SPEC.F5-4711E2

DHP85-2, M65D

Hydraulic Pile Driving Rig

SPECIFICATION

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CONTENTS

1. FEATURES

1) High performance in hydraulic pile hammer work

The machine is specially designed for a heavy duty pile driving work equipped with NISSHA NH70-2 hydraulic pile hammer and an earth auger drive at the same time.
(Consult the nearest NISSHA representatives when other hydraulic pile hammers which are not manufactured by NISSHA are required to be installed and driven with the hydraulic power take-off of DHP85-2 pile driving rig)

2) Durable and stable pile driving work

A durable cylindrical leader with a pair of back stays mechanism gives a high degree of durability and stability of the machine.

3) Excellent maneuverability

The maximum allowable operating weight of 863kN (88,000kgf) assures facile maneuverability in the site.
R.H. and L.H. independent traveling mechanism with a high traction force enables the machine to make both pivot and spin turns, and to steer the crawlers smoothly and continuously.

4) Easy positioning by revolving leader

The leader equipped with a hammer and an earth auger can be rotated 90 degrees in either direction for facile positioning of the hammer and earth auger center to the center of the pile to be driven.

5) Comfortable operator's room

Well insulated operator room with five (5) wide wind-shields assures bright and quiet operation circumference with minimum fatigue.

6) Easy operation

Hydraulic actuated control levers are easy to operate, and high / low winch speeds and winging-stop-rewinding actions can be done by one control lever.

7) Easy maintenance

Adopting floating ring seals in drive tumblers, take-up tumblers and lower track rollers, and sealed bearings to every sheaves require minimum daily maintenance service. A grease-bath type swing pinion gear prolongs its service interval.

8) Low fuel consumption

The machine is powered by a direct fuel injection type diesel engine with a pair of variable displacement type plunger pumps of efficient performance, accordingly economical operation can be assured.

9) Easy transporting and reassembling of leader at job site

Its basic leader connected with a pair of back stay cylinders can be stored at the front of the basic machine for transportation, which minimizes its reassembling time and assures a facile transportation and reassembling it at the job site.

10) Inclinometer

An inclinometer equipped with a posture alarm is provided as standard for safe operation.

11) Load indicator

Any slacking on the earth auger drive suspension rope is eliminated by a load indicator provided as optional extra.

2. SPECIFICATIONS OF PILE DRIVING RIG

2.1 Model of basic machine ····· DHP85-2

2.2 Nominal dimensions

1) Overall width in transportation ····· 3,200 mm
2) Crawler overall width in working ····· 4,010 mm
3) Crawler overall width in transportation ····· 3,200 mm
4) Crawler center to center distance in transportation ····· 2,440 mm
5) Crawler center to center distance in working ····· 3,250 mm
6) Crawler shoe width ····· 760 mm
7) Crawler overall length ····· 5,120 mm
8) Tumblers center to center distance ····· 4,260 mm
9) Ground clearance ····· 359 mm
10) Cab width ····· 3,080 mm
11) Cab height ····· 2,895 mm
12) Gantry height (Working) ····· 5,034 mm
13) Overall height (Transportation) ····· 3,293 mm
14) Distance from swing center to rear end (Transportation) ····· 3,992 mm
15) Rear end radius (Counterweight end) ····· 3,950 mm
16) Rear end clearance ····· 970 mm

2.3 Operation speed

1) Main, auxiliary drum, winding speed (Low) ····· * 35 m/min.
2) Main, auxiliary drum, winding speed (High) ····· * 71 m/min.
3) Third drum, winding speed ····· * 56 m/min.
4) Leader drum, winding speed (Low) ····· * 51 m/min.
5) Swing speed ····· 3.5 min^{-1}
6) Travel speed ····· *1.4 km/hr.
7) Gradeability (Basic machine) ····· 40 %
8) Weight of basic machine ····· 275 kN (28,000kgf)
9) Counterweight ····· (9,000kgf + 5,000kgf) 137 kN (14,000kgf)
10) Standard leader length ····· 21 m
11) Maximum permissible operating weight ····· 863 kN (88,000kgf)
12) Ground contacting area ····· 64,752 cm^2
13) Average ground pressure (Maximum operating weight of 863 kN) ·····133 kPa (1.36 kgf/cm^2)

"*"marked items change in accordance with load.

2.4 Diesel engine

1) Maker ····· Hino Motors, Ltd.

2) Model ····· J08C-UT diesel engine

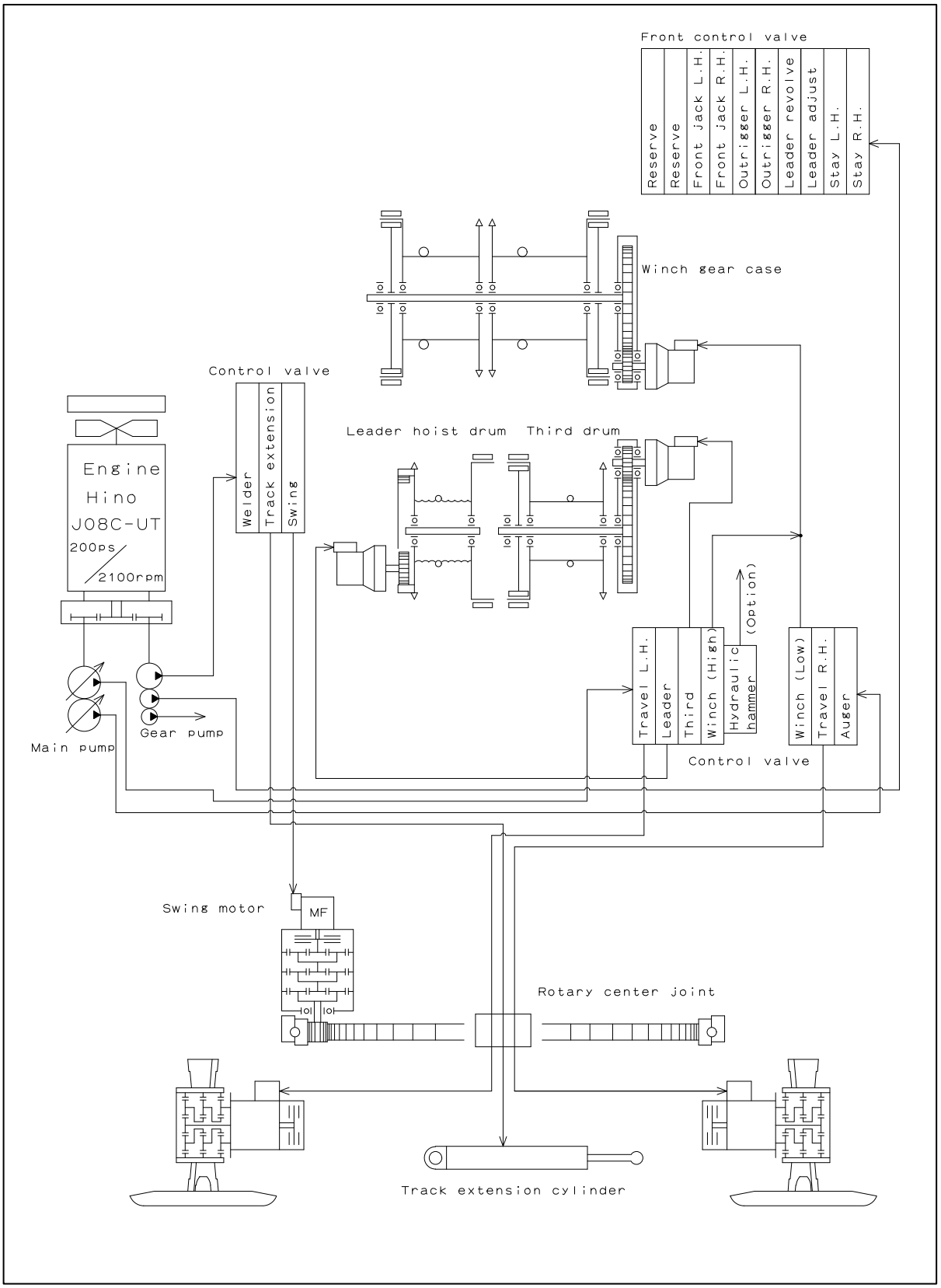
3) Type ····· Water cooled, 4-cycle, Overhead valve, in-line 6-cylinder, direct fuel injection, turbo-charged.

No. of cylinder x bore x stroke ·····	6 x 114 mm x 130 mm
Total displacement ·····	7,961 cc
Compression ratio ·····	18.0 : 1
Rated output ·····	147 kW / 2100 min^{-1} (200 PS / 2100 min^{-1})
Maximum torque ·····	750 N-m / 1600 min^{-1} (76.5 kgf-m / 1600 min^{-1})
Fuel consumption rate ·····	234 g/kW・hr (172 g/PS・hr)

2.5 Battery ····· DC24V-120A・h x 2 pcs.

2.6 Fuel tank capacity ····· 250 liters

3. POWER TRAIN DIAGRAM OF BASIC MACHINE



4. STRUCTURE AND FUNCTIONS

4.1 Upper revolving superstructure

All welded, stress relieved and precision machined unit, specially designed for rigidity and durability.

4.2 Winch drums

1) Main, auxiliary, third and leader winch drums are made of special alloy cast iron.
2) Grooved leader drum is mounted on single drum shaft and driven independently by one hydraulic motor.
3) Main and auxiliary drums are mounted abreast each other on single drum shaft on anti-friction bearings and driven by one hydraulic motor.
   Third drum is mounted on single drum shaft and driven independently by one hydraulic motor.
4) Main, auxiliary and third drums are equipped with internal expanding friction clutch bands powered by respective hydraulic clutch cylinders and ensure both power controlled lowering and free-fall lowering.
5) Drum brake system
   Main, auxiliary and third drums are equipped with external contracting friction bands powered by treading respective brake pedals.
6) Leader hoisting/lowering mechanism
   Completely independent operation from other winch functions.
   Both hydraulic brake and spring-loaded/hydraulic-released band brake offer positive and safe stopping of leader action.
7) Drum pawl lock
   Main, auxiliary, third and leader drums are equipped with drum pawl locks for safe operation.

4.3 Swing mechanism

1) Swing motor
   Axial piston motor with built-in planetary reduction gear.
2) Swing bearing
   Sealed ball race bearing with a heat-treated internal gear.
3) Swing brake
   Spring loaded and hydraulic released negative brake is installed.
4) Swing lock
   Manually operated mechanical lock with a rod tip which is engaged in the hole of track frame during transportation and assembling, whenever needed.

4.4 Operator room

Roomy, completely independent operator's room has safety glass windshields giving super blighting and excellent all-round visibility.

1) Control levers and instruments are arranged convenient, reducing unnecessary movements for operator.
2) Comfortable reclining seat is adjustable.

4.5 Undercarriage

1) Track frame

   All welded, stress relieved, precision machined unit, especially designed for rigidity and durability.
2) Crawler side frame

   Side frame of all-welded construction can be expanded for better stability of the machine during working and retracted for transportation by hydraulic cylinders as a standard equipment.
3) Track shoes

   Shoes are made of heat-treated cast steel and have flat and tapered surfaces, and are connected by heat-treated steel pins.
4) Rollers

   Life-lubricated lower rollers, upper rollers and drive tumblers.

   8 lower rollers and 2 upper rollers in each side frame, with double rolling surfaces.

4.6 Hydraulic system

A semi-closed circuit hydraulic system with double-plunger pump plus 3-gear pump assures both independent and simultaneous operations of all functions.

4.6.1 Main pump (Double-plunger pump)

Type	Plunger pump 1 Variable displacement Total power control	Plunger pump 2 Variable displacement Total power control
Setting pressure	30.4 MPa (310 kgf/cm^2) (304 bar)	30.4 MPa (310 kgf/cm^2) (304 bar)
Oil flow	242.3 lit./min.	242.3 lit./min.
Applications	Travel (L.H.) Leader drum Third drum (low) Main/Aux. drum (high)	Travel (R.H.) Main/Aux. drum (low)

4.6.2 Gear pump

Type	Gear pump 1	Gear pump 2	Gear pump 3
Setting pressure	20.6 MPa (210 kgf/cm²) (206 bar)	17.2 MPa (175 kgf/cm²) (172 bar)	5.4 MPa (55 kgf/cm²) (54 bar)
Oil flow	129.8 lit./min.	78.5 lit./min.	34.4 lit./min.
Applications	Swing Expansion of crawlers	Front-end attachments	Pilot circuit

4.6.3 Hydraulic motor

1) Swing motor 1-fixed volume axial piston motor with brake.
2) Winch (Main/aux.) 1-fixed volume axial piston motor with counter balance valve
3) Winch (Leader) 1-fixed volume axial piston motor with counter balance valve
4) Travel 2-fixed volume axial piston motor with spring loaded/ hydraulic released negative brakes and relief valves.

4.6.4 Hydraulic oil tank capacity : 280 liters

4.7 Leader and back stays

1) Leader

M65D leader is supported at its middle portion with a pair of back stays and cylinders and at the lower end with a leader bracket.

Two pairs of guide pipes (ϕ 70 x 330mm pitch) are provided along with whole length of the leader which enable to equip two operating attachments such as a hammer and an earth auger drive at the same time.

2) Top sheave assembly

The leader can be revolved 90 degrees in either direction to position the hammer or the earth auger to the center of the pile to be driven.

A top sheave assembly provided at the top of the leader has three sheaves for an earth auger, two sheaves for a hammer and one sheave for a pile.

5. WORKING CAPACITY TABLE

Working capacity table

(DHP85-2 M65D)

Rated output	147kW(200PS) /2100min⁻¹
Travel speed	1.4 km/h
Leader model	M65D
Leader bracket model	3.1 M
Counterweight	14.0 t
Weight of basic machine	28.0 t

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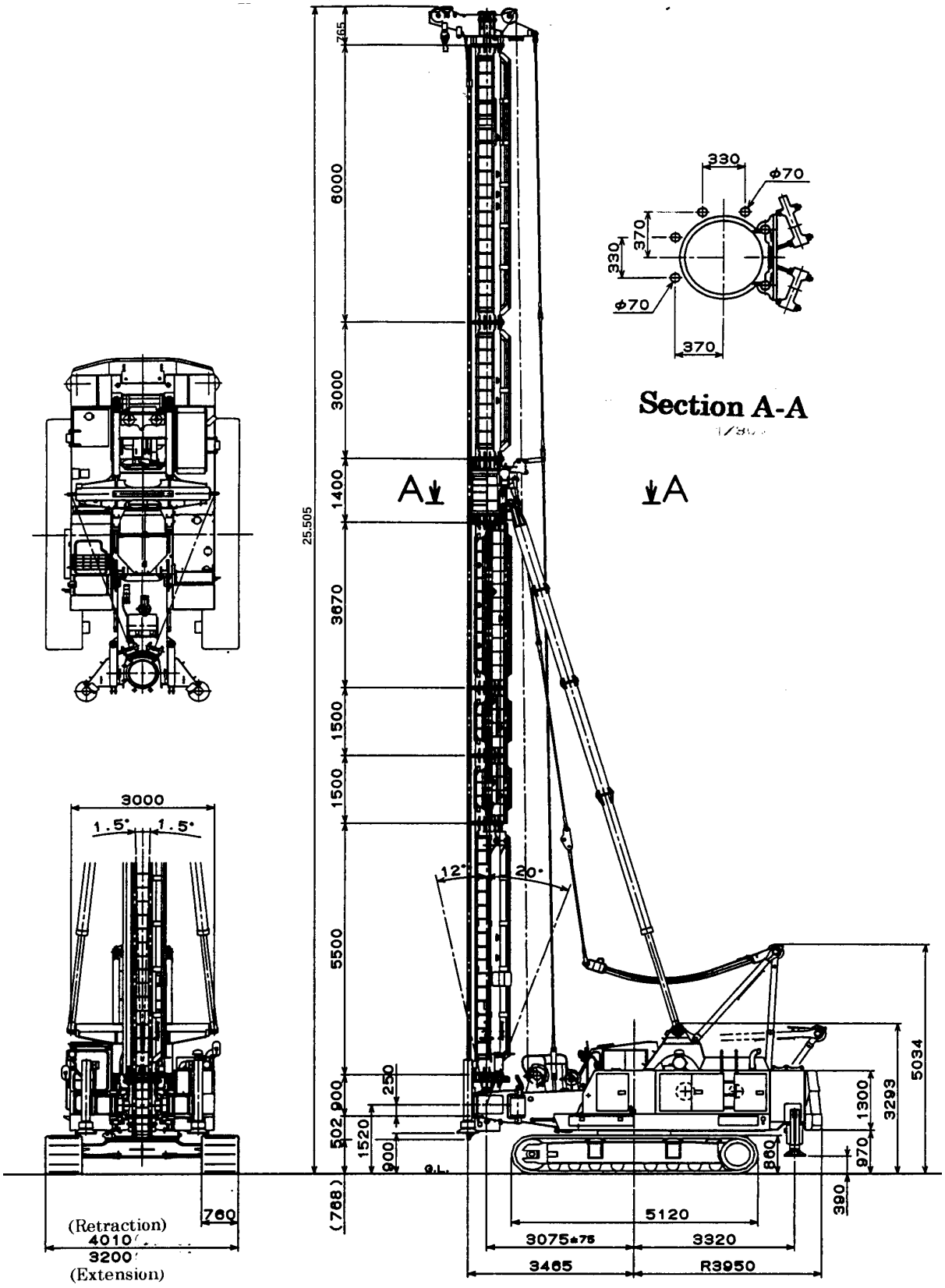
Counter weight	Hammer			Auger				Leader			Pile		Vertical stability (with pile)		Backward inclination		Total operating weight (without pile)	Average ground pressure (without pile)	
	Class	Weight	Cap weight	Auger drive		Screw		Length	Weight		Length	Weight			Angle	Stability (without pile)			
				Class	Weight	Length	Weight						For/aft	Side		For/aft	Side		
ton		ton	ton		ton	m	ton	m	ton		m	ton						kPa	kg/cm²
Standard 14.0	KB60	15.0	3.0	——	——	——	——	24	9.7		16	6.3	5.0°	12.4°	15°	6.1°	12.8°	75.5	114	1.17
	#45	11.0	1.5	——	——	——	——	24	9.7		17	10.0	6.1°	13.4°	15°	6.1°	14.3°	70.0	106	1.08
	NH-70	14.3	0.5	——	——	——	——	24	9.7		17	9.6	5.0°	12.7°	—	——	——	72.6	110	1.12
	——	——	——	NAS100	7.3	19	3.8	24	9.7		17	10.0	7.0°	14.6°	—	——	——	69.7	106	1.08
	NH-40	9.8	0.3	NAS100	7.3	19	3.8	24	9.7		18	5.1	5.0°	10.4°	—	——	——	80.1	121	1.24
	#45	11.0	1.5	NAS100	7.3	16	3.2	21	9.0		14	5.7	5.0°	11.8°	—	——	——	80.8	122	1.25
	NH-40	9.8	0.3	NAS80	7.1	20	3.4	24	9.7		18	5.4	5.0°	10.4°	—	——	——	79.4	120	1.23
	#45	11.0	1.5	NAS80	7.1	17	2.9	21	9.0		14	5.9	5.0°	11.8°	—	——	——	80.2	121	1.24
	NH-70	14.3	0.5	NAS60A	5.5	17	2.6	21	9.0		14	4.4	5.0°	11.9°	—	——	——	80.8	122	1.25
	NH-40	9.8	0.3	NAS60A	5.5	20	3.0	24	9.7		18	7.4	5.0°	10.9°	—	——	——	77.3	117	1.19
Standard 14.0 + Optional 2.6	NH-70	14.3	0.5	NAS100	7.3	16	3.2	21	9.0		14	5.9	5.0°	11.6°	—	——	——	86.0	130	1.33
	NH-40	9.8	0.3	NAS100	7.3	19	3.8	24	9.7		18	8.6	5.0°	10.6°	—	——	——	82.7	125	1.28
	NH-70	14.3	0.5	NAS80	7.1	17	2.9	21	9.0		14	6.2	5.0°	11.6°	—	——	——	85.4	129	1.32
	NH-70	14.3	0.5	NAS60A	5.5	20	3.0	24	9.7		17	4.8	5.0°	10.6°	—	——	——	84.6	128	1.31

Note

1. The table above shows based on NIPPON SHARYO standard specifications. Consult us when special specifications are required.
   The weight of front jacks. outrigger jacks and back tensioner are included in the total operating weight shown in the table.
2. The maximum leader length of self-erection is 24m with the front jack provided.
3. The permissible lifting load of the pile suspension rope of φ20 is 5 tons with single-part line and 10 tons with two-part line.
   Never allow to exceed the permissible lifting load. Consult us when using ropes having other specifications and 3 to 4-part line.
4. Take the safty factor of 6 and more for the auger suspension rope.
5. Guide pipe of the leader is φ70 x 330.
6. Use outrigger jacks when any backward batter pile driving is carried out. The maximum backward batter angle is up to 20 degrees.
   Consult us if any different condtion than the above is required.
7. The maximum permissible operation weight is up to 88 tons.
8. The maximum permissible torque of the earth auger is up to 44kN-m(4.5ton-m).
9. The maximum permissible extraction load on the top of the leader is 353kN(36tonf) ((441kN(45tonf) with back tensioner) with
   the leader length of 21m and the distance between the auger center and guide pipe center to be 655mm. Provide the front jacks
   when the auger extraction force exceeds 314kN(32tonf).

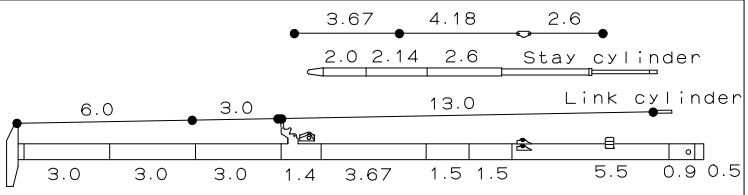
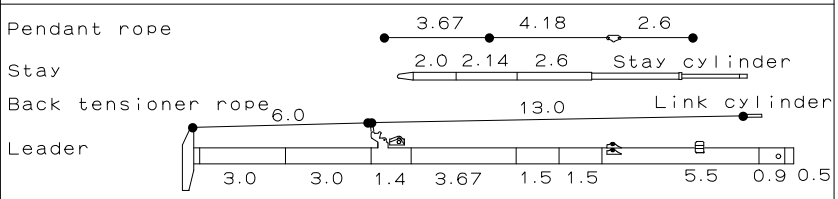
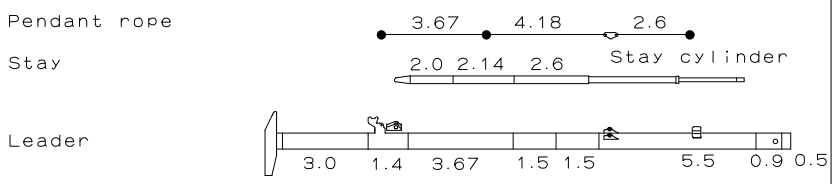
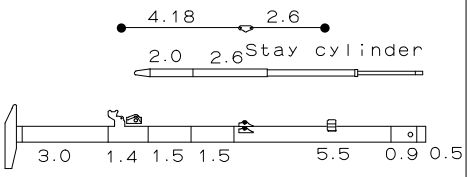
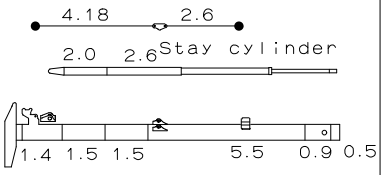
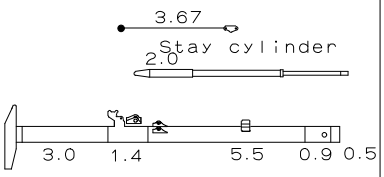
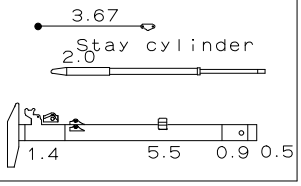
6. GENERAL VIEW OF DHP85-2, M65D, 24M LEADER



7. LEADER COMPOSITION (TYPE: M65D)

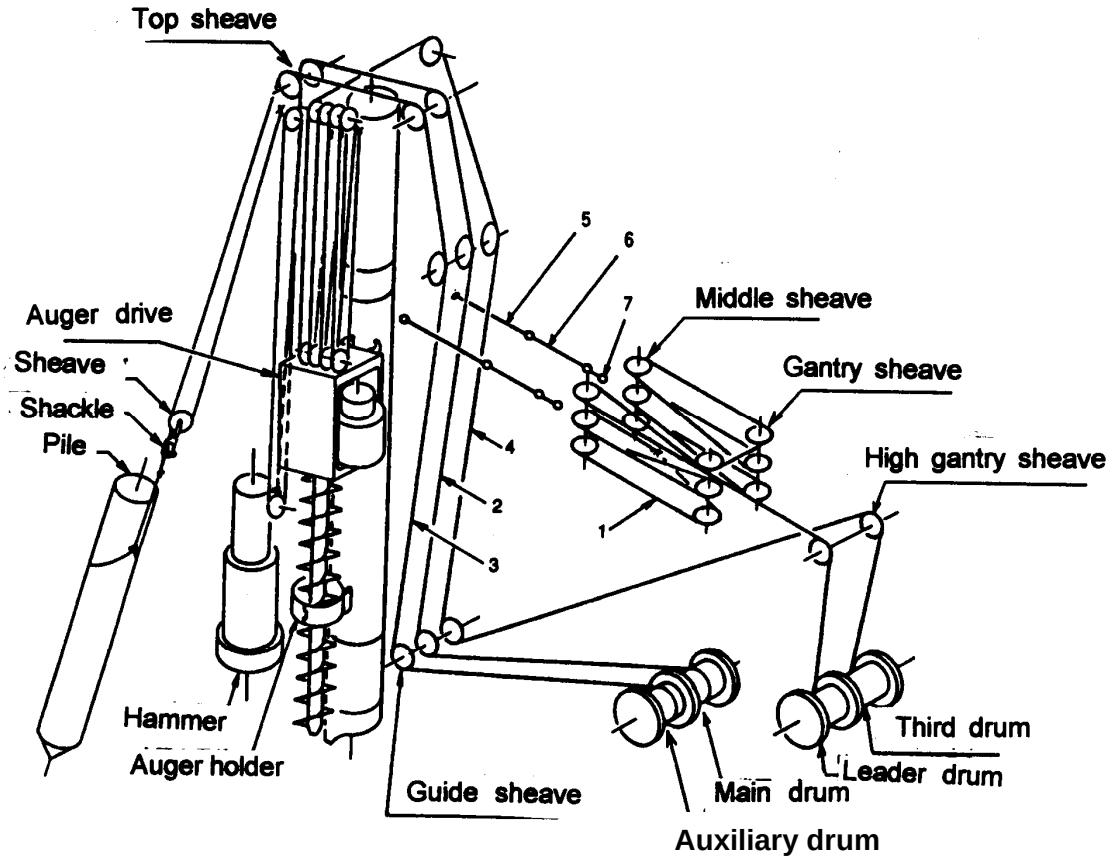
Composition of leader sections, back stays and pendant ropes is as shown below table.

★Select the leader length as short as possible in accordance with the pile driving work to carry out.

No.	Leader length (m)	Hight (m)	Composition
1	24	25.575m	
2	21	22.575m	
3	18	19.575m	
4	14	15.905m	
5	11	12.905m	
6	11	12.905m	
7	8	9.905m	

8. ROPE REEVING CHART AND ROPE SPECIFICATIONS

Hammer/auger combination work



No.	Rope name	Rope specifications	Rope dia. (Braking force)	Rope length
1	Leader	XP 7 x 7 + 6 x Ws(31) Ordinary Z-twist	ϕ 14 mm 188kN(19.2t)	130 m
2	Hammer	IWRC 6 x Fi(29) Ordinary Z-twist	ϕ 20 mm 294kN(30.0t)	150 (170) m
3	Pile	IWRC 6 x Fi(29) Ordinary Z-twist	ϕ 16 mm 294kN(30.0t)	90 m
4	Auger	IWRC 6 x Fi(29) Ordinary Z-twist	ϕ 14 mm 294kN(30.0t)	230m
5,6,7	Pendant	7 x 7 + 6 x Fi(29) ordinary Z-twist	ϕ 32 mm 1030kN(105t)	3,67, 4,18, 2.6 m

*Especially, wire for Hammer winding is able to wind 170m at 24m leader condition.

9. TRANSPORTATION WEIGHT

Basic machine	28.0 t
Counterweight (A)	9.0 t
Counterweight (B)	5.0 t
Leader bracket	2.1 t
Basic leader (0.9m + 5.5m + 3.0m)	3.42 t
21 m leader ass'y	7.79 t
Stay (both side)	2.27 t

10. STANDARD EQUIPMENT

1) Basic machine

- 14.0 ton counter weight
- Four drums of main, auxiliary, third and leader
- Leader bracket
- A pair of self-erecting jack
- A pair of outrigger jacks
- Air conditioner (cool only)
- Electric fan in operator's cab
- Heater
- Radio
- Electric fuel pump
- Ash tray and sight level gauge with a bubble
- Inclinometer with posture alarm
- Standard tool set

2) Pile driving front-end attachments

- 24m Leader, Revolver type Model: M65D
- Two pairs of guide pipes (ϕ 70 x pitch 330)

Composed of

0.5 m lower leader	1pc.
0.9 m revolver	1pc.
5.5 m lower leader	1pc.
1.5 m middle leader	2pcs.
3.67 m middle leader	1pc.
1.4 m holder	1pc.
3 m upper leader	1pc.
6 m upper leader	1pc.
Top sheaves assembly	1set

11. OPTIONAL EQUIPMENT

- Auger suspension load indicator
- Hydraulic P.T.O for hammer
- Back tensioner
- NH-40, NH-70 hydraulic pile hammer and accessories

12. GENERAL CONDITIONS

This specification shall cover the standard specification of Hydraulic Pile Driving Rig ; model DHP85-2, M65D (here-in-after called "The machine") manufactured by NIPPON SHARYO, LTD.

The general arrangement and principal dimensions of the machine are shown in the drawings attached.

1) DESIGN AND WORKMANSHIP

The machine shall be designed to perform the maximum efficiency with the least fuel consumption and the lowest maintenance costs.

The workmanship shall be of the first class in all respects.

The machine shall be built for simple mechanical arrangement and easy in inspection and maintenance.

2) MATERIALS

The materials used in the manufacture of the machine shall be of the highest quality, free from defects and imperfections.

Principal materials such as bolts, nuts, seals and steel plates used in the machine confirm to the Japanese Industrial Standards. (Almost equal to ISO9001)

3) TEST AND INSPECTION

Routine test and inspection in our factory shall be final.

4) PAINTING AND LETTERING

Under-coating by anti-rust paint and enamel finishing shall be performed in accordance with manufacturer's standard practice.

Main parts of the equipment shall be painted in NISSHA Green and other equipment in manufacturer's standard.

5) SERVICE CONDITIONS

The equipment shall meet the following service conditions.

Ambient temperature: -10 ℃ or higher and 40 ℃ or lower.

6) WARRANTY

All the machines specified herein shall be warranted by us for a period of twelve (12) calendar months after the date of being to put into operation, or fourteen (14) months after the date of shipment at a Japanese port, or one thousand engine operation hours according to the service hour meter, whichever is soonest.

The warranty shall cover defects in design, materials and workmanship only, shall not applicable to damage sustained mishandling of the machine or normal wear and tear.

The warranty shall not be applicable to the parts and materials mentioned below.

①Linings as brake/clutch bands and disc.
②Wear plates
③Wire ropes
④Rubber made parts
⑤Seals as o-rings, seal rings, back-up rings, etc.
⑥Gaskets and sheet packings
⑦Filter elements
⑧Batteries
⑨Electric wiring
⑩Glasses
⑪Other quick moving parts
⑫Lubricants

… concluded