the grounding wire on or near the material to be welded.

If the air temperature drops, a starting trouble or freezing of the coolant may occur. Prepare for the cold season as described below.

■ Fuel

In winter season, the fuel may be frozen and starting the engine may be difficult in cold districts. Use the fuel (light oil) matching the air temperature.

Light oil freezing temperature (according to JIS K2204)

Type of light oil	Freezing temperature	Remarks
No.1	-5°C or lower	C
No.2	-10°C or lower	General use
No.3	-20°C or lower	CH END
Special No.3	-30°C or lower	Cold districts

■ Coolant

This machine is shipped from the factory by mixing the long-life coolant (LLC) upon shipping (Density: 50%). The freczing temperature is -35°C.

Replace the long-life coolant every 2 years (in autumn of the second year).

■ Lubrication oils/greases

Replace the engine oil and hydraulic oil with the ones with viscosity matching the outer air temperature. For the specified viscosity, see "A2-07 Oil/Grease, Fuel, Coolant".

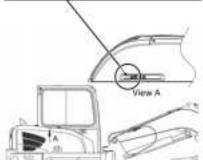
Battery

In the cold season, the current discharged at the start is high and the battery capability is degraded. In the state close to discharge, the battery liquid may be frozen. Set the state close to fully charged and pay attention to heat insulation for starting in the next morning. Refill with the distilled water immediately before starting to avoid freezing.

■ Post-work precautions

- To prevent the hydraulic cylinder rod seal from being damaged, remove mud and water from the cylinder rod.
- To prevent chassis parts from being frozen, park the vehicle on a dry, rigid ground or on plates put on the ground.
- To prevent the fuel from being frozen, drain away water from the water sedimentor.



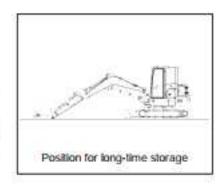




During long-time storage, keep the position as shown at right to prevent rust from being generated on the cylinder rod.

■ Before storage

- Wash/clean each part.
- Supply oil/grease or replace oil for each part.
- Coat grease on the exposed part of the hydraulic cylinder piston rod.
- Store the machine indoors. If the machine is inevitably being left outdoors, select a well-draining, well-ventilated place with less moisture. Put plates on the ground and cover the machine with vinyl sheet, etc.
- Remove the battery, charge it fully, and store it or remove the minus terminal.



■ During storage

⚠ CAUTION

If rust-preventive operation is inevitably being performed indoors, open windows and entrances for ventilation to prevent gas poisoning.

- While the machine stops for a long time, run a series of operations including traveling, swing, and working machine motions at a low speed after warming up once a month for rust prevention and lubrication.
- Before running the working machine, wipe off the grease coated on the hydraulic cylinder rod.

■ After storage

- Supply oil/grease to each part. Check the coolant volume and refill with the coolant if necessary.
- Wipe off the grease coated on the hydraulic cylinder rod.
- After the engine is started, repeat operations of traveling, swing, and working machine operation several times after warming up for idling of each part.

Units used in this document comply with the SI Units.

· What is SI Units?

SI is an abbreviation of Systèm International d'Unites in French representing the International Unit System, which was established to unify various unit systems used by countries internationally.

Basically, this is an extension of "metric units" that have been used in Japan, etc.

As one of main features, the units of "mass" and "force" that have been used identically are explicitly distinguished from each other and the unit of "force" is N (Newton).

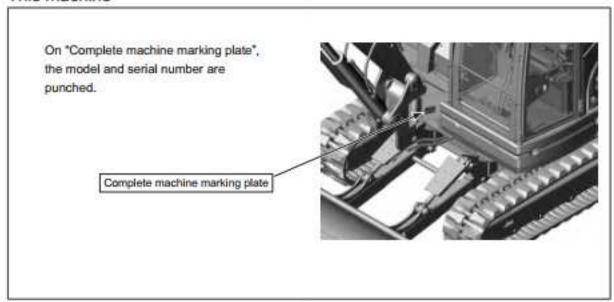
The "weight" represented in the SI Units is "mass" multiplied by "standard gravity acceleration" and its concept is different from that of "weight" that has been idiomatically used.

Volume name	Measuring unit	Remarks
Mass	kg	For the machine mass, running mass, etc. kg is used. For the rated total load list for the crane work, t is used.
Force (tensile force, compres- sive force, load, etc)	N	1 kgf = 9.80665 N For the excavating force and traction force, kN is used. The width for rounding is 5 or 10 N
Torque/bending moment	N±m	1 kg·m = 9.80665 N·m Tightening torques for bolts, etc. are included. The width for rounding is 5 or 10 N·m.
Stress/strength	MPa	1 kgf/mm² = 9.80665 MPa The width for rounding is 5 or 10 MPa.
Pressure	MPa	1 kg/cm² = 0.0980665 MPa The hydraulic pressure is represented in MPa, and the grounding pressure in kPa. The value is rounded to the first place below decimal point.
Charpy impact strength	J/cm²	1 kgf·m/cm² = 9.80665 J/cm² Rounded to an integer.
Output	kW	1PS = 0.7355 kW Rounded to an integer.
Heat quantity	ı	1cal = 4.18605 J Rounded to an integer.
Dynamic viscosity	cm ² /s	1 St = 1 cm ² /s
Rotation speed	min ⁻¹	For the turn speed and engine rotation speed, min ⁻¹ is used.
Length	μm, mm, m, km	For machine dimensions, mm is used. For the crane working radius, m is used. For the boom length, m is used.
Area	mm², cm², m²	
Volume	mm³, cm², L, m³	For the volume of water and oils, L is used (i.e. I (el) is hard to distinguish from 1 (one)). For the engine exhaust volume, mL is used. For the bucket capacity, m ³ is used.
Angle	•	
Time	s, min, h	

A2 Machine Body Information

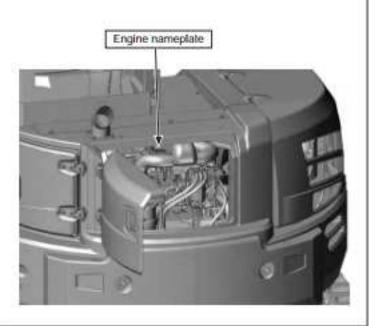
- . The check/maintenance method and parts may vary depending on the time of manufacture.
- . Before the start of maintenance or order placement of parts, be sure to confirm the serial number.
- Serial numbers of this machine and the engine are marked on the positions shown below.

This machine



Engine

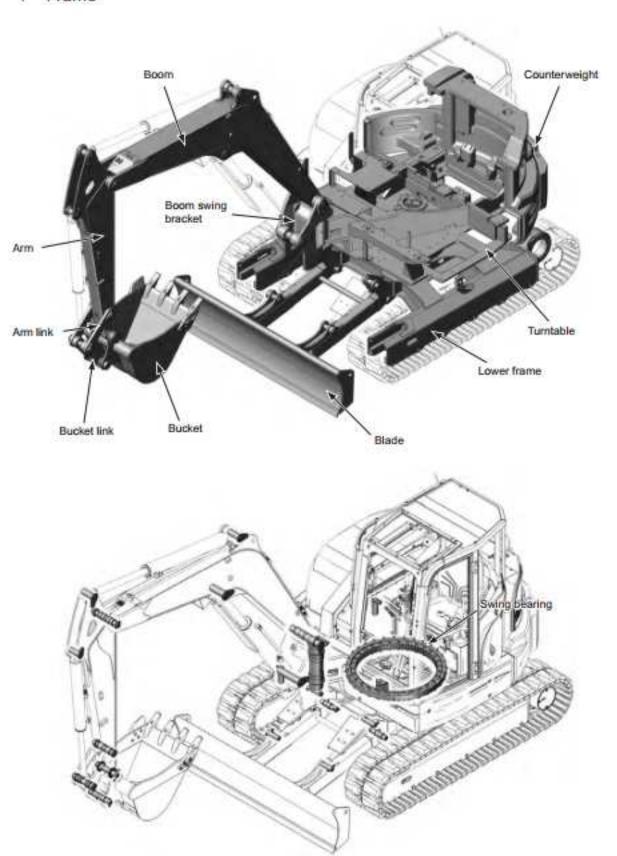
On "Engine nameplate", the model and engine serial number are punched.



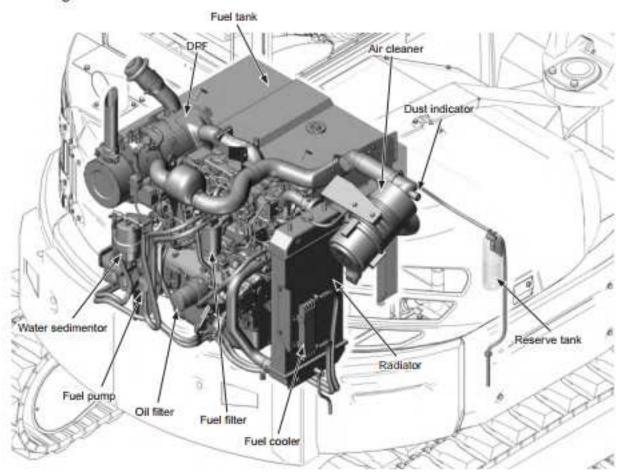
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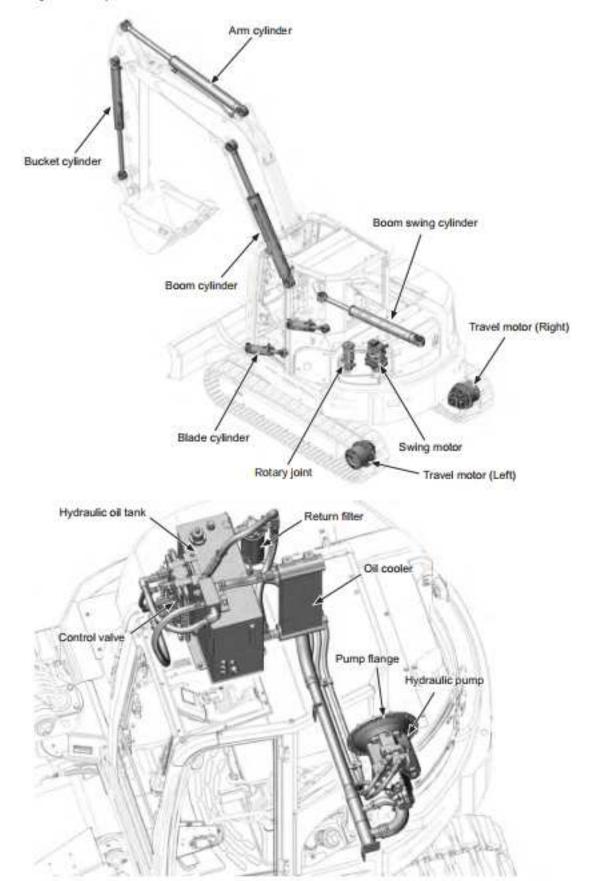
1 Frame

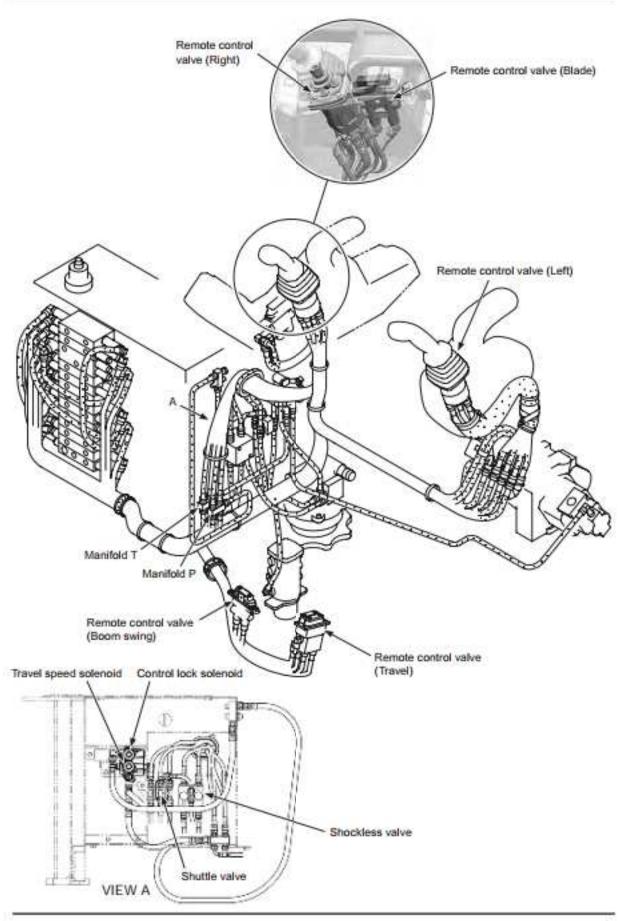


2 Engine

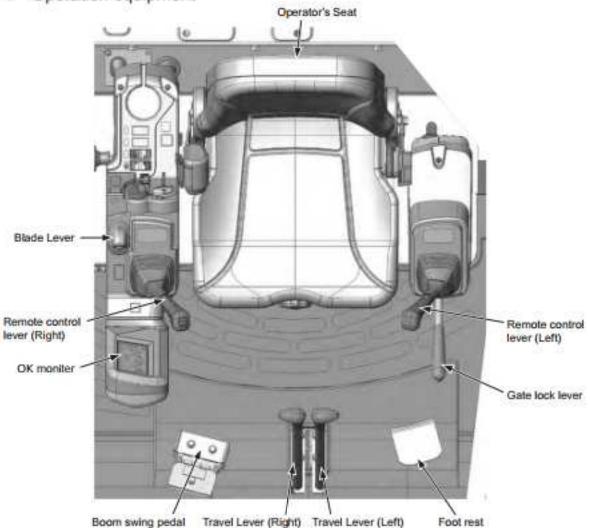


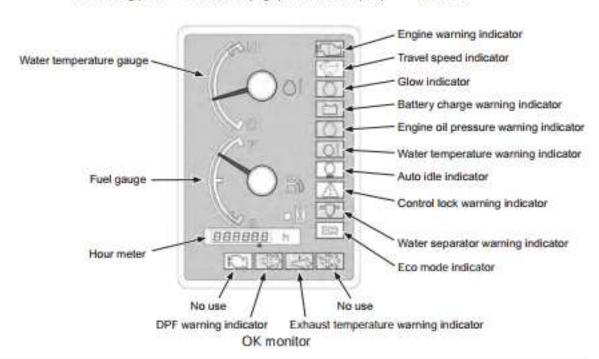
3 Hydraulic parts



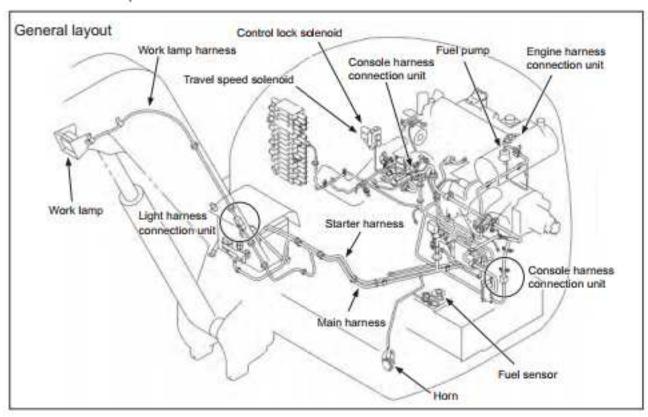


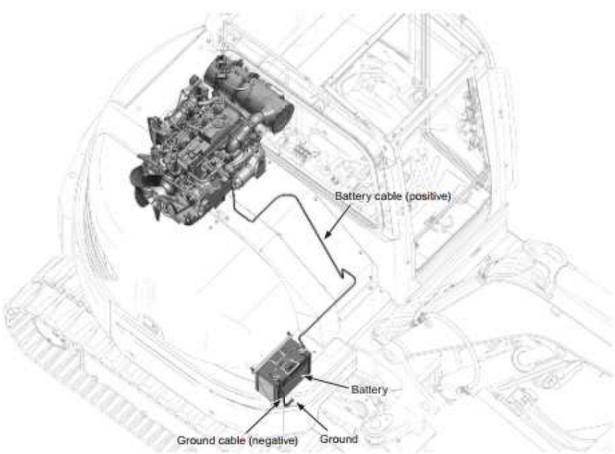
4 Operation equipment

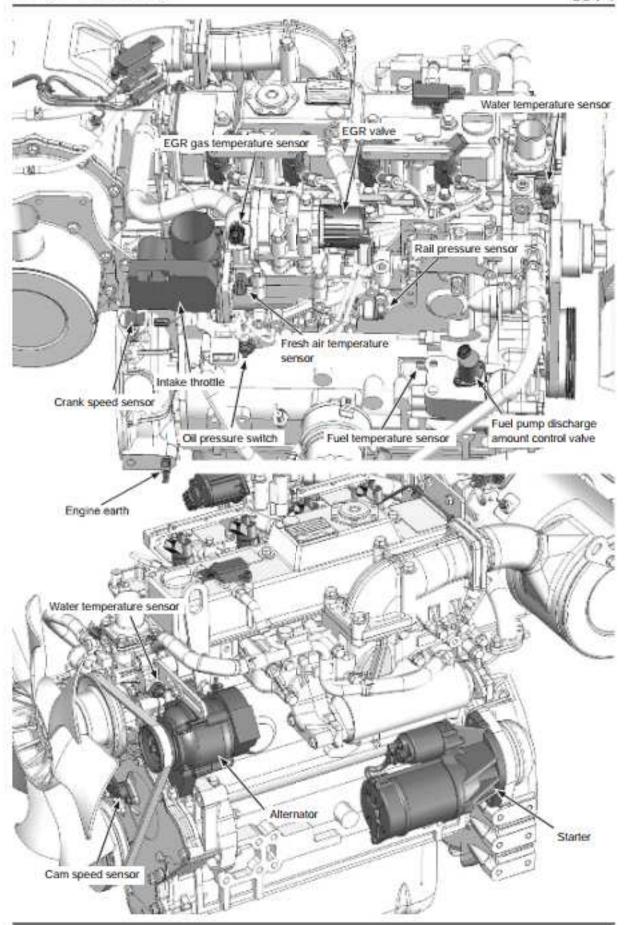


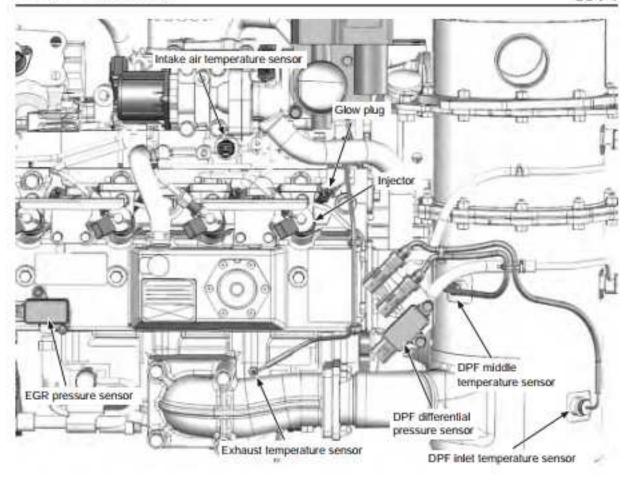


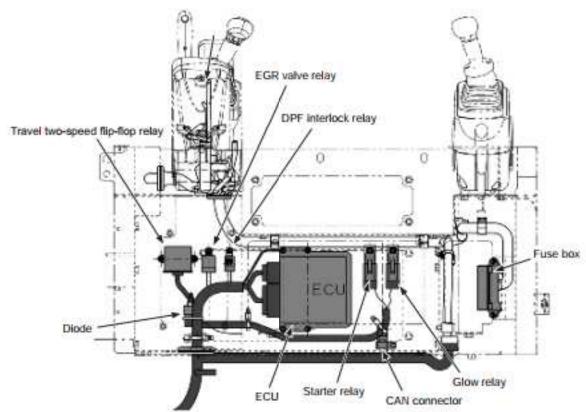
5 Electrical parts

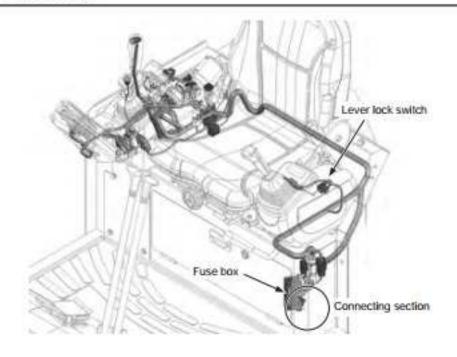


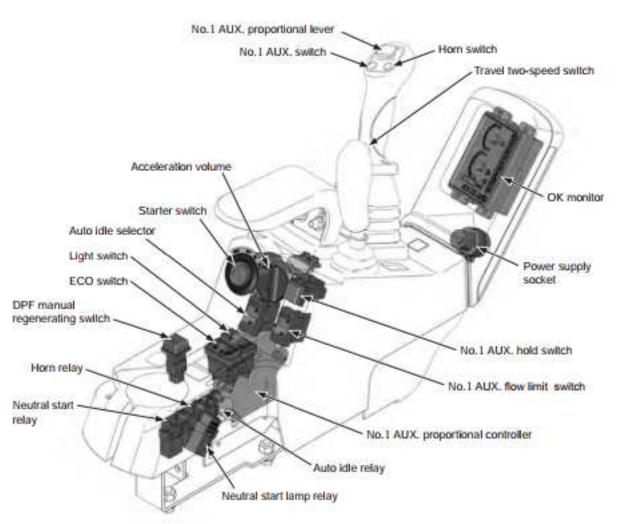




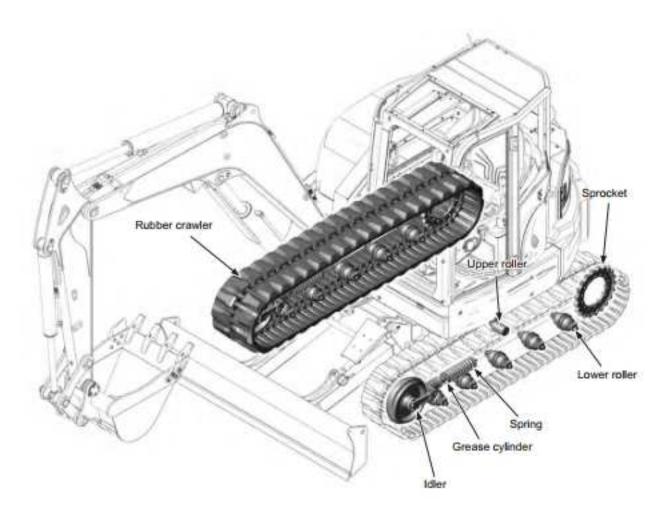








6 Travel equipment



Speed and hil I-climbing ability

Swing speed	9.0 min ⁻¹	
Travel speed (low/high)	2.5 / 4.4 km/hr	
Hill-climbing ability	58% (30°)	

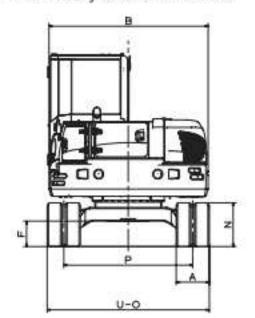
■ Engine

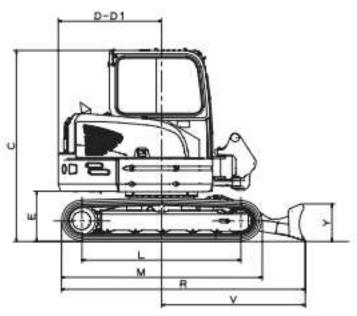
Maker	YANMER	
Name	4TNV98C-VIK	
Туре	Vertical water-cooled 4-cycle	Common rail type
Number of cylinders - diameter × stroke	4 - φ 98mm × 110 mm	
Total exhaust volume	3.318 L	
Rated output	42.7 kW / 2100 min ⁻¹ (58.1 ps / 2100 rpm)	Net
Maximum torque	241 N•m / 1560 min ⁻¹ (24.5 kgf•m / 1560 rpm)	Gross
Fuel consumption (rated)	236 g / kW+h (174 g / psh)	
Fuel tank capacity	114 L	
Starter	12 V - 3.0 kW	
Battery	12 V - 72 AH	115D31L
Alternator	12 V - 40A	
Lubricating oil quantity	Max. 10.2 L Min. 4.5 L	
Coolant capacity	11.0 L (only for engine itself 4.5 L)	3

Mass

		0	85V4 Additional Weight	Without add weight
Machine mass	9220	Rubber shoe	6610	6270
Machine mass	kg	Steel shoe	6660	6320
******	line.	Rubber shoe	8440	8100
Machine body mass	kg	Steel shoe	8490	8150
Average grounding	i.p.	Rubber shoe	41	38
pressure	kPa	Steel shoe	41	38
0	9227	Rubber shoe	8515	8175
Operating mass	kg	Steel shoe	8565	8225

Main body external dimensions





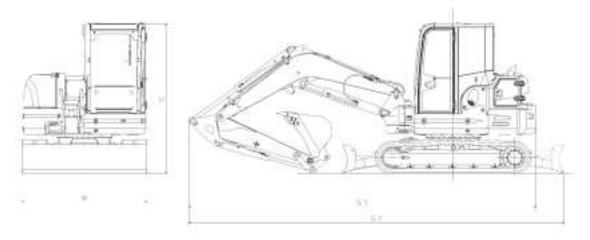
Unit:mm

			85V4 Additional Weight	Without add weight
В	Upper structure over	all width	2160	2160
С	0	Rubber shoe	2630	2630
9	Overall height	Steel shoe	2630	2630
D	Tail end swing radius	i	1450	1400
D1	Swing body tail end	distance	1450	1400
E	Swing body rear lower end height	Rubber shoe	690	690
E		Steel shoe	690	690
F	Rubber shoe		350	350
r	Ground clearance	Steel shoe	350	350
Y	Blade height		500	500
U	Blade width		2200	2200
V	Blade ground contac	t position	1950	1950

Unit: mm

Name	Distance between tumbler centers	Crawler overall length	Crawler height	Crawler oversal width	Distance between crawler centers	Crawler shoe width	Shoe pitch	Number of shoe	Undercar- riage overall length	Crawler bearing area JIS (cm²)
Crawler specification	L	M.	N	0	P	A	-		R	-
Rubber shoe	2155	2730	605	2200	1750	450	71	82×2	3315	21190
Steel shoe	2130	2700	605	2200	1750	450	135	42×2	3315	20935

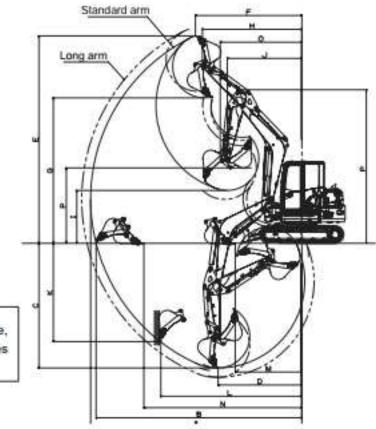
Dimensions upon transportation



Unit: mm

			85V4 Additional Weight		
Arm			Standard	Long	
Buck	et capacity (m³),	New JIS Heaped	0.25	0.21	
SI	Overall length (blade in front)		6100	6130	
S2-	Overall length (blade in rear)		6600	6630	
С	O	Rubber crawler shoe	2630	2630	
C	Overall length	Steel shoe	2630	2630	
w	Overall width	Rubber crawler shoe	2200	2200	
	Overall Width	Steel shoe	2200	2200	

(1) Standard/Long arm



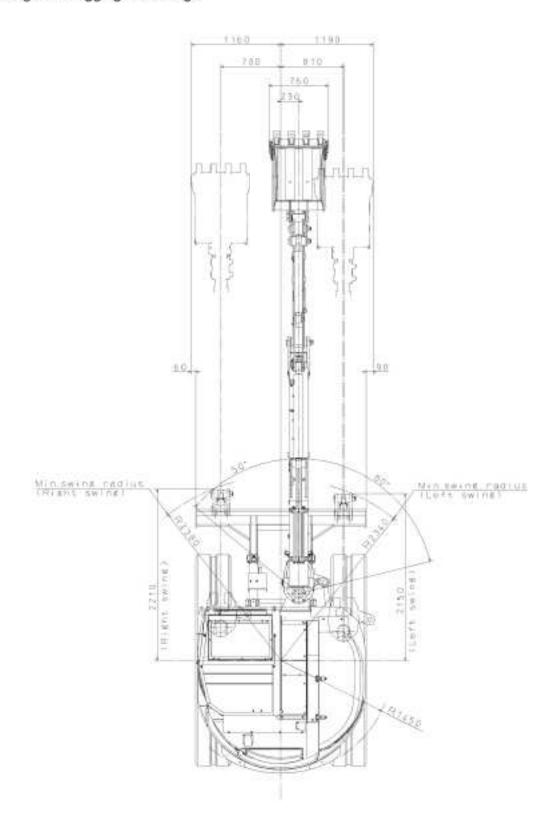
A CAUTION

When digging deep at the blade side, the boom cylinder sometimes interferes with the blade.

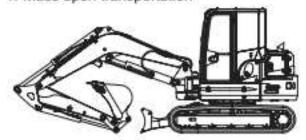
Unit: mm

			Crim. 11
No.	Name	Standard arm	Long arm
145,000	Standard mounted bucket capacity (m ³) New JIS	0.25	0.21
A	Maximum digging radius	6830	7110
В	Maximum floor level digging radius	6650	6940
C	Maximum digging depth (without blade)	4020	4320
D	Radius against maximum digging depth	2710	2710
E	Maximum digging height	6700	6920
F	Radius against maximum digging height	3440	3650
G	Maximum dump height	4700	4910
Н	Radius against maximum dump height	3210	3420
I	Minimum dump height	1710	1420
J	Radius against minimum dump height	2410	2490
K	Maximum vertical digging depth	3170	3460
L	Radius against maximum vertical digging depth	4560	4640
М	Minimum floor level digging radius	2150	2030
N	Maximum digging distance with floor	5100	5400
	Minimum front swing radius	2640	2720
0	(Swing in right)	2150	2240
	(Swing in left)	2210	2300
Р	Height against minimum front swing radius	2400	2110
	Arm length	1780	2080
	Boom length	3150	3150

(2) Side groove digging work range



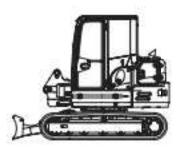
1. Mass upon transportation



Mass (kg)
8440
8490
8470
8520

(Without additional counter weight -340kg)

2. Base machine



Shoe Specification	Mass (kg)	
Rubber shoe	7340	
Steel shoe	7390	

(Without additional counter weight -340kg)

This mass is not the machine body mass but includes water, fuel, blade, etc.

3. Upper machine



Cab Specification	Mass (kg)
Cabin	4760

(Without additional counter weight -340kg)

4. Lower machine



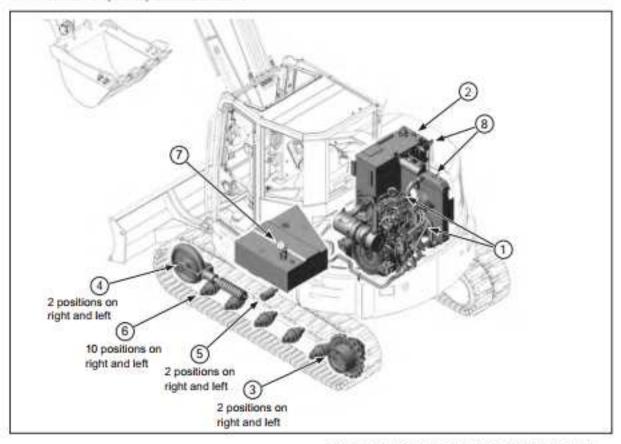
Туре	Mass (kg)
Rubber shoe	2580
Steel shoe	2630

5. Hoe attachment



Туре	Mass (kg) 1100	
Standard		
Long	1130	

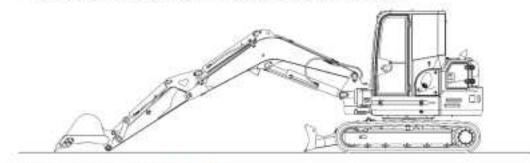
1 List of oil, fuel, and coolant



* Depending on air temperature, follow the table.

	V	Type Grade		Use depending on air temperature	6	
Ц	Location	Туре	Grade	-30 -20 -10 0 10 20 30 40	Required volume	
1	Engine oil pan	Engine oil	API CJ-4 (JASO DH-2)	SAE10W-30 SAE15W-40	Maximum : 10.2 l Minimum : 4.5 L	
2	Hydraulic oil tank	Hydraulic oil	Wear- resistant	ISO-VG46 ISO-VG32	*Note 1 Total qty. : 125 L Tank level : 75 L	
3	Travel reduction gear	Gear oil	API GL-4	SAE90	1.1 L × 2	
4	Front idler	Engine oil	API-CD	SAE30	0.08 L × 2	
5	Upper roller	Engine oil	API-CD	SAE30	0.045 L × 2	
6	Lower roller	Engine oil	API-CD	SAE30	0.18 L × 10	
7	Fuel tank	Diesel fuel	ISO 8217 DMX Ultra Low Sulfur		110 L	
8	Cooling system	Water	пс	Long life coolant (LLC) added * Note 2	Engine : 4.5 L Total qty. : 11.0 I	

Note 1: The full system oil volume means that the hydraulic oil is supplied to the standard position on the hydraulic tank oil level gauge with the position shown in the figure.



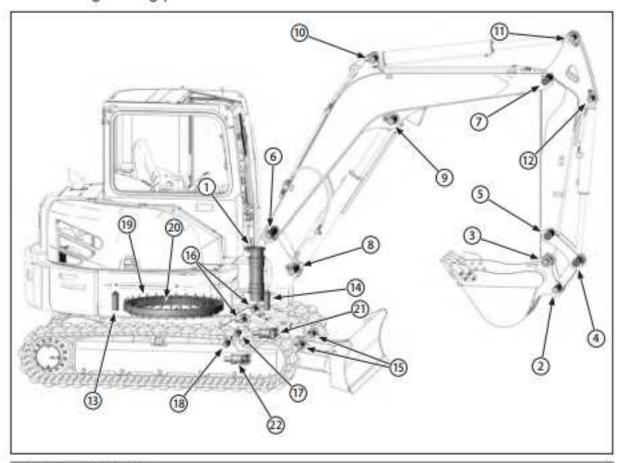
Note 2: The mixed quantity should be 50%.

Lowest outer	air temperature (°C)	-35	
Mixing perce	ntage (%)	50	
Mixed	Coolant (L)	5.5	
volume (L)	Water (L)	5.5	
Coolant, Total qty.: 11	.OL	Engine body Radiator, etc. Tank	: 4.5L, : 6.0L, : 0.5L

2 List of check/replacement cycle for oil, fuel, and coolant

1	Engine oil pan	Engine oil	Check and refill every day. Replace 50 hours after the initial use and then replace every 250 hours.
2	Hydraulic oil tank	Hydraulic oil	Check and refill every day. Replace every 1,000 hours.
3	Travel reduction gear	Gear oil	Replace 50 hours after the initial use. Check and refill every 500 hours. Replace every 1,000 hours.
4	Front idler	Engine oil	Replace upon disassembly/repair.
5	Upper roller	Engine oil	Unreplaceable (Replace the assembly of upper roller.)
6	Lower roller	Engine oil	Replace upon disassembly/repair.
7	Fuel tank	Diesel fuel	Orain water from the water sedimentor every day.
8	Cooling system	Water	Check and refill every day. Replace every 2 years.

3 List of greasing positions



1	Swing bracket pin		
2	Bucket pin		
3	Bucket pin		
4	Bucket cylinder head pin		
5	Arm link pin		
6	Boom foot pin		
7	Boom top pin		
8	Boom cylinder foot pin		
9	Boom cylinder head pin		
10	Arm cylinder foot pin	greasing every 50 hours.	
11	Arm cylinder head pin	HINTOCOMPENSATION CONT.	
12	Bucket cylinder foot pin		
13	Boom swing cylinder foot pin		
14	Boom swing cylinder head pin		
15	Blade cylinder foot pin		
16	Blade cylinder head pin		
17	Blade pin (left)		
18	Blade pin (right)		
19	Swing bearing		
20	Swing gear	greasing every 500 hours.	
21	Grease cylinder (left)	For crawler tension adjustment. Lubricate upon adjust-	
22	Grease cylinder (right)	ment/replacement of the crawler tension.	

Use Extreme-Pressure Grease EP-2

1 General tightening torque

Unless torque is specified for screws, tighten them according to the table below.

1-1 Tightening torque of metric screw (10T)

	Wrench	Tightening torque		
Bolt size (mm)		Metric coarse heat-treated bolt (N•m)	Metric fine heat-treated bolt (N•m)	
M8	13	23	25	
M10	17	47	50	
M12	19	83	91	
M14	22	134	135	
M16	24	208	221	
M20	30	411	452	
M24	36	715	811	

1-2 Tightening torque of piping taper screw

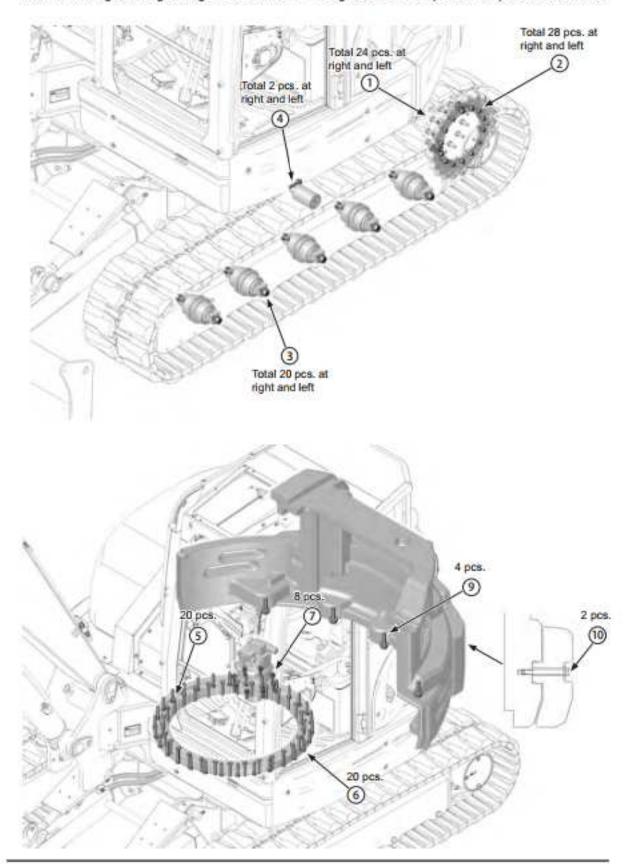
Pipe thread nominal diameter	Tightening torque (N-m)
1/4	19.6 - 39.2
3/8	29.4 - 58.8
1/2	58.8 - 98.0
3/4	117.6 - 166.6
1	137.2 - 205.8
1-1/4	166.6 - 254.8
1-1/2	205.8 - 294.0
2	245.0 - 343.0

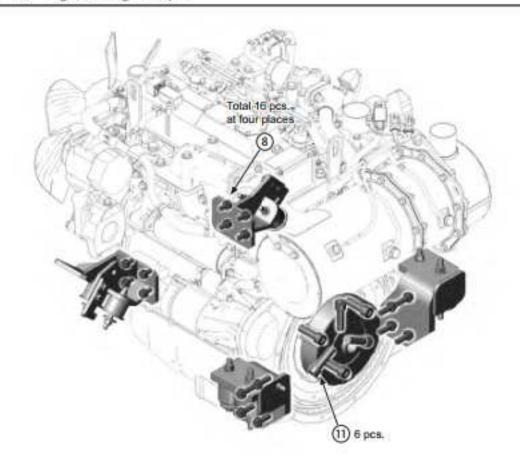
1-3 Tightening torque of rubber hose union nut

Hose size (inch)	Tightening torque (N•m)
1/4"	25
3/8"	49
1/2"	59
3/4"	118
1*	137
1-1/4"	167

2 Position to be tightened by the specified torque

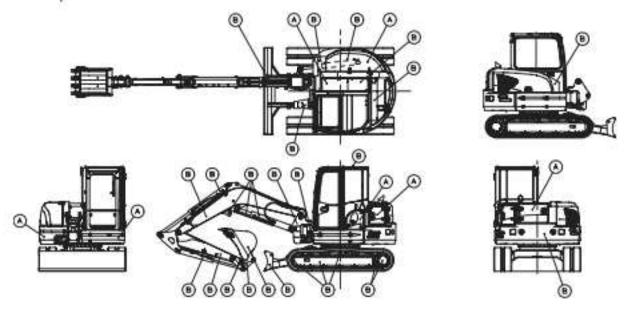
When removing and retightening the bolts shown in the figure, follow the specified torque and conditions.





Code	Position	Bolt nominal diameter	Wrench to be used (mm)	Tightening torque (N·m)	Other conditions
1	Travel motor	M16	24	241	Apply the screw lock.
2	Drive sprocket	M14	19	156	Apply the screw lock.
3	Lower roller	M20	32	490	Apply molybdenum disulfide grease.
- 4	Upper roller	M16	24	241	1
5	Swing bearing (Inner)	M16	24	245	1
6	Swing bearing (Outer)	M16	24	245	1
7	Swing motor	M16	24	245	t
8	Engine vibration-proof rubber bracket	M10	14	68.6	Apply the screw lock.
9	Base weight	M24	36	826	Apply molybdenum disulfide grease.
10	85V4 standard Additional weight	M20	30	475	Apply molybdenum disulfide grease.
11	Coupling	M14	Hexagonal wrench (width across flat: 12)	137	Accessory of coupling

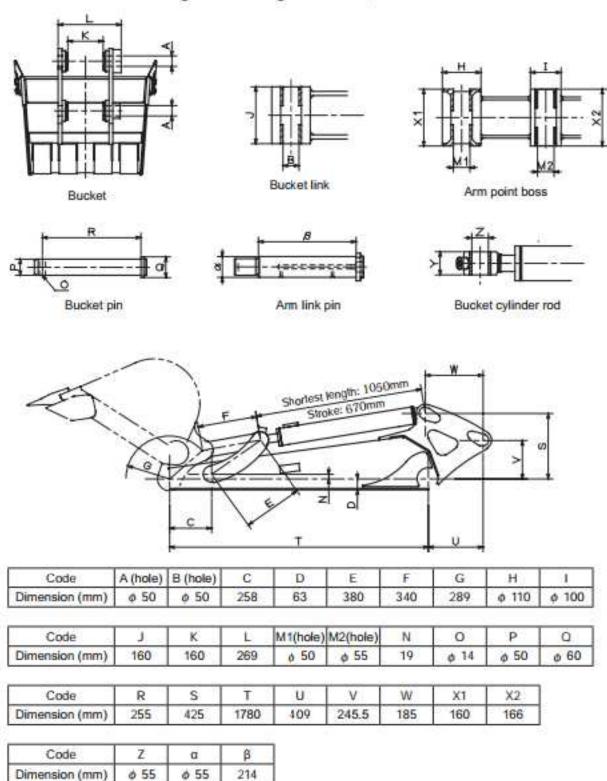
Cab specification



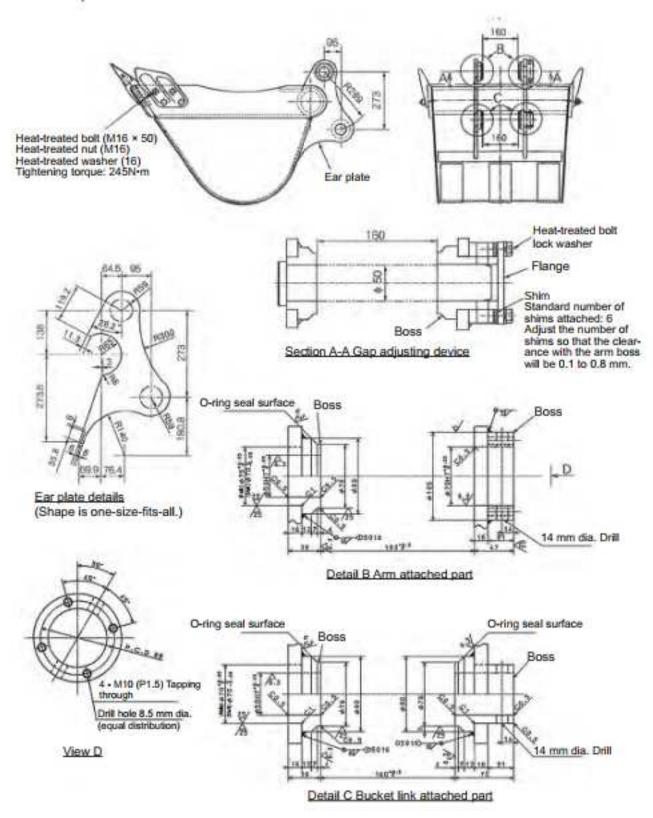
	Name	DIC No.	Munsell No.	JPMA No.	Coating type	Kansai Paint Product No.
	Lead-free (J)		2.5 BG		Urethane	60-388-500
Α	Light green		6/10		Melamine	LX-373-011
	Lead-free (J)		Non	DO 1001	Urethane	LX-388-001
В	Dark gray		N-3.0	P2-1034	Melamine	LX-373-012

Notes: Do not coat the following parts: rubber parts, sponge parts, catch metal fixtures, hydraulic hose, cylinder rod, rod packing, ATT plating pin, air cleaner, muffler and exhaust pipes.

1 Dimensions relating to mounting of breaker, etc.

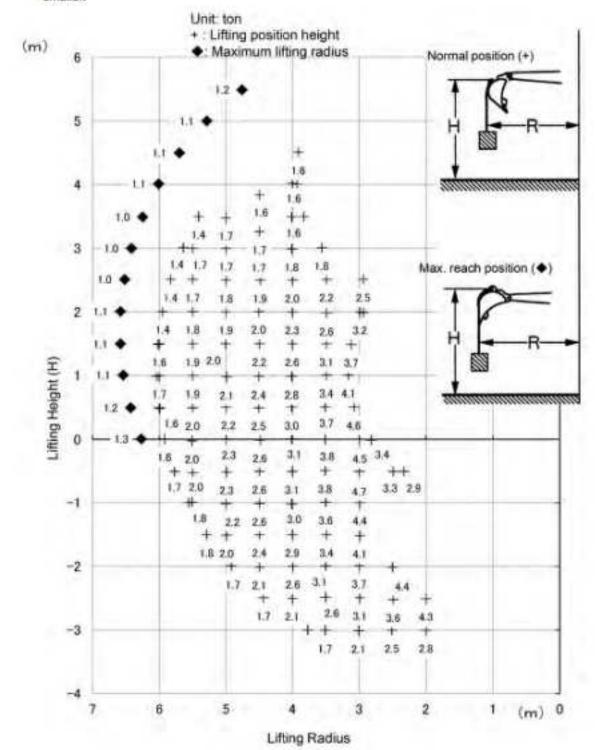


2 Ear plate dimensions



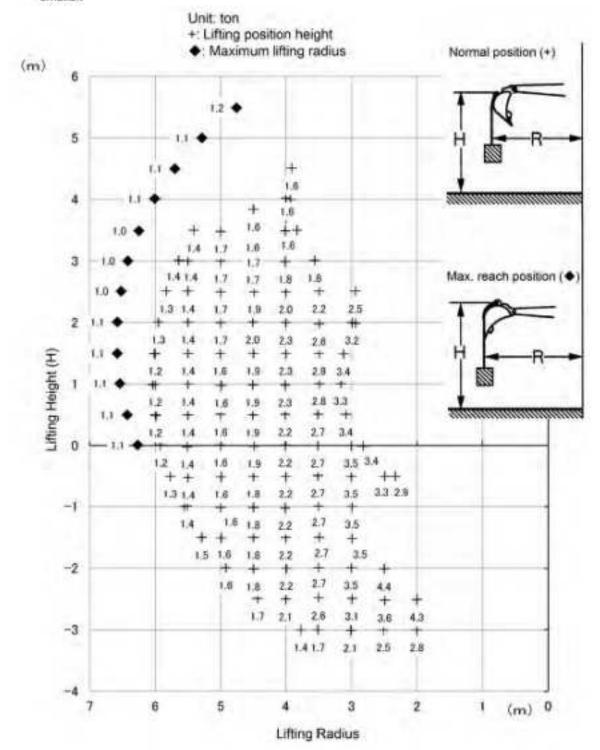
Front lifting, Blade fulcrum, with standard arm

(Note) The lifting load in this table is 75% of the tipping load or 87% of the load upon relief, whichever is smaller.



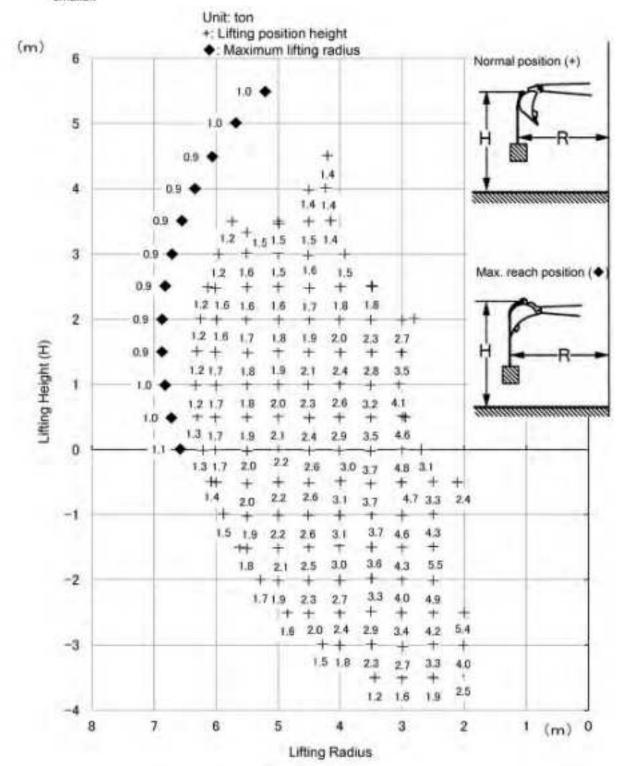
Side lifting, with standard arm

(Note) The lifting load in this table is 75% of the tipping load or 87% of the load upon relief, whichever is smaller.



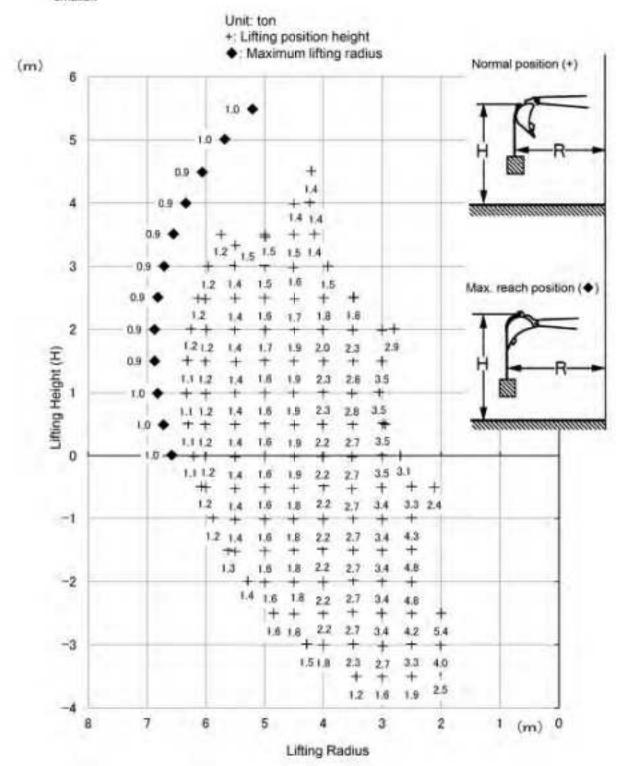
Front lifting, Blade fulcrum, with Long arm

(Note) The lifting load in this table is 75% of the tipping load or 87% of the load upon relief, whichever is smaller.



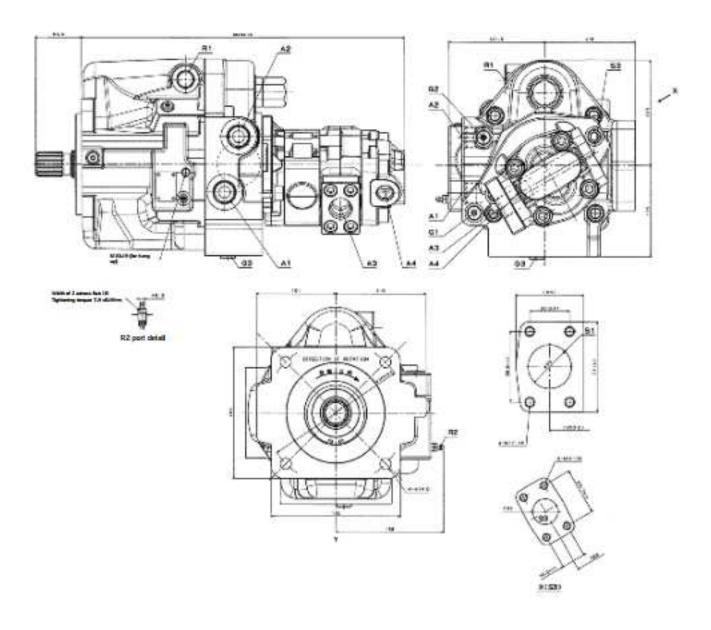
Side lifting, with Long arm

(Note) The lifting load in this table is 75% of the tipping load or 87% of the load upon relief, whichever is smaller.



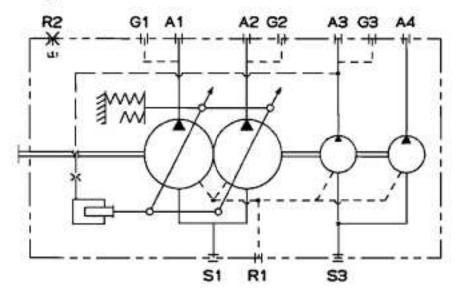
A3 Component Information (Hydraulic Components)

1 External view

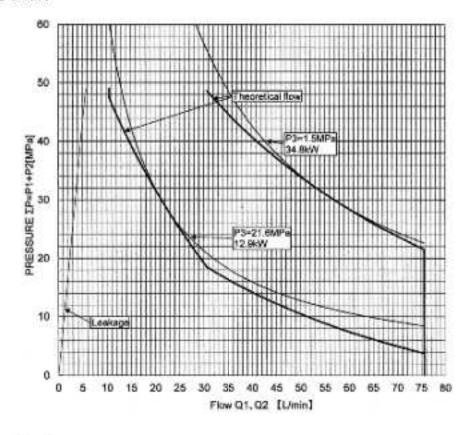


Mass: 51 kg

2 Hydraulic symbols



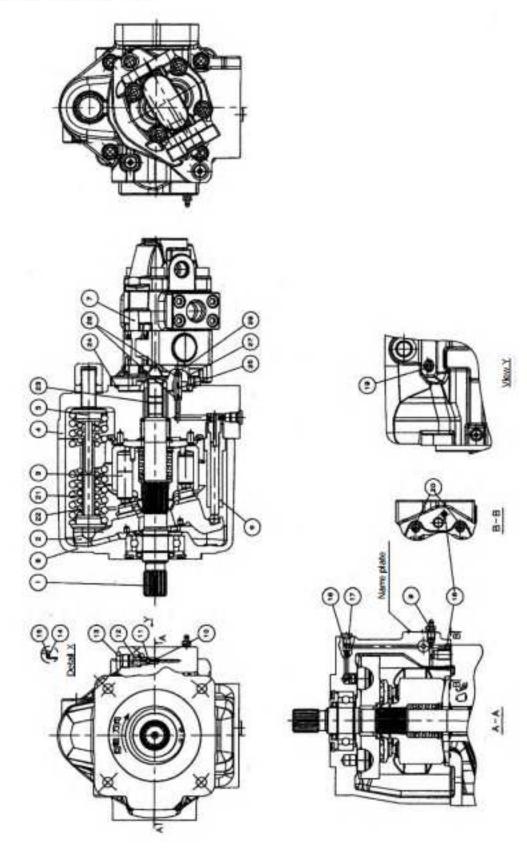
3 P-Q chart



4 Specifications

	36.0 + 36.0 + 25.8 + 7.0 (P1 + P2 + P3 + P4)
Rotation direction	Clockwise rotation (as viewed from the shaft edge)

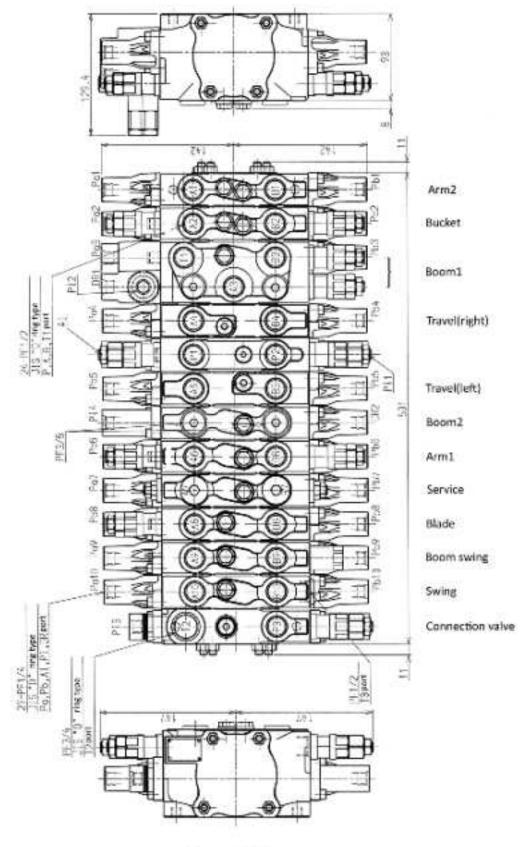
5 Cross-sectional view



No.	Name	Q'ty
1	Shaft unit	1
2	Swash plate ASSY	1
3	Rotary group	1
4	Port plate ASSY	1.
5	Spring sheet ASSY	1
6	Control piston ASSY	1
7	Gear pump	1
8	Housing	1
9	Air vent valve ASSY	1
10	Bush	1
11	Steel ball	1
12	Plug	1
13	Plug	1
14	Packing	1
15	Shim	1
16	Double break off plug	- 1
17	Plug ASSY	. 1
18	Orifice	1
19	Plug	1:
20	Square ring	2
21	Spring	1
22	Spring	1
23	Coupling	1
24	O-ring	-1
25	Sleeve	. 1

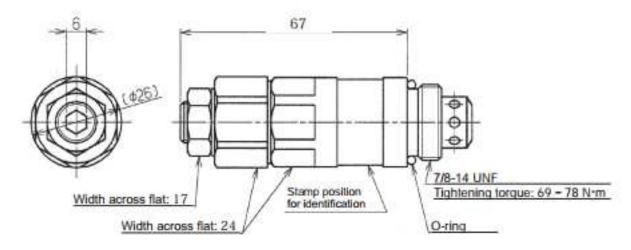
No.	Name	O'ty
26	O-ring	2
27	Plain washer	2
28	Socket head bolt	2

1 External view

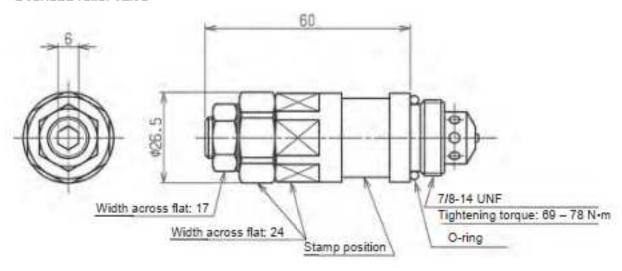


Mass: 47 kg

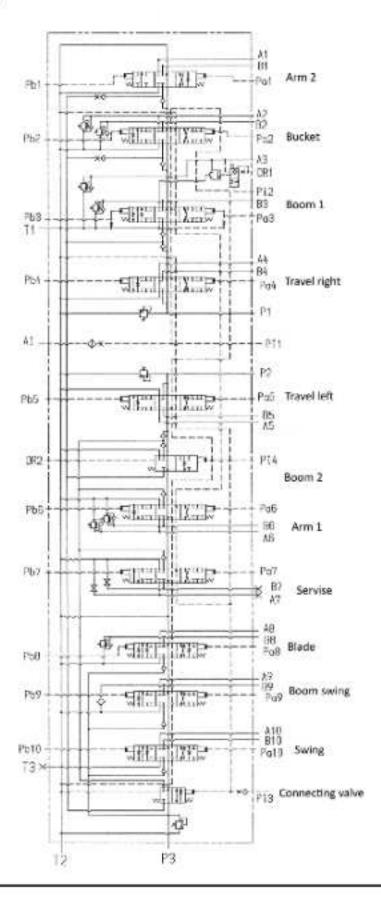
Main relief valve



Overload relief valve

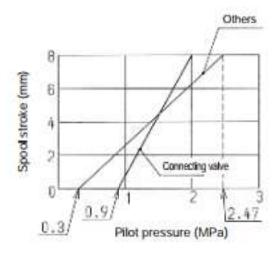


2 Hydraulic symbols



3 Characteristic chart

Spool pressure reception characteristics



4 Specifications

· Relief valve setting pressure

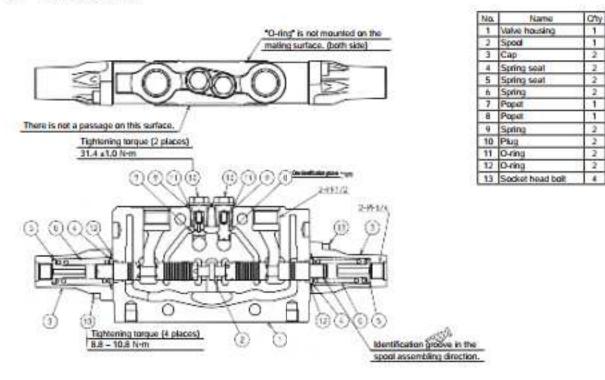
P1: 24.5 *0.5 MPa, at 71L	/min
P2: 24.5 *0.5 MPa, at 71L	/min
P3: 21.6 *0.5 MPa, at 53L	/min

· Overload relief valve setting pressure

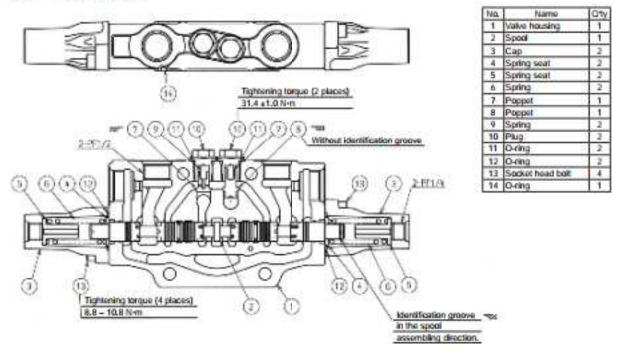
A2: 27.5	*0.5 MPa, at 10L/min
	*0.5 MPa, at 10L/min
A8: 29.4	*0.5 MPa, at 10L/min

5 Cross-sectional view

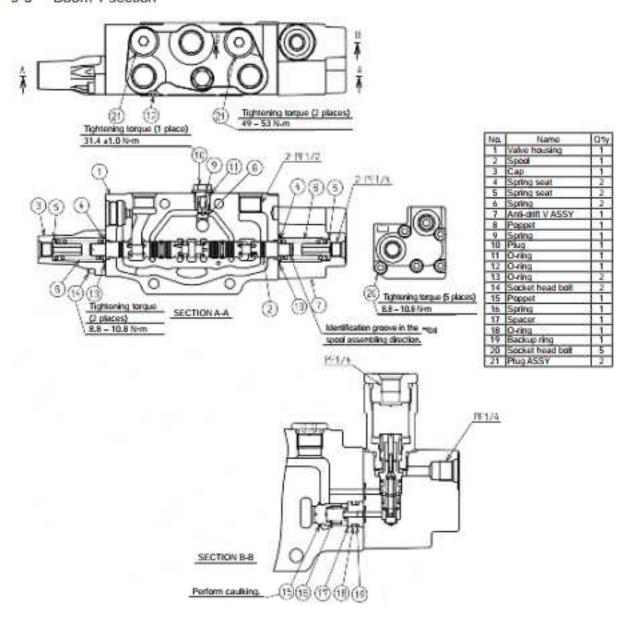
5-1 Arm 2 section



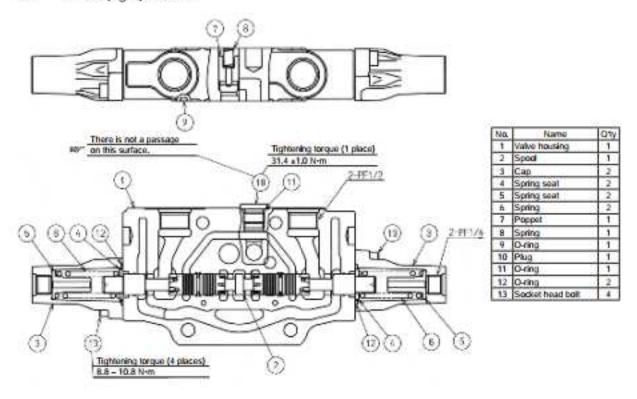
5-2 Bucket section



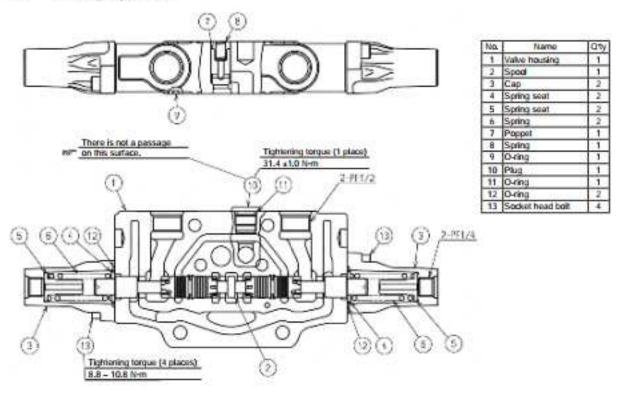
5-3 Boom 1 section



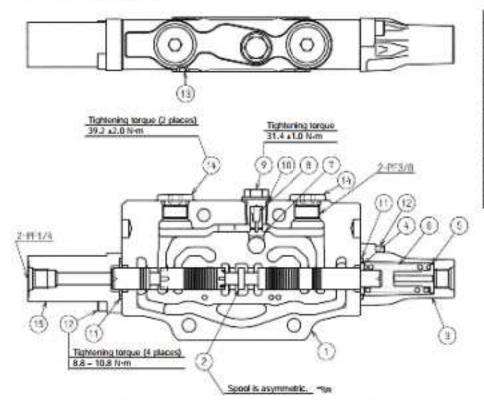
5-4 Travel (right) section



5-5 Travel (left) section

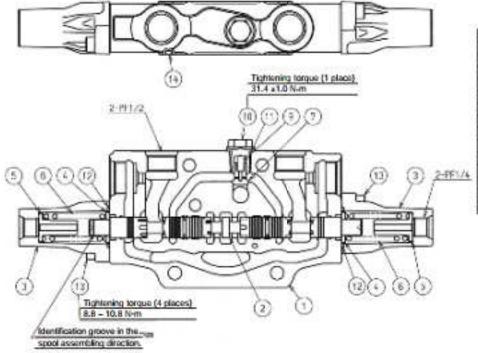


5-6 Boom 2 section



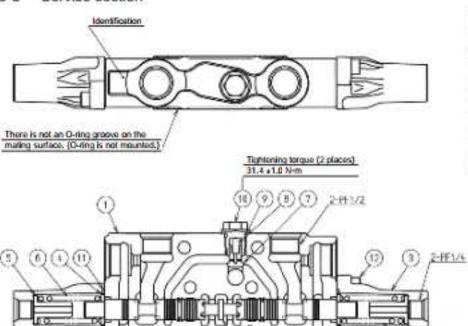
No.	Name	Ofty
1	Valve housing	1.1
2	Spool	1.1
3	Cap	11
4	Spring sheet	1
	Spring sheet	1
6	Spring	1
7	Poppet	1
8	Spring	1.
9	Plug	1
10	O-ring	1
11	O-ring	2
12	Socket head boilt	4
13	O-ring	1
14	Plug ASSY	2
15	Cap	1.1

5-7 Arm 1 section



No.	Name	Qty
1	Valve housing	1
2	Spool	1
3	Cap	2
4	Spring-seat	2
5	Spring seat	2
6	Spring	2
7	Poppet	1
8		
9	Spring	- 1
10	Plug	1 1
11	O-ring	1
12	O-ring	2
	Socket head bolt	4
14	O-ring	11

5-8 Service section



(11)

(6)

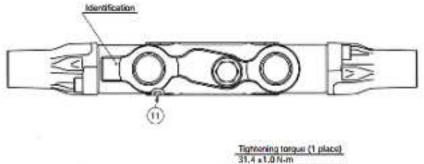
(5)

Np.	Name	Ony
1	Valve housing	1.1
2	Spool	1
3	Cap	2
4	Spring seat	2
5	Spring seat	2
6	Spring	. 2
7	Poppet	1
8	Spring	1
9	O-ring	1.
10	Plug	1
11	O-ring	2
12	Socket head boilt	4

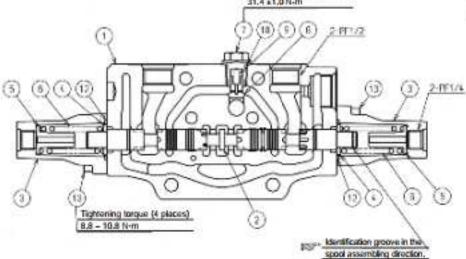
5-9 Blade section

Tightening torque (4 places) 8.8 - 10.8 N/m

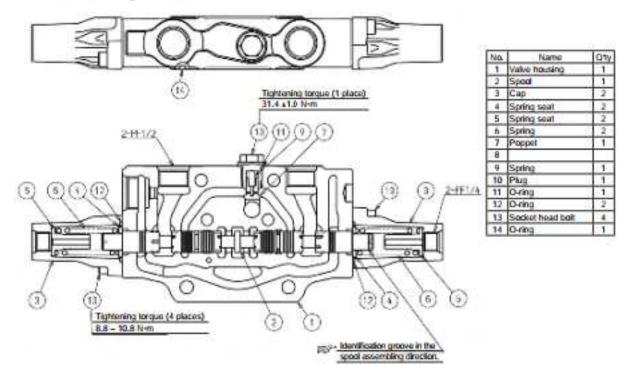
(3



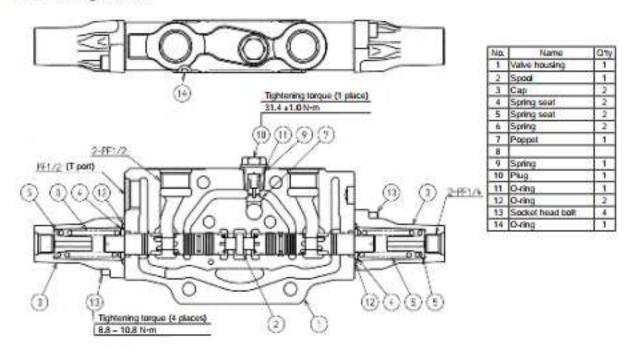
No.	Name	Qty
1	Valve housing	1.1
2	Speal	1
3	Cap	2
4	Spring seat	- 2
5	Spring seat	2
6	Spring	2
7	Plug	1
Н	Poppet	1
9	Spring	1
10	O-ring	11
11	O-ring	1
12	O-ring	2
13	Socket head bolt	4



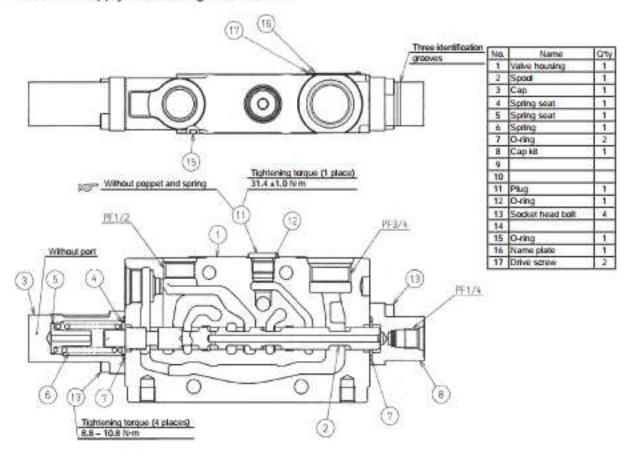
5-10 Boom swing section



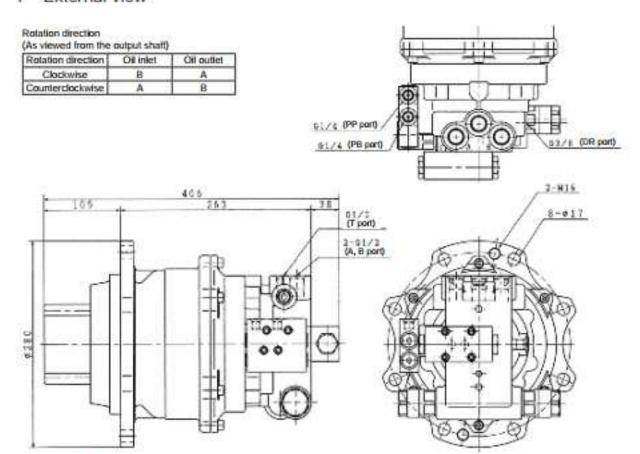
5-11 Swing section



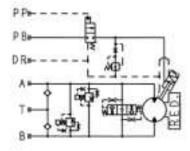
5-12 P3 Supply/Connecting valve section



1 External view



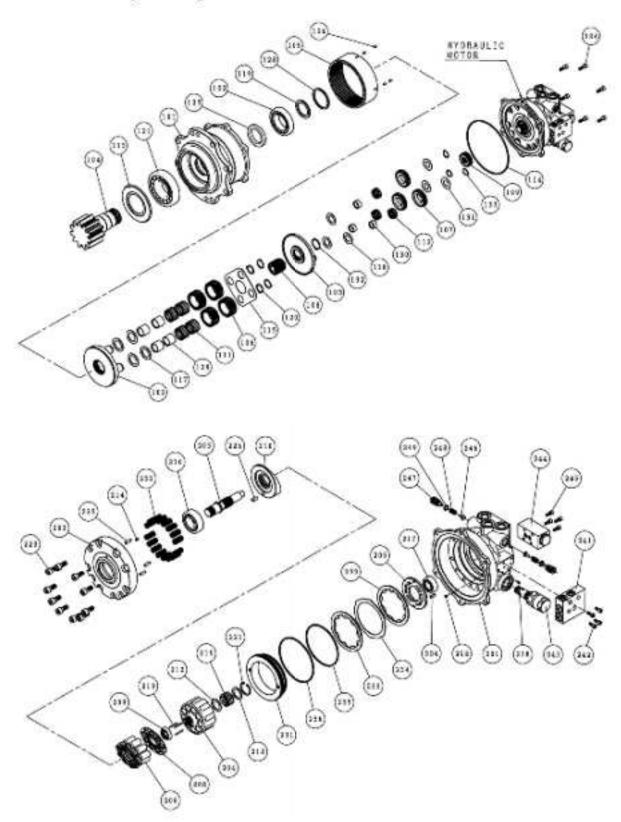
2 Hydraulic symbols

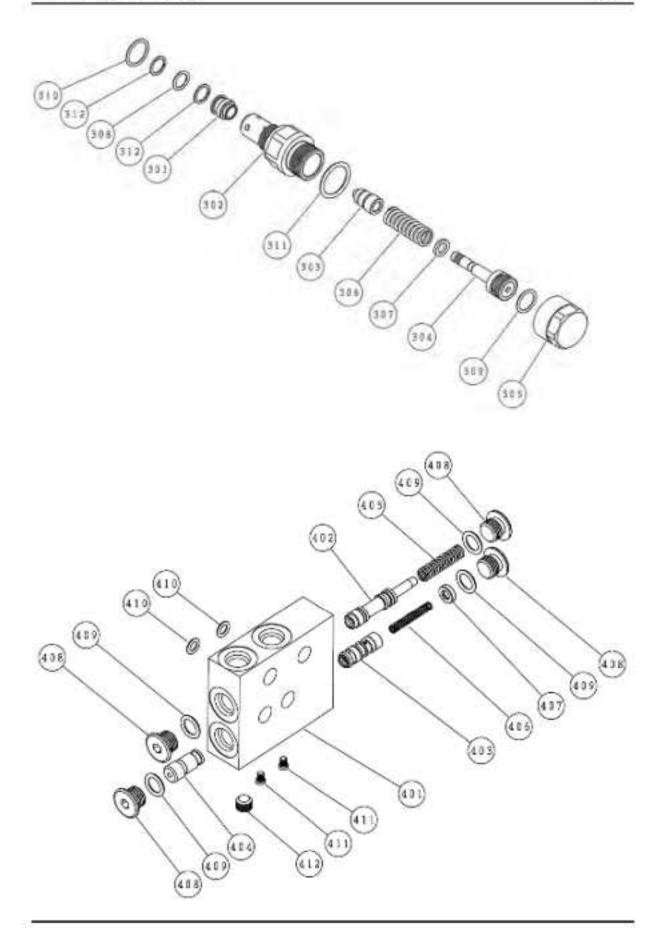


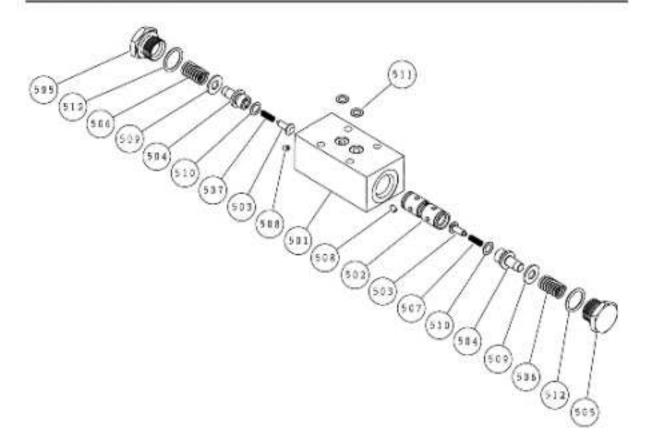
3 Specifications

Equivalent capacity		650 cm³/rev		
Reduction gear	Speed reduction ratio		1/23.2	
Hydraulic motor	Hydraulic motor Capacity		28.0 cm ² /rev	
D. H. S. A.	Releasing	Minimum value	2.9 MPa	
Parking brake	pressure	Maximum value	4.9 MPa	
Relief valve	ve Set pressure		19.6 MPa at 53L/min	
(single unit)	Cracking pressure		15.7 MPa at 1L/min	
Mass		Approx. 55kg		

4 Disassembly drawing







5 Parts list

No.	Name	Qty
101	BODY	1
102	CARRIER 1	1
103	CARRIER 2	1
104	PINION SHAFT	1
105	A INTERNAL GEAR	1
106	B1 GEAR	4
107	B2 GEAR	3
108	S1 GEAR	1
109	S2 GERA	1
111	NEEDLE	92
112	NEEDLE	69
113	RING SEAL	1
114	O RING	1
115	THRUST PLATE	1
117	THRUST WASHER	4
118	THRUST WASHER	3
119	PRE-ROAD COLLAR	2
120	SNAP RING	4
121	BEARING	1
122	BEARING	1
123	OIL SEAL	2
124	SCREW	6
126	PIN	4
128	RING	1
129	RING 1	4
130	RING 2	3
131	THRUST WASHER	3
132	SNAP RING	1
133	SNAP RING	3

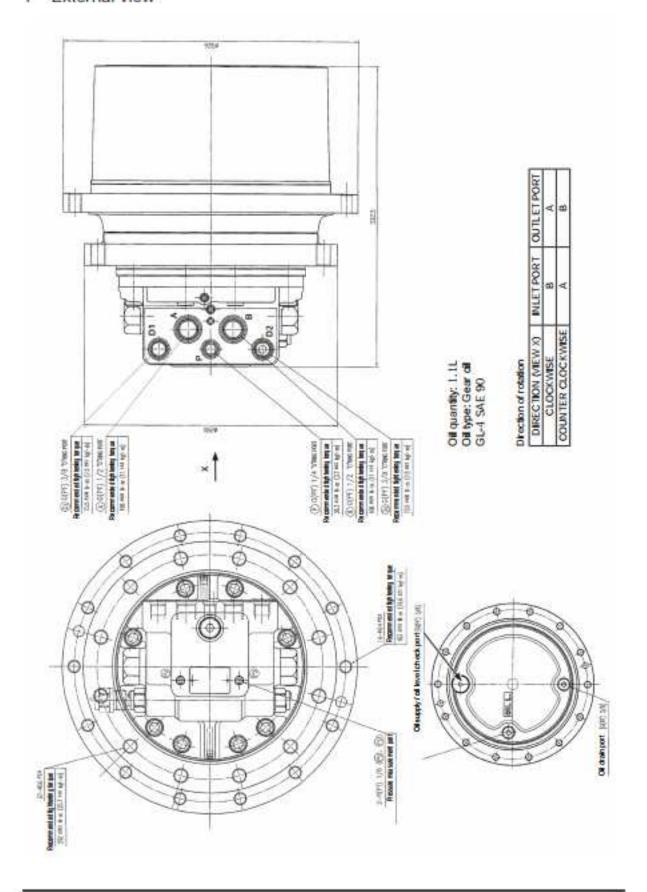
No.	Name	Only
201	BODYH	1
202	PLATE S	1
203	SHAFT	1
204	CYLINDER BARREL	1
205	VALVE PLATE	1
206	PISTON ASSY	9
208	SHOE HOLDER	1
209	BARREL HOLDER	1
210	SWASH PLATE	1
212	RETAINER	2
213	PIN	3
214	FILTER	1
215	SPRING C	1
216	BEARING	1
217	BEARING	1.5
218	METAL PLUG	2
221	SNAP RING	1.5
222	METAL PLUG	1
223	SCREW	10
224	SPRING PIN	1
225	PIN	3
226	PIN	1
231	BRAKE PISTON	16
232	SPRING B	1n
233	DISK PLATE	2
234	STEEL PLATE	1
235	O RING	1:
236	O RING	1
241	P/B TIMER VALVE	1
242	SCREW	4
243	RELIEF VALVE	2.
244	BY-PASS VALVE	1
245	SCREW	4
246	CHECK VALVE	2
247	PLUG	2
248	SPRING	2
249	O RING	2

No.	Name	Otty
301	SEAT	1
302	RETAINER	1
303	POPPET	- 1
304	PISTON	1
305	CAP	1
306	SPRING	1
307	SPACER	
308	O RING	1
309	O RING	.1
310	O RING	. 1
311	O RING	. 1
312	BACK UP RING	2.

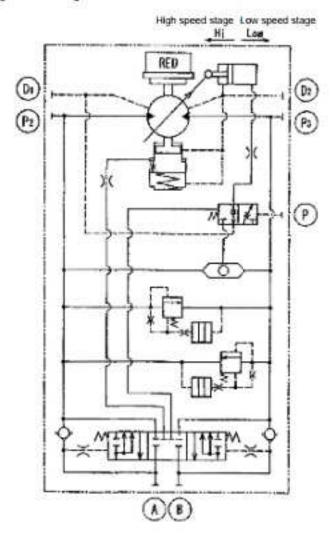
No.	Name	Ony
401	BODY	- 1
402	SPOOL	-1.
403	PISTON	1
404	STOPPER	1
405	SPRING	1
406	SPRING	. 1
407	SPRING HOLDER	1
408	PLUG	4
409	O RING	- 4
410	O RING	2
411	METAL PLUG	2
412	PLUG	. 1

No.	Name	Ony
501	BODY	- 1
502	SPOOL	1
503	CHECK VALVE	2
504	SPRING GUIDE	2
505	PLUG	2
506	SPRING	2
507	SPRING	2
508	CHOKE	2
509	RING	2
510	O RING	2
511	O RING	2
512	O RING	2

1 External view



2 Hydraulic symbols

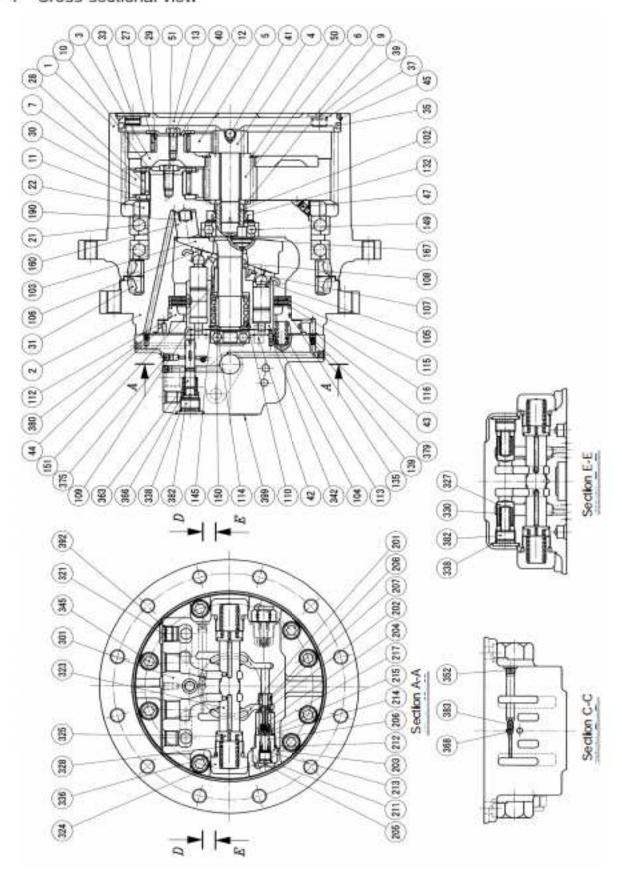


3 Specifications

Reduction	Maximum outp	ut torque	1st/2nd speed	5300/9600 N·m
	Maximum outp	ut rotary speed	1st/2nd speed	26.5 / 46.0 min ⁻¹
gear	Speed reduction	n ratio		1 / 50.111
	Capacity		1st/2nd speed	55.8 / 31.5 cm³/rev
	Maximum use pressure			24.5 MPa
-	Maximum output rotary speed 1st/2nd speed		1328 / 2304 min ⁻¹	
Hydraulic motor	Maximum flow rate		75.6 L/min	
motor	Two-speed cha	inge pressure		3.40 MPa
	2000	Static friction to	rque	121 N·m
	Parking brake	Release pressu	re	0.63 MPa
		Antonio de la companya del la companya de la compan		A STREET OF THE PARTY OF THE PA

Mass: 82 kg

4 Cross-sectional view



No.	Name	Q'ty
1	Hub	1
2	Spindle	1
3	Carrier	1
4	Sun gear (1)	1
5	Planetary gear (1)	3
6	Sun gear (2)	1
7	Planetary gear (2)	4
9	Thrust collar (1)	1
10	Thrust washer (1)	4
11	Thrust washer (2)	4
12	Thrust washer (3)	3
13	Cover	1
21	Ball bearing	2
22	Ring nut	1
27	Needle roller bearing with holder	3
28	Needle roller bearing with holder	4
29	Inner ring	3
30	Inner ring	4
33	Flange plug	1
35	O-ring	1
37	O-ring	3
39	Plug	2
40	Hex. bolt	3
41	Steel ball	1
42	Parallel pin	2
43	O-ring	2
44	O-ring	1
45	Ring	1
47	Hex. socket setscrew	2
50	C type snap ring for shaft	1
51	Hex. bolt	4
	NOTICE CONTRACTOR OF THE PARTY	1
	Hydraulic motor with P.B.	1
_	Cylinder & Piston kit	1
_	+Piston kit	1
	**Piston assembly parts	9
105	***Piston	1
106	***Shoe	1
104	-Cylinder block	1
102	Shaft	1
103	Swash plate	1
107	Retainer plate	1
108	Thrust ball	1
109	Timing plate	1
110	Washer	2
112	Piston	1
113	Spring	10
114	Spring	1
115	Friction plate	2
116	Mating plate	3
132	Oil seal	1
135	O-ring	1
139 145	O-ring THS snap ring	
1455	LIMS Shap nng	1

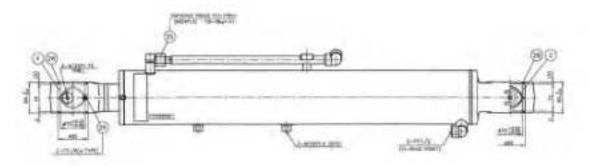
No.	Name	Q'ty
150	Deep groove ball bearing	1
151	Needle roller	3
160	Piston	1
167	Pivot	2
190	Spring	1
	Relief valve	1
Sant Sail	Relief valve assembly parts	2
201	Valve seat	1
202	Valve	1
203	•Sleeve	1
201	• Collar	1
205	• Plug	3 1 h
206	•Spring	1
207	•O-ring	1
208	Backup ring	2
211	•O-ring	1
212	•O-ring	1
213	+Shim	1
214	Piston	1
215	•O-ring	1
217	Orifice	
	Barrer	2
	Control valve	1
	Commence and the commence of the contract of	3
	Rear flange assembly parts	1
	•Rear flange kit	1
301	· · Rear flange	1
323	••Spool	1
352	Socket head plug	3
368	Steel ball	
375	· · Socket head plug	4
379	· · Filter	1
380	· · Orifice	1
383	Flanged plug	1
399	Name plate	1
321	• Ptug	1
324	•Plug	2
325	Spring retainer	
327	Valve	2
328	•Spring	2
330	Spring	2
336	•O-ring	3
338	•O-ring	
363	•Spool	1
366	Spring	1
382	•Plug	3
392	•O-ring	1
342	Parallel pin	1
345	Socket head bolt	8
	Seal kit	

Contents

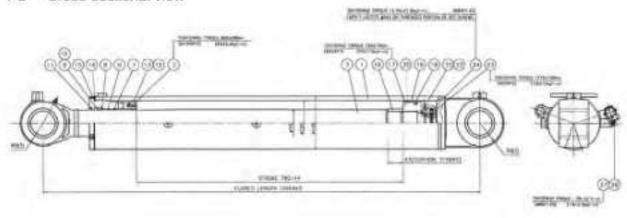
1	Boom Cylinder	P2
2	Arm Cylinder	P3
3	Bucket Cylinder	P4
4	Boom Swing Cylinder	P5
5	Blade Cylinder	P6

Boom cylinder

1-1 External view



1-2 Cross-sectional view



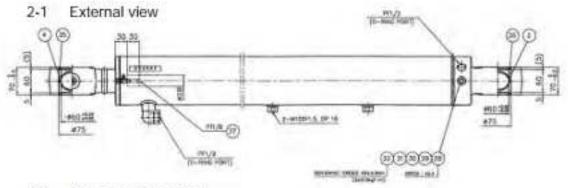
1-3 Parts list

No.	Name	Q'ty
1	TUBE ASSY	1
2	PIN BUSH	1
3	ROD ASSY	1
4	PIN BUSH	1
5	ROD COVER	1
6	ROD BUSH	1
7	RETAINING RING	1
8	BUFFER SEAL	1
9	U-PACKING	1
10	BACK UP RING	1
11	DUST WIPER	1
12	O-RING	2
13	BACK UP RING	2
14	O-RING	1
15	WASHER	1

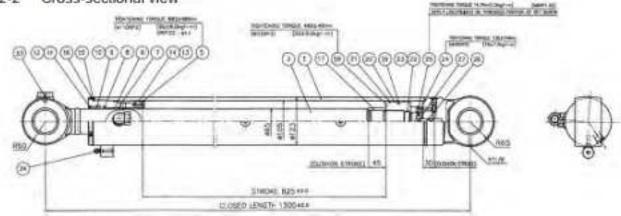
No.	Name	Q'ty
16	CUSHION RING	1
17	PISTON	1
18	PISTON SEAL	1
19	WEAR RING	2
20	DUST RING	1
21	O-RING	1
22	BACK UP RING	1
23	PISTON NUT	1
24	SET SCREW	2
25	PIPE ASSY	1
26	WASHER	1
27	HEX BOLT	1
28	PIN WIPER	4
29	GREASE NIPPLE	2

Mass: 111.3 kg

2 Arm cylinder



2-2 Cross-sectional view



2-3 Parts list

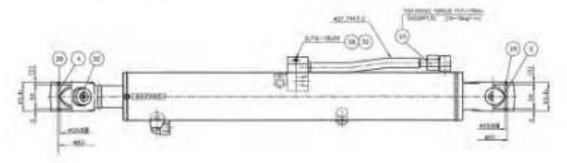
No.	Name	City
1	TUBE ASSY	1
2	PIN BUSH	1
3	ROD ASSY	1
4	PIN BUSH	1
5	ROD COVER	1
6	ROD BUSH	1
7	RETAINING RING	1
8	BUFFER SEAL	1
Q.	U-PACKING	1
10	BACK UP RING	10
11	DUST WIPER	1
12	RETAINING RING	1
13	O-RING	2
14	BACK UP RING	2
15	O-RING	1
16	WASHER	1)
17	CUSHION RING	1
18	PISTON	1

No.	Name	Q'ty
19	PISTON SEAL	1
20	WEAR RING	2
21	DUST RING	2
22	O-RING	1
23	BACK UP RING	1
24	PISTON NUT	1
25	SET SCREW	2
26	C/PLUNGER	1
27	STOP RING	1
28	CHECK	1
29	SPRING	1
30	BACKET	1
31	O-RING	1
32	PLUG	1
33	GREASE NIPPLE	1
34	GREASE NIPPLE	1
35	PIN WIPER	4

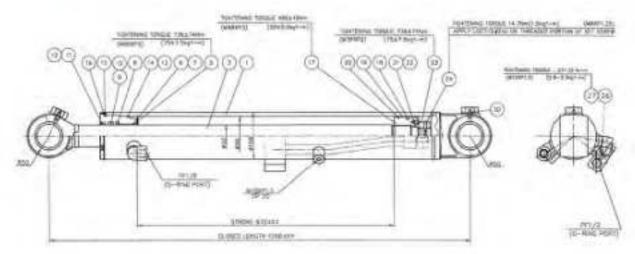
Mass: 82.5 kg

3 Bucket cylinder

3-1 External view



3-2 Cross-sectional view



3-3 Parts list

No.	Name	Otty
1	TUBE ASSY	1
2	PIN BUSH	1
3	ROD ASSY	10
4	PIN BUSH	1
5	ROD COVER	1
6	ROD BUSH	10
7	RETAINING RING	1
8	BUFFER SEAL	1
9	U-PACKING	1
10	BACK UP RING	1
11	DUST WIPER	10
12	RETAINING RING	10/
13	O-RING	10
14	BACK UP RING	10
15	O-RING	111

No.	Name	Q'ty
16	WASHER	1
17	PISTON	1
18	PISTON SEAL	1
19	WEAR RING	2
20	DUST RING	2
21	O-RING	1
22	BACK UP RING	1
23	PISTON NUT	1
24	SET SCREW	2
25	PIPE ASSY	1
26	HEX BOLT	1
27	WASHER	1
28	PLUG	1
29	PIN WIPER	4
30	GREASE NIPPLE	2

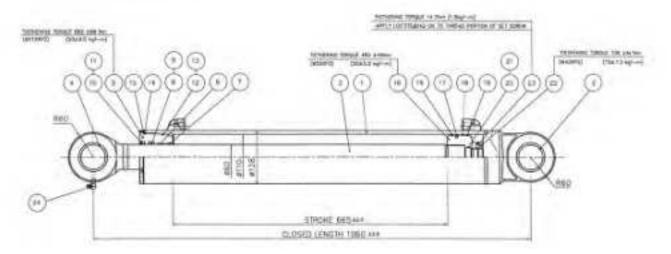
Mass: 50.5 kg

4 Boom swing cylinder

4-1 External view



4-2 Cross-sectional view



4-3 Parts list

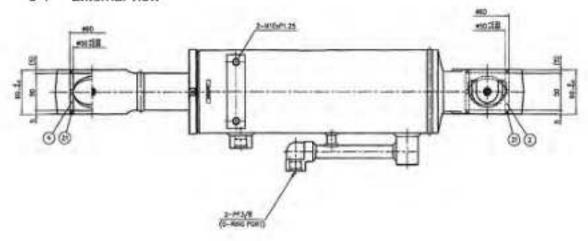
No.	Name	Q'ty
1	TUBE ASSY	1/2
2	PIN BUSH	1
3	ROD ASSY	1
4	PIN BUSH	1
5	ROD COVER	1
6	ROD BUSH	100
7	RETAINING RING	1
8	U-PACKING	1
9	BACK UP RING	t:
10	DUST WIPER	10
11	RETAINING RING	100
12	O-RING	1 1
13	BACK UP RING	10

No.	Name	Q'ty
14	O-RING	1
15	WASHER	1
16	PISTON	1
17	PISTON SEAL	1
18	WEAR RING	1
19	DUST RING	2
20	O-RING	. 1
21	BACK UP RING	1
22	PISTON NUT	1
23	SET SCREW	1
24	GREASE NIPPLE	1
25	PIN WIPER	2

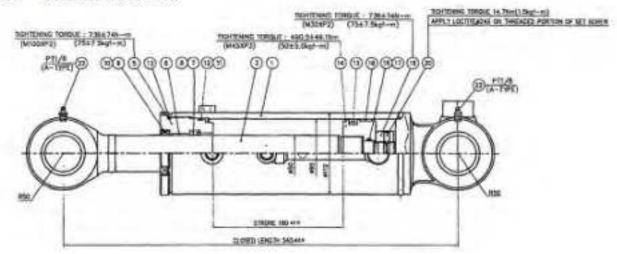
Mass: 73.7 kg

5 Blade cylinder

5-1 External view



5-2 Cross-sectional view



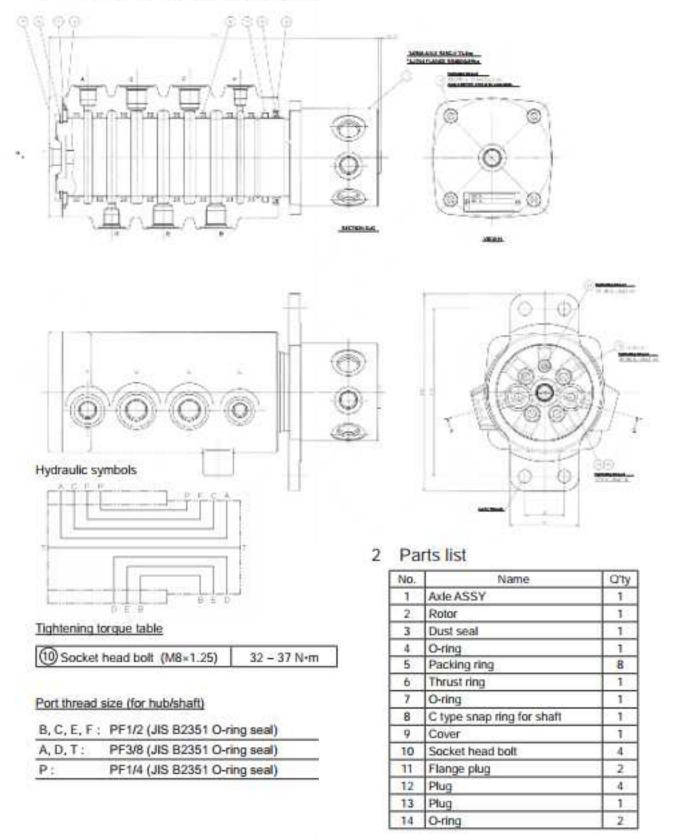
5-3 Parts list

No.	Name	Q'ty
1	TUBE ASSY	1
2	PIN BUSH	1
3	ROD ASSY	100
4	PIN BUSH	1
5	ROD COVER	1
6	ROD BUSH	10
7	U-PACKING	1
8	BACK UP RING	1
9	DUST WIPER	1
10	RETAINING RING	100
11	O-RING	10

No.	Name	Q'ty
12	BACK UP RING	1
13	O-RING	1
14	PISTON	1
15	PISTON SEAL	1
16	WEAR RING	1
17	O-RING	
18	BACK UP RING	1
19	PISTON NUT	1
20	SET SCREW	1
21	PIN WIPER	4
22	GREASE NIPPLE	2

Mass: 31.8 kg

1 External view/Cross-sectional view



Mass: 23.3 kg

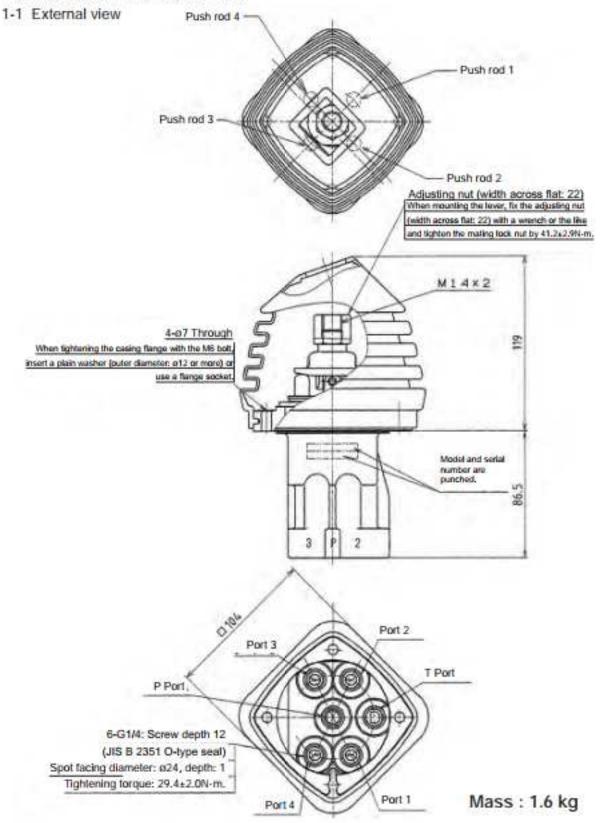
Contents

		Page
1	Joystick remote control valve	P2
2	Remote control valve for boom swing/blade	P6
3	Remote control valve for travel	P9

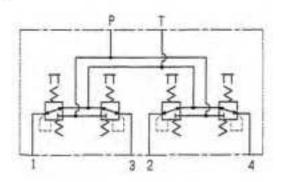
Joystick remote control valve

Note:

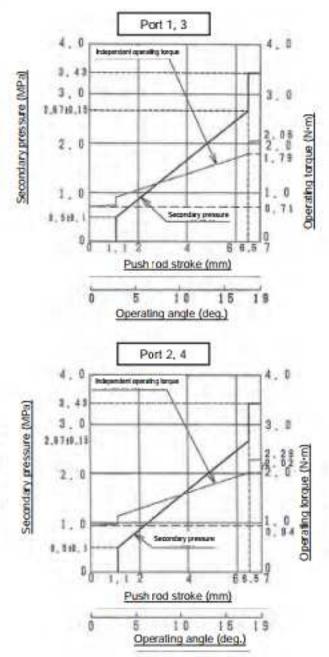
One valve can be used for the right and left. The figure below shows "When used at the right side". To use this at the left side, turn the bellows in 180°.



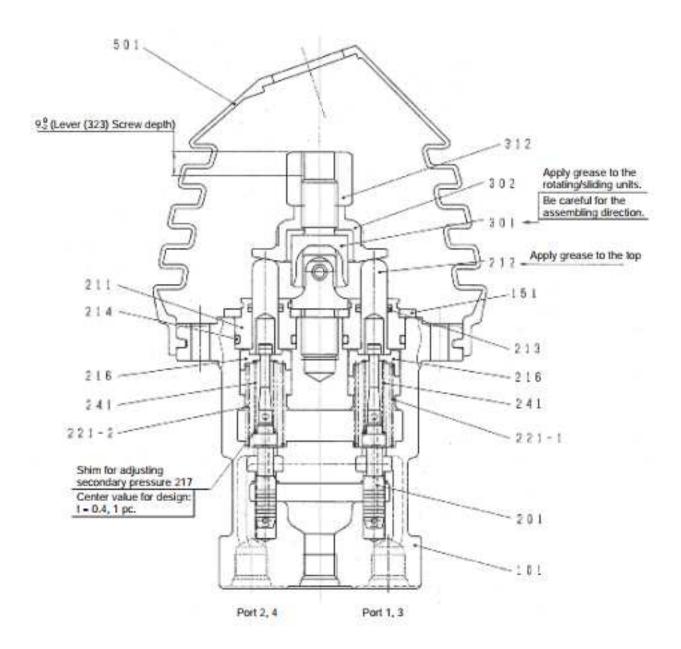
1-2 Hydraulic symbols



1-3 Control diagram



1-4 Internal structure



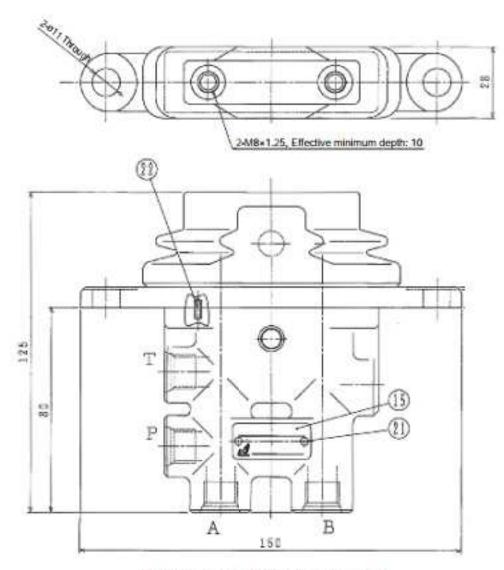
No.	Name	Q'ty
101	Casing	1
151	Plate	1
201	Spool	4
211	Plug	4
212	Push rod	4
213	Seal	4
214	O-ring	4
216	Spring seat	4
217	Washer 2	4
221-1	Spring	2
221-2	Spring	2
241	Spring	4
301	Joint	1
302	Disk	1
312	Adjusting nut	1
501	Bellows	1

Tightening torque table

301	M14	47.1 ±2.9 N·m
302, 312	M14	68.6 ±4.9 N·m

2 Remote control valve for boom swing/blade

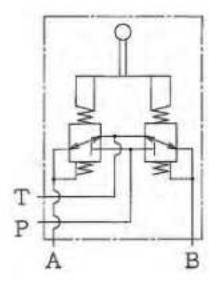
2-1 External view



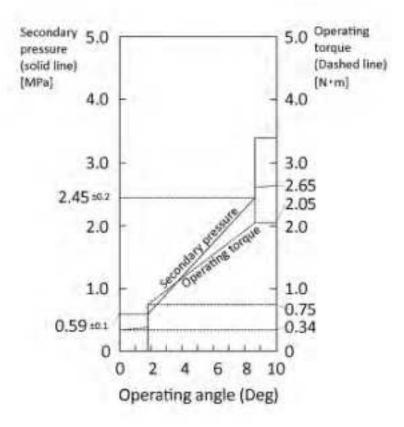
Port thread size: PF1/4 (JIS B2351 O-ring seal)

Mass: 0.65 kg

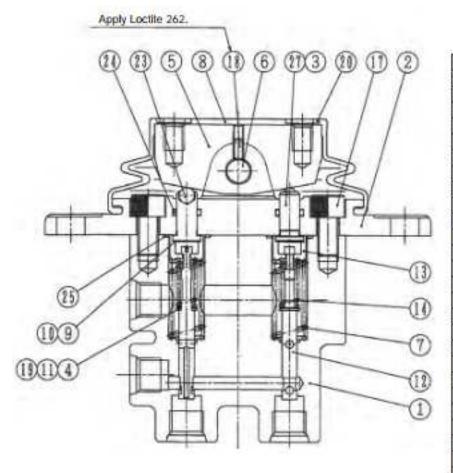
2-2 Hydraulic symbols



2-3 Control diagram



2-4 Internal structure



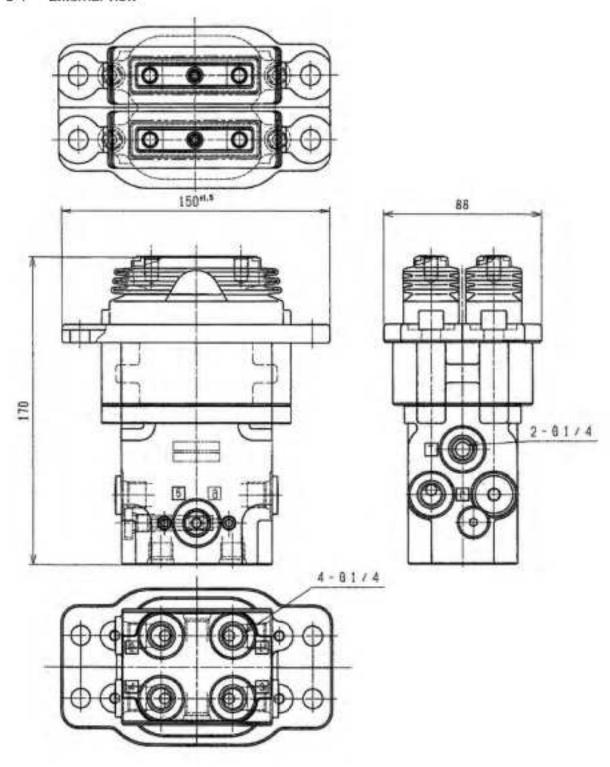
No.	Namo	Chy
1	Body	1
2	Cover	t
3	Pusher	2
4	Shim	-2
5	Cam	.1
5	Pin	1
7	Spring, compression	2
8	Boot	1
9	Shim	2
10	SNim	2
11	Shim	2
12	Speak	2
13	Holder, spring	2
14	Spring, compression	2
15	Plate, name	1
16		
17	Socket head bolt	2
18	Set screw	- 1
19	Plain washer	2
20	Plain washer	2
21	Rivet screw	2
22	Spring pin	2
23	Steel ball	2
24	O-ring	2
25	O-ring	2
26		18
27	Pusher, assiy	2.

Tightening torque table

① Socket head bolt	10.8 ±1 N-m
18) Set screw	4.9 ±1 N•m

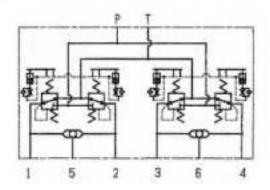
3 Remote control valve for travel

3-1 External view

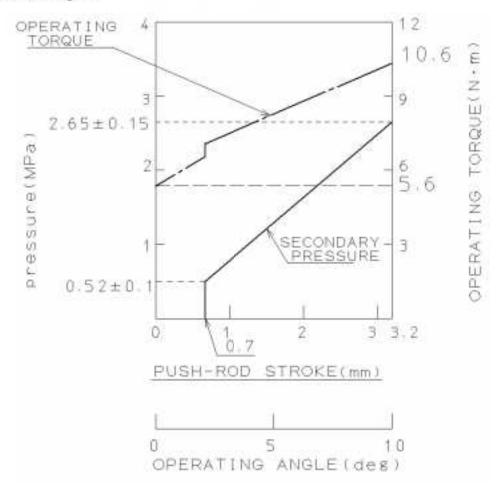


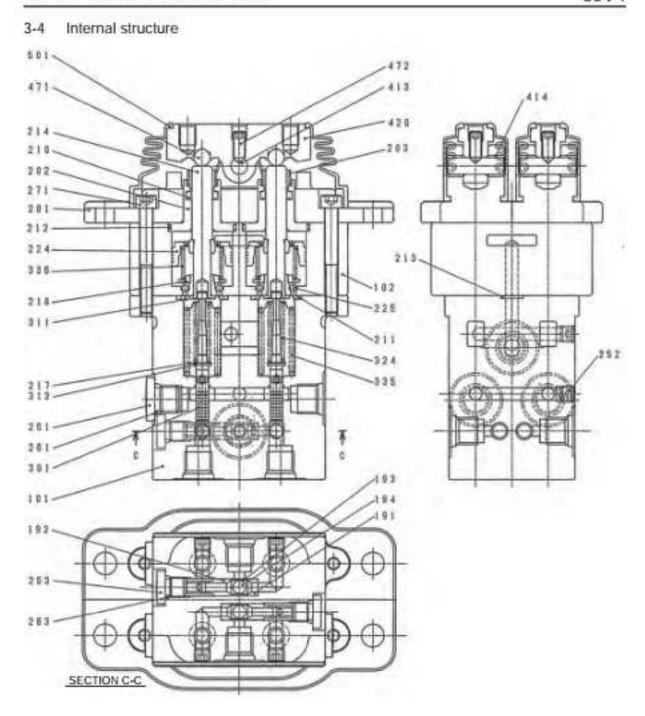
Mass: 3.9 kg

3-2 Hydraulic symbols



3-3 Control diagram





No.	Name	Q'ty
101	Casing	1
102	Casing (damper)	1
191	Seat 1	2
192	Seat 2	2
193	Pusher	2
194	Steel ball	2
201	Cover	2
202	Plug	4
203	Grease cup	4
210	Packing	4
211	O-ring	4
212	O-ring	4
213	O-ring	2
214	Push rod	4
217	Shim	4
218	Spring seat	4
224	Piston 2D055	4
225	Steel ball	12
251	RO plug	3
252	Plug	6
253	RO plug	2
261	O-ring	3
263	O-ring	2
271	Socket head bolt	4
301	Spool	4
311	Spring seat	4
313	Washer	4
324	Spring	4
335	Spring	4
336	Spring	4
413	Cam shaft	2
414	Pusher	4
420	Cam	2
471	Steel ball	4
472	Socket head setscrew	2
501	Bellows	2

Tightening torque table

271	M6	8.8 ±0.8 N·m
472	M6	6.9 ±1.0 N·m (Apply Loctite #241.)

A4 Equipment Information (Other Than Hydraulic Equipment)

A4-01 Crawler 85V4

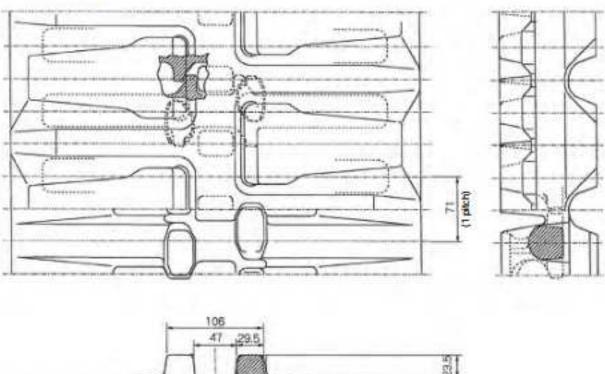
Contents

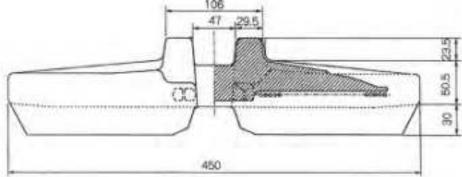
		Page
1	Rubber Crawler	P2
2	Steel Crawler	P3

A4-01 Crawler 85V4

1 Rubber crawler

1-1 External dimensions





450 × 71° × 82L

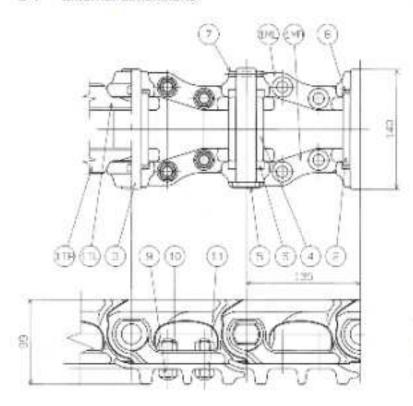
1-2 Specifications

1.	Circumferential length at rubber crawler center	5822 mm (71 ^P × 82)
2.	Mass	368 kg/pc.

A4-01 Crawler 85V4

2 Steel crawler

2-1 External dimensions

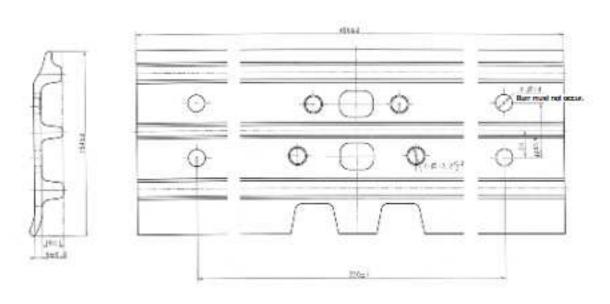


2-2 Parts list

No.	Name	O'ty
1TR	Track link	41
1TL	Track link	41
1MR	Master link	1
1ML	Master link	1
2	Track bushing	41
3	Track pin	41
4	Master bushing	1
5	Master pin	1
6	Collar	2
7	Set pin	1
8	Seal	82
9	Shoe bolt	168
10	Shoe nut	168
11	Shoe L=450	42

The tightening torque of shoe bolt should be 216±20N-m.

"O'ty" means "quantity for one steel crawler".



450 × 71^P × 82L

Mass: 391.4 kg / pc

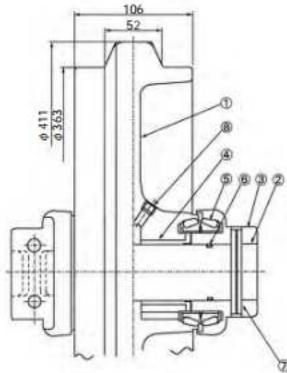
A4-02 Idler 85V4



Notes:

- Before mounting the bearing block in the front idler assembly, coat grease on the slide surface with the frame.
- 2. When mounting the front idler assembly to the frame, the oil supply plug side must be outside.

A4-02 Idler 85V4



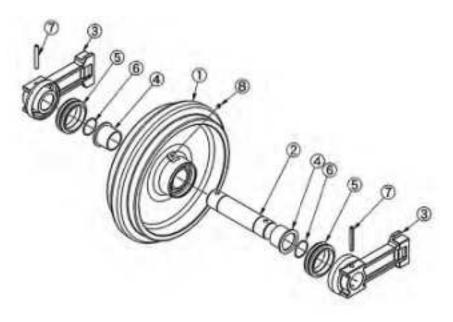
No.	Name	Q'ty
1	Idler tumbler	1
2	Shaft	1 1
3	Bearing block	2
4	Bushing	2
5	Floating seal	2
6	O-ring	2
7	Spring pin	2
8	Plug	2

Notes:

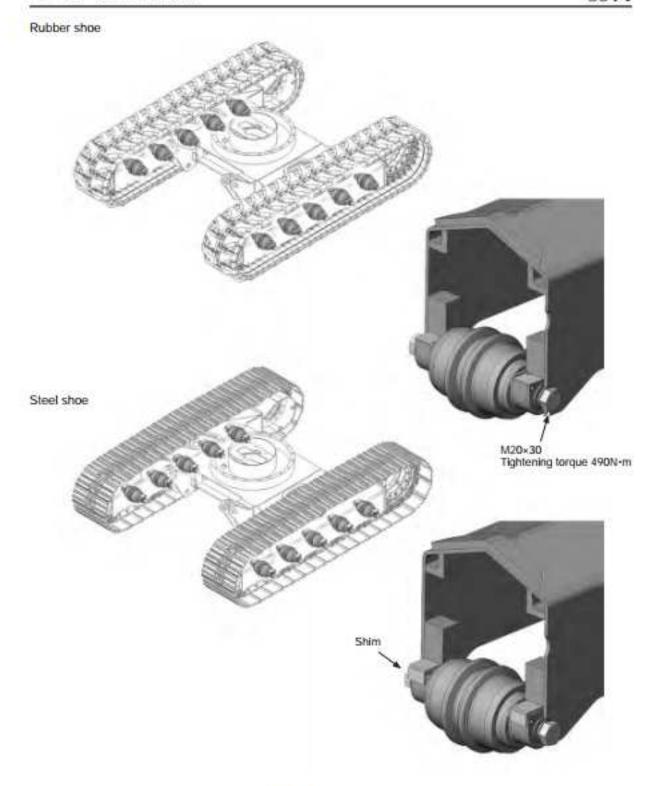
- Before mounting, clean the parts well to prevent foreign matters from entering the units.
- Apply oil to the inner and outer diameters of the seal and then press-fit it. Fill the gap between the lips of seal with grease.
- After assembling, supply the lubricant.

Type of lubricant	Capacity
API-CD	80 cc
SAE#30	80 00

- Oil leak test:
 - Apply an air pressure of 98kPa through the (8) plug hole.
- Wind the seal tape around the plug (8) and mount it to the roller.



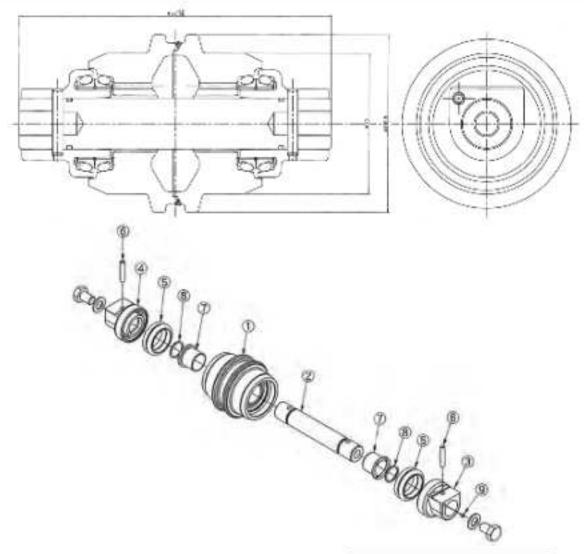
Mass: 53.8 kg



Tighten the bolt under the condition that the lower roller mounting surface is tightly in contact with the crawler frame.

Tightening torque: 490 N-m

In the case of steel shoe, put a shim (thickness: 12mm) into the gap between frame and shaft. Under the condition that the mounting surfaces are tightly in contact with each other, tighten the bolt.



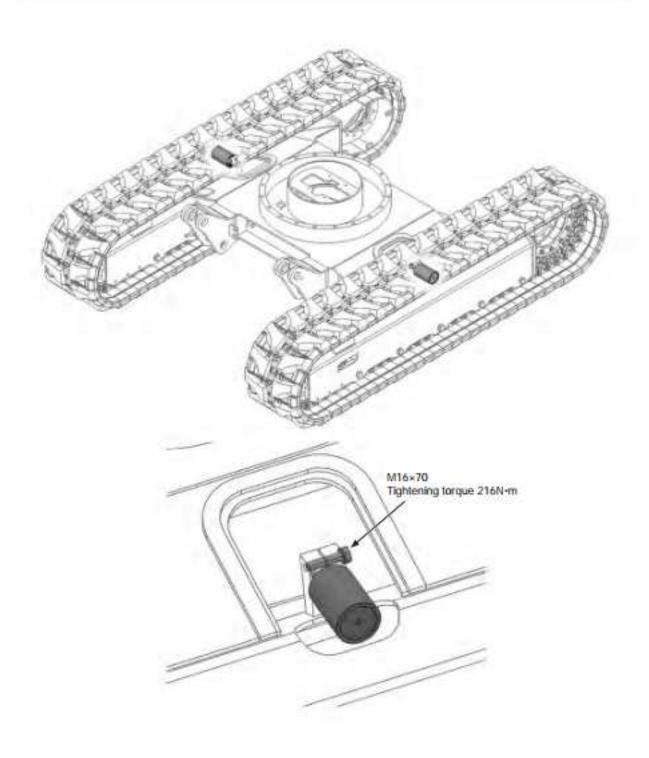
- Before mounting, clean the parts well to prevent foreign matters from entering the units.
- Apply oil to the inner and outer diameters of the seal and then press-fit it. Fill the gap between the lips of seal with grease.
- 3. After assembling, supply the lubricant.

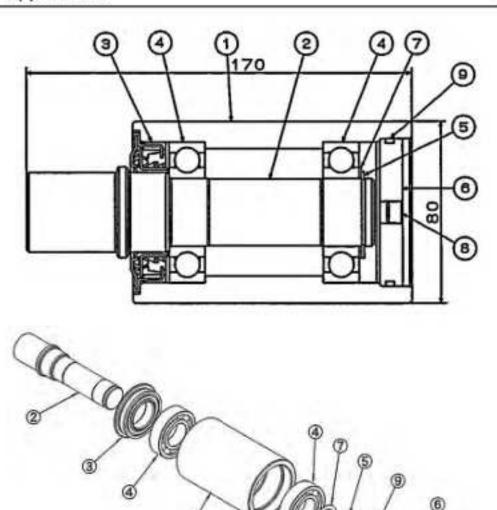
Type of lubricant	Capacity	
API-CD	120 cc	
SAE#30	120 CC	

- 4. Oil leak test:
 - Apply an air pressure of 98kPa through the (9) plug hole.
- Wind the seal tape around the plug (9) and mount it to the roller.

No.	Name	Qty
1	Roller	1
2	Shaft	1
3	Collar	1
4	Collar	1
5	Floating seal	2
6	Pin	2
7	Bushing	2
8	O-ring	2
9	Plug	1

Mass: 11.6 kg



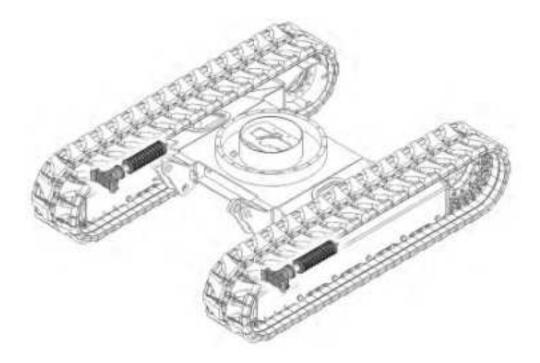


Overhaul is not permitted. Replace the parts as Assembly.

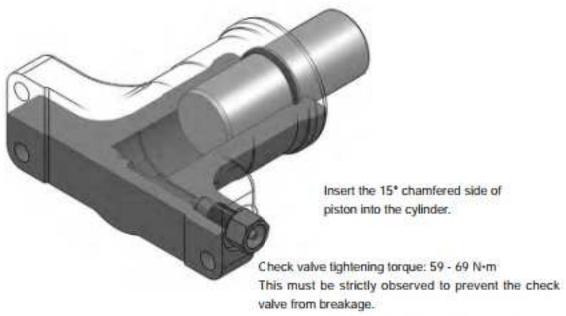
Type of lubricant	Capacity
API-CD	82 – 90 cc
SAE#30	82 - 90 CC

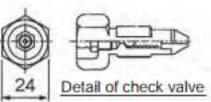
No.	Name	Q'ty
1	Roller	1
2	Shaft	1
3	Muddy water seal	1
4	Deep groove ball bearing	2
5	C type snap ring	1
6	Cover	1
7	Spacer	1
8	Plug with seal nylon	1
9	O-ring	1

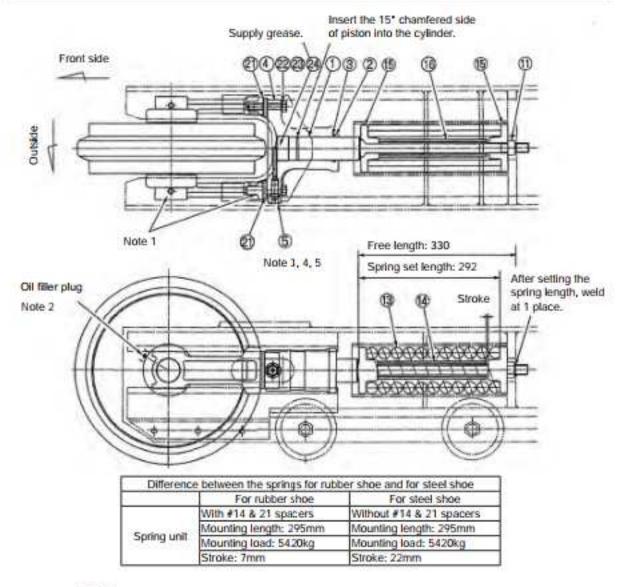
Mass: 3.7 kg



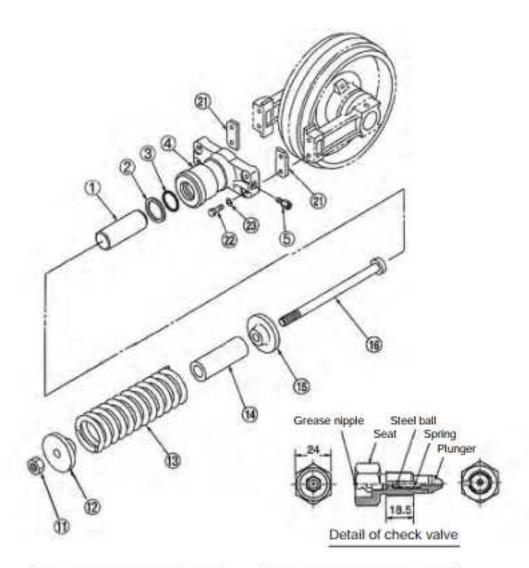
- 1. For the grease cylinder, the grease port side must be outside.
- When loosening the shoe, be sure to loosen the check valve to discharge the grease from the inside.Do not loosen the grease nipple because the high-pressure grease jets out to cause a dangerous status.







- For the bearing block in the front idler assembly, coat grease on the slide surface with the frame before assembly.
- When assembling the front idler assembly with the frame, be sure that the oil supply plug side is the outside.
- For the grease cylinder (4), the oil supply port should be on the outside of crawler frame.
- 4. When loosening the shoe, be sure to loosen the check valve (§) to discharge the grease inside. Since the high-pressure grease jets out and is dangerous, never loosen the grease nipple.
- To prevent the check valve and cylinder from damage, do not tighten the check valve excessively. Tightening torque: 59 - 69N·m
- This diagram shows the left side. Assemble the right side symmetrically.
- This diagram shows the device for rubber shoe.



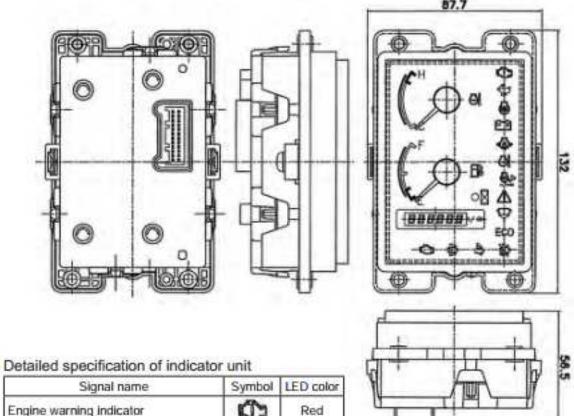
No.	Name	Q'1y
1	Piston	1
2	Backup ring	1
3	O-ring	1
4	Grease cylinder	1 1
5	Check valve	1
11	Hexagonal nut	1.1
12	Spring retainer	1

No.	Name	Oty
13	Spring	1
14	Spacer	1
15	Spring retainer	1
16	Adjusting bolt	1
21	Spacer	. 2
22	Heat-treated bolt	4
23	Heat-treated washer	4

Changing rubber shoe to steel shoe

- Replace the spring unit Ass'y.
 Change the spring unit (with #14 & #21 spacers) to the sprong unit (without #14 & #21 spacers).
- 2. Add shims to the lower roller mounting section.

1 External view/Cross-sectional view

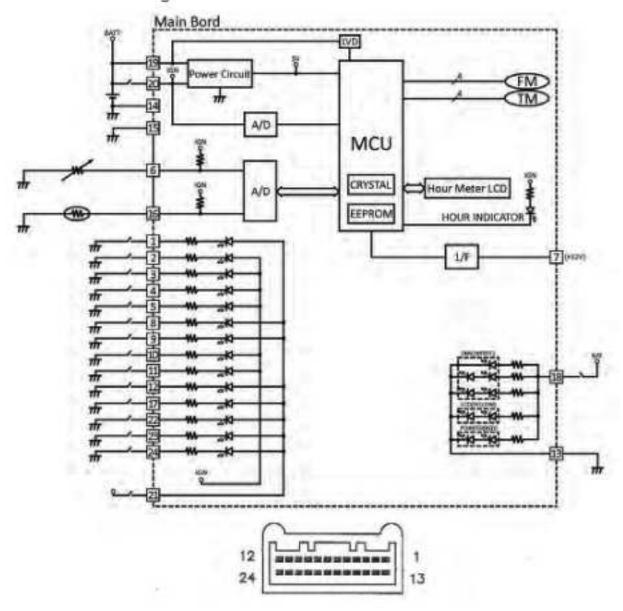


Yellow

Signal name	Symbol	LED color
Engine warning indicator	0	Red
Travel speed indicator	3	Yellow
Glow indicator	6	Red
Battery charge warning indicator	20	Red
Engine oil pressure warning indicator	400-	Red
Water temperature warning indicator	Ol.	Red
Auto idle indicator	O.	Green
Control lock warning indicator	Δ	Yellow
Water separator warning indicator	Q	Red
ECO mode indicator	ECO	Green
no use	0	Yellow
DPF warning indicator	₩	Yellow
Exhaust temperature warning indicator	By	Yellow

no use

2 Connection diagram

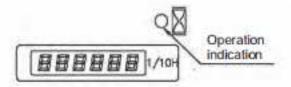


No.	Signal name	No.	Signal name
1	Engine warning indicator	13	GND (illumination)
2	Travel speed indicator	14	GND (power)
3	Glow indicator	15	GND (circuit)
4	Battery charge warning indicator	16	Water temperature gauge
5	Engine oil pressure warning indicator	17	no use
6	Fuel gauge	18	Light switch
7	Hour meter start	19	Battery
8	Water temperature warning indicator	20	IGN
9	Auto idle indicator	21	IGN (Engine ECU)
10	Control lock warning indicator	22	DPF warning indicator
11	Water separator warning indicator	23	Exhaust temperature warning indicator
12	ECO mode indicator	24	no use

3 Meter reference values

3-1 Hour meter

3-1-1 Hour meter LCD



3-1-2 Check voltage: DC12.0V ±0.3V

Check temperature: 20 ±0.5°C

3-1-3 LCD specification

- 1) IGN is turned on/off. The indication is always ON.
- 2) When IGN is turned on and the hour meter signal is received, the LCD counts time.
- The indication range is 0 to 999999 (1/10H). When the value exceeds this range, "999999 (1/10H)" is indicated.
- The accuracy about time is ±0.1%.
- Resolution: 0.1H
- 6) The LCD consists of 7 sections and time is indicated with a 6-digit number. (The indication shifts to the rightmost end.)
- When the battery is consumed, the data is saved in the memory for at least 25 years.
- 3-1-4 Indicator LED for hour meter operation
 - When the hour meter begins to count, the LED is lit.
 - The LED color is green and the operation cycle is 2 seconds (0.5Hz).
 - When the hour meter is OFF, the LED is turned off.

3-2 Water temperature meter

3-2-1 Tolerance of indication

Indication (°C)	50	67	105	135	Indication scale
Unit resistance (Ω)	153.9	51.9 - 27.4	23.9	10.8	Red zone
Display (°)	0	38	62	76	4 Pull
Tolerance (°)	±8.0	±3.5	±3.5	2	1150

3-2-2 Check voltage: DC12.0V ±0.3V Check temperature: 20 ±0.5°C

3-2-3 Braking characteristics of water temperature meter

When the machine is left at Point C for 1 minute and then the load resistance is instantaneously moved from Point C to H, it takes 2 ±0.8 seconds to pass Point OH.

3-3 Fuel meter

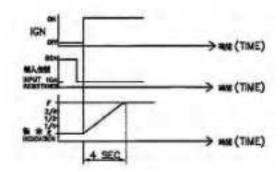
3-3-1 Tolerance of indication

Indication	F	1/2	E	Indication scale
Unit resistance (Ω)	10	38	80	N=
Display (°)	76	36	0	4
Tolerance (*)	5±2	±3.0	-2±1	Red zon

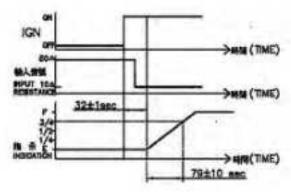
3-3-2 Check voltage: DC12.0V ±0.3V Check temperature: 20 ±0.5°C

3-3-3 Characteristics of fuel meter

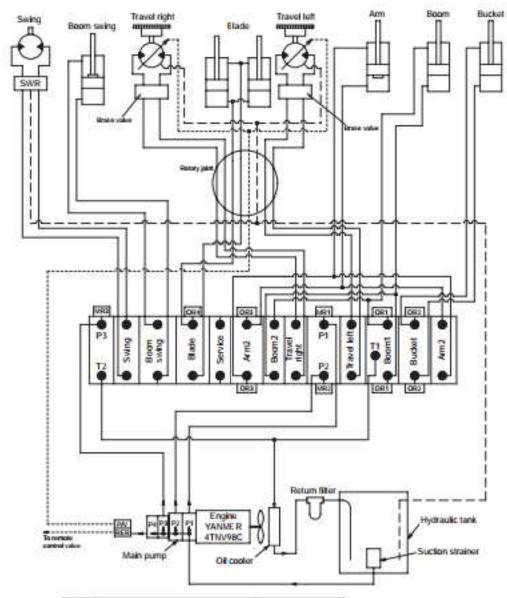
 When the load resistance is moved from Point E (80Ω) to Point F (10Ω) while IGN is OFF, it takes maximum 4 seconds to move from Point E to Point F.



2) When 32 ±1 seconds have passed since IGN was ON and the load resistance is instantaneously moved from Point E (80Ω) to Point F (10Ω), it takes 79±10 seconds to pass Point 3/4.



A5 Circuit Diagram



Code	tlem	Pre	ssure
Code	Hem	Mpa	kgt/cm ²
MR1	P1 Pump main relief valve	24.5	250
MR2	P2 Pump main relief valve	24.5	250
MR3	P3 Pump main relief valve	21.6	220
OR1	Overload relief valve (Boom)	27.4	280
OR2	Overload relief valve (Arm)	27.4	280
OR3	Overload relief valve (Bucket)	27.4	280
OR4	Overload relief valve (Blade)	29.5	300
SWR	Swing relief valve	20.6	210
RER	Remote-controlled relief valve	3.4	35

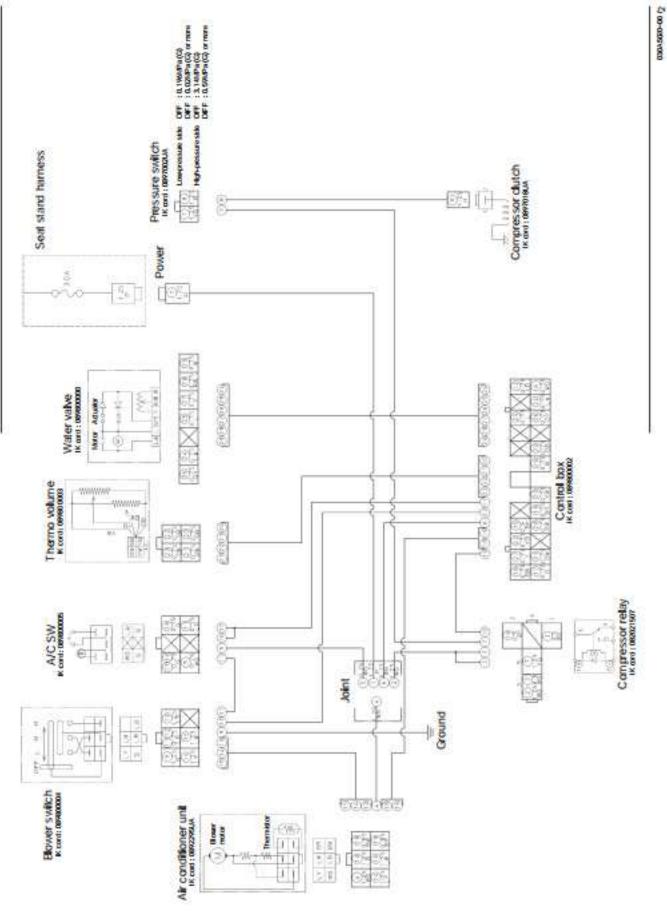
Max. pump flow rate P1: 75.6 L/min P2: 75.6 L/min P3: 54.2L/min

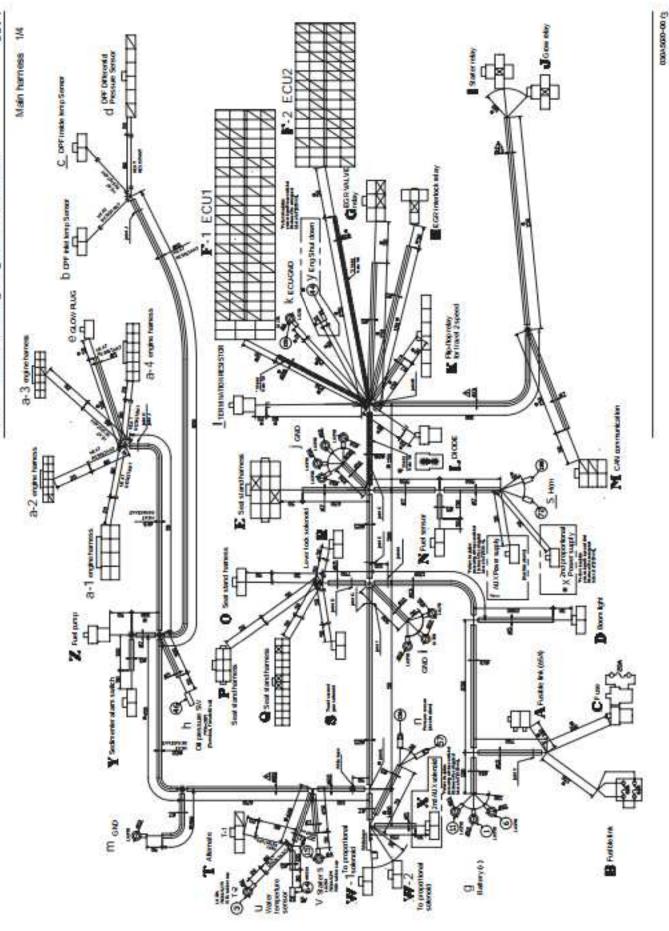
For service port, the flow of the pump 2 is passed.

\$ 00-000sv000

£100-00054000

00005000

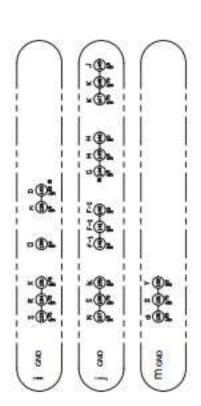




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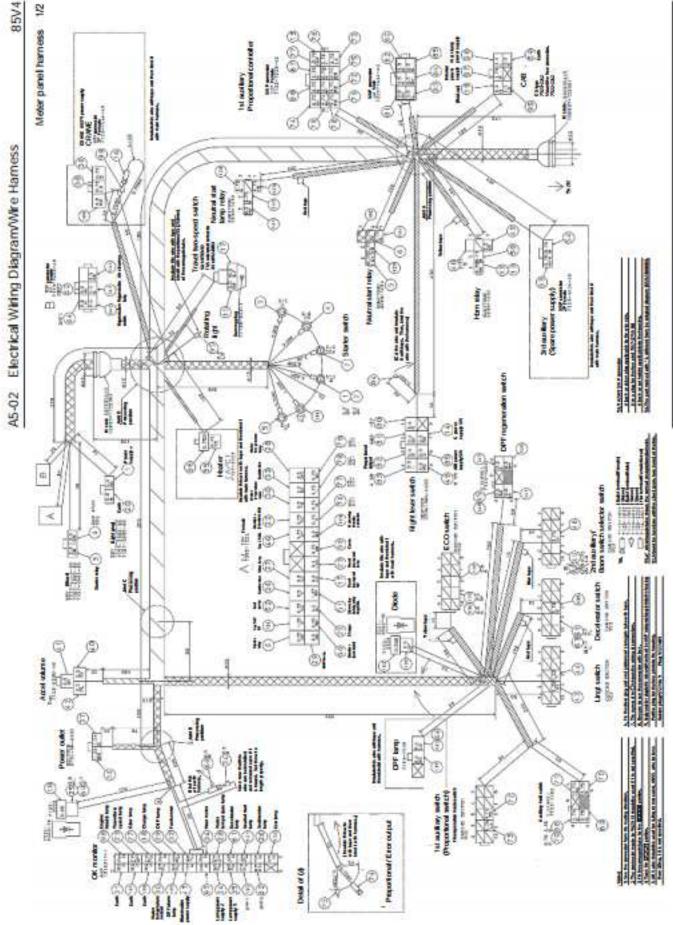


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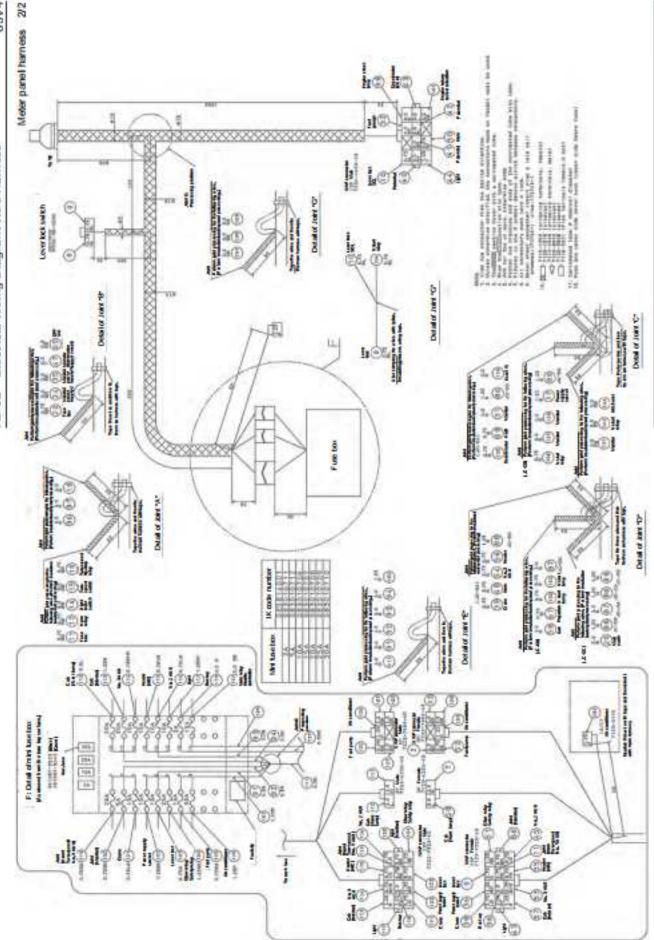
Table 1. Hamens color

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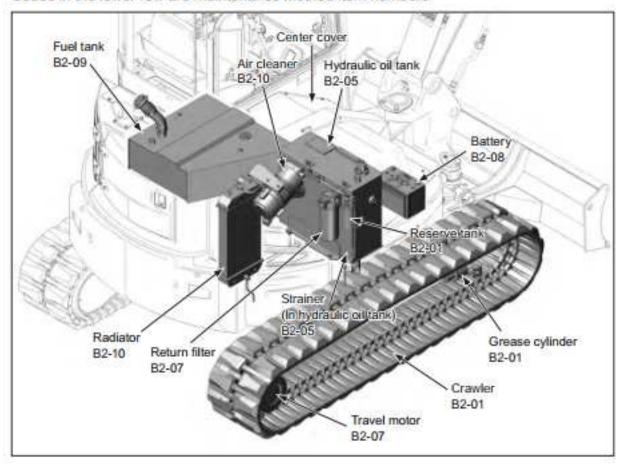
B1 General Maintenance

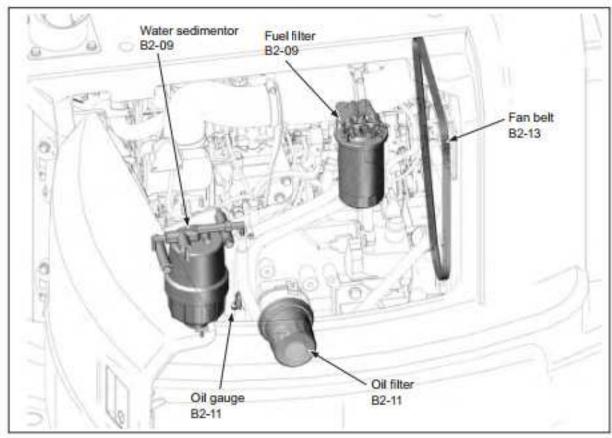
Parts shown in the figure require periodic check/replacement.

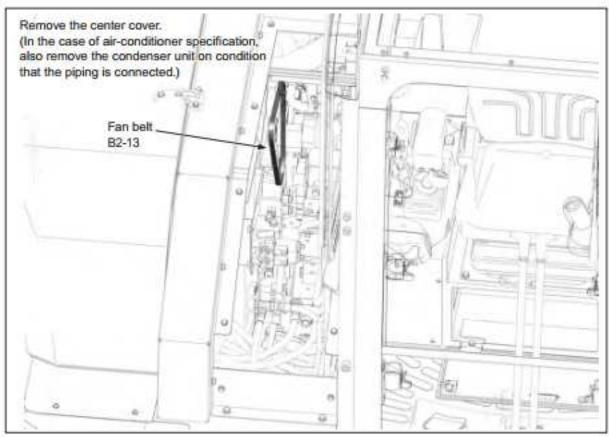
For work details, please see each item in section 2.

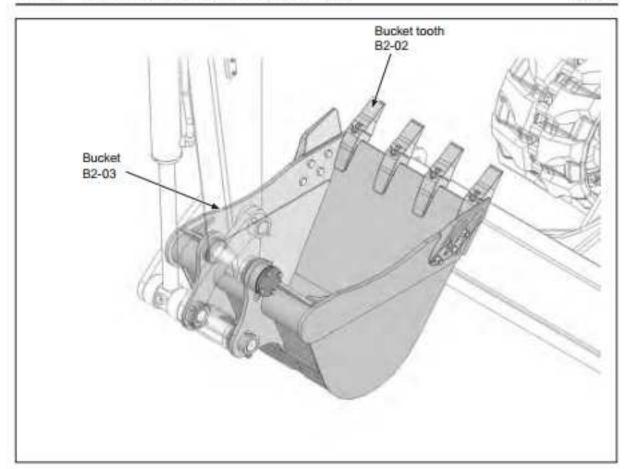
For the check cycle, see B1-02

Codes in the lower row are maintenance method item numbers.









∆: Inspection/Adjustment ⊘: Replacement Interval of check/maintenance Contents of checkl Check/mainte-Class nance part maintenance 50h 100h 250h 500h 800h 1000h 1500h 2000h 3000h 4 main Every day Attachment Δ Boom swing Δ Greasing Blade Grease Δ Swing bearing Δ Swing ring gear Δ Bucket tooth Replace 0 Δ Bucket Bucket Change 0 Δ Clearance Adjust. Δ Check wear and Rubber shoe 0 Crawfer Δ deterioration Shoe tension Check and adjust Δ Check oil leak Δ 2005 Reduction Travel reduction gear Check oil qty & refill Δ 0 Change oil 0 First Check oil qty & refill Hydraulic oil tank Change hydraulic oil/ O" Clean the tank Hydraulic system Suction strainer Clean Δ 0 O² Return filter Replace cartridge First Air breather Replace element. 0 Hydraulic equipment Check oil leak Δ Hydraulic devices Check oil leak Δ

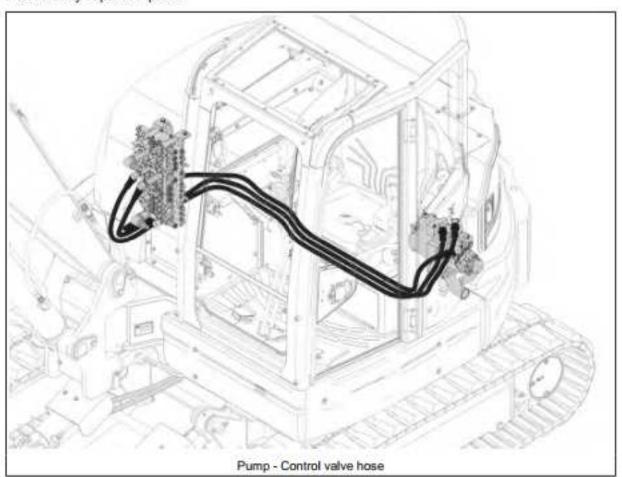
*1: When breaker is used: 600 hours *2: When breaker is used: 100 hours

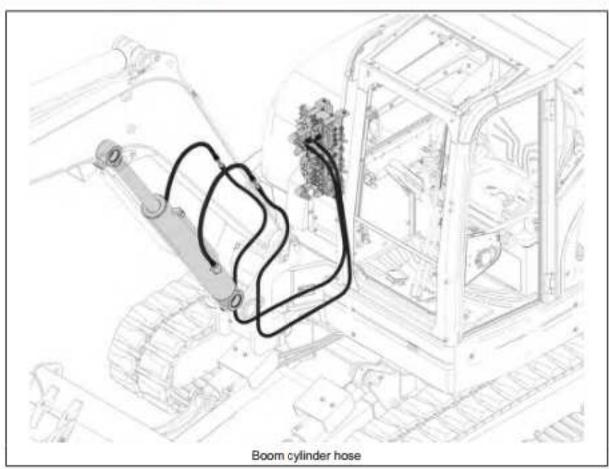
Class	Check/mainte-	Contents of check/				Inter	rval of	chec	k/maint	enance			
CESS	nance part	maintenance	Every day	50h	100h	250h	500h	800h	1000h	1500h	2000h	3000h	As required
ystem	Engine of	Check oil qty & refill	Δ										
Lubécation system	Engine oil	Change		O First		0							
Lubác	Oil filter	Replace		O First		0							
	Fuel tank	Check oil qty & refill	Δ										
ystem	Water sedimentor	Check	Δ										
Fud system	vvater sedimentor	Clean/ Replace element					Δ						0
	Fuel filter	Replace					0						
	Reserve tank	Check coolant qty & refill	Δ										
	Destates	Clean							Δ				
system	Radiator	Change coolant							O or one year				
Coding system	Radiator fins/ Oil cooler fins	Check & Clean				Δ							
	Facility	Adjust tension		∆ First	Δ								
	Fan belt	Check cracks		∆ First	Δ								0
mem		Check dust indicator	Δ										
Suction system	Air cleaner	Check element/Clean		∆ First	Δ								
Suc		Replace element					0						
Hoses	Fuel hose/ Radiator hose/ Hydraulic hose	Check leak & replace.	Δ								O or two years		

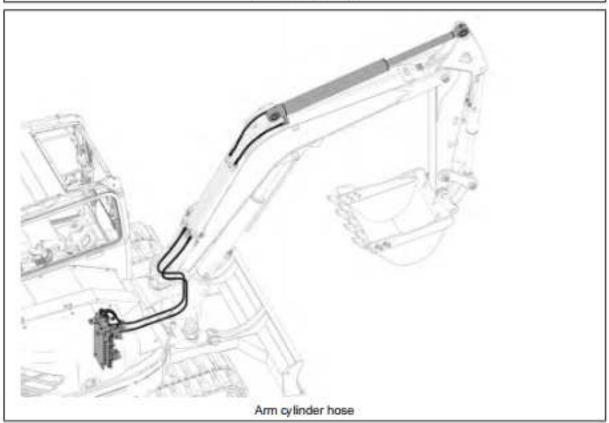
Class	Check/mainte-	Contents of check/				Inte	rval o	f chec	ck/main	tenano	e		
Class	nance part	maintenance	Every day	50h	100h	250h	500h	800h	1000h	1500h	2000h	3000h	As require
	Intake valve & exhaust valve head	Adjust clearance						Δ					
	Fuel injection system	Check/Clean/ Check functioning										Δ	
		Check and clean EGR valve. Check its operation.										Δ	
sten		Clean EGR lead valve.										Δ	
Engine system	Exhaust regulation	Clean EGR cooler. (Clean passage for water/exhaust by blower.)										Δ	
		Check crankcase breather system.								Δ			
		Check and clean DPF soot filter.										Δ	
		Check operation of intake throttle valve.										Δ	
	Fuse	Replace											0
syster	Fusible link	Replace											0
Electrical system	Battery	Check battery liquid qty & refill		Δ									
ш		Clean terminal					Δ						
Bolt ti	ghtening point	Retightening		∆ First									Δ

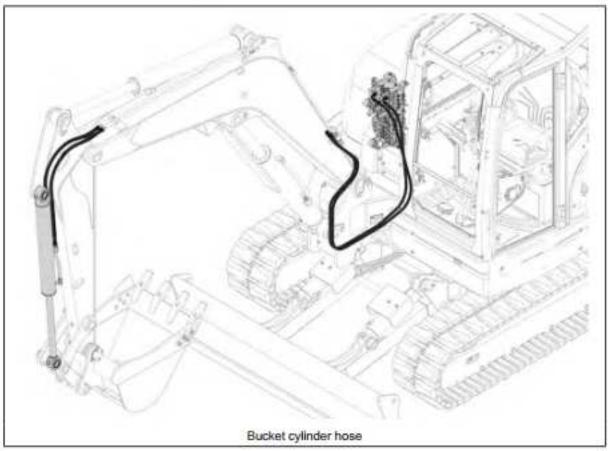
- O The important parts shown below that are especially related to safety and fire disasters should be replaced every 2 years.
- O For these parts, the material may be changed due to aging or degradation, wear, or fatigue may be caused as a result of repeated use. Then, serious accidents may occur.
- O For these parts, it is hard to judge the remaining life from the appearance inspection or the feeling of driving.
- O These parts should be replaced with new ones on a regular basis to maintain the full function even though any particular abnormality is not found.
- O Even before the replacement time, these parts should be repaired or replaced immediately after any abnormality is found.
- O If any abnormality is found on the hydraulic hose or joint other than the periodically replaced parts, retightening or replacement should be performed.

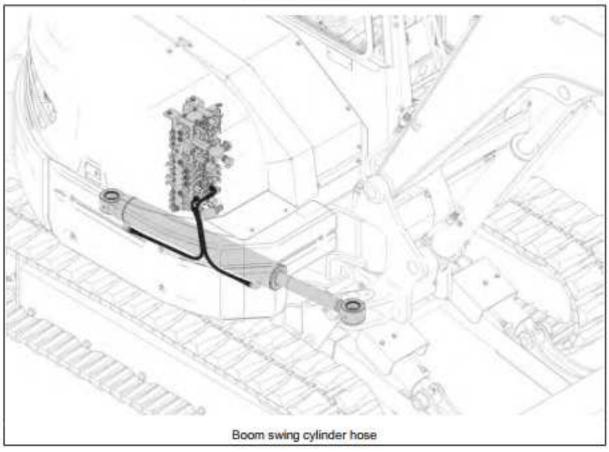
Periodically replaced parts

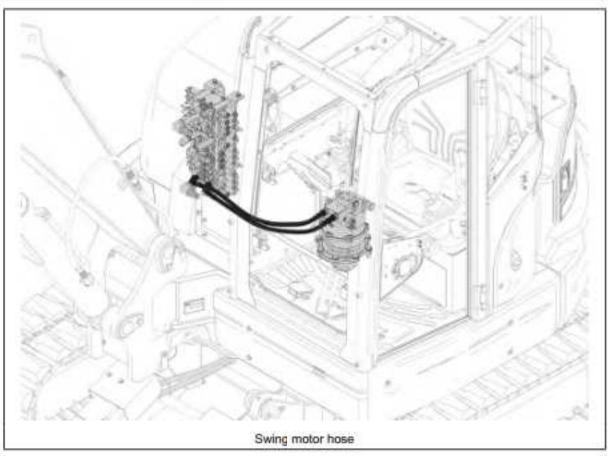


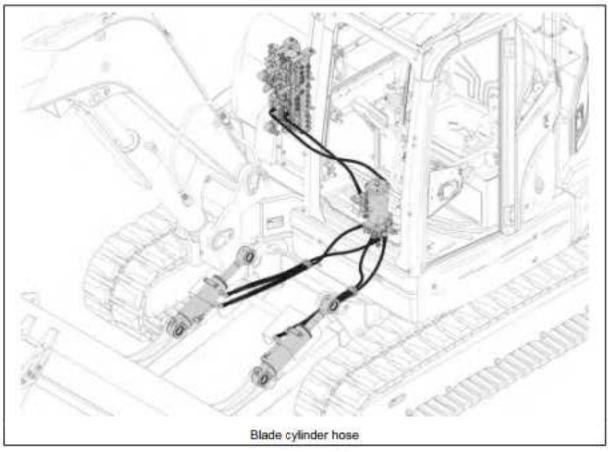


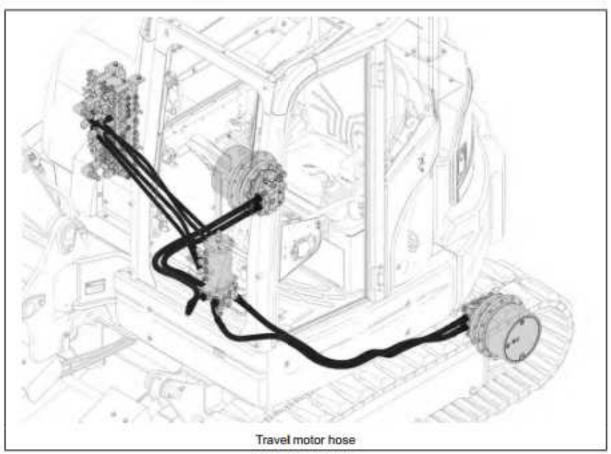


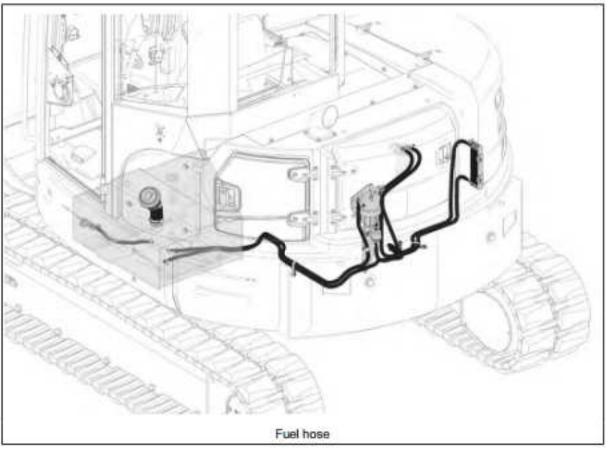


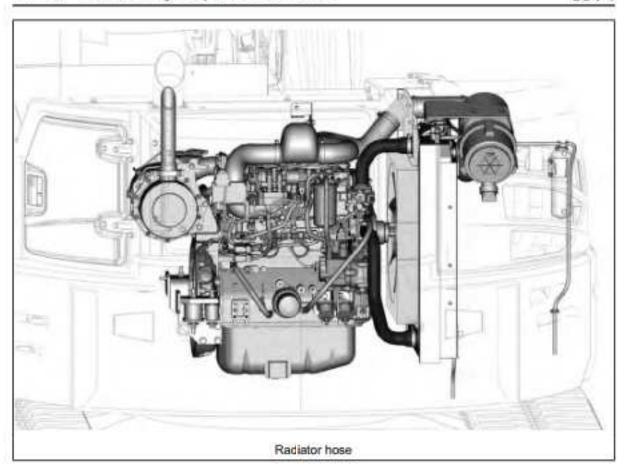












1. Cautions for measuring

- (1) Measurement Location
 - Set the machine on the flat and solid ground.
 - ② For natural lowering amount during traveling and swinging, the place should be sloped in 15°.
 - 3 Clearing space for the attachment to swing with maximum reach.
 - ① Clearing flat and solid ground where the machine can run 10 m straight.
 - (5) Safety measures such as "Keep Off" should be in place for the measurement.
- (2) Measuring Instruments
 - 1 Stop watch
 - Scale
 - 3 Thermometer
 - Inclination gauge
 - Pen, notebook, chalk and felt pen
 - Pressure gauge
 - Engine rpm detector
- (3) Measurement condition

The hydraulic oil temperature must be 50 ± 5°C for measuring.

(4) Measurement result

Compare the measurement result with the function data. If the result is out of the tolerance, repair the machine.

2 Measuring method

Measurement should be performed three times for each time. If a measured value is significantly different from the rest, measurement should be performed once more and an average of three closer values should be taken.

	Item	Unit	Method	Remarks
	Rated revolution	min ⁻¹		At a high land, the output gener-
	Rated output	kW		ally reduces approximately 10% per 1000 m.
Engine	Maximum torque	N-m		 The rated revolution is the revo- lution provided for the engine's
ш	Maximum revolution without load	min ⁻¹	1	rated output. The revolution is ap- proximately 6 to 8% higher with-
	Minimum revolution without load	min ⁻¹		out load.
	Boom			If the oil temperature is lower,
	Arm			the pressure is indicated higher. If the engine revolution is lower,
arre	Bucket			the pressure is indicated lower. Therefore, the reference values
Offpressure	Swing	MPa	Refer to *B1-05 Oil Pressure Measurement and Adjustment".	should be observed. Note that, since the swing pres-
0	Travel			sure is the set value on the bench, a line resistance is provid-
	Boom swing			ed on the actual machine and, as a result, the pressure is indicated
	Blade			higher on the gauge.

	Item	Unit	Method	Remarks
	Travel speed	sec/10m	Time required for 10 m travel after a 5 m running-in operation Retandriged ground 5m 10 m Recruing-in Measured section	Full change-over of the travel valve (spool stroke check/adjustment) The shoe tension should be identical between the right and left and within the standard range. Be sure to perform running-in operation. Remove the soil and sand from the shoe link.
Travel	Straight running	mm/10m	A turn upon 10 m straight running after a 5 m running-in operation	Full change-over of the travel valve (spool stroke check/adjustment) Particularly, the road surface should be flat and rigid. If a slope, soft ground, or convexity/concavity exists, the turn becomes larger. The shoe tension should be identical between the right and left and within the standard range. Remove soil and sand from the shoe link.
Ţ	Natural lowering during travel	mm/5 minutes	Natural lowering of the machine after 5 minutes	Do not stop the engine. Otherwise, the motor becomes free from oil, the brake does not work, and overrun may occur. Therefore, care must be taken.
	Crawler belt rotation speed	sec/5 rotations	☆ Time required for 5 rotations after 1 idle rotation	Full change-over of the travel valve (spool stroke check/adjustment) The shoe tension should be identical between the right and left and within the standard range. Remove soil and sand from the shoe link.

	Item	Unit	Method	Remarks
Swing	Motion after swing stop (brake working angle)	degrees	Measurement position The bucket/arm cylinder is fully retracted. The line connecting the boom foot and arm point is horizontal above the ground surface. Arm point pin Horizontal Measurement At the 90° swing position, release the lever to make it neutral. Measure the subsequent motion angle. Start Stop Measurement Lever at neutral	
	Time required for swing	sec/2 rotations	Measurement Time required for 2 rotations after 1 rotation	
	Natural lowering during swing	degrees/ 5 minutes	Measurement position The bucket/arm cylinder is fully retracted. The line connecting the boom foot and arm point is parallel with the slope. Measurement Angle of lowering after 5 minutes Measurement	

Ü	Item	Unit	Method	Remarks
Boom cylinder	Up (bucket grounded cylinder fully ex- tended)		Measurement position The bucket/arm cylinder is fully retracted. Measurement Cylinder working time	To the front of the cushion for Up (excluding the cushion stroke) Until the bucket is grounded for
Boom	Down (cylinder fully ex- tended → bucket grounded)	sec		Down (Return the lever immedi- ately before grounding so that the bucket will not hit the ground.)
nder	Cylinder extended (arm pulling)		Measurement position	To the front of the cushion for pulling (excluding the cushion stroke)
Arm cylinder	Cylinder retracted (arm pushing)	sec	Pully retracted Fully extended Distribute into equivalent angles Measurement Time required for the cylinder full stroke	To the stroke end for the cylinder without cushion To the stroke end for pushing
ylinder	Cylinder extended (digging with bucket)		Measurement position Fully extended retracted	The position should divide the
Bucket cylinder	Cylinder retracted (releasing soil from bucket)	sec	Measurement Time required for the cylinder full stroke	rotation into approximately same angles.

	Item	Unit	Method	Remarks		
Natural lowering of cylinder	Boom cylinder retraction	mm/10 minutes	Measurement position The bucket/arm cylinder is fully retracted. The line connecting the boom foot and arm point is horizontal above the ground. Z Horizontal W			
	Arm cylinder ex- tension					
	Bucket cylinder extension		Measurement. Rod length changed after 10 minutes With a felt pen, mark on the cylinder rod and measure the movement after 10 minutes. Measurement start After 10 minutes			
	Bucket tooth end lowering					

3 Performance check criteria/permissible value

Reference values refer to the performance of a new vehicle.

The machine performance is gradually degraded during long-time use and deviation from reference values occurs. Many factors are involved with degradation of a performance item, so recovery of performance back to the original reference value is difficult by simply replacing some parts.

Therefore, a permissible value is defined for reference of performance judgment.

The permissible value is determined based on experience to cause no problem in actual work if the corresponding performance is achieved.

Upon adjustment/repair, consider the time, cost, etc. and set the performance within the range between the permissible value and reference value.

⚠ CAUTION

The reference/permissible values indicated in this document are targeted for the standard type machine. For the non-standard type, please contact us.

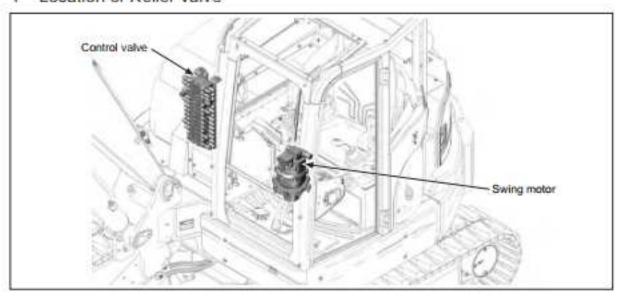
	Item	Unit	Reference value	Permissible value
	Rated revolution	min ⁻¹	2100	-
	Rated output	kW	44.3	±3%
Engine	Maximum torque	N•m	235	±25
ш	Maximum revolution without load	min-1	2130	±10
	Minimum revolution without load	min-1	1100	±10
	Boom		24.5 ^{+0.5}	+0.5 -1.0
	Arm		24.5 ^{+0.5}	+0.5 -1.0
aure	Bucket	MPa	24.5 00.5	+0.5 -1.0
pressure	Swing		19.6 ^{+0.5}	+0.5 -1.0
0	Travel		24.5 00.5	+0.5 -1.0
	Boom swing		21.6 ^{+0.5}	+0.5 -1.0
	Blade		21.6 0 0 0	+0.5 -1.0

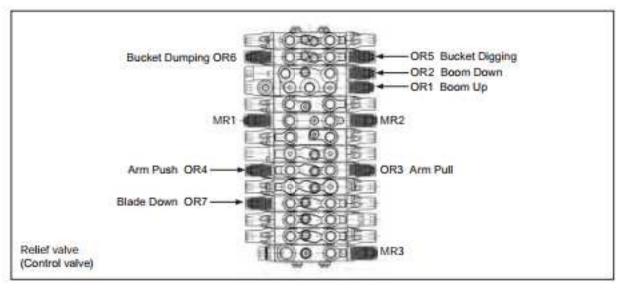
		Item		Unit	Reference value	Permissible value
П	Travel speed	Rubber shoe	High-speed	sec/10 m	9.3±1.0	11.0
			Low-speed		14.6±1.0	17.0
		Steel shoe	High-speed		9.5±1.0	11.2
e ve			Low-speed		15.0±1.0	17.6
La	Straight running		mm/10 m	500 or less	700	
latural lowering Cythoder speed Swing Travel	Lowering on a slope		mm/5 minutes	0	0	
	Time required for 5 ro-		High-speed	sec/5 rotations -	28±1.0	30
			Low-speed		42±1.0	45
_	Motion after swing stop		degrees	30±10	45	
WED S	Time required for swing		sec/2 rotations	14.1±0.5	15.0	
n	Lowering on a slope		degrees/5 minutes	0	0	
	Boom Up Down		Up	sec	3.6±0.5	4.2
			Down		3.4±0.5	4.0
	Arm		Pull		3.3±0.5	3.9
peq			Push		3.2±0.5	3.8
Spe	Bucket -		Dig		3.6±0.5	4.2
noe			Dump		2.6±0.5	3.2
3	Boom swing Left Right			7.4±0.5	8.0	
			Right		5.4±0.5	6.0
	Blade		Up		2.5±0.5	3.1
			Down		3.2±0.5	3.8
E C	Boom cylinder		mm/10 minutes -	5 or less	10	
Natural lowering	Arm cylinder			10 or less	20	
	Bucket cylinder			6 or less	10	
	Bucket end			200 or less	300	

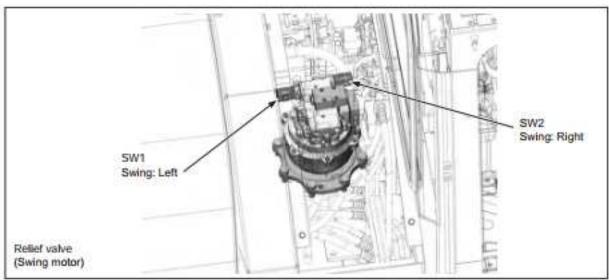
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3	Relief Valve Set Pressure and Measuring Conditions	P4
4	Measuring Tools	P5
5	Measurement/Adjustment of Main Relief Valve Set Pressure	P6
6	Measurement/Adjustment of Overload Relief Valve Set Pressure	P8
7	Measurement of Swing Relief Valve Set Pressure	P10

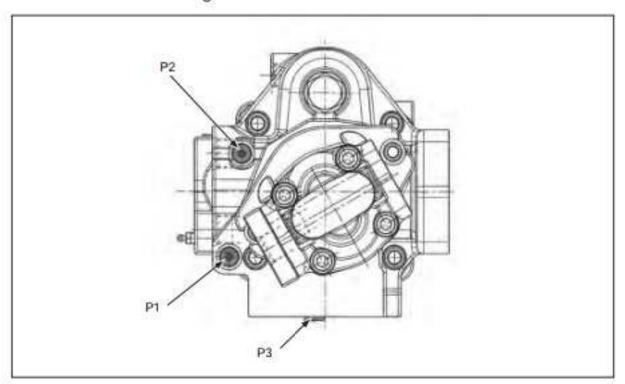
1 Location of Relief Valve







2 Location of Measuring Port



3 Relief Valve Set Pressure and Measuring Conditions

	Relief valve	Gauge port	Valve position	Set reference value MPa	Remarks
	Boom/Bucket	P1	MR1	24.5 +0.5	At rated rotation of engine
Main	Arm/Service	P2	MR2	24.5 0	At rated rotation of engine
	Swing/Blade/Boom swing	P3	MR3	21.6 *0.5	At rated rotation of engine
	Boom (up)	D1	OR1	27.5 *0.5	
	Boom (down)	P1	OR2	at 10L/min	
Overload	Arm (pull)	P2	OR3	27.5 *0.5 at 10L/min	See measurement/adjustment items.
	Arm (push)		OR4	27.5 *0.5 at 10L/min	
0	Blade (down)	P3	OR7	29.4 *0.5 at 10L/min	
	Bucket (digging)	0.1	OR5	27.5 +0.5	
	Bucket (dumping)	P1	OR6	at 10L/min	
Brake	Swing	P3	SW1 SW2	19.6 ±0.5	At low speed rotation of engine
Rer	note control relief valve	P4	PP	3.4 +0.5	Engine rotary speed 1000min ⁻¹

^{*1:} SW1/2 (relief valve for swing) cannot be adjusted. If it malfunctions, replace or overhaul it.

Port size

Measure and adjust pressure when oil temperature is 50±5°C.

⚠ CAUTION

Since the high-temperature and high-pressure hydraulic oil is dangerous, relieve the pressure from the hydraulic oil tank before installing/removing the coupler. Install the coupler before the oil temperature rises and remove it after the oil temperature falls sufficiently.

4 Measuring Tools

The following kit is recommended.

Oil pressure measuring gauge kit



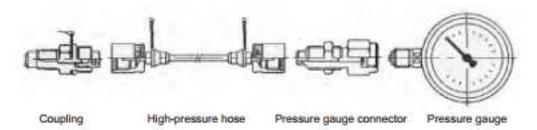
Part No. 598014102

	Product name	Specification	Q'ty
	Pressure gauge	40MPa	
	Pressure gauge	6MPa	1
	High-pressure hose	4m	2
	High-pressure hose	1m	
Standard kit	Pressure gauge connector	For connecting pressure gauge and hose	3
	Coupling	G1/4	3
	Coupling	R1/4	3
	Coupling	R1/8	2
	Special case	Kit storing box	1

Added option

Name	Part No.
Pressure gauge 40MPa	500 - 42.400
Pressure gauge 6MPa	500 - 42.060
Coupling (R1/8)	100 - 51.000
Coupling (R1/4)	0754141UA
Coupling (G1/4)	0754142UA
Hose (1m)	200 - 16.100
Hose (4m)	200 - 16.400

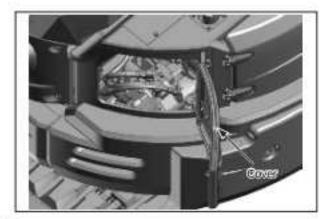
Name	Part No.	Specification	
Adapter 1/4"	407295301	Rc1/4: Hale	
Adapter 3/8"	407295302	also.	
Adapter 1/2"	407295303	The Post	
Adapter 3/4"	407295304	0	
Adapter 1*	407295305	40.	
Adapter UNF6/19	D06028600	1	



5 Measurement/Adjustment of Main Relief Valve Set Pressure

Measurement

Open the cover.



Remove the plug and attach the coupling. Then, connect the measuring gauge.

MR1 measurement P1

MR2 measurement P2

MR3 measurement P3

Start the engine and increase the rotation to the maximum.

Operate the cylinder on each relief valve circuit to the stroke end and relieve the relief valve.

MR1 measurement .. Boom or bucket cylinder MR2 measurement .. Arm cylinder

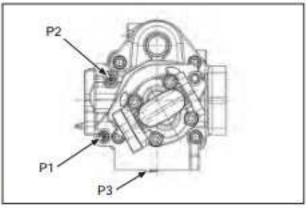
MR3 measurement .. Boom swing cylinder

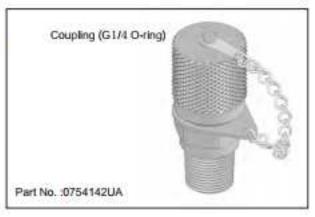
Read the gauge value.

If the measured value deviates from the set value, perform adjustment.

A CAUTION

When a large amount of pressure leaks from the cylinder, a low relief pressure is indicated. If it seems that the leak occurs, disconnect the hose from the cylinder, block with a plug and then measure the pressure.

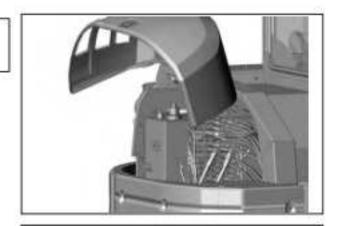


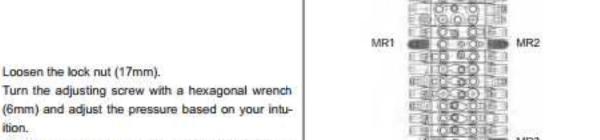


Adjustment

⚠ CAUTION

Adjust the main relief valve pressure in the state of pressure measurement.





Turn the adjusting screw with a hexagonal wrench (6mm) and adjust the pressure based on your intuition.

(When turning the adjusting screw by one round, pressure is changed by 17.7MPa.)

Right turn: Pressure rises. Left turn : Pressure lowers.

⚠ CAUTION

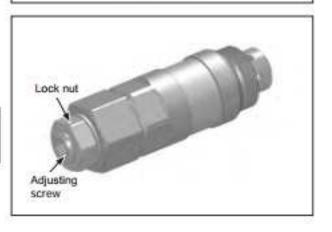
Decide the adjusting position as tightening the adjusting screw.

Fasten with the lock nut and measure the pressure.

Repeat the above steps until the set value is obtained.

⚠ CAUTION

If the pressure is not changed though you turn the adjusting screw, maybe the cause is not the fatigued spring but the adjusting valve or pressureadjusting valve which is eccentrically worn or dust or stuffing. Remove the relief valve and then disassemble and overhaul it.



6 Measurement/Adjustment of Overload Relief Valve Set Pressure.

Measurement

Install the measuring gauge.

OR1 (boom up) measurement	P1
OR2 (boom down) measurement	P1
OR3 (arm pull) measurement	P2
OR4 (arm push) measurement	P2
OR5 (bucket-dig) measurement	P1
OR6 (bucket-dump) measurement	P1
OR7 (blade down) measurement	P3

2. Set the main relief pressure temporarily.

OR1 (boom up) measurement	MR1
OR2 (boom down) measurement	MR1
OR3 (arm pull) measurement	MR2
OR4 (arm push) measurement	MR2
OR5 (bucket-dig) measurement	MR1
OR6 (bucket-dump) measurement	MR1
OR7 (blade down) measurement	MR3

Loosen the lock nut, turn the adjusting screw clockwise by 180 degrees, and tighten the lock nut for fastening.

⚠ CAUTION

After measurement is completed, perform readjustment according to the main relief valve pressure adjusting method.

Start the engine and set the rotation to "low idling".

Operate the cylinder on each relief valve circuit to the stroke end and relieve the relief valve.

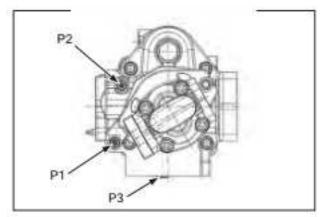
A CAUTION

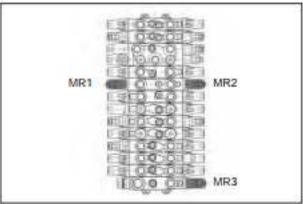
The flow amount at the overload relief valve setting is 10L/min. If the flow amount is large, the relief pressure is high. Be sure to measure the pressure in the idling status.

Read the gauge value.

If the measured value deviates from the set value, perform adjustment.

Readjust the main relief valve pressure.





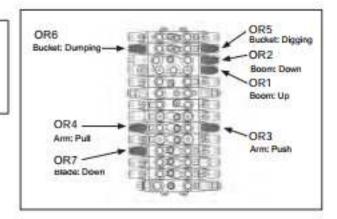


Adjustment

A CAUTION

Adjust the overload relief valve pressure in the state of pressure measurement.

The main relief valve must be temporarily adjusted.



Loosen the lock nut.

Turn the adjusting screw with a hexagonal wrench and adjust the pressure based on your intuition. (Approx. 28.4MPa is changed by one turn of adjusting screw.)

Right turn The pressure rises. Left turn The pressure falls.

⚠ CAUTION

Decide the adjusting position as tightening the adjusting screw.

Fasten with the lock nut and measure the pressure.

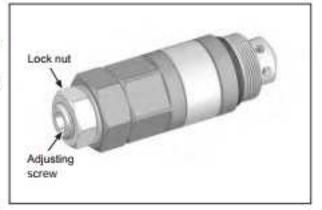
Repeat the procedure mentioned above until the set value is obtained.

⚠ CAUTION

If the pressure is not changed though you turn the adjusting screw, maybe the cause is not the fatigued spring but the adjusting valve or pressure-adjusting valve which is eccentrically worn or dust or stuffing. Remove the relief valve and then disassemble and overhaul it.

⚠ CAUTION

After measurement is completed, perform readjustment according to the main relief valve pressure adjusting method.



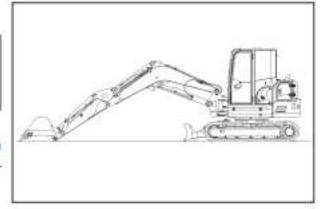
7 Measurement/Adjustment of Swing Relief Valve Set Pressure

Measurement

⚠ CAUTION

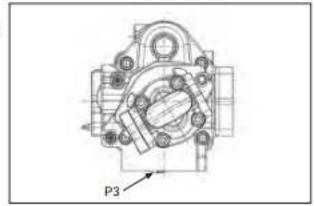
Before measurement of the swing brake relief valve, measure the main relief valve pressure and make sure that the pressure is normal.

With the position shown at right, let the bucket tooth to grip the ground surface to fasten it so that the upper machine cannot swing.



As the main relief valve measurement, remove the covers.

Install the measuring gauge on the P3 port.



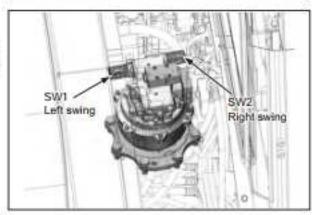
Start the engine and set the rotation to "low idling".

Operate the swing operation lever slowly to the stroke end and relieve the relief valve.

SW1 measurement...... Left swing SW2 measurement...... Right swing

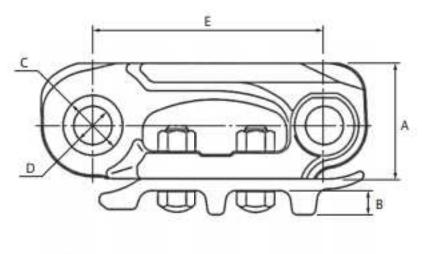
Read the gauge value

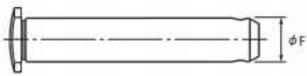
If the measured value deviates from the set value, replace or overhaul the relief valve.



1 Lower machine

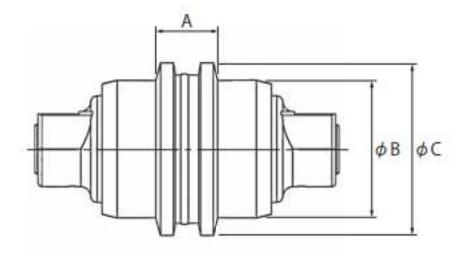
1-1 Steel crawler





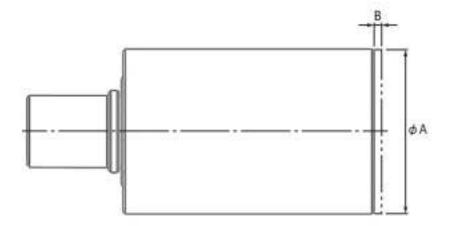
	Item	Unit	Reference dimension	Permissible value	Action to be taken
Link height (A)			75	72.75	
Grouser height (B)			18	-	
Donkley	Outside diameter (C)		41	38.87	O Sample one link. O If the permissible value is
Bushing	Inside diameter (D)	mm	24	127	exceeded again, replace the crawler.
Link pitch	(E)	1	135	137.36	
Master pin	diameter (F)	1	23.66	-	

1-2 Lower roller



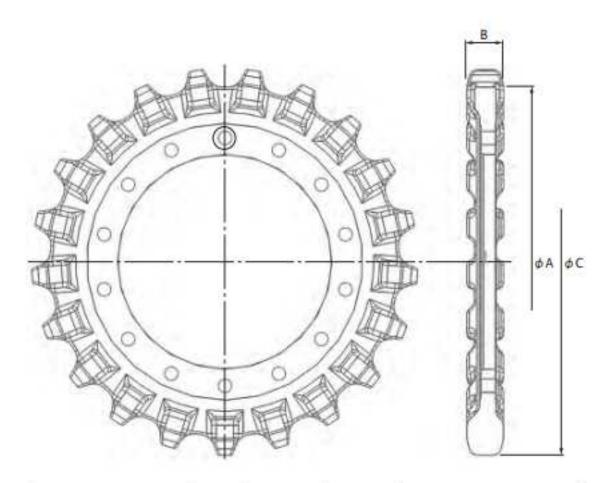
Unit	Reference dimension	Permissible value	Action to be taken
Z SZASTN	43	37	
	110	103	Replace.
mm	138.5	198	177.
	0.5	375	Replace the ball bearing.
	mm	Unit dimension 43 110 138.5	Unit dimension value 43 37 110 103 138.5 -

1-3 Upper roller



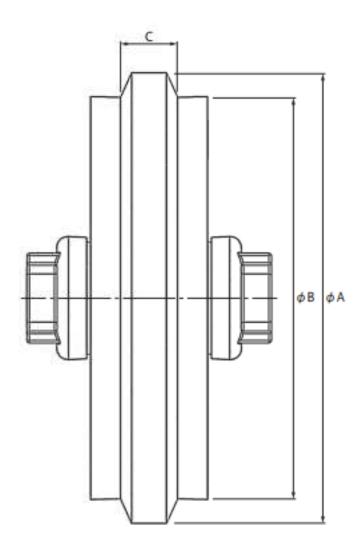
Item	Unit	Reference dimension	Permissible value	Action to be taken
Tread outside diameter (A)	0.000	80	75	Davisos
Roller axial play (B)	mm	0.5	0.9	Replace.

1-4 Sprocket



Item	Unit	Reference dimension	Permissible value	Action to be taken
Root diameter (A)		416.6	409.6	
Tooth width (B)	mm	38		Replace.
Outside diameter (C)		468	461	

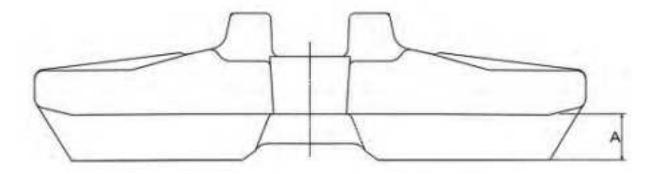
1-5 Idler



Item	Unit	Reference dimension	Permissible value	Action to be taken
(A)		411	-	
(B)	mm	363	353	Replace.
(C)		52	32	

1-6 Rubber crawler

When the lug height is beyond the permissible value, replace the rubber crawler.

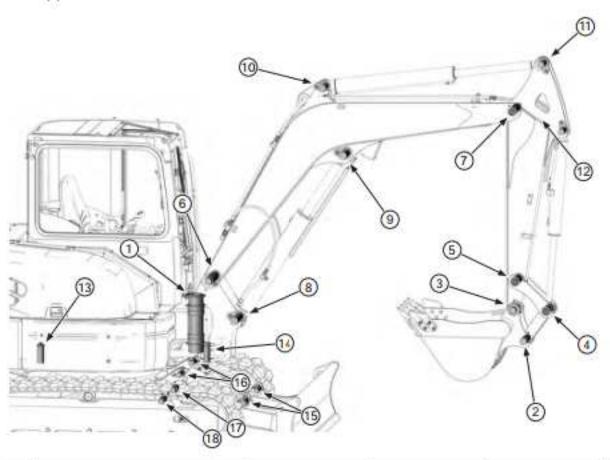


		(mm)
	Reference dimension	Permissible value
A	30	5

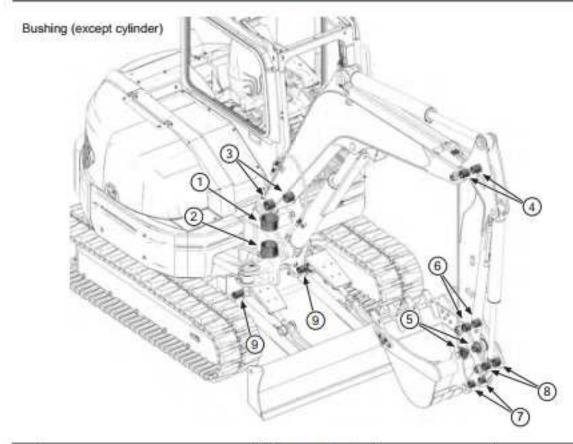
The status mentioned below is the use limit and the rubber crawler must be replaced.

- 1. The rubber is worn or damaged and so the steel cord is exposed.
- 2. Half or more of the steel cord layer at one side is broken.
- 3. The core metal of rubber crawler is separated at one place or more.

2 Upper Machine



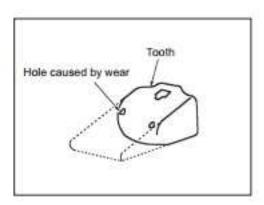
	Name	Reference diameter (mm)	Permissible value	Action to be taken
1	Swing bracket pin	130		
2	Bucket pin	50		
3	Bucket pin	50		
4	Bucket cylinder head pin	55		
5	Arm link pin	55		
6	Boom foot pin	65		
7	Arm foot pin	55	Permissible gap:	Replace.
8	Boom cylinder foot pin	70		
9	Boom cylinder head pin	70		
10	Arm cylinder foot pin	60		
11	Arm cylinder head pin	60		
12	Bucket cylinder foot pin	55		
13	Boom swing cylinder foot pin	60		
14	Boom swing cylinder head pin	60		
15	Blade cylinder foot pin	50		
16	Blade cylinder head pin	50		
17	Blade pin (left)	50		
18	Blade pin (right)	50		



	Name	Reference diameter (mm)	Permissible value	Action to be taken
1	Swing bracket bushing (upper)	130		
2	Swing bracket bushing (lower)	130		
3	Boom foot bushing	65		
4	Arm foot bushing	55	+0.5mm Replace.	
5	Arm head bushing	50		Replace.
6	Arm link bushing	55		
7	Bucket link bushing (bucket side)	50		
8	Bucket link bushing (cylinder side)	55		
9	Blade bushing	50		

■ Use limit of bucket tooth

When the tooth is worn and a hole can be made on it, replace it.



B2 Maintenance Method

■ Crawler shoe tension check/adjustment

A WARNING

Since the shoe tension is checked with the body lifted, a very dangerous state may occur if the body is dropped by mistake during check. Never move the machine during measurement.

Growth of shoe wear or looseness depends on the situation of the work site.

If the loosened shoe is used, slip-off of the crawler shoe may be caused.

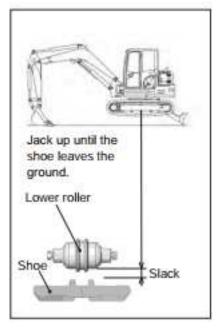
Check/adjust the tension as required.

1. Check

- Using the work machine and blade, lift the main body until the shoe leaves the ground.
- (2) Measure the clearance between the tread of the second lower roller from the sprocket and the shoe tread.

Clearance: 10 to 20 mm for the rubber shoe 30 to 50 mm for the steel shoe

These reserve standard tensions.



2. Adjustment

⚠ WARNING

- Since the grease cylinder contains a high pressure, loosening too much may cause the grease to jet
 out or check valve ① to pop out.
- When loosening the check valve, loosen it slowly and, when grease comes out, do not loosen any more.
- Never loosen grease nipple ②.
- · Do not put your face or hand close to the check valve.

When setting the crawler shoe:

- With a grease gun, supply grease from the grease nipple on check valve ①.
- (2) Turn the crawler and then check the shoe tension. If the tension is not proper, re-adjustment is required.

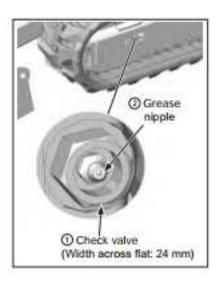
When reducing the tension

- (1) Remove mud around the front idler.
- (2) Loosen check valve ① slowly and, when grease comes out, do not loosen any more.
- If grease comes out poorly, turn the crawler slightly back and forth.
- (4) If the shoe slack becomes proper, tighten check valve ①.

⚠ IMPORTANT

Tighten check valve ① at a torque of 59 to 69 N-m. Avoid overtightening.

(5) Turn the crawler and then check the shoe tension. If the tension is not proper, re-adjustment is required.



Rubber crawler check

Lug height

Replace with a new one when the remaining lug height is 5 mm or smaller.

Steel cord exposure

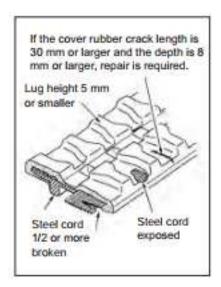
If the steel cord is exposed as a result of the wear or damage of rubber, replace with a new one.

Rubber crawler steel cord is broken.

If a half or more of the one-side steel cord layer is broken, immediate replacement is required.

⚠ CAUTION

If the rubber crawler is left in this state, the rubber crawler may be suddenly broken during work and a serious accident may occur.



4. Repairing cover rubber flaws

If the flaw length is at least 30 mm and the depth is at least 8 mm, repair is required.

If the steel cord is visible, immediate repair is required regardless of the flaw size.

⚠ CAUTION

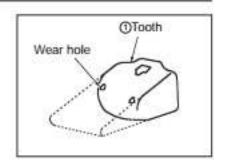
If this state is left unchanged, water may enter, rust will be generated on the steel cord, and the rubber crawler may be broken.

Slip-off of rubber crawler core metal

If the rubber crawler core metal slips off at one or more positions, replace the rubber crawler with a new one.

⚠ CAUTION

- Before replacing the bucket tooth, put the bucket on a block and stop the engine.
- When knocking the lock pin in, fragments may fly and personal injury may occur. Before the work, put on protectors such as the protection glasses, helmet, gloves, etc.



⚠ IMPORTANT

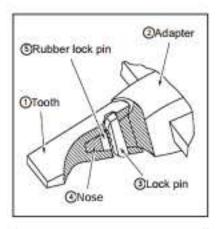
If tooth ① is worn out and the hole is likely to grow, replace the tooth.

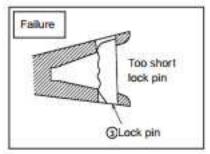
Replace tooth ① before wear of adapter ② beoins.

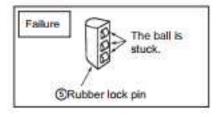
- With the hammer and removing tool, knock off lock pin 3 and remove the tooth.
- (2) Remove mud from nose (3).
- (3) Check the removed lock pin (3) and rubber lock pin (3). If lock pin (3) is too short or rubber is broken and the ball is coming out from rubber lock pin (3), replace with a new one.

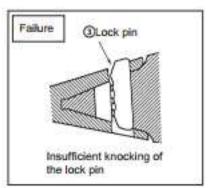
It is recommended to replace the rubber lock pin each time the tooth is replaced.

- (4) Attach rubber lock pin (3) on the nose.
- (5) Insert tooth ① into nose ⑥.
- (6) With a hammer, knock in lock pin ③ to the same level as the surface of tooth ⑤. If knocking is insufficient, tooth ⑤ may slip down.
- (7) Make sure that tooth (1) is fastened securely.





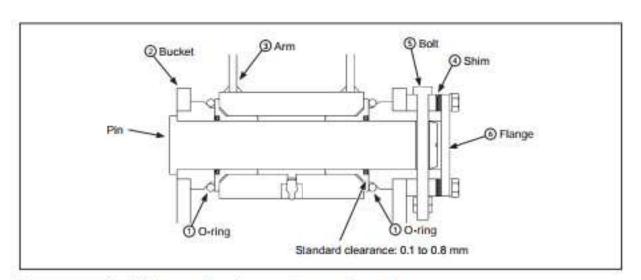




The standard bucket of this machine is equipped with a bucket clearance adjusting mechanism to prevent shakiness.

If shakiness becomes extremely large during use, perform adjustment as described below.

- (1) Let the back of the bucket lightly touch the ground, swing the bucket slightly to the right, and make the arm end press the inside of the clearance adjusting part.
- (2) Stop the engine.
- (3) Move O-ring ① onto the boss and measure the mounting clearance between bucket ② and arm ③.
- (4) If the clearance is 1 mm or larger, remove shim ② and make adjustment. Thickness of shim ③ is 0.8 mm. If the clearance is 0.8 mm or smaller, do not remove the shim because the clearance will be lost.
- (5) Remove three bolts (§) and remove shim (§) inside flange (§) according to shakiness (wear).
- (6) Attach flange (a) and tighten three bolts (3).
- (7) Measure the mounting clearance. The standard clearance is 0.1 to 0.8 mm.



⚠ IMPORTANT

If the mounting clearance is a negative value, abnormal wear of the boss contact surface between the arm and bucket will be caused. Therefore, be sure to reserve the clearance.



Use Extreme Pressure Grease EP-2

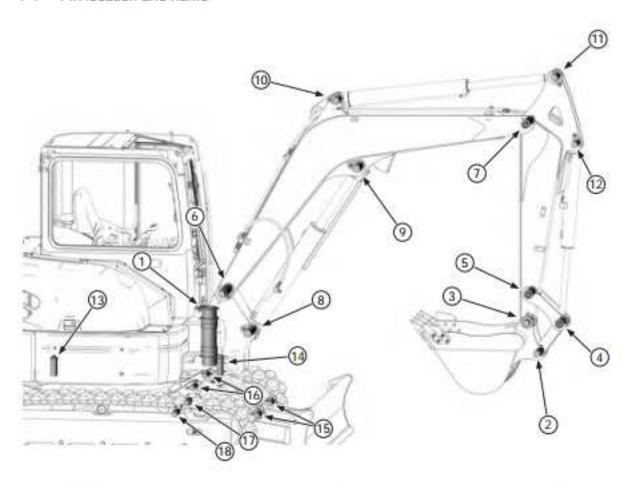
Contentes

		Page
1	Attachment/Dozer Blade Pin	P2
	1-1 Pin location and name	
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	1-3 Greasing	
2	Swing Bearing	P5
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	2-2 Greasing	
3	Swing Gear	P6
	3-1 Check/filler port and drain port	
	3-2 Check/greasing	

1 Attachment/Dozer Blade Pin

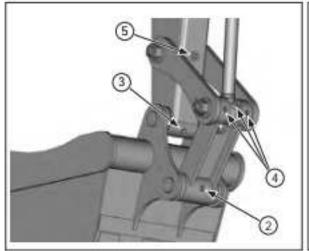
The grease nipple peculiar to each unit is provided. Apply grease with a grease gun periodically.

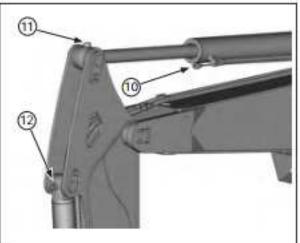
1-1 Pin location and name

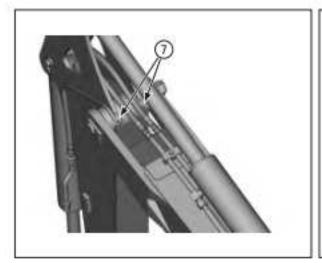


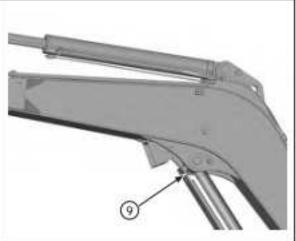
	Name		Name
1	Swing bracket pin	10	Arm cylinder foot pin
2	Bucket pin	11	Arm cylinder head pin
3	Bucket pin	12	Bucket cylinder foot pin
4	Bucket cylinder head pin	13	Boom swing cylinder foot pin
5	Arm link pin	14	Boom swing cylinder head pin
6	Boom foot pin	15	Blade cylinder foot pin
7	Arm foot pin	16	Blade cylinder head pin
8	Boom cylinder foot pin	17	Blade pin (left)
9	Boom cylinder head pin	18	Blade pin (right)

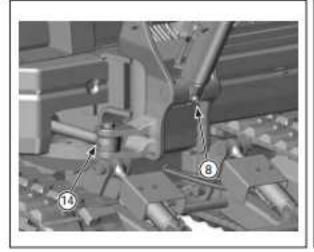
1-2 Greasing location (Grease nipple location. The number is the pin number in the preceding page.)

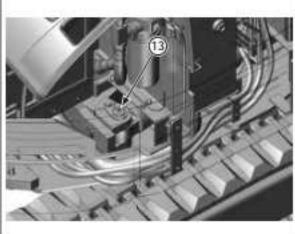


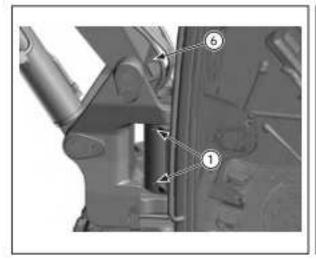


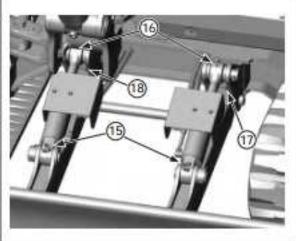












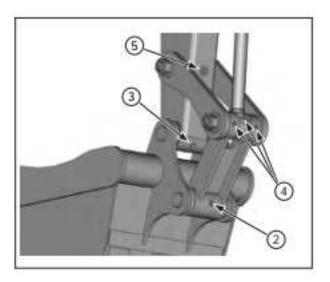
1-3 Greasing

- (1) Lower the Attachment to the ground and stop the engine.
- (2) With a grease gun, supply grease from the grease nipples until old grease comes out of the clearance.
- (3) After greasing, wipe off the old grease that has come out.

Interval for greasing: 50 hours

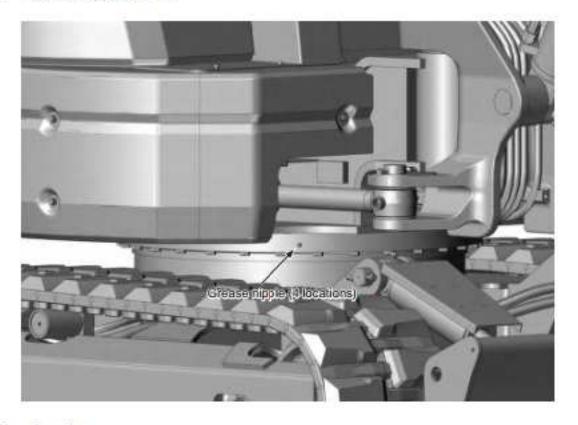
▲IMPORTANT

For 5 positions around the bucket, be sure to supply grease before underwater excavation regardless of the maintenance time.



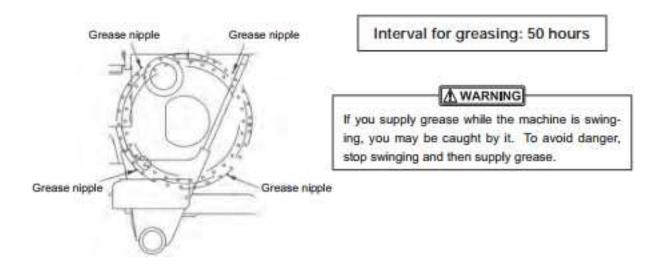
2 Swing Bearing

2-1 Grease nipple location



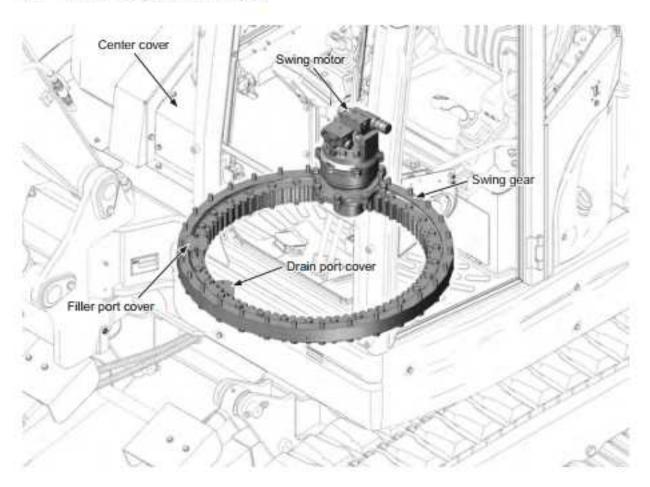
2-2 Greasing

- 1. Lower the bucket to the ground and stop the engine.
- 2. With a grease gun, supply grease through the grease nipple by 3 5 strokes.



3 Swing Gear

3-1 Check/filler port and drain port



3-2 Check/greasing

- Lower the bucket to the ground and stop the engine.
- 2. Remove the center cover.
- Remove the filler port cover on the upper machine side. Check if grease is supplied enough on the swing gear.

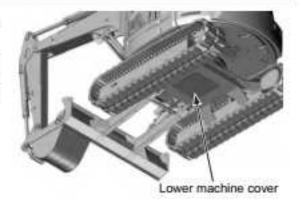
If grease is insufficient on the tooth, supply grease with about 0.5kg as standard.



Interval for checking/greasing: 500 hours

 If grease is whitish due to the mixed water or mud, replace the total volume of grease with new one.
 Remove the lower machine cover and the drain port cover and drain away the old grease. Attach the drain port cover again and supply new grease from the filler port.

Total grease volume: 17kg

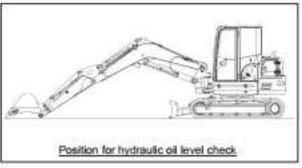


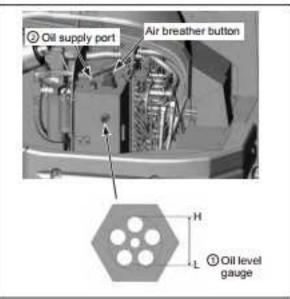


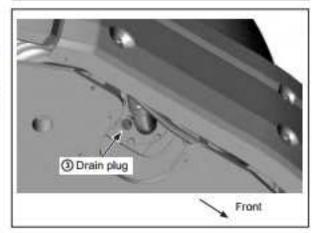
 After swinging a few times, make sure that grease is fully supplied to the swing gear. Then, attach the lower machine cover and the filler port cover on the upper machine. 1 Hydraulic oil volume check/refilling

⚠ CAUTION

- 1 Do not run the machine if the hydraulic oil is below the "L" level.
- If the hydraulic oil is refilled exceeding the "H" level, loosen drain plug (3) and discharge the extra oil.
- (1) Put the machine on a flat location, ground the blade, fully retract the arm and bucket cylinders, lower the boom and ground the bucket, and stop the engine.
- (2) Check oil level gauge ①. The oil level should be between H and L. Since the oil level varies depending on the oil temperature, the following should be used for reference:
 - Near the L level before running (oil temperature 10 to 30°C)
 - Near the H level during running (oil temperature 50 to 80°C)
- (3) If the hydraulic oil is below the L level, refill the hydraulic oil from the oil supply port ②. Before removing the oil supply port ②, press the air breather button and relieve the pressure.







Hydraulic oil replacement and strainer cleaning

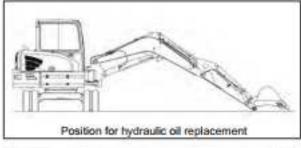
⚠ CAUTION

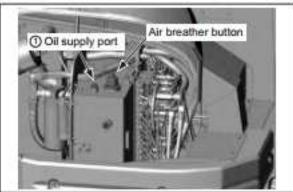
- Oil is hot immediately after movement. Touching may result in a burn. Start the work after oil is cooled down.
- Be sure to perform the work after the pressurized air in the hydraulic oil tank is relieved.
- Swing to the side to access the drain plug on the hydraulic oil tank will be on the middle between the right and left crawlers.
- Fully retract the arm and bucket cylinders, lower the boom, and ground the bucket.
- (3) Ground the blade and stop the engine.
- (4) Loosen the oil supply plug ① slowly. As relieving the pressure from the hydraulic oil tank, remove the oil supply plug ①.
- (5) Put an oil receiving container below the drain plug on the bottom of the hydraulic oil tank, remove drain plug ②, and discharge the oil. After discharging, tighten drain plug ②.
- (6) Remove the hose ③, loosen the bolt ③ and remove the strainer cover ⑤.
- Remove dust from strainer (a), clean the strainer, and assemble it.
- (8) Fasten strainer cover

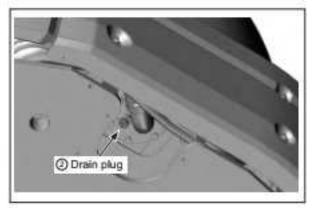
 with bolt

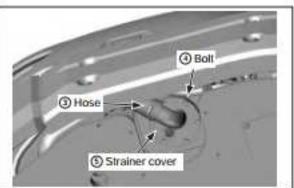
 and attach hose

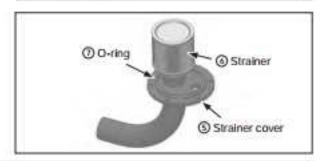
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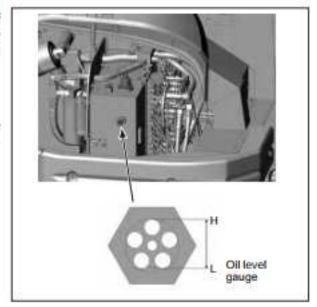








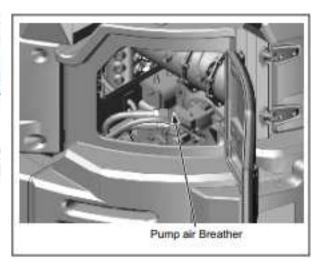
- (9) Supply the specified volume of hydraulic oil from the oil supply port. Be sure that the hydraulic oil is between H and L on level gauge.
- (10) Breathe air from the hydraulic pump. Loosen the air Breather. Make sure that air is removed from the plug hole and oil comes out.



⚠ IMPORTANT

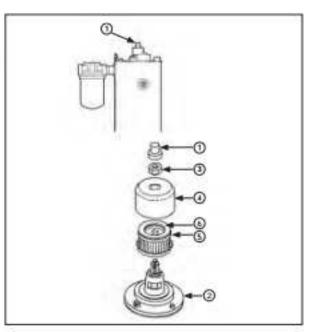
Unless air is exhausted, seizure may occur on the hydraulic pump. When replacing the hydraulic oil or hydraulic pump, be sure to exhaust air from the hydraulic pump.

(11) Run the engine for a few minutes in low idling. Then, check the oil level in the level check position. If the oil is insufficient, refill.



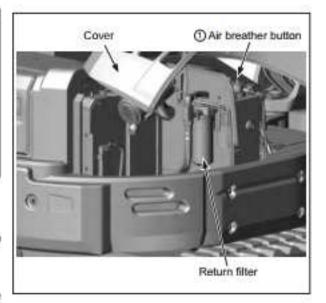
3 Air breather element replacement

- Press the air breather button ① on the top of the hydraulic oil tank to exhaust air from the tank.
- (2) Remove the button, nut ③ and cover ④ from the body ②.
- (3) Remove the filter element (5).
- (4) Put the packing (a) on the new element. Then, mount the new element to the body.
- (5) Attach the cover, nut and button.



A CAUTION

- Oil is not immediately after movement. Start the work after the oil is cooled down.
- The hydraulic oil tank is pressurized with air. Removing the filter cartridge immediately will cause the oil to jet out and it is dangerous, so be sure to stop the engine, press the air breather button and relieve the internal pressure before removal.
- Put the Attachment on the ground and stop the engine.
- (2) Press the air breather button ① to relieve the internal air in the tank.
- (3) With a filter wrench, turn filter cartridge ② counterclockwise and remove it.
- (4) Thinly coat the hydraulic oil to the O-ring ③ of the new cartridge and tighten it with a filter wrench.
- (5) Start the engine and make sure that oil does not leak

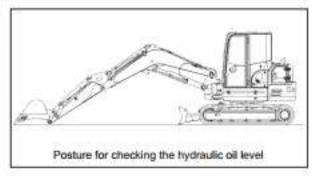


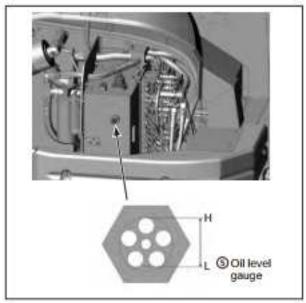


(6) Put the work machine in the oil level check posture and check the level.

The oil should be between "H" and "L" on the level gauge (s).

If the oil is not sufficient, replenish the hydraulic oil.





Oil level check/refilling

A CAUTION

The gear case, oil, etc. are hot immediately after the stop of driving.

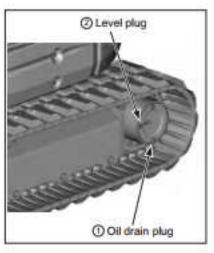
Start the work after they are cooled down.

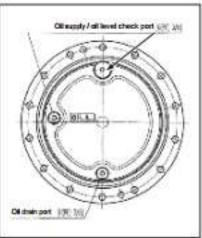
- (1) Set oil drain plug (1) at the lowest position and stop the engine.
- (2) Put an oil receiving container below level plug 2.
- (3) With a hexagonal wrench, remove level plug ②. If the oil is on the lower edge of the plug hole, the oil volume is appropriate.
- (4) If the oil is not sufficient, replenish the oil until it spills out of the level hole.
- (5) Clean the removed plugs and then attach them.

2 Oil replacement

- Set the oil drain plug ① at the lowest position and stop the engine.
- (2) Put an oil receiving container below oil drain plug ①.
- (3) With a hexagonal wrench, remove level plug ② and oil drain plug ①.
- (4) Clean the oil drain plug (1) and attach it.
- (5) Refill with oil from the level hole until oil spills out of the level hole.
- (6) Clean the removed plug and then attach it.

For the oil type/amount, refer to "A2-07".





⚠ WARNING

- Combustible hydrogen gas is generated from the battery. Since ignition or explosion may be caused, never put fire close nor generate spark.
- Never put metal materials such as tools and combustible materials on or near the battery. Shortcircuiting will result in ignition or explosion.
- The battery liquid (diluted sulfuric acid) may cause blindness or burns. If it adheres on your eye, skin, or clothes, wash and remove it immediately with a large amount of water and accept medical treatment.
- When handling the battery, be sure to put on protection glasses.
- While the engine is rotating, never remove the battery cable.

Battery liquid refilling

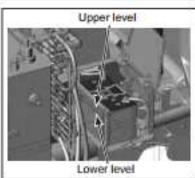
If you check the indicator and <LIQUID INSUFFICIENT> is indicated, or if you check the liquid level on the side of the battery and the liquid level is about to reach LOWER LEVEL, be sure to remove the cap on each cell and refill with the liquid to UPPER LEVEL. Do not refill exceeding UPPER LEVEL.

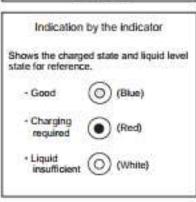
Battery terminal cleaning

⚠ IMPORTANT

- Be sure to stop the engine before starting the work.
- During work, be careful not to cause shortcircuiting of the ⊕ and ⊖ connectors on the battery with tools, etc.
- When removing battery connectors from the terminal, remove the
 ⊖ connector first.
 When attaching, attach the
 ⊖ connector last.
- Tighten securely so that looseness will not occur on the terminal side.
- Remove dirt or corrosion from the terminal. (If white powder is deposited on the terminal as a result of corrosion, dip cloth into warm water and then use the cloth to wipe the white powder off.)
- (2) If excessive corrosion exists on the terminal, remove the terminal and polish it with wire brush and sandpaper.
- (3) After cleaning and tightening, thinly coat grease on the terminal.



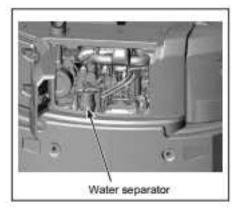




Check and Clean Water Separator and Replace Element

⚠ CAUTION

- Perform this work after each part of the engine is cooled down.
- Do not put fire close.
- Since spilled light oil may result in fire disasters, wipe it off carefully.



Check and Discharging Water

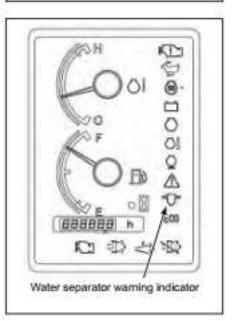
When the water separator warning indicator on the OK monitor turns on, the water separator contains the specified amount of water.

Discharge the water.

- Close the fuel cock ②.
- Loosen the drain plug (3) to discharge water and foreign matters to the container.
- 3. Close the drain plug.
- 4. Open the fuel cock as before.
- 5. Turn key on (no start engine).
- Discharge air from the water separator.
- 7. Make sure that no fuel leaks.

Cleaning and Replacing

- Close the fuel cock ②.
- Disconnect the wiring connector.
- Open the drain plug 3 to discharge water and foreign matters to the container.
- Turn the cup (4) counterclockwise to detach it.
- Discharge water and sediment from inside of the cup into the container.
- Clean the element ① and inside of the cup completely with fresh fuel. Replace the element if it is flawed or damaged.
- Attach the element and O-ring to the body.If the O-ring is damaged, replace it with a new one.
- Turn the cup clockwise to attach it to the body. Be sure to tighten it by hand.
- 9. Close the drain plug.
- 10. Connect the wiring connector.
- 11. Open the fuel cock as before.
- 12. Discharge air from the water separator.
- 13. Make sure that no fuel leaks.



Fuel filter cartridge replacement

⚠ CAUTION

- Perform this work after each part of the engine is cooled down.
- · Do not put fire close.
- Since spilled light oil may result in fire disasters, wipe it off carefully.

▲ IMPORTANT

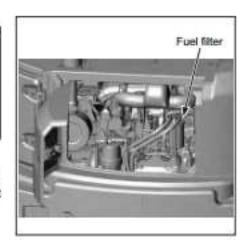
Do not tighten filter cartridge ① too much. Over-tightening may result in element damages.

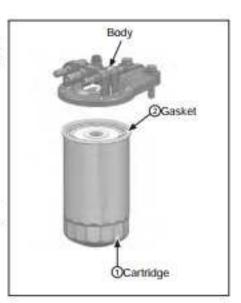
- Put the Attachment on the ground and stop the engine.
- (2) With a filter wrench, turn filter cartridge ① counterclockwise and remove it.
- (3) When attaching a filter cartridge, thinly coat the engine oil on the gasket of filter cartridge ①. After gasket ② contacts the seal surface, tighten by 3/4 to 1 turn.
- (4) After attaching, purge air.

Air purging method

If the cartridge is replaced or the fuel tank is emptied, air comes in the circuit and the fuel does not flow. Therefore, air purging is required.

- (1) Fill the fuel tank with the fuel.
- (2) Fill the cartridge with the fuel.
- (3) Turn the starter switch key to "Start" (ON) and leave it for approximately 20 seconds.
- (4) The automatic air purge unit purges air automatically and allows the engine to be started.



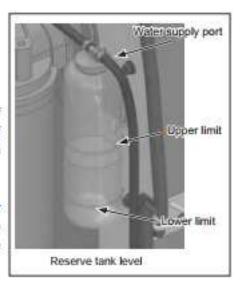


Check/refilling

⚠ WARNING

In normal cases, do not open the radiator cap. Check the coolant with the reservoir tank only if the engine is cold.

- (1) Open the engine cover and check to see if the level of coolant in the reserve tank is between FULL and LOW. If the level is lower, refill with coolant to the FULL level from the water supply port of the reserve tank.
- (2) If the reserve tank is empty, stop the engine and check for water leak and check the water level in the radiator. If the level is lower, refill the radiator and reserve tank with the coolant.



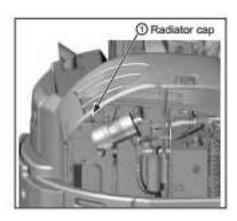
Replacement

A CAUTION

- Immediately after the engine is stopped, the coolant is hot.
 Draining the coolant immediately may result in a burn.
 Drain the coolant after the engine is cooled down.
- If the water temperature in the radiator is high, do not remove the cap.

After the water is cooled down, turn the cap slowly to relieve the pressure from the radiator and then remove the cap.

- Put the attachment on the ground and stop the engine.
- Remove radiator cap 3.

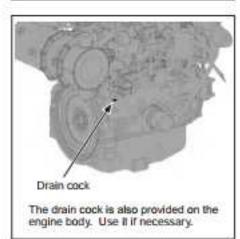


- (3) Remove the cover ②. Open drain cock ③ on the bottom of the radiator to drain water.
- (4) Close drain cock ③. Put in service water and radiator cleaner. Run the engine for approximately 10 minutes at a slightly higher rotation than low idling.
- (5) Stop the engine and open drain cock (3) to drain water.
- (6) After water is drained, close drain cock (3) to supply service water.
- (7) Open drain cock (3) and set the engine to low idling. While adjusting the supplied water volume so that the radiator will always be full of water, perform washing with water for 10 minutes.
- (8) Close drain cock ③ and fill with the coolant consisting of the service water and long-life coolant to the lower edge of the radiator water supply port.
- (9) Run the engine for 5 minutes in low idling and then stop it. The water level drops because the internal air is purged. Refill with the coolant to near the water supply port and close the cap.
- (10) Drain the coolant from reserve tank ①. Wash the inside of the tank. Fill with the coolant consisting of the service water and long-life coolant to the FULL mark.







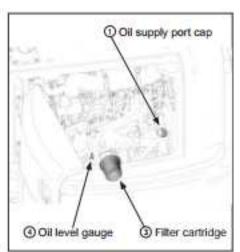


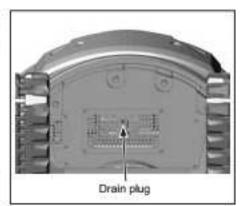
Engine oil volume check/refilling

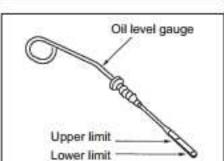
- Remove the oil level gauge and wipe it with dry cloth.
 Then, fully insert it and remove it calmly.
- (2) If the level is between the upper and lower limits on the level gauge, the oil volume is appropriate. If the oil does not reach the lower limit, refill with the engine oil from the oil supply port.
- (3) If the oil is above the upper limit, remove the extra volume from the drain plug and check the oil level again.

A IMPORTANT

- Before check, set the machine horizontal.
- To check after the engine is started, start checking at least 10 minutes after the engine stops.
- Do not start the engine if the oil level is above the upper limit or below the lower limit.







Engine oil and oil filter replacement

A CAUTION

Oil is not and a burn may occur immediately after movement. Start the work after the oil is cooled down.

Engine oil draining

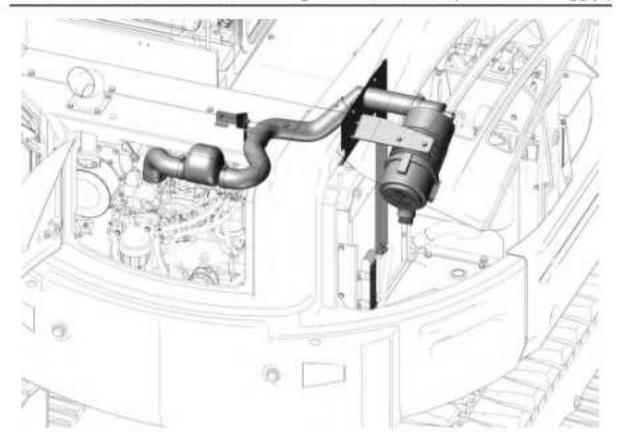
- (1) Stop the engine.
- (2) Put a drain oil receiver below drain plug ② of the engine.
- (3) Clean around oil supply port cap ① so that foreign matters will not come in. Then, remove oil supply port cap ①.
- (4) Remove drain plug ② slowly so that oil will not splash, for oil draining.
- (5) Check the drained oil. If the drained oil has much metal powder or foreign matters, it is necessary to overhaul the engine. (Refer to the engine service manual.)

Filter cartridge replacement

- With a filter wrench, turn filter cartridge ③ counterclockwise and remove it.
- (2) Remove dust, etc. from the cartridge mounting surface.
- (3) Thinly coat the engine oil on the gasket of the new cartridge.
- (4) Screw in the cartridge by hand. After the gasket contacts the seal surface, tighten by approximately 3/4 turn with a filter wrench.

Engine oil refilling

- (1) Attach drain plug (3).
- (2) From oil supply port ①, refill with the engine oil to the level between the upper limit and lower limit on level gauge ④.
- (3) Run the engine in idling for several minutes then stop it. Check the engine oil volume 10 to 20 minutes later. If the volume is insufficient, refill with the engine oil to the specified level.



A CAUTION

- Be sure to clean/replace the air cleaner after the engine stops. If this work is done while the engine is rotating, dust is absorbed and the engine may be damaged.
- When cleaning the element using the compressed air, put on protection glasses because dust may enter your eyes and it is dangerous.

⚠ IMPORTANT

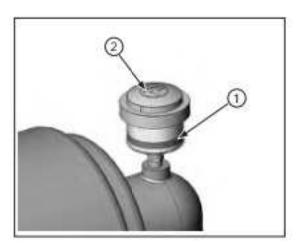
- If the element is dirty with oily smoke, soot, oil, etc., replace with a new element regardless of the replacement cycle.
- · Do not hit, knock, or drop the element.
- If it is found in daily check that the dust indicator lamp is lit, clean or replace the element regardless of the maintenance cycle.

Cleaning: Every 250 hours or when the dust indicator lamp is lit.

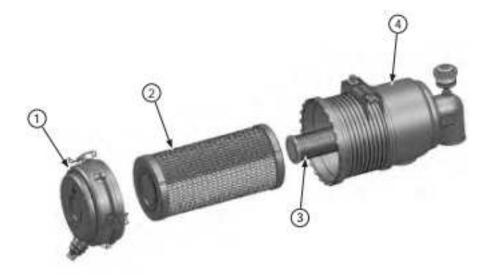
Replacement: When the air cleaner has been cleaned up to five times or when one year has passed since the last replacement or when the dust indicator lamp is lit right after cleaning.

1 Dust indicator check

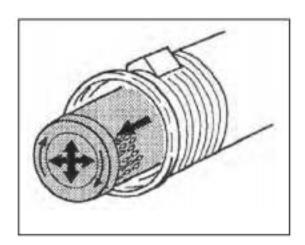
- (1) Check to see if the red signal is emitted from dust indicator in the air cleaner suction pipe.
- (2) If the red signal is emitted, clean or replace the element immediately.
- (3) After the element is cleaned or replaced, press the reset button on dust indicator to reset the red signal.



2 Air cleaner element cleaning

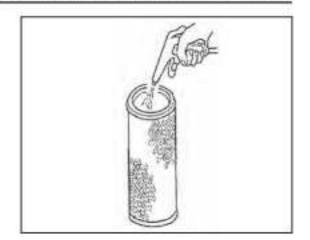


- (1) Stop the engine.
- (2) Remove the cover ① and take out the outer element ②. Don't remove the inner element ③. The inner element will not be cleaned and reused.
- (3) To remove the outer element, move the its edge up and down and right and left or turn it. Gradually pull out the element not to disperse dust.

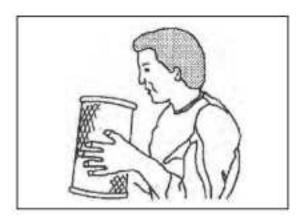


(4) Clean the inside of the cover and body 3.

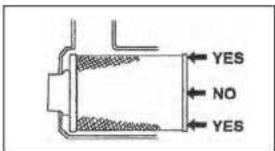
(5) From the inside of the element, blow the dry compressed air (0.29 - 0.49 MPa) in the vertical direction along the fold of the filter paper. Then, blow the air from the outside and then blow from the inside again to remove dust from the surface.



(6) With a light spotted from the inside of the element, check the filter paper. If the filter paper is broken, the paper has pin holes (particularly thin parts), or the packing is broken, replacement is required.



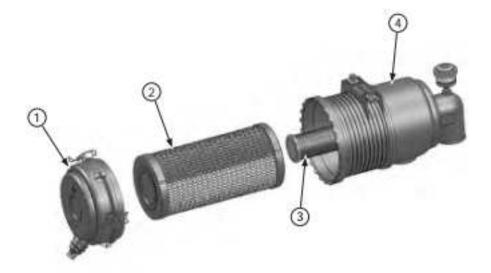
(7) After cleaning is completed, attach element. Push not the edge center but the edge outer circumference of the element securely to attach it.



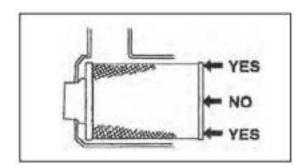
(8) With the arrow (†) on cover ① facing up, attach the cover and fasten it with the clamp.



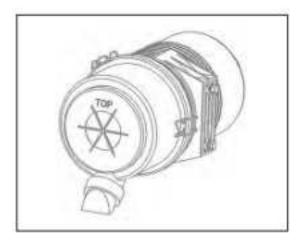
3 Air cleaner element replacement



- (1) Stop the engine.
- (2) Remove the cover ①. Take out the outer element ② and inner element ③.
- (3) Clean the inside of the cover and body ①.
- (4) Attach the new inner and outer elements in turn. Push not the edge center but the edge outer circumference of the element securely to attach it.



(5) With the arrow (†) on cover ① facing up, attach the cover and fasten it with the clamp.

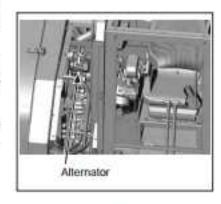


A CAUTION

- Perform this work after each part of the engine is cooled down.
- · Stop the engine and remove the starter switch key.

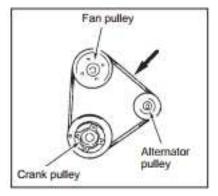
▲ IMPORTANT

- If the belt is excessively tensed, the bearing or belt will be damaged earlier than usual.
- If the elongated belt does not have the adjusting allowance or if the belt has a cut or crack, replace it.
- After you have replaced the belt, run the engine at high speed for 30 minutes. Then, check and adjust the belt tension.



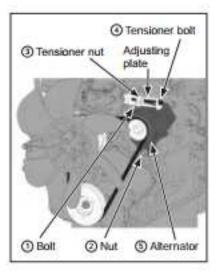
Check

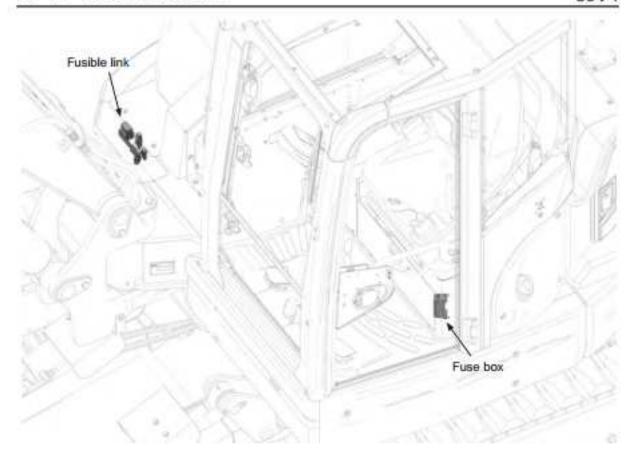
- Open the tank cover. Remove the bolts and then remove the check port cover so that you can see the alternator.
- (2) Press the middle position between the fan pulley and alternator with your thumb (approximately 98 N). A deflection of approximately 10 mm is appropriate.
- (3) If the belt has flaws or cracks, replace the belt.



Adjustment

- (1) Loosen bolt (1) and nut (2).
- (2) Adjust tensioner nut ③ and tensioner bolt ④ to move alternator ⑤ so that the belt tension will result in a deflection of approximately 10 to 14mm (98 N).
- (3) Tighten bolt ①, nut ②, tensioner nut ③ and tensioner bolt ④.
- (4) If the belt is elongated and there is no more adjusting allowance, replace the belt.





- As the cause of melting of the fuse or fusible link, circuit short-circuiting, component damages, etc.
 are considered. Detect the cause, make repair, and replace the fuse.
- Before replacing the fuse, be sure to set the starter switch to the stop (OFF) position.
- Be sure to install the fuse and fusible link with the specified capacities. Never use steel wire, wrapping foil, etc.

Contents

		· aga
1	Fuse replacement	P2
2	Fusible link replacement	P5

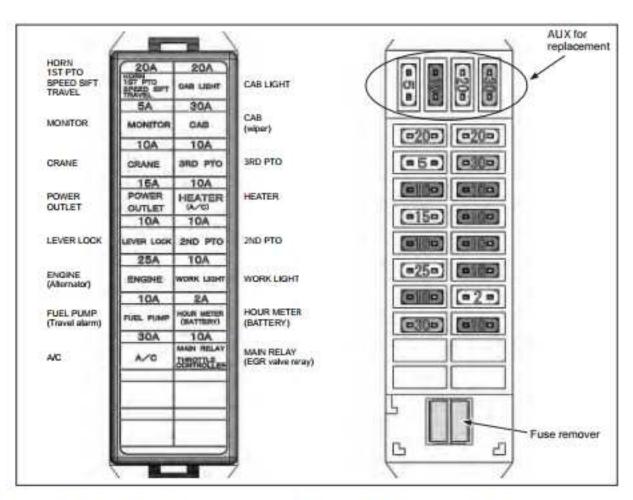
1 Fuse Replacement

- Before replacing the fuse, be sure to set the starter switch to the stop (OFF) position.
- Don't use steel wire, wrapping foil, etc. instead of fuse. The wire may be overheated or burned to cause a fire.
- When the fuse has blown out right after replacement, it is probable that the harness or component malfunctions (e.g. short-circuiting).
 Find out the cause and repair the trouble part at once.



Fuse box

1-1 Components supported by fuses



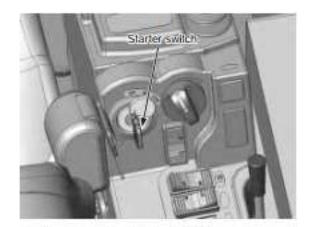
Search for the inactive component in the correspondence table on the cover to find out the relevant fuse.

Fuse 5A Brownish-red Part No. 083010712 2A Gray Part No. 083010711 10A Red 15A Blue Part No. 083010706 Part No. 083010707 20A Yellow 25A Water-clear Part No. 083010708 Part No. 0B3010709 30A Green Part No. 083010710

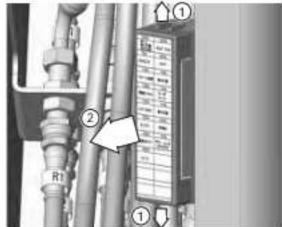
1-2 Replacement

Make sure that the starter switch is at the stop (OFF) position.

(The key is perpendicular to the forward direction.)



Unlock the latch of the fuse box cover. Pull the cover forward and remove it.



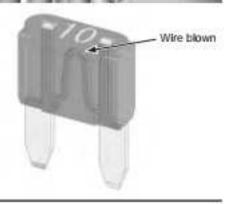
With a fuse remover, take off the fuse of the problem component.



Check the fuse for wire blown.

If there is not wire break, it is probable that the harness or component malfunctions (e.g. short-circuiting). Find out the cause and repair the trouble part at once.

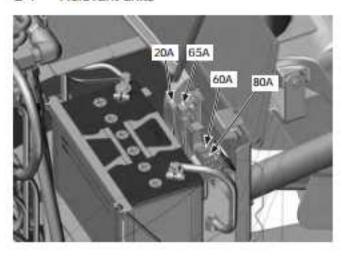
Replace the blown fuse with a new one of the same capacity. (If you use the auxiliary fuse, supply a new auxiliary fuse.)



2 Fusible link replacement

If you set the starter switch to "Start" (ON) and the power is not turned on, it is probable that the fusible link on the circuit from battery to starter switch is broken by an accident (e.g. short-circuiting of circuit). Remove the fusible link and check it. If the fusible link has blown out, repair the problem part and replace the fusible link.

2-1 Relevant units

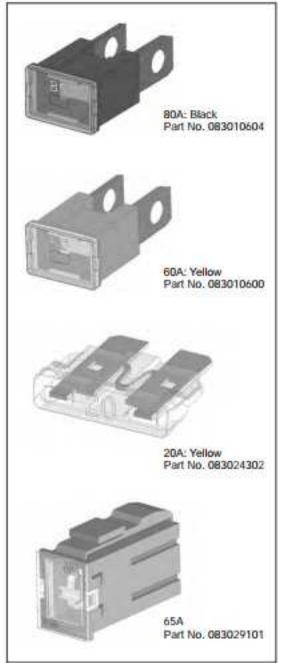


80A: For glow plug 60A: For starter motor

20A: For ECU

65A: For others except the above-mentioned devices

Refer to "A5-02: Electrical Wiring Diagram/Wire Harness" for details.

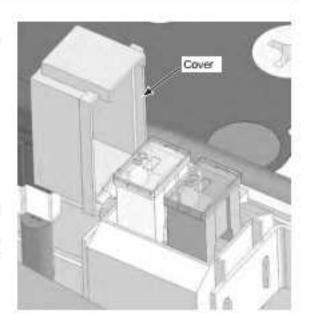


2-2 Replacement: 80A/60A

80A/60A is placed in a case. To remove the 80A/60A fusible link, open the case cover and pull it upward.

Check for wire break from the window on the fusible link end surface.

If wire break has occurred, repair the problem part and then replace the fusible link with a new one.

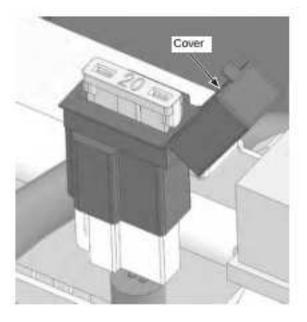


2-3 Replacement: 20A

20A is placed in a case. To remove the 20A fusible link, open the case cover and pull it upward.

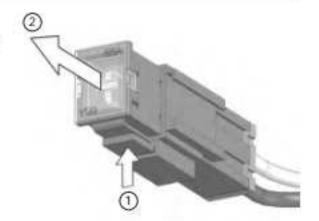
Check for wire break from the window on the fusible link end surface.

If wire break has occurred, repair the problem part and then replace the fusible link with a new one.



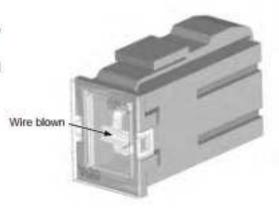
2-4 Replacement: 65A

Push in the lock of the fusible link (①) and pull it up (②). The fusible link can be removed.



Check for wire blown from the window on the fusible link end surface.

If wire break has occurred, repair the problem part and replace the fusible link with a new one.



A CAUTION

- When checking the engine and when handling the compressed air or high-pressure water, be sure to wear the eye protection tools. Your eyes may be injured by dust, dispersed substance, compressed air, high-pressure water or steam.
- Unless you can observe this caution, tiny injury may be caused.
- Blow off dust from the fin with the compressed air (200kPa or less).
 - Be careful not to damage the fin with the compressed air.
- When there is a lot of dust on the fin, use a cleaner and tap water to clean the fin.



IMPORTANT

Use high-pressure water and compressed air with as low pressure as possible (200kPa). Don't use a wire brush to clean the fin. The fin will be damaged.