

SHOP MANUAL

KOMATSU

PW160-7H

MACHINE MODEL
PW160-7H

SERIAL NUMBER
H50051 AND UP

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- PW160-7H mount the SAA4D102E-2 engine. For details of the engine, see the 102 Series Engine Shop Manual.

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SAFETY

SAFETY NOTICE

IMPORTANT SAFETY NOTICE

Proper service and repair is extremely important for the safe operation of your machine. The service and repair techniques recommended and described in this manual are both effective and safe methods of operation. Some of these operations require the use of tools specially designed for the purpose.

To prevent injury to workers, the symbol  is used to mark safety precautions in this manual. The cautions accompanying these symbols should always be followed carefully. If any dangerous situation arises or may possibly arise, first consider safety, and take the necessary actions to deal with the situation.

GENERAL PRECAUTIONS

Mistakes in operation are extremely dangerous. Read the OPERATION & MAINTENANCE MANUAL carefully BEFORE operating the machine.

1. Before carrying out any greasing or repairs, read all the precautions given on the decals which are fixed to the machine.
2. When carrying out any operation, always wear safety shoes and helmet. Do not wear loose work clothes, or clothes with buttons missing.
- Always wear safety glasses when hitting parts with a hammer.
- Always wear safety glasses when grinding parts with a grinder, etc.
3. If welding repairs are needed, always have a trained, experienced welder carry out the work. When carrying out welding work, always wear welding gloves, apron, glasses, cap and other clothes suited for welding work.
4. When carrying out any operation with two or more workers, always agree on the operating procedure before starting. Always inform your fellow workers before starting any step of the operation. Before starting work, hang UNDER REPAIR signs on the controls in the operator's compartment.
5. Keep all tools in good condition and learn the correct way to use them.
6. Decide a place in the repair workshop to keep tools and removed parts. Always keep the tools and parts in their correct places. Always keep the work area clean and make sure that there is no dirt or oil on the floor. Smoke only in the areas provided for smoking. Never smoke while working.

PREPARATIONS FOR WORK

1. Before adding oil or making repairs, park the machine on hard, level ground, and block the wheels or tracks to prevent the machine from moving.
2. Before starting work, lower blade, ripper, bucket or any other work equipment to the ground. If this is not possible, insert the safety pin or use blocks to prevent the work equipment from falling. In addition, be sure to lock all the control levers and hang warning signs on them.
3. When disassembling or assembling, support the machine with blocks, jacks or stands before starting work.
4. Remove all mud and oil from the steps or other places used to get on and off the machine. Always use the handrails, ladders or steps when getting on or off the machine. Never jump on or off the machine. If it is impossible to use the handrails, ladders or steps, use a stand to provide safe footing.

PRECAUTIONS DURING WORK

1. When removing the oil filler cap, drain plug or hydraulic pressure measuring plugs, loosen them slowly to prevent the oil from spouting out. Before disconnecting or removing components of the oil, water or air circuits, first remove the pressure completely from the circuit.
2. The water and oil in the circuits are hot when the engine is stopped, so be careful not to get burned. Wait for the oil and water to cool before carrying out any work on the oil or water circuits.
3. Before starting work, remove the leads from the battery. **ALWAYS** remove the lead from the negative (-) terminal first.
4. When raising heavy components, use a hoist or crane. Check that the wire rope, chains and hooks are free from damage. Always use lifting equipment which has ample capacity. Install the lifting equipment at the correct places. Use a hoist or crane and operate slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
5. When removing covers which are under internal pressure or under pressure from a spring, always leave two bolts in position on opposite sides. Slowly release the pressure, then slowly loosen the bolts to remove.
6. When removing components, be careful not to break or damage the wiring. Damaged wiring may cause electrical fires.
7. When removing piping, stop the fuel or oil from spilling out. If any fuel or oil drips on to the floor, wipe it up immediately. Fuel or oil on the floor can cause you to slip, or can even start fires.
8. As a general rule, do not use gasoline to wash parts. In particular, use only the minimum of gasoline when washing electrical parts.
9. Be sure to assemble all parts again in their original places. Replace any damaged part with new parts.
- When installing hoses and wires, be sure that they will not be damaged by contact with other parts when the machine is being operated.
10. When installing high pressure hoses, make sure that they are not twisted. Damaged tubes are dangerous, so be extremely careful when installing tubes for high pressure circuits. Also check that connecting parts are correctly installed.
11. When assembling or installing parts, always use the specified tightening torques. When installing protective parts such as guards, or parts which vibrate violently or rotate at high speed, be particularly careful to check that they are installed correctly.
12. When aligning two holes, never insert your fingers or hand. Be careful not to get your fingers caught in a hole.
13. When measuring hydraulic pressure, check that the measuring tool is correctly assembled before taking any measurements.
14. Take care when removing or installing the tracks of track-type machines. When removing the track, the track separates suddenly, so never let anyone stand at either end of the track.

GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following sections. These sections are further divided into each main group of components.

GENERAL

This section lists the general machine dimensions, performance specifications, component weights, and fuel, coolant and lubricant specification charts.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.

TESTING, ADJUSTING AND TROUBLESHOOTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs. Troubleshooting charts correlating "Problems" to "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the order to be followed when removing, installing, disassembling or assembling each component, as well as precautions to be taken for these operations.

MAINTENANCE STANDARD

This section gives the judgement standards when inspecting disassembled parts.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Contact your distributor for the latest information.

HOW TO READ THE SHOP MANUAL

VOLUMES

Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model

Engine volume: Issued for each engine series

Electrical volume: Each issued as one to cover all models

Attachment volume: Each issued as one to cover all models

These various volumes are designed to avoid duplication of information. Therefore to deal with all repairs for any model, it is necessary that chassis, engine, electrical and attachment be available.

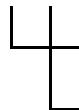
DISTRIBUTION AND UPDATING

Any additions, amendments or other changes will be sent to your distributors. Get the most up-to-date information before you start any work.

FILING METHOD

1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number:
Example:

10 - 3



Item number (10. Structure and Function)
Consecutive page number for each item

3. Additional pages: Additional pages are indicated by a hyphen (-) and numbered after the page number. File as in the example.

Example:

10-4

10-4-1



Added pages

10-4-2

10-5

REVISED EDITION MARK

When a manual is revised, an edition mark (①②③...) is recorded on the bottom outside corner of the pages.

REVISIONS

Revised pages are shown at the LIST OF REVISED PAGES between the title page and SAFETY page.

SYMBOLS

So that the shop manual can be of ample practical use, important places for safety and quality are marked with the following symbols.

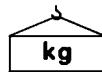
| Symbol | Item | Remarks |
|--------|-------------------|---|
| | Safety | Special safety precautions are necessary when performing the work. |
| | Caution | Special technical precautions or other precautions for preserving standards are necessary when performing the work. |
| | Weight | Weight of parts or systems. Caution necessary when selecting hoisting wire or when working posture is important, etc. |
| | Tightening torque | Places that require special attention for tightening torque during assembly. |
| | Coat | Places to be coated with adhesives and lubricants etc. |
| | Oil, water | Places where oil, water or fuel must be added, and the capacity. |
| | Drain | Places where oil or water must be drained, and quantity to be drained. |

HOISTING INSTRUCTIONS

HOISTING



WARNING! Heavy parts (25 kg or more) must be lifted with a hoist etc. In the **DISASSEMBLY AND ASSEMBLY** section, every part weighing 25 kg or more is indicated clearly with the symbol



- If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:
 1. Check for removal of all bolts fastening the part to the relative parts.
 2. Check for existence of another part causing interface with the part to be removed.

WIRE ROPES

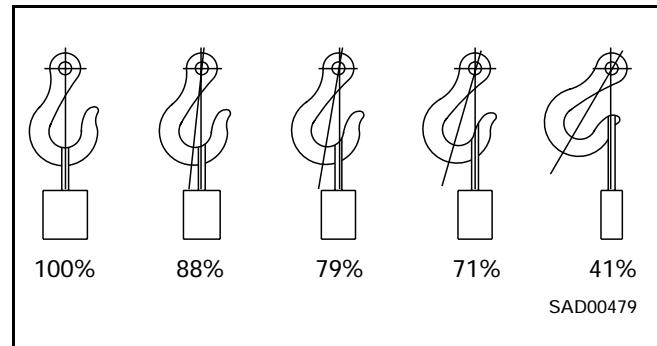
1. Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

Wire ropes
(Standard "Z" or "S" twist ropes without galvanizing)

| Rope diameter | Allowable load | |
|---------------|----------------|------|
| mm | kN | tons |
| 10 | 9.8 | 1.0 |
| 11.2 | 13.7 | 1.4 |
| 12.5 | 15.7 | 1.6 |
| 14 | 21.6 | 2.2 |
| 16 | 27.5 | 2.8 |
| 18 | 35.3 | 3.6 |
| 20 | 43.1 | 4.4 |
| 22.4 | 54.9 | 5.6 |
| 30 | 98.1 | 10.0 |
| 40 | 176.5 | 18.0 |
| 50 | 274.6 | 28.0 |
| 60 | 392.2 | 40.0 |

★ The allowable load value is estimated to be 1/6 or 1/7 of the breaking strength of the rope used.

2. Sling wire ropes from the middle portion of the hook. Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.

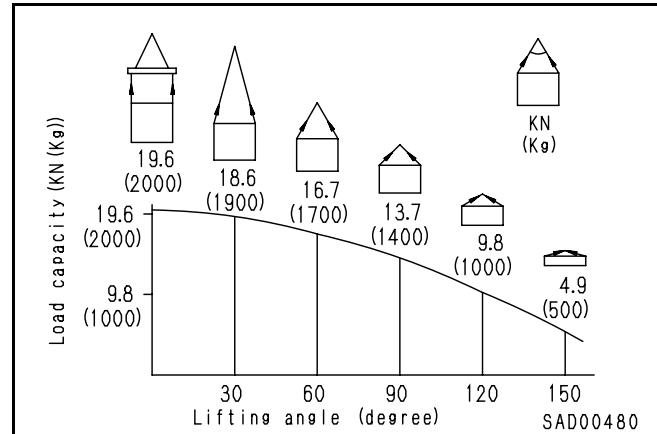


3. Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound on to the load.



WARNING! Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident

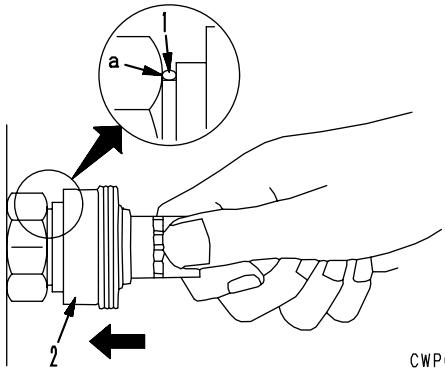
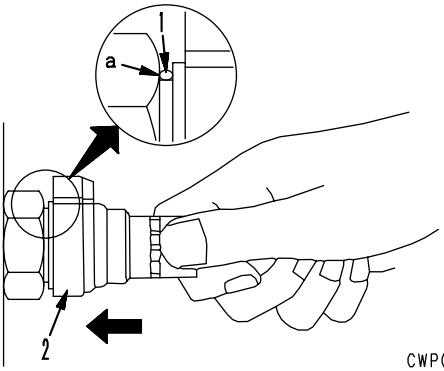
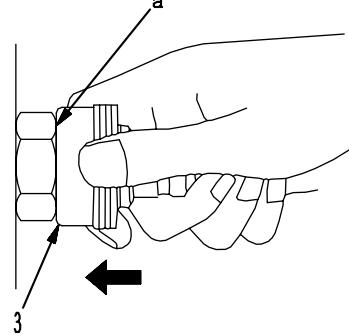
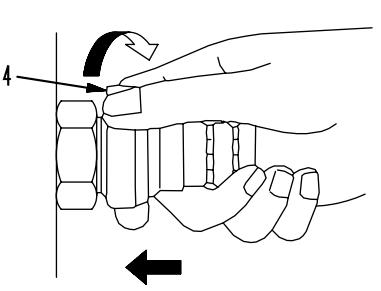
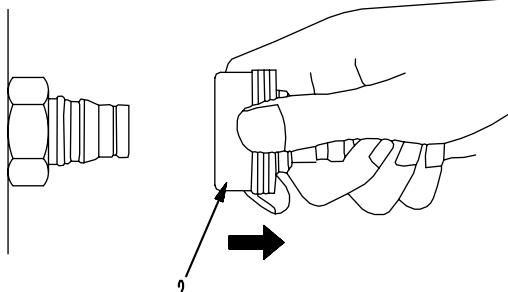
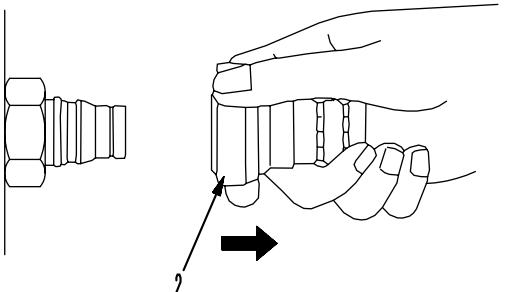
4. Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles. When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subject to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°

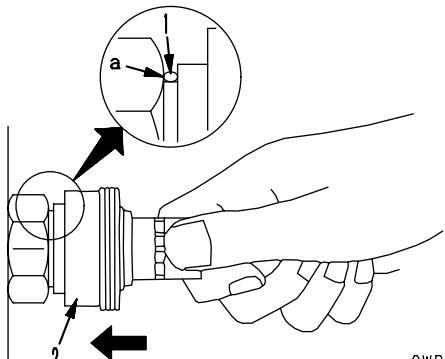
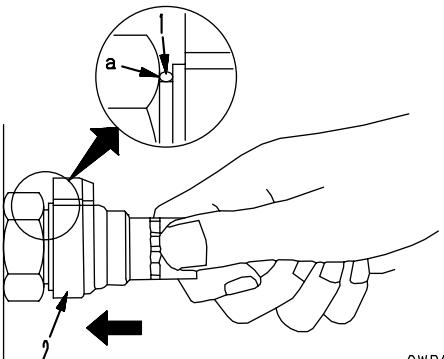


PUSH-PULL TYPE COUPLERS

★ There are 2 types of push-pull type couplers. The method of connecting and disconnecting are different,

so see the table below when connecting and disconnecting the coupler.

| | Type 1 | Type 2 |
|---------------|---|--|
| Disconnecting | <p>1. Hold the mouthpiece of the tightening portion. Push the body (2) in straight until the sliding prevention ring (1) contacts the surface (a) of the hexagonal portion at the male end.</p>  <p>CWP06391</p> | <p>1. Hold the mouthpiece of the tightening portion. Push the body (2) in straight until the sliding prevention ring (1) contacts the surface (a) of the hexagonal portion at the male end.</p>  <p>CWP06392</p> |
| | <p>2. Hold in the condition in Step 1. Push in until the cover (3) contacts the surface (a) of the hexagonal portion at the male end.</p>  <p>CWP06393</p> | <p>2. Hold in the condition in Step 1. Turn lever (4) clockwise.</p>  <p>CWP06394</p> |
| | <p>3. Hold in the condition in Steps 1 and 2. Pull out entire body (2) to disconnect it.</p>  <p>CWP06395</p> | <p>3. Hold in the condition in Steps 1 and 2. Pull out entire body (2) to disconnect it.</p>  <p>CWP06396</p> |

| | Type 1 | Type 2 |
|------------|---|--|
| Connection | <ul style="list-style-type: none">Hold the mouthpiece of the tightening portion. Push body (2) in straight until sliding prevention ring (1) contacts the contact surface (a) of the hexagonal portion at the male end to connect it.  <p>CWP06391</p> | <ul style="list-style-type: none">Hold the mouthpiece of the tightening portion. Push body (2) in straight until sliding prevention ring (1) contacts the contact surface (a) of the hexagonal portion at the male end to connect it.  <p>CWP06392</p> |

COATING MATERIALS

★ The recommended coating materials prescribed in the shop manuals are listed below.

| Category | Code | Part No. | Quantity | Container | Main applications, features |
|----------------|-----------------|---|--|------------------------|---|
| Adhesives | LT-1A | 790-129-9030 | 150 g | Tube | <ul style="list-style-type: none"> Used to prevent rubber gaskets, rubber cushions and cork plugs from coming out |
| | LT-1B | 790-129-9050 | 20 g (2 pes.) | Polyethylene container | <ul style="list-style-type: none"> Used in places requiring an immediately effective, strong adhesive. Used for plastics (except polyethylene, polypropylene, tetrafluoroethylene, and vinyl chloride), rubber, metal and non-metal. |
| | LT-2 | 09940-00030 | 50 g | Polyethylene container | <ul style="list-style-type: none"> Features: Resistance to heat, chemicals Used for anti-loosening and sealant purposes for bolts and plugs. |
| | LT-3 | 790-129-9060 (Set of adhesive and hardening agent) | Adhesive: 1 kg Hardening agent: 500 g | Can | <ul style="list-style-type: none"> Used as adhesive or sealant for metal, glass or plastic. |
| | LT-4 | 790-129-9040 | 250 g | Polyethylene container | <ul style="list-style-type: none"> Used as sealant for machined holes. |
| | Holtz MH 705 | 790-126-9120 | 75 g | Tube | <ul style="list-style-type: none"> Used as heat-resisting sealant for repairing engine. |
| | Three bond 1735 | 179-129-9140 | 50 g | Polyethylene container | <ul style="list-style-type: none"> Quick hardening type adhesive. Cure time: within 5 sec. to 3 min. Used mainly for adhesion of metals, rubbers, plastics and woods. |
| | Aron-alpha 201 | 790-129-9130 | 2 g | Polyethylene container | <ul style="list-style-type: none"> Quick hardening type adhesive. Quick cure type (max. strength after 30 minutes). Used mainly for adhesion of rubbers, plastics and metals. |
| | Loctite 648-50 | 79A-129-9110 | 50 cc | Polyethylene container | <ul style="list-style-type: none"> Features: Resistance to heat, chemicals Used at joint portions subject to high temperature. |
| Gasket sealant | LG-1 | 790-129-9010 | 200 g | Tube | <ul style="list-style-type: none"> Used as adhesive or sealant for gaskets and packing of power train case, etc. |
| | LG-3 | 790-129-9070 | 1 kg | Can | <ul style="list-style-type: none"> Features: Resistance to heat Used as sealant for flange surfaces and bolts at high temperature locations; used to prevent seizure. Used as sealant for heat resistant gasket for at high temperature locations such as engine pre-combustion chamber, exhaust pipe. |

| Category | Code | Part No. | Quantity | Container | Main applications, features |
|---------------------------------|---------------------------------|--|------------------------|------------------------|---|
| Gasket sealant | LG-4 | 790-129-9020 | 200 g | Tube | <ul style="list-style-type: none"> Features: Resistance to water, oil Used as sealant for flange surface, thread. Also possible to use as sealant for flanges with large clearance. Used as sealant for mating surfaces of final drive case, transmission case. |
| | LG-5 | 790-129-9080 | 1 kg | Polyethylene container | <ul style="list-style-type: none"> Used as sealant for various threads, pipe joints, flanges. Used as sealant for tapered plugs, elbows, nipples of hydraulic piping. |
| | LG-6 | 09940-00011 | 250 g | Tube | <ul style="list-style-type: none"> Features: Silicon based, resistant to heat, cold. Used as sealant for flange surface, thread. Used as sealant for oil pan, final drive case, etc. |
| | LG-7 | 09920-00150 | 150 g | Tube | <ul style="list-style-type: none"> Features: Silicon based, quick hardening type. Used as sealant for flywheel housing, intake manifold, oil pan, thermostat housing, etc. |
| | Three bond 1211 | 790-129-9090 | 100 g | Tube | <ul style="list-style-type: none"> Used as heat-resisting sealant for repairing engines. |
| Molybdenum disulphide lubricant | LM-G | 09940-00051 | 60 g | Can | <ul style="list-style-type: none"> Used as lubricant for sliding parts (to prevent squeaking). |
| | LM-P | 09940-00040 | 200 g | Tube | <ul style="list-style-type: none"> Used to prevent seizure or scuffing of the thread when press fitting or shrink fitting. Used as lubricant for linkage, bearings, etc. |
| Grease | G2-LI | SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA160CNLI | Various | Various | <ul style="list-style-type: none"> General purpose type |
| | G2-CA | SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYG2-160CNCA | Various | Various | <ul style="list-style-type: none"> Used for normal temperature, light load bearing at places in contact with water or steam. |
| | Molybdenum disulphide lubricant | SYG2-400M | 400 g (10 per case) | Belows type | <ul style="list-style-type: none"> Used for places with heavy load. |

STANDARD TIGHTENING TORQUE**STANDARD TIGHTENING TORQUE OF BOLTS AND NUTS**

The following charts give the standard tightening torques of bolts and nuts. Exceptions are given in DISASSEMBLY AND ASSEMBLY.

| Thread diameter of bolt | Width across flats |  |  |
|-------------------------|--------------------|--|---|
| mm | mm | Nm | kgm |
| 6 | 10 | 13.2 ± 1.4 | 1.35 ± 0.15 |
| 8 | 13 | 31.4 ± 2.9 | 3.20 ± 0.3 |
| 10 | 17 | 65.7 ± 6.8 | 6.70 ± 0.7 |
| 12 | 19 | 112 ± 9.8 | 11.5 ± 1.0 |
| 14 | 22 | 177 ± 19 | 18 ± 2.0 |
| 16 | 24 | 279 ± 29 | 28.5 ± 3 |
| 18 | 27 | 383 ± 39 | 39 ± 4 |
| 20 | 30 | 549 ± 58 | 56 ± 6 |
| 22 | 32 | 745 ± 78 | 76 ± 8 |
| 24 | 36 | 927 ± 98 | 94.5 ± 10 |
| 27 | 41 | 1320 ± 140 | 135 ± 15 |
| 30 | 46 | 1720 ± 190 | 175 ± 20 |
| 33 | 50 | 2210 ± 240 | 225 ± 25 |
| 36 | 55 | 2750 ± 290 | 280 ± 30 |
| 39 | 60 | 3280 ± 340 | 335 ± 35 |

| Thread diameter of bolt | Width across flats |  | CDL00373 |
|-------------------------|--------------------|---|-----------|
| mm | mm | Nm | kgm |
| 6 | 10 | 7.85 ± 1.95 | 0.8 ± 0.2 |
| 8 | 13 | 18.6 ± 4.9 | 1.9 ± 0.5 |
| 10 | 14 | 40.2 ± 5.9 | 4.1 ± 0.6 |
| 12 | 27 | 82.35 ± 7.85 | 8.4 ± 0.8 |

TIGHTENING TORQUE OF HOSE NUTS

Use these torques for hose nuts.

| Nominal No. | Thread diameter | Width across flat | Tightening torque | |
|-------------|-----------------|-------------------|-------------------|-----------|
| | mm | mm | Nm | kgm |
| 02 | 14 | 19 | 24.5 ± 4.9 | 2.5 ± 0.5 |
| 03 | 18 | 24 | 49 ± 19.6 | 5 ± 2 |
| 04 | 22 | 27 | 78.5 ± 19.6 | 8 ± 2 |
| 05 | 24 | 32 | 137.3 ± 29.4 | 14 ± 3 |
| 06 | 30 | 36 | 176.5 ± 29.4 | 18 ± 3 |
| 10 | 33 | 41 | 196.1 ± 49 | 20 ± 5 |
| 12 | 36 | 46 | 245.2 ± 49 | 25 ± 5 |
| 14 | 42 | 55 | 294.2 ± 49 | 30 ± 5 |

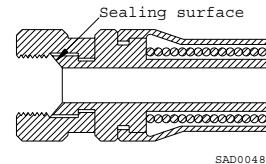
TIGHTENING TORQUE OF SPLIT FLANGE BOLTS

Use these torques for split flange bolts.

| Thread diameter | Width across flat | Tightening torque | |
|-----------------|-------------------|-------------------|-----------|
| mm | mm | Nm | kgm |
| 10 | 14 | 65.7 ± 6.8 | 6.7 ± 0.7 |
| 12 | 17 | 112 ± 9.8 | 11.5 ± 1 |
| 16 | 22 | 279 ± 29 | 28.5 ± 3 |

TIGHTENING TORQUE FOR FLARED NUTS

Use these torques for flared part of nut.



| Thread diameter | Width across flat | Tightening torque | |
|-----------------|-------------------|-------------------|-----------|
| mm | mm | Nm | kgm |
| 14 | 19 | 24.5 ± 4.9 | 2.5 ± 0.5 |
| 18 | 24 | 49 ± 19.6 | 5 ± 2 |
| 22 | 27 | 78.5 ± 19.6 | 8 ± 2 |
| 24 | 32 | 137.3 ± 29.4 | 14 ± 3 |
| 30 | 36 | 176.5 ± 29.4 | 18 ± 3 |
| 33 | 41 | 196.1 ± 49 | 20 ± 5 |
| 36 | 46 | 245.2 ± 49 | 25 ± 5 |
| 42 | 55 | 294.2 ± 49 | 30 ± 5 |

TIGHTENING TORQUE FOR 102 ENGINE SERIES (BOLTS AND NUTS)

Use these torque values for bolts and nuts (unit: mm).

| Thread diameter | Tightening torque | |
|-----------------|-------------------|-------------|
| mm | Nm | kgm |
| 6 | 10 ± 2 | 1.02 ± 0.20 |
| 8 | 24 ± 4 | 2.45 ± 0.41 |
| 10 | 43 ± 6 | 4.38 ± 0.61 |
| 12 | 77 ± 12 | 7.85 ± 1.22 |

TIGHTENING TORQUE FOR 102 ENGINE SERIES (EYE JOINTS)

Use these torque values for eye joints (unit: mm).

| Thread diameter | Tightening torque | |
|-----------------|-------------------|-------------|
| mm | Nm | kgm |
| 6 | 8 ± 2 | 0.81 ± 0.20 |
| 8 | 10 ± 2 | 1.02 ± 0.20 |
| 10 | 12 ± 2 | 1.22 ± 0.20 |
| 12 | 24 ± 4 | 2.45 ± 0.41 |
| 14 | 36 ± 5 | 3.67 ± 0.51 |

TIGHTENING TORQUE FOR 102 ENGINE SERIES (TAPERED SCREWS)

Use these torque values for tapered screws (unit: inch).

| Thread diameter | Tightening torque | |
|-----------------|-------------------|-------------|
| inch | Nm | kgm |
| 1/16 | 3 ± 1 | 0.31 ± 0.10 |
| 1/8 | 8 ± 2 | 0.81 ± 0.20 |
| 1/4 | 12 ± 2 | 1.22 ± 0.20 |
| 3/8 | 15 ± 2 | 1.53 ± 0.41 |
| 1/2 | 24 ± 4 | 2.45 ± 0.41 |
| 3/4 | 36 ± 5 | 3.67 ± 0.51 |
| 1 | 60 ± 9 | 6.12 ± 0.92 |

ELECTRIC WIRE CODE

In the wiring diagrams, various colors and symbols are employed to indicate the thickness of wires. This wire code table will help you understand WIRING DIAGRAMS.

EXAMPLE: 05WB indicates a cable having a nominal number 05 and white coating with black stripe.

CLASSIFICATION BY THICKNESS

| Nominal number | Copper wire | | | Cable O.D. (mm) | Current rating (A) | Applicable circuit |
|----------------|-------------------|---------------------|--------------------|-----------------|--------------------|---------------------------------|
| | Number of strands | Dia. Of strand (mm) | Cross section (mm) | | | |
| 0.85 | 11 | 0.32 | 0.88 | 2.4 | 12 | Starting, lighting, signal etc. |
| 2 | 26 | 0.32 | 2.09 | 3.1 | 20 | Lighting, signal etc. |
| 5 | 65 | 0.32 | 5.23 | 4.6 | 37 | Charging and signal |
| 15 | 84 | 0.45 | 13.36 | 7.0 | 59 | Starting (Glow plug) |
| 40 | 85 | 0.80 | 42.73 | 11.4 | 135 | Starting |
| 60 | 127 | 0.80 | 63.84 | 13.6 | 178 | Starting |
| 100 | 217 | 0.80 | 109.1 | 17.6 | 230 | Starting |

CLASSIFICATION BY COLOR AND CODE

| Priority | Circuits Classification | | Charging | Ground | Starting | Lighting | Instrument | Signal | Other | |
|----------|-------------------------|-------|---------------|--------|----------------|--------------|----------------|----------------|---------------|--|
| 1 | Primary | Code | W | B | B | R | Y | G | L | |
| | | Color | White | Black | Black | Red | Yellow | Green | Blue | |
| 2 | Auxiliary | Code | WR | — | BW | RW | YR | GW | LW | |
| | | Color | White & Red | — | Black & White | Red & White | Yellow & Red | Green & White | Blue & White | |
| 3 | | Code | WB | — | BY | RB | YB | GR | LR | |
| | | Color | White & Black | — | Black & Yellow | Red & Black | Yellow & Black | Green & Red | Blue & Red | |
| 4 | | Code | WL | — | BR | RY | YG | GY | LY | |
| | | Color | White & Blue | — | Black & Red | Red & Yellow | Yellow & Green | Green & Yellow | Blue & Yellow | |
| 5 | | Code | WG | — | — | RG | YL | GB | LB | |
| | | Color | White & Green | — | — | Red & Green | Yellow & Blue | Green & Black | Blue & Black | |
| 6 | | Code | — | — | — | RL | YW | GL | — | |
| | | Color | — | — | — | Red & Blue | Yellow & White | Green & Blue | — | |

CONVERSION TABLES

METHOD OF USING THE CONVERSION TABLE

The Conversion Table in this section is provided to enable simple conversion of figures. For details of the method of using the Conversion Table, see the example given below.

EXAMPLE

- Method of using the Conversion Table to convert from millimeters to inches.

1. Convert 55 mm into inches.
 - A. Locate the number 50 in the vertical column at the left side, take this as ①, then draw a horizontal line from ①.
 - B. Locate the number 5 in the row across the top, take this as ②, then draw a perpendicular line down from ②.
 - C. Take the point where the two lines cross as ③. This point ③ gives the value when converting from millimeters to inches. Therefore, 55 millimeters = 2.165 inches.
2. Convert 550 mm into inches.
 - A. The number 550 does not appear in the table, so divide by 10 (move the decimal one place to the left) to convert it to 55 mm.
 - B. Carry out the same procedure as above to convert 55 mm to 2.165 inches.
 - C. The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

| Millimeters to inches | | | | | | | | | | | 1 mm = 0.03937 in |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 0 | 0 | 0.039 | 0.079 | 0.118 | 0.157 | 0.197 | 0.236 | 0.276 | 0.315 | 0.354 | |
| 10 | 0.394 | 0.433 | 0.472 | 0.512 | 0.551 | 0.591 | 0.630 | 0.669 | 0.709 | 0.748 | |
| 20 | 0.787 | 0.827 | 0.866 | 0.906 | 0.945 | 0.984 | 1.024 | 1.063 | 1.102 | 1.142 | |
| 30 | 1.181 | 1.220 | 1.260 | 1.299 | 1.339 | 1.378 | 1.417 | 1.457 | 1.496 | 1.536 | |
| 40 | 1.575 | 1.614 | 1.654 | 1.693 | 1.732 | 1.772 | 1.811 | 1.850 | 1.890 | 1.929 | |
| 50 | 1.969 | 2.008 | 2.047 | 2.087 | 2.126 | 2.165 | 2.205 | 2.244 | 2.283 | 2.323 | |
| 60 | 2.362 | 2.402 | 2.441 | 2.480 | 2.520 | 2.559 | 2.598 | 2.638 | 2.677 | 2.717 | |
| 70 | 2.756 | 2.795 | 2.835 | 2.874 | 2.913 | 2.953 | 2.992 | 3.032 | 3.071 | 3.110 | |
| 80 | 3.150 | 3.189 | 3.228 | 3.268 | 3.307 | 3.346 | 3.386 | 3.425 | 3.465 | 3.504 | |
| 90 | 3.543 | 3.583 | 3.622 | 3.661 | 3.701 | 3.740 | 3.780 | 3.819 | 3.858 | 3.898 | |

Millimeters to Inches**1 mm = 0.03937 in**

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | 0 | 0.039 | 0.079 | 0.118 | 0.157 | 0.197 | 0.236 | 0.276 | 0.315 | 0.354 |
| 10 | 0.394 | 0.433 | 0.472 | 0.512 | 0.551 | 0.591 | 0.630 | 0.669 | 0.709 | 0.748 |
| 20 | 0.787 | 0.827 | 0.866 | 0.906 | 0.945 | 0.984 | 1.024 | 1.063 | 1.102 | 1.142 |
| 30 | 1.181 | 1.220 | 1.260 | 1.299 | 1.339 | 1.378 | 1.417 | 1.457 | 1.496 | 1.536 |
| 40 | 1.575 | 1.614 | 1.654 | 1.693 | 1.732 | 1.772 | 1.811 | 1.850 | 1.890 | 1.929 |
| 50 | 1.969 | 2.008 | 2.047 | 2.087 | 2.126 | 2.165 | 2.205 | 2.244 | 2.283 | 2.323 |
| 60 | 2.362 | 2.402 | 2.441 | 2.480 | 2.520 | 2.559 | 2.598 | 2.638 | 2.677 | 2.717 |
| 70 | 2.756 | 2.795 | 2.835 | 2.874 | 2.913 | 2.953 | 2.992 | 3.032 | 3.071 | 3.110 |
| 80 | 3.150 | 3.189 | 3.228 | 3.268 | 3.307 | 3.346 | 3.386 | 3.425 | 3.465 | 3.504 |
| 90 | 3.543 | 3.583 | 3.622 | 3.661 | 3.701 | 3.740 | 3.780 | 3.819 | 3.858 | 3.898 |

Kilogram to Pound**1 kg = 2.2046 lb**

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 0 | 2.20 | 4.41 | 6.61 | 8.82 | 11.02 | 13.23 | 15.43 | 17.64 | 19.84 |
| 10 | 22.05 | 24.25 | 26.46 | 28.66 | 30.86 | 33.07 | 35.27 | 37.48 | 39.68 | 41.89 |
| 20 | 44.09 | 46.30 | 48.50 | 50.71 | 51.91 | 55.12 | 57.32 | 59.53 | 61.73 | 63.93 |
| 30 | 66.14 | 68.34 | 70.55 | 72.75 | 74.96 | 77.16 | 79.37 | 81.57 | 83.78 | 85.98 |
| 40 | 88.18 | 90.39 | 92.59 | 94.80 | 97.00 | 99.21 | 101.41 | 103.62 | 105.82 | 108.03 |
| 50 | 110.23 | 112.44 | 114.64 | 116.85 | 119.05 | 121.25 | 123.46 | 125.66 | 127.87 | 130.07 |
| 60 | 132.28 | 134.48 | 136.69 | 138.89 | 141.10 | 143.30 | 145.51 | 147.71 | 149.91 | 152.12 |
| 70 | 154.32 | 156.53 | 158.73 | 160.94 | 163.14 | 165.35 | 167.55 | 169.76 | 171.96 | 174.17 |
| 80 | 176.37 | 178.57 | 180.78 | 182.98 | 185.19 | 187.39 | 189.60 | 191.80 | 194.01 | 196.21 |
| 90 | 198.42 | 200.62 | 202.83 | 205.03 | 207.24 | 209.44 | 211.64 | 213.85 | 216.05 | 218.26 |

Liter to U.S. Gallon

1 L = 0.2642 U.S. Gal

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 0 | 0.264 | 0.528 | 0.793 | 1.057 | 1.321 | 1.585 | 1.849 | 2.113 | 2.378 |
| 10 | 2.642 | 2.906 | 3.170 | 3.434 | 3.698 | 3.963 | 4.227 | 4.491 | 4.755 | 5.019 |
| 20 | 5.283 | 5.548 | 5.812 | 6.076 | 6.340 | 6.604 | 6.869 | 7.133 | 7.397 | 7.661 |
| 30 | 7.925 | 8.189 | 8.454 | 8.718 | 8.982 | 9.246 | 9.510 | 9.774 | 10.039 | 10.303 |
| 40 | 10.567 | 10.831 | 11.095 | 11.359 | 11.624 | 11.888 | 12.152 | 12.416 | 12.680 | 12.944 |
| 50 | 13.209 | 13.473 | 13.737 | 14.001 | 14.265 | 14.529 | 14.795 | 15.058 | 15.322 | 15.586 |
| 60 | 15.850 | 16.115 | 16.379 | 16.643 | 16.907 | 17.171 | 17.435 | 17.700 | 17.964 | 18.228 |
| 70 | 18.492 | 18.756 | 19.020 | 19.285 | 19.549 | 19.813 | 20.077 | 20.341 | 20.605 | 20.870 |
| 80 | 21.134 | 21.398 | 21.662 | 21.926 | 22.190 | 22.455 | 22.719 | 22.983 | 23.247 | 23.511 |
| 90 | 23.775 | 24.040 | 24.304 | 24.568 | 24.832 | 25.096 | 25.361 | 25.625 | 25.889 | 26.153 |

Liter to U.K. Gallon

1 L = 0.21997 U.K. Gal

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 0 | 0.220 | 0.440 | 0.660 | 0.880 | 1.100 | 1.320 | 1.540 | 1.760 | 1.980 |
| 10 | 2.200 | 2.420 | 2.640 | 2.860 | 3.080 | 3.300 | 3.520 | 3.740 | 3.950 | 4.179 |
| 20 | 4.399 | 4.619 | 4.839 | 5.059 | 5.279 | 5.499 | 5.719 | 5.939 | 6.159 | 6.379 |
| 30 | 6.599 | 6.819 | 7.039 | 7.259 | 7.479 | 7.699 | 7.919 | 8.139 | 8.359 | 8.579 |
| 40 | 8.799 | 9.019 | 9.239 | 9.459 | 9.679 | 9.899 | 10.119 | 10.339 | 10.559 | 10.778 |
| 50 | 10.998 | 11.281 | 11.438 | 11.658 | 11.878 | 12.098 | 12.318 | 12.528 | 12.758 | 12.978 |
| 60 | 13.198 | 13.418 | 13.638 | 13.858 | 14.078 | 14.298 | 14.518 | 14.738 | 14.958 | 15.178 |
| 70 | 15.398 | 15.618 | 15.838 | 16.058 | 16.278 | 16.498 | 16.718 | 16.938 | 17.158 | 17.378 |
| 80 | 17.598 | 17.818 | 18.037 | 18.257 | 18.477 | 18.697 | 18.917 | 19.137 | 19.357 | 19.577 |
| 90 | 19.797 | 20.017 | 20.237 | 20.457 | 20.677 | 20.897 | 21.117 | 21.337 | 21.557 | 21.777 |

kgm to ft. lb.

1 kgm = 7.233 ft. lb.

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|--------|--------|--------|--------|--------|--------|--------|---------|--------|--------|
| 0 | 0 | 7.2 | 14.5 | 21.7 | 28.9 | 36.2 | 43.4 | 50.6 | 57.9 | 65.1 |
| 10 | 72.3 | 79.6 | 86.8 | 94.0 | 101.3 | 108.5 | 115.7 | 123.0 | 130.2 | 137.4 |
| 20 | 144.7 | 151.9 | 159.1 | 166.4 | 173.6 | 180.8 | 188.1 | 195.3 | 202.5 | 209.8 |
| 30 | 217.0 | 224.2 | 231.5 | 238.7 | 245.9 | 253.2 | 260.4 | 267.6 | 274.9 | 282.1 |
| 40 | 289.3 | 296.6 | 303.8 | 311.0 | 318.3 | 325.5 | 332.7 | 340.0 | 347.2 | 354.4 |
| 50 | 361.7 | 368.9 | 376.1 | 383.4 | 390.6 | 397.8 | 405.1 | 412.3 | 419.5 | 426.8 |
| 60 | 434.0 | 441.2 | 448.5 | 455.7 | 462.9 | 470.2 | 477.4 | 484.6 | 491.8 | 499.1 |
| 70 | 506.3 | 513.5 | 520.8 | 528.0 | 535.2 | 542.5 | 549.7 | 556.9 | 564.2 | 571.4 |
| 80 | 578.6 | 585.9 | 593.1 | 600.3 | 607.6 | 614.8 | 622.0 | 629.3 | 636.5 | 643.7 |
| 90 | 651.0 | 658.2 | 665.4 | 672.7 | 679.9 | 687.1 | 694.4 | 701.6 | 708.8 | 716.1 |
| 100 | 723.3 | 730.5 | 737.8 | 745.0 | 752.2 | 759.5 | 766.7 | 773.9 | 781.2 | 788.4 |
| 110 | 795.6 | 802.9 | 810.1 | 817.3 | 824.6 | 831.8 | 839.0 | 846.3 | 853.5 | 860.7 |
| 120 | 868.0 | 875.2 | 882.4 | 889.7 | 896.9 | 904.1 | 911.4 | 918.6 | 925.8 | 933.1 |
| 130 | 940.3 | 947.5 | 954.8 | 962.0 | 969.2 | 976.5 | 983.7 | 990.9 | 998.2 | 1005.4 |
| 140 | 1012.6 | 1019.9 | 1027.1 | 1034.3 | 1041.5 | 1048.8 | 1056.0 | 1063.2 | 1070.5 | 1077.7 |
| 150 | 1084.9 | 1092.2 | 1099.4 | 1106.6 | 1113.9 | 1121.1 | 1128.3 | 1135.6 | 1142.8 | 1150.0 |
| 160 | 1157.3 | 1164.5 | 1171.7 | 1179.0 | 1186.2 | 1193.4 | 1200.7 | 1207.9 | 1215.1 | 1222.4 |
| 170 | 1129.6 | 1236.8 | 1244.1 | 1251.3 | 1258.5 | 1265.8 | 1273.0 | 1280.1 | 1287.5 | 1294.7 |
| 180 | 1301.9 | 1309.2 | 1316.4 | 1323.6 | 1330.9 | 1338.1 | 1345.3 | 1352.63 | 1359.8 | 1367.0 |
| 190 | 1374.3 | 1381.5 | 1388.7 | 1396.0 | 1403.2 | 1410.4 | 1417.7 | 1424.9 | 1432.1 | 1439.4 |

kg/cm² to lb/in²1 kg/cm² = 14.2233 lb/in²

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 0 | 0 | 14.2 | 28.4 | 42.7 | 56.9 | 71.1 | 85.3 | 99.6 | 113.8 | 128.0 |
| 10 | 142.2 | 156.5 | 170.7 | 184.9 | 199.1 | 213.4 | 227.6 | 241.8 | 256.0 | 270.2 |
| 20 | 284.5 | 298.7 | 312.9 | 327.1 | 341.4 | 355.6 | 369.8 | 384.0 | 398.3 | 412.5 |
| 30 | 426.7 | 440.9 | 455.1 | 469.4 | 483.6 | 497.8 | 512.0 | 526.3 | 540.5 | 554.7 |
| 40 | 568.9 | 583.2 | 597.4 | 611.6 | 625.8 | 640.1 | 654.3 | 668.5 | 682.7 | 696.9 |
| 50 | 711.2 | 725.4 | 739.6 | 753.8 | 768.1 | 782.3 | 796.5 | 810.7 | 825.0 | 839.2 |
| 60 | 853.4 | 867.6 | 881.8 | 896.1 | 910.3 | 924.5 | 938.7 | 953.0 | 967.2 | 981.4 |
| 70 | 995.6 | 1010 | 1024 | 1038 | 1053 | 1067 | 1081 | 1095 | 1109 | 1124 |
| 80 | 1138 | 1152 | 1166 | 1181 | 1195 | 1209 | 1223 | 1237 | 1252 | 1266 |
| 90 | 1280 | 1294 | 1309 | 1323 | 1337 | 1351 | 1365 | 1380 | 1394 | 1408 |
| 100 | 1422 | 1437 | 1451 | 1465 | 1479 | 1493 | 1508 | 1522 | 1536 | 1550 |
| 110 | 1565 | 1579 | 1593 | 1607 | 1621 | 1636 | 1650 | 1664 | 1678 | 1693 |
| 120 | 1707 | 1721 | 1735 | 1749 | 1764 | 1778 | 1792 | 1806 | 1821 | 1835 |
| 130 | 1849 | 1863 | 1877 | 1892 | 1906 | 1920 | 19324 | 1949 | 1963 | 1977 |
| 140 | 1991 | 2005 | 2034 | 2048 | 2062 | 2077 | 2091 | 2105 | 2119 | |
| 150 | 2134 | 2148 | 2162 | 2176 | 2190 | 2205 | 2219 | 2233 | 2247 | 2262 |
| 160 | 2276 | 2290 | 2304 | 2318 | 2333 | 2347 | 2361 | 2375 | 2389 | 2404 |
| 170 | 2418 | 2432 | 2446 | 2460 | 2475 | 2489 | 2503 | 2518 | 2532 | 2546 |
| 180 | 2560 | 2574 | 2589 | 2603 | 2617 | 2631 | 2646 | 2660 | 2674 | 2688 |
| 190 | 2702 | 2717 | 2731 | 2745 | 2759 | 2773 | 2788 | 2802 | 2816 | 2830 |
| 200 | 2845 | 2859 | 2873 | 2887 | 2901 | 2916 | 2930 | 2944 | 2958 | 2973 |
| 210 | 2987 | 3001 | 3015 | 3030 | 3044 | 3058 | 3072 | 3086 | 3101 | 3115 |
| 220 | 3129 | 3143 | 3158 | 3172 | 3186 | 3200 | 3214 | 3229 | 3243 | 3257 |
| 230 | 3271 | 3286 | 3300 | 3314 | 3328 | 3343 | 3357 | 3371 | 3385 | 3399 |
| 240 | 3414 | 3428 | 3442 | 3456 | 3470 | 3485 | 3499 | 3513 | 3527 | 3542 |

Temperature

Fahrenheit Centigrade Conversion; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees. If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left. If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

| °C | | °F | °C | | °F | °C | | °F | °C | | °F |
|-------|-----|-------|-------|----|-------|------|----|-------|------|-----|-------|
| -40.4 | -40 | -40.0 | -11.7 | 11 | 51.8 | 7.8 | 46 | 114.8 | 27.2 | 81 | 117.8 |
| -37.2 | .35 | -31.0 | -11.1 | 12 | 53.6 | 8.3 | 47 | 116.6 | 27.8 | 82 | 179.6 |
| -34.4 | -30 | -22.0 | -10.6 | 13 | 55.4 | 8.9 | 48 | 118.4 | 28.3 | 83 | 181.4 |
| -31.7 | -25 | -13.0 | -10.0 | 14 | 57.2 | 9.4 | 49 | 120.2 | 28.9 | 84 | 183.2 |
| -28.9 | -20 | -4.0 | -9.4 | 15 | 59.0 | 10.0 | 50 | 122.0 | 29.4 | 85 | 185.0 |
| -28.3 | -19 | -2.2 | -8.9 | 16 | 60.8 | 10.6 | 51 | 123.8 | 30.0 | 86 | 186.8 |
| -27.8 | -18 | -0.4 | -8.3 | 17 | 62.6 | 11.1 | 52 | 125.6 | 30.6 | 87 | 188.6 |
| -27.2 | -17 | 1.4 | -7.8 | 18 | 64.4 | 11.7 | 53 | 127.4 | 31.1 | 88 | 190.4 |
| -26.7 | -16 | 3.2 | -7.2 | 19 | 66.2 | 12.2 | 54 | 129.2 | 31.7 | 89 | 192.2 |
| -26.1 | -15 | 5.0 | -6.7 | 20 | 68.0 | 12.8 | 55 | 131.0 | 32.2 | 90 | 194.0 |
| -25.6 | -14 | 6.8 | -6.1 | 21 | 69.8 | 13.3 | 56 | 132.8 | 32.8 | 91 | 195.8 |
| -25.0 | -13 | 8.6 | -5.6 | 22 | 71.6 | 13.9 | 57 | 134.6 | 33.3 | 92 | 197.6 |
| -24.4 | -12 | 10.4 | -5.0 | 23 | 73.4 | 14.4 | 58 | 136.4 | 33.9 | 93 | 199.4 |
| -23.9 | -11 | 12.2 | -4.4 | 24 | 75.2 | 15.0 | 59 | 138.2 | 34.4 | 94 | 201.2 |
| -23.3 | -10 | 14.0 | -3.9 | 25 | 77.0 | 15.6 | 60 | 140.0 | 35.0 | 95 | 203.0 |
| -22.8 | -9 | 15.8 | -3.3 | 26 | 78.8 | 16.1 | 61 | 141.8 | 35.6 | 96 | 204.8 |
| -22.2 | -8 | 17.6 | -2.8 | 27 | 80.6 | 16.7 | 62 | 143.6 | 36.1 | 97 | 206.6 |
| -21.7 | -7 | 19.4 | -2.2 | 28 | 82.4 | 17.2 | 63 | 145.4 | 36.7 | 98 | 208.4 |
| -21.1 | -6 | 21.2 | -1.7 | 29 | 84.2 | 17.8 | 64 | 147.2 | 37.2 | 99 | 210.2 |
| -20.6 | -5 | 23.0 | -1.1 | 30 | 86.0 | 18.3 | 65 | 149.0 | 37.8 | 100 | 212.0 |
| -20.0 | -4 | 24.8 | -0.6 | 31 | 87.8 | 18.9 | 66 | 150.8 | 40.6 | 105 | 221.0 |
| -19.4 | -3 | 26.6 | 0 | 32 | 89.6 | 19.4 | 67 | 152.6 | 43.3 | 110 | 230.0 |
| -18.9 | -2 | 28.4 | 0.6 | 33 | 91.4 | 20.0 | 68 | 154.4 | 46.1 | 115 | 239.0 |
| -18.3 | -1 | 30.2 | 1.1 | 34 | 93.2 | 20.6 | 69 | 156.2 | 48.9 | 120 | 248.0 |
| -17.8 | 0 | 32.0 | 1.7 | 35 | 95.0 | 21.1 | 70 | 158.0 | 51.7 | 125 | 257.0 |
| -17.2 | 1 | 33.8 | 2.2 | 36 | 96.8 | 21.7 | 71 | 159.8 | 54.4 | 130 | 266.0 |
| -16.7 | 2 | 35.6 | 2.8 | 37 | 98.6 | 22.2 | 72 | 161.6 | 57.2 | 135 | 275.0 |
| -16.1 | 3 | 37.4 | 3.3 | 38 | 100.4 | 22.8 | 73 | 163.4 | 60.0 | 140 | 284.0 |
| -15.6 | 4 | 39.2 | 3.9 | 39 | 102.2 | 23.3 | 74 | 165.2 | 62.7 | 145 | 293.0 |
| -15.0 | 5 | 41.0 | 4.4 | 40 | 104.0 | 23.9 | 75 | 167.0 | 65.6 | 150 | 302.0 |
| -14.4 | 6 | 42.8 | 5.0 | 41 | 105.8 | 24.4 | 76 | 168.8 | 68.3 | 155 | 311.0 |
| -13.9 | 7 | 44.6 | 5.6 | 42 | 107.6 | 25.0 | 77 | 170.6 | 71.1 | 160 | 320.0 |
| -13.3 | 8 | 46.4 | 6.1 | 43 | 109.4 | 25.6 | 78 | 172.4 | 73.9 | 165 | 329.0 |
| -12.8 | 9 | 48.2 | 6.7 | 44 | 111.2 | 26.1 | 79 | 174.2 | 76.7 | 170 | 338.0 |
| -12.2 | 10 | 50.0 | 7.2 | 45 | 113.0 | 26.7 | 80 | 176.0 | 79.4 | 175 | 347.0 |

UNITS

In this manual, the measuring units are indicated with International System of units (SI).
As for reference, conventionally used Gravitational System of units are indicated in parentheses { }.

Example:

N {kg}
Nm {kgm}
MPa {kg/cm²}
kPa {mmH₂O}
kPa {mmHg}
kw/rpm {HP/rpm}
g/kwh {g/HPh}

01 GENERAL

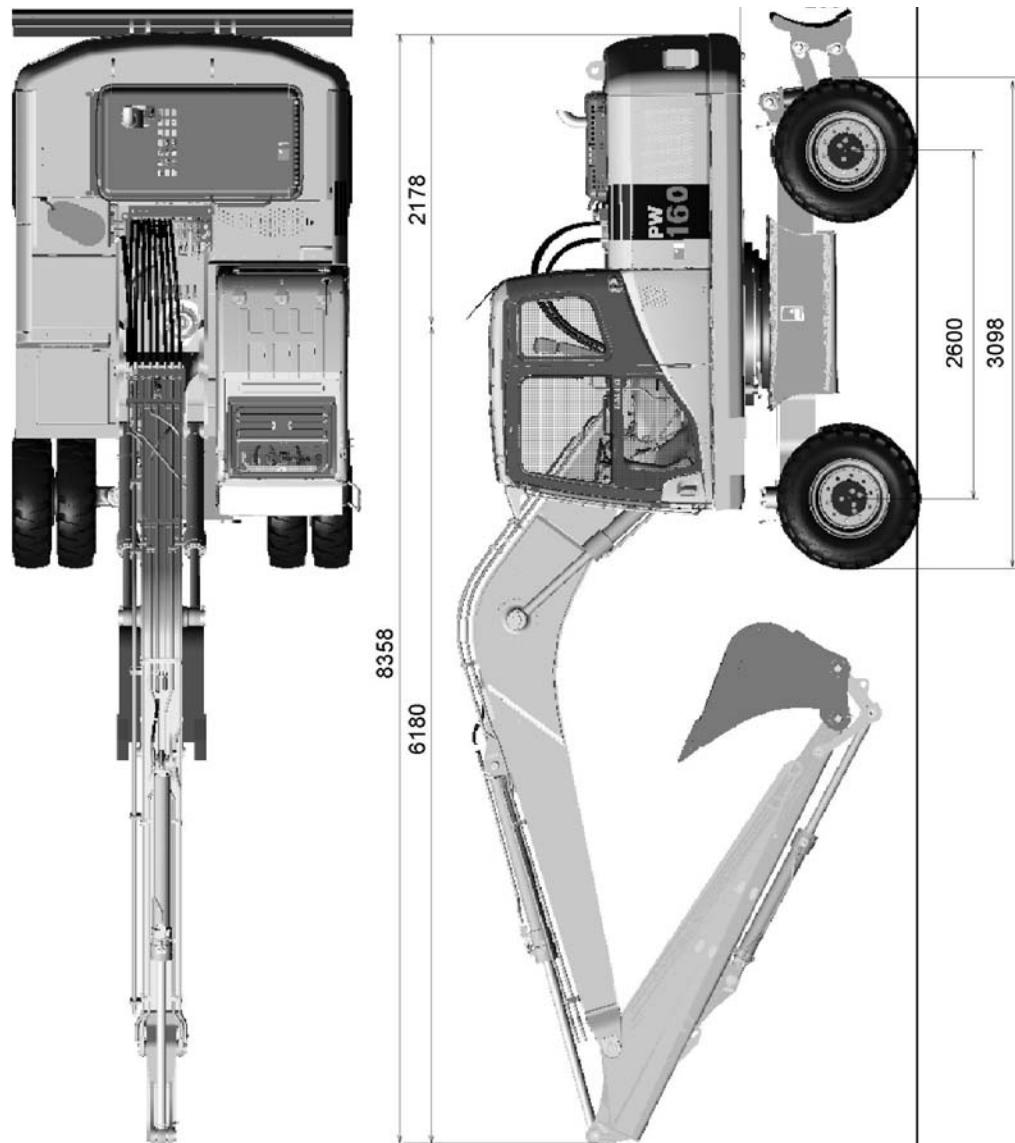
Specification Dimension Drawings

| | |
|-------------------------------------|-------|
| 1 Piece Boom | 01-2 |
| 2 Piece Boom | 01-3 |
| Working range | |
| 1 Piece Boom | 01-4 |
| 2 Piece Boom | 01-5 |
| Specifications | 01-6 |
| Weight Table | 01-8 |
| Fuel, Coolant, And Lubricants | 01-11 |

SPECIFICATION DIMENSION DRAWINGS

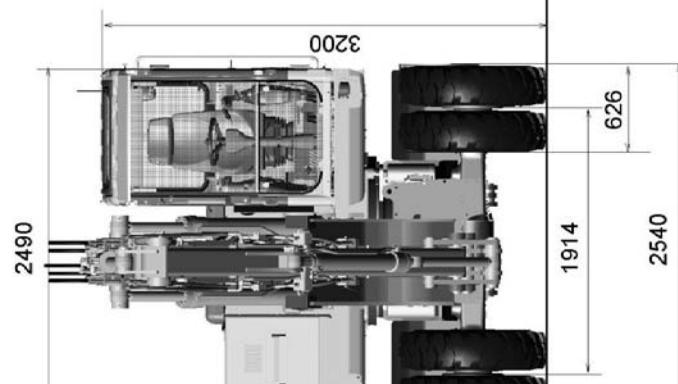
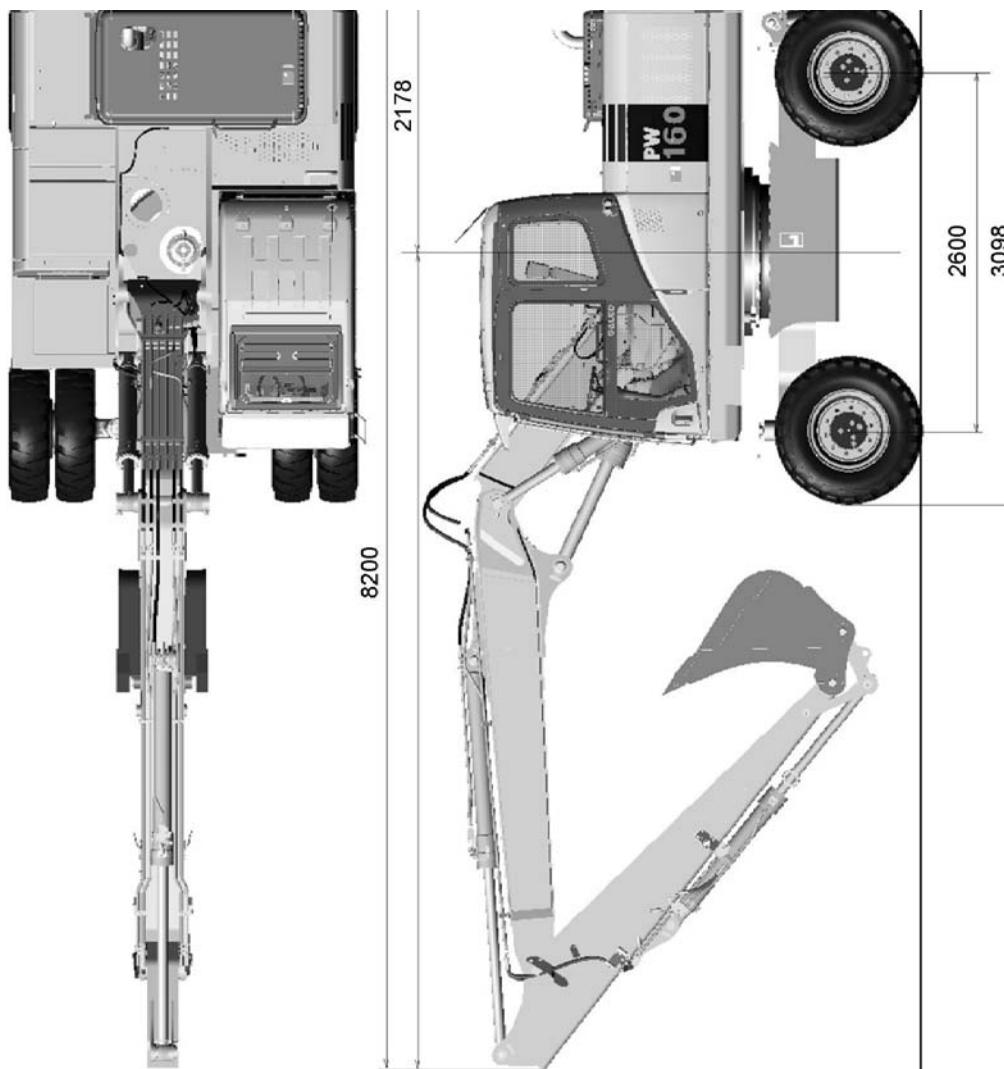
DIMENSIONS

1 PIECE BOOM



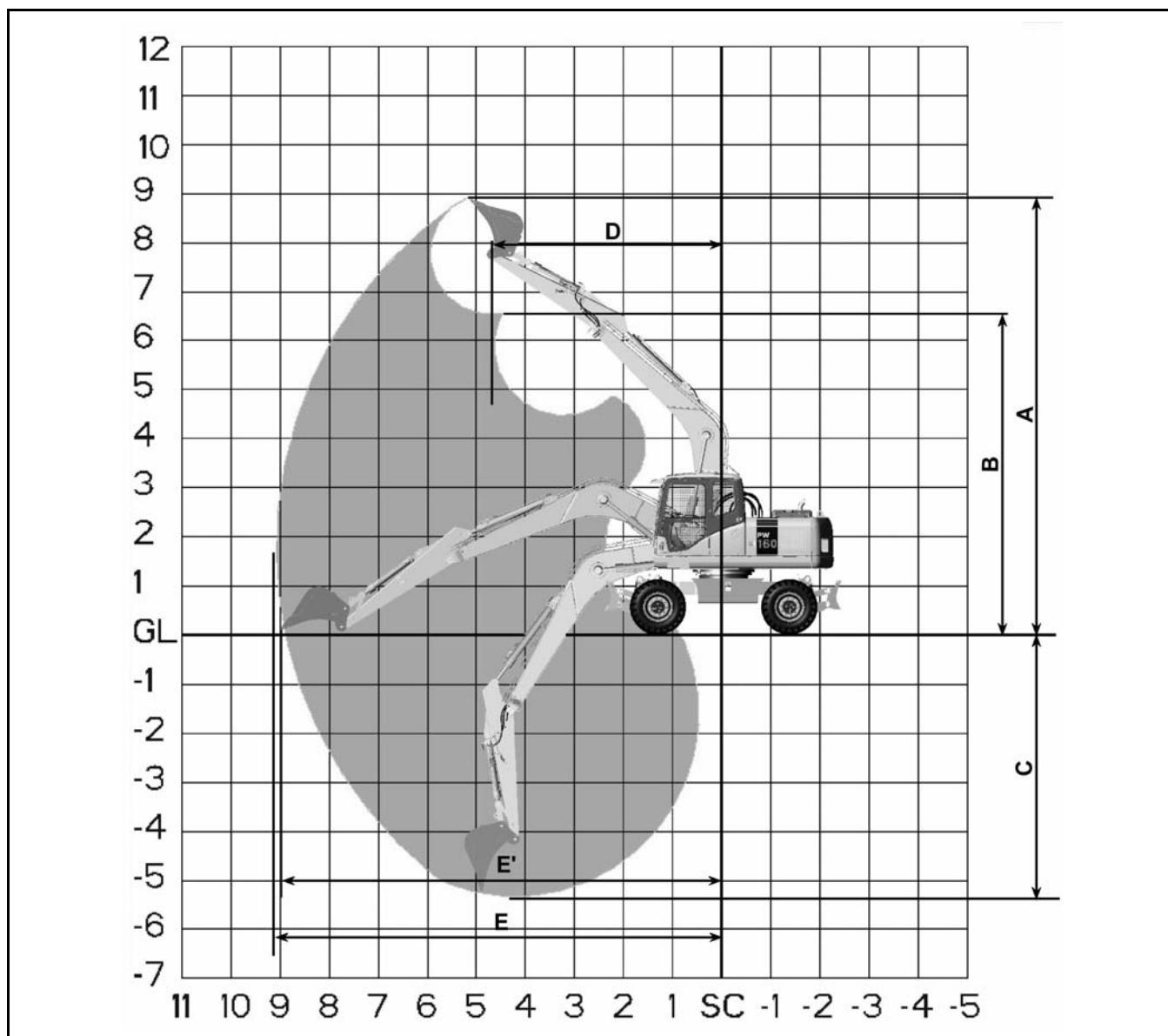
DIMENSIONS

2 PIECE BOOM



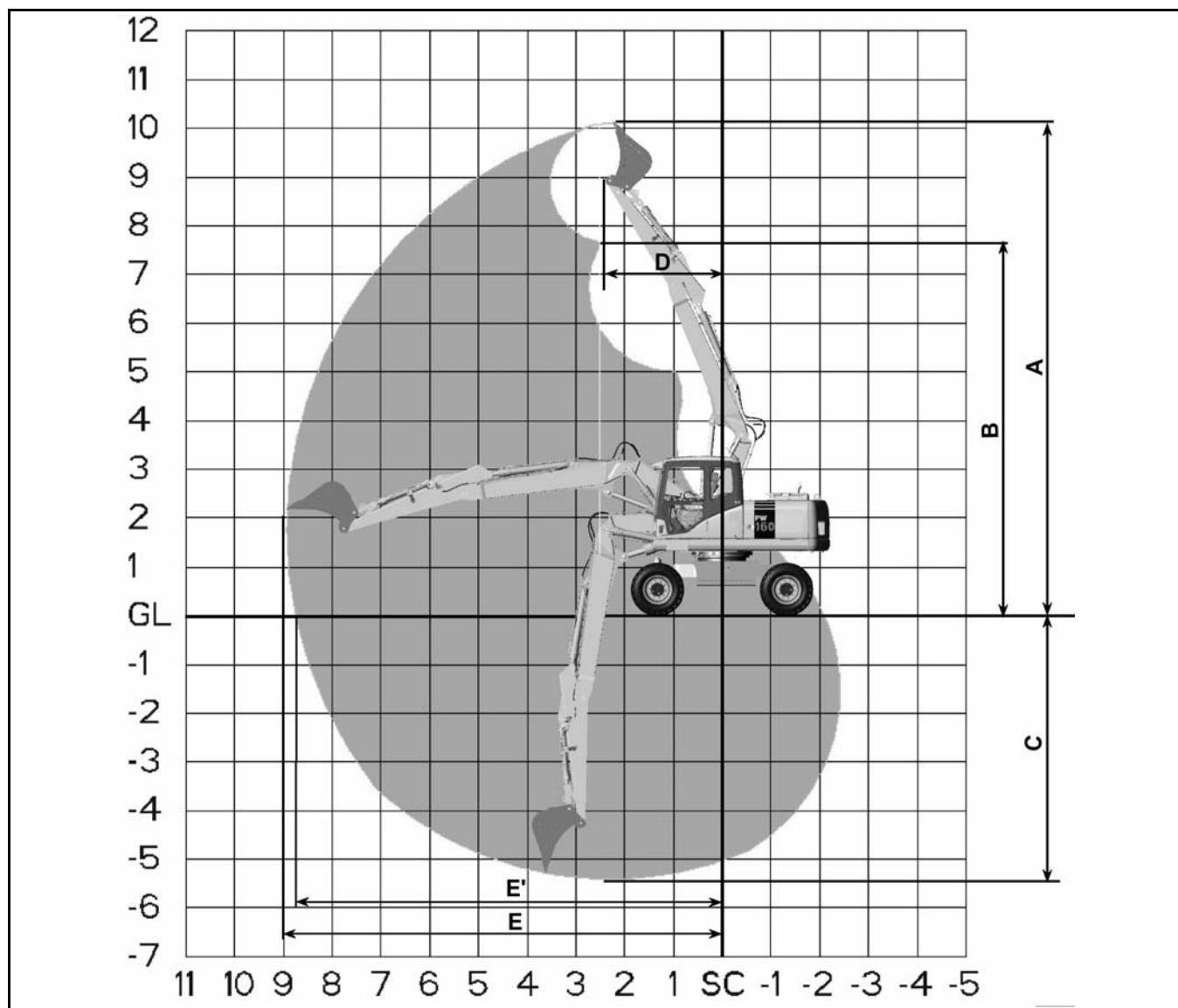
WORKING RANGES

1 PIECE BOOM



| Arm length mm (Tt/In) | 2100 | 2500 | 3000 |
|-----------------------------|------|------|------|
| A Max. digging height | 8730 | 8930 | 9285 |
| B Max. dumping height | 6335 | 6555 | 6911 |
| C Max. digging depth | 4925 | 5320 | 5600 |
| D Min. swing radius | 3205 | 3160 | 3180 |
| E' Max. digging reach at GL | 8620 | 8885 | 9315 |
| E Max. digging reach | 8640 | 9070 | 9485 |

2 PIECE BOOM



| Arm length mm (Tt/In) | | 2100 | 2500 | 3000 |
|-----------------------|--------------------------|------|-------|-------|
| A | Max.digging height | 9745 | 10118 | 10575 |
| B | Max.dumping height | 7285 | 7655 | 8117 |
| C | Max digging depth | 4960 | 5465 | 5770 |
| D | Min. swing radius | 2215 | 2385 | 2590 |
| E' | Max. digging reach ay GL | 8310 | 8745 | 9225 |
| E | Max. digging reach | 8505 | 8930 | 9410 |

SPECIFICATIONS

| | | | |
|---------------------|--|-----------------------------------|---|
| Machine model | | PW160-7H | |
| Serial Number | | H50051 and up | |
| Bucket capacity | Arm size (m) | m^3 | 0.55 |
| Operating weight | | kg | 15,800 |
| Performance | Max. digging force (using power max. function) | 2.1 | |
| | | 2.5 | kN {kg} 102.0 {10,400} |
| | | 3.0 | |
| | Swing speed | rpm | 11.5 |
| | Swing max. slope angle | deg. | 21.5 |
| | Travel speed | km/h | Cr : 0-2.5 Lo : 0-10 Hi : 10-35 (Germany :10-20) |
| | Gradeability | deg. kPa {kg cm ² } | 35 36.3 {0.37} |
| Standard Tyre Width | | mm | 10.00 - 20 |

| | | | | | | | | | | |
|------------------|---|---|--------------|------------------------------------|---|---|--------------------------------------|--|--|--|
| Machine model | | | | PW160-7H | | | | | | |
| Serial Number | | | | H50051 and up | | | | | | |
| Engine | Model Type No. of cylinders - bore x stroke Piston displacement | | | mm l {cc} | | SAA4D102E-2 4-cycle, water-cooled, in-line, vertical, direct injection, with turbo charger 4 - 102 x 120 3.9 {3900} | | | | |
| | Performance | Flywheel horsepower Max. torque Max. speed at no load Min. speed at no load | | kW/rpm Nm/rpm rpm rpm | | 93.3/2200 481/1400 2,450 950 | | | | |
| | Starting motor Alternator Battery | | | | | 24V, 4.5 kW 24V, 40 A 12V, 95 Ah x 2 | | | | |
| | Radiator core type | | | | | Triple Cooler | | | | |
| | Hydraulic pump | Type x No. Delivery Set pressure | | l/min MPa (kg/cm ²) | | HPV140, variable displacement Piston type: 308 x 1 Piston type: 37.2 {380} | | | | |
| Hydraulic system | Control valve | Type x No. Control method | 1 Piece Boom | | | 7-spool + 1 service spool type x 1 Hydraulic | | | | |
| | | | 2 Piece Boom | | | 8-spool + 1 service spool type x 1 Hydraulic | | | | |
| | Hydraulic motor | Travel motor Swing motor | | | A6VM107 HAXT/63W-VAB380A-SK, Piston type (with counter balance valve): x 1 MSF85P, Piston type (with safety valve, holding brake): x 1 | | | | | |
| | | | | | | | | | | |
| | 1 Piece Boom | Type | | | Boom | Arm | Bucket | | | |
| | | Inside diameter of cylinder Diameter of piston rod Stroke Max. distance between pins Min. distance between pins | | | Double acting piston | Double acting piston | Double acting piston | | | |
| | | | | | 110 75 960 2,660 1,700 | 115 80 1,175 2,877 1,702 | 105 70 885 2,263 1,378 | | | |
| | | Type | | | Adjust | Boom | Arm | | | |
| | | Inside diameter of cylinder Diameter of piston rod Stroke Max. distance between pins Min. distance between pins | | | Double acting piston | L.H R.H | Double acting piston | | | |
| | 2 Piece Boom | | | | | Double acting piston | Double acting piston | | | |
| | | | | | 160 100 702 1,900 1,198 | 115 75 996 2,523 1,527 | 115 80 1,175 2,877 1,702 | | | |
| | Hydraulic tank Hydraulic filter Hydraulic cooler | | | | | Closed box type Tank return side 7320/7043 (Air cooled) | | | | |

WEIGHT TABLE

This weight table is for use when handling components or when transporting the machine.

Unit: kg

| | | |
|---|----------------|----|
| Machine model | PW160-7H | |
| Serial Number | H50051 and up | |
| Engine assembly | 453.5 | |
| • Engine | 338 | |
| • Damper | 1.5 | |
| • Hydraulic pump | 114 | |
| Radiator oil cooler assembly | 90 | |
| Hydraulic tank, filter assembly (excluding hydraulic oil) | 123 | |
| Fuel tank (excluding fuel) | 120 | |
| Revolving frame | 1,620 | |
| Operator's cab | 286 | |
| Operator's seat | Mechanical | 38 |
| | Air Suspension | 42 |
| Counterweight | 3,100 | |
| Swing machinery | 170 | |
| Control valve | 107 | |
| Travel motor | 66 | |
| Center swivel joint | 95 | |

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