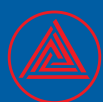
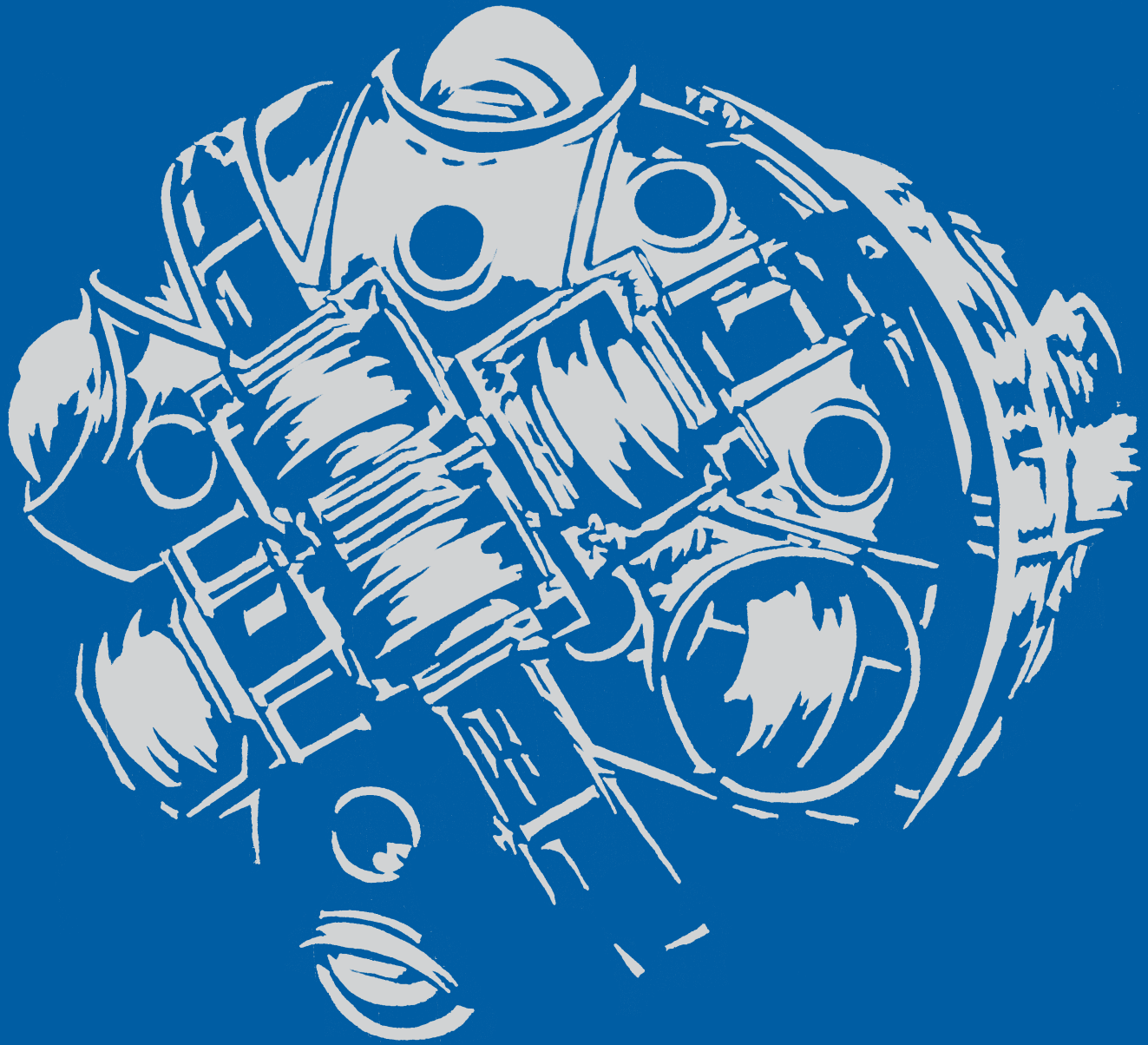
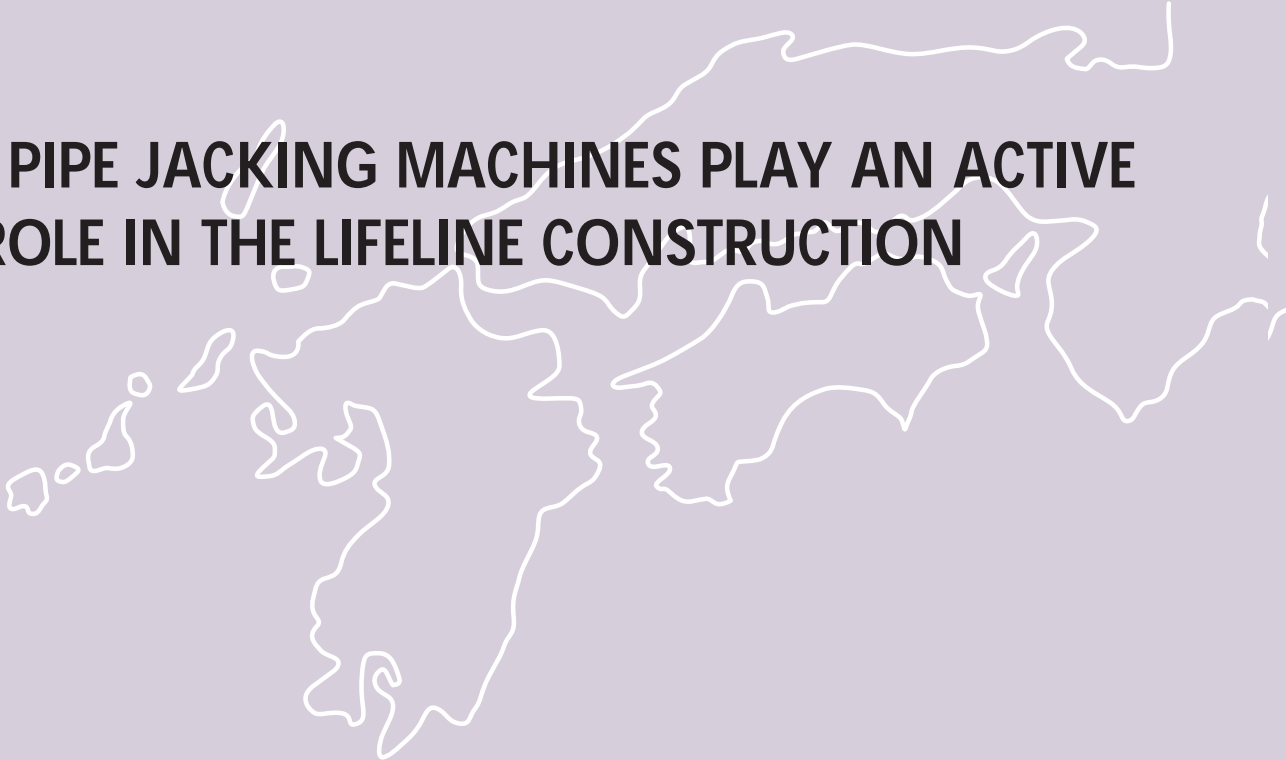


RASA



RASA INDUSTRIES, LTD.

RASA'S PIPE JACKING MACHINES PLAY AN ACTIVE ROLE IN THE LIFELINE CONSTRUCTION



A southern island is the root

Located at Lat, 24°N and Long. 131°E, about 408 km to the southeast of Okinawa Main Island and having an area of a little over 1,146,000 m², there is an island officially named Rasa Island, although indicated as Okinawa Island on the map. Before World War II, was an important place for the Japanese agriculture as the only domestic mine of phosphate ore, a raw material of fertilizers, and had a population of 2,000. At present it is an uninhabited island but is still holding a significant position as one of the base points to defend Japanese territorial waters of 200 nautical miles offshore. The island, owned by Rasa Industries, has inherited a variety of romances and legends. The word "rasa" is of a Latin origin meaning "flat", suggesting that Rasa Island was so named possibly by the discoverer because of its very flat landform. The company name "Rasa" originates rightly from the name of this island, where the company started its business activities from the mining of phosphate ore.

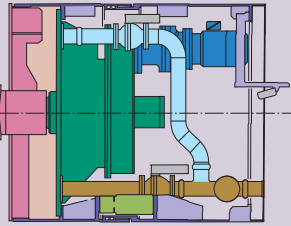


Rasa Island (Oki-Daito Island)

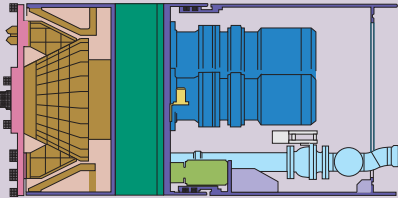
SELECTION CRITERIA FOR RASA JACKING EQUIPMENT

SLURRY PIPE JACKING

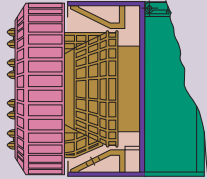
Model:DT(For ordinary soil layer)



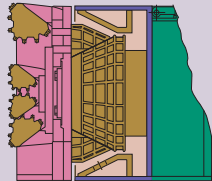
Model:DH(For cobble gravel layer)



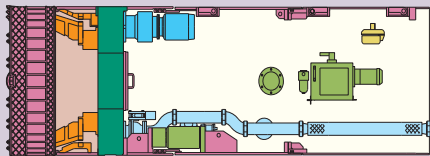
(For boulder & medium hard rock layer)



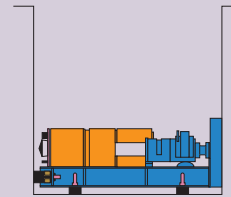
(For hard rock)



Model:DH-L(For long distance)

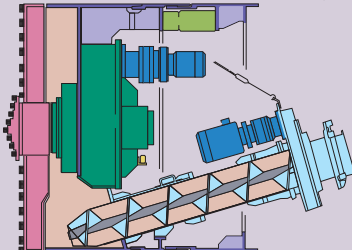


Model:DH-FS (Microtunneling Small starting shaft)



Earth Pressure Balanced Pipe jacking

Model:BM(For ordinary soil and gravel layer)



Others

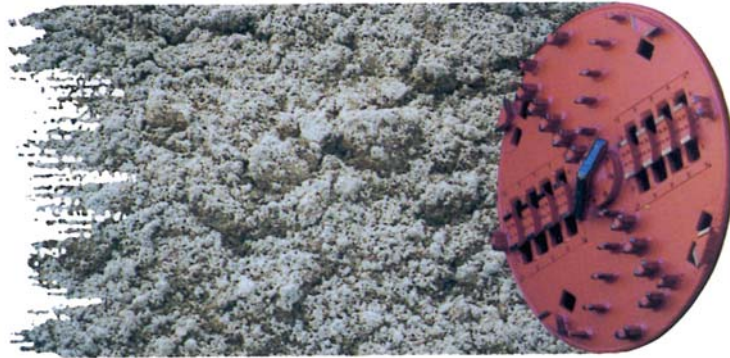
TBM
Segmental shield

Slurry treatment plant
Slurry pump
Jacking system

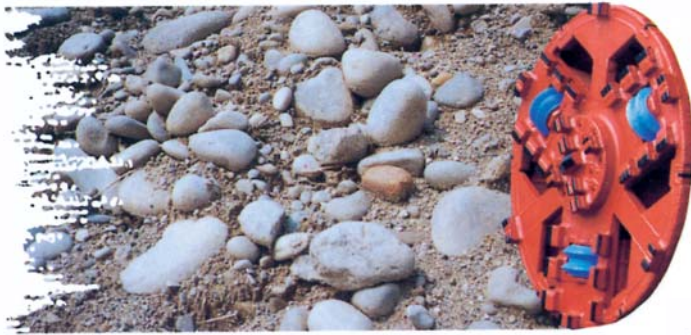
Putzmeister
Muck pump

Thrust reducer
Steering shield for sharp curve
Data logging system

ITS TOUGHNESS IN PERFORMANCE BRINGS ABOUT RELIABILITY



Ordinary soil
Hard soil



Cobble gravel

**A variety of cutter
disks available**



Soft rock



Hard rock



Boulder mixed with
medium hard rock

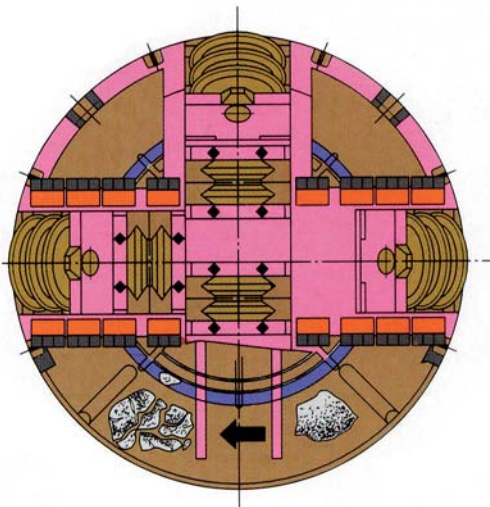


Medium hard rock

for various soil conditions



UNICORN Slurry Pipe Jacking Machine

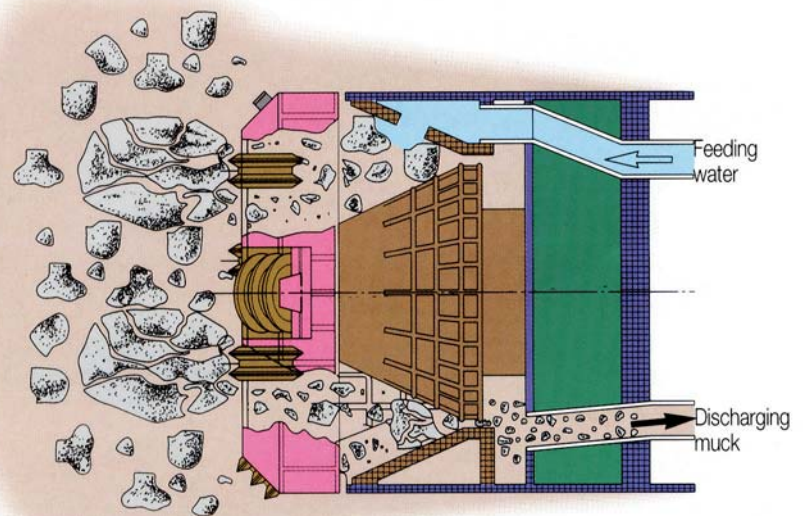


General

A series of UNICORN slurry pipe jacking machines are capable of handling pipe sizes (I.D.) from 250 mm to 2600 mm and of excavating through boulder, soft rock, medium hard rock, and hard rock layers. By changing its cutter disc, the machine can also be applied to the pipe jacking in the ordinary soil, hard soil, and cobble gravel layers.

Crushing mechanism

The machine adopts a two-stage crushing mechanism; that is, the primary crushing is performed with roller bits installed on the cutter disk that rotates at a large torque and the secondary crushing is performed with a robust cone crusher consisting of a mantle and cone cabling.



Crushing mechanism

UNICORN SLURRY PIPE JACKING MACHINE FOR BOULDER AND ROCK LAYER APPLICATION



Three outstanding features

1. Powerful crushers

The primary and secondary crushing mechanisms that are driven by a large torque power are provided.

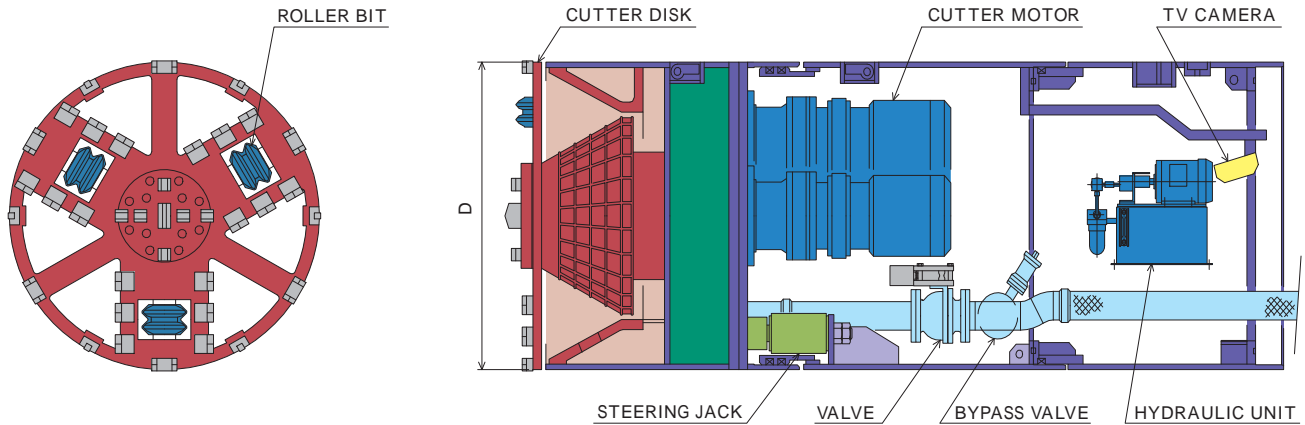
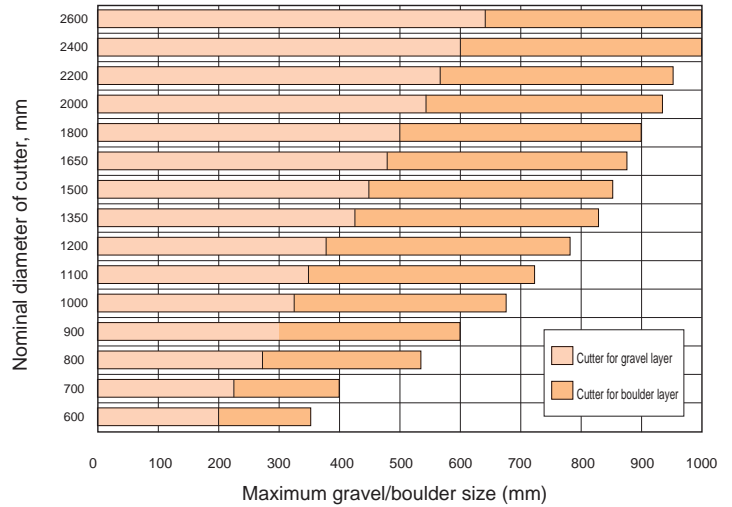
2. Greater applicability

With a variety of cutter disks available, the machine can be used for excavating through various types of soil.

3. Economy

Its simple construction and remote control for various functions will reduce the running cost to a minimum.

Applicability of cutter size to max. gravel size



Specifications of DH type machine

I.D.	Dimensions (mm) D x L	Weight (t)	Power (kW x set)	Torque (kN·m)		Revolution (min ⁻¹)		Steering Jack (kN x st x set)	Hydraulic unit (kW)	Piping in shield body (mm)
				50Hz	60Hz	50Hz	60Hz			
600	790 x 2485	3.6	7.5 x 2	19	16	7.6	9.1	160 x 20 x 4	0.75	100
700	910 x 2575	4.0	11 x 2	33	28	6.4	7.6	270 x 30 x 4	0.75	100
800	990 x 2575	5.0	7.5 x 3	42	35	5.2	6.2	270 x 30 x 4	0.75	100
900	1110 x 2585	6.7	11 x 3	73	60	4.3	5.2	370 x 30 x 4	2.2	100
1000	1230 x 2600	8.0	11 x 3	80	66	4.0	4.8	420 x 30 x 4	1.5	100
1100	1340 x 2860	9.5	15 x 3	101	84	4.2	5.1	420 x 30 x 4	1.5	100
1200	1460 x 2860	12.0	15 x 3	122	101	3.5	4.2	420 x 50 x 4	1.5	100
1350	1630 x 3015	13.0	22 x 3	201	168	3.1	3.8	750 x 50 x 4	2.2	150
1500	1810 x 3105	17.0	22 x 3	250	209	2.5	3.0	750 x 50 x 4	3.7	150
1650	1980 x 3150	21.0	22 x 3	314	262	2.0	2.4	1000 x 50 x 4	3.7	150
1800	2150 x 3320	25.0	18.5 x 4	411	342	1.7	2.1	630 x 50 x 8	3.7	150
2000	2375 x 3495	28.0	22 x 4	557	464	1.5	1.8	750 x 100 x 8	3.7	150
2200	2610 x 3920	37.0	30 x 3	561	467	1.5	1.8	1000 x 100 x 8	3.7	150
2400	2840 x 3990	41.5	30 x 4	758	632	1.5	1.8	1000 x 100 x 8	5.5	150
2600	3070 x 3990	47.0	30 x 4	850	730	1.3	1.6	1000 x 100 x 8	5.5	150

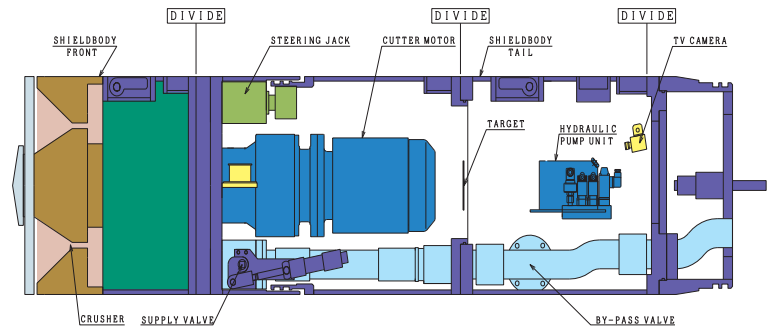
• Numbers in parentheses represent the machine for gravel layer application.
 • Heavy duty cutter face for boulder and rock can be fixed by on the above DH type machine.

UNICORN MICROTUNNELING

The unique feature of the DH-FS type is that it can be jacked from a small starting pit.

Its structure can be divided into 4 smaller portions means that it can be collected from existing man hole.

A hydraulic drive system is employed, realizing powerful excavation performance and space saving.



Hydraulic model

Specifications of DH-FS

I.D.	Dimensions D×L(mm)	Weight (t)	Power (kW×set)	Torque (kN·m)	Rev. (min ⁻¹)	Piping	Starting Shaft (m)	Arriving Shaft (m)
300	440 × 2380	1.3	30 × 1(Hyd. motor)	11	0-15	2B	2.0	1.6
400	560 × 2500	1.9	30 × 1(Hyd. motor)	15	0-15	2.5B	2.0	1.6
500	690 × 2705	2.8	30 × 1(Hyd. motor)	24	0-10	3B	2.5	2.0
600	800 × 2670	3.5	30 × 1(Hyd. motor)	24	0-10	3B	2.5	2.0
700	920 × 2670	4.2	30 × 1(Hyd. motor)	30	0-8	3B	2.5	2.0

Specifications of jacking system

I.D.	300	400	500	600	700
Starting Shaft(m)	2.0	2.0	2.5	2.5	2.5
Power(kN)	350kN × 2	500kN × 2	750kN × 2	900kN × 2	1000kN × 2
Stroke(mm)	675	675	665	800	800
Width(mm)	1090	1090	1270	1434	1434
Length(mm)	1816	1816	1880	2225	2225
Pipe Center	431	431	510	525	525
Weight(kg)	950	1000	1200	2100	2500
Hydraulic Unit	30kW + 7.5kW	30kW + 7.5kW	30kW + 7.5kW	30kW + 7.5kW	30kW + 7.5kW

Electric model

Specifications of DH-FS

I.D.	Dimensions (mm) D×L	Weight (t)	Power (kW×set)	Torque (kN·m)		Revolution (min ⁻¹)		Steering Jack (kN × st × set)	Hydraulic unit (kW)	Piping in shield body (mm)	Min. MH (mm)
				50Hz	60Hz	50Hz	60Hz				
250	380 × 2295	0.8	2.2 × 1	4.4	3.8	4.8	5.8	50 × 10 × 3	0.18	50	900
300	430 × 2295	1.1	2.2 × 1	4.4	3.8	4.8	5.8	50 × 10 × 3	0.18	50	900
350	490 × 2350	1.4	5.5 × 1	5.0	4.5	10.0	12.1	100 × 16 × 2	0.18	65	1200
400	550 × 2380	1.7	7.5 × 1	8.7	7.2	8.4	10.1	130 × 16 × 2	0.18	65	1200
450	600 × 2231	1.9	11 × 1	14.3	12.1	7.3	8.7	170 × 20 × 2	0.55	80	1500
500	660 × 2562	2.4	11 × 1	14.3	12.1	7.3	8.7	200 × 20 × 2	0.55	80	1500

voltage 400V

Specifications of jacking system

I.D.	250 ~ 300	350 ~ 500
Starting pit(m)	2.0	2.5
Thrust power(kN)	700	1500
Width(mm)	970	1440
Length(mm)	1790	2190
Center of pipe	450	550
Weight(kg)	900	1200
Power(kW)	7.5	

DH-L FOR LONG DISTANCE

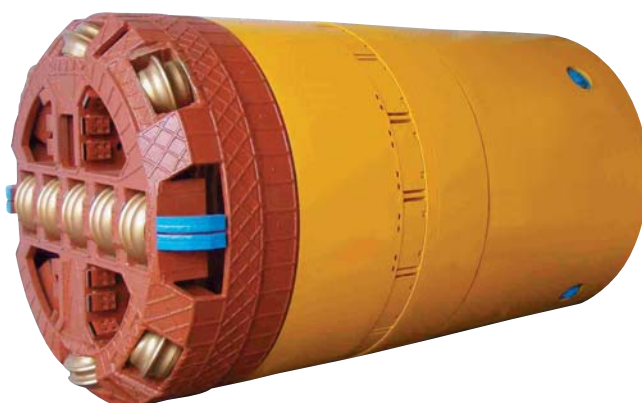


General

Slurry pipe jacking method is developed to improve economy as well as to accomplish reliable execution result and to reduce adverse effect to the surrounding environment. It is for laying supply water pipe, electrical or gas piping or communication network lines.

This machine employed in this method is applicable to a variety of soil property ranging from rock or boulder layer to normal soil. It accomplishes long distance thrust (300m ~ 1000m for 1span) and enables replacement of cutter bit at anytime as required.

It would cause less disturbance and inconvenience to the public due to less surface works.



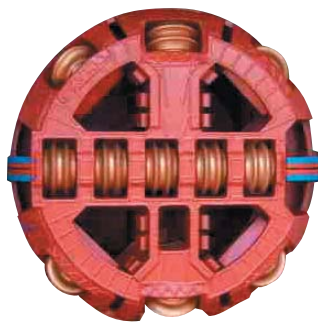
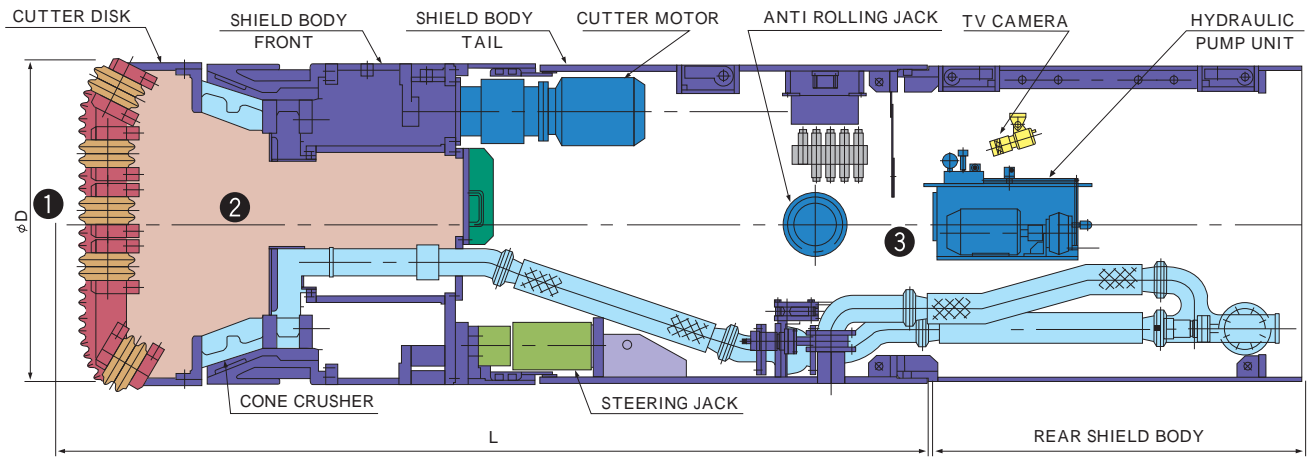
Features

1. Drive system in DH-L, installed on the periphery of the machine, generates high torque. With attached high-power cone crusher in a chamber, it is adaptable to large boulder layer as large as 2/3 of the nominal diameter to 200MPa rock layer.
2. Cutter bit, when worn out, can be replaced from inside of the machine.
3. Optimum cutter selected in accordance with the soil property will offer effective excavating capacity and reduces surface resistance.
4. High precise excavation result can be obtained not only for linear excavation but for curved excavation with its effective center-bending method steering mechanism, thrust angle sensor and detective system using optical instrument.

Specifications of DH-L

I.D.	Dimensions (mm) D×L	Weight (t)	Power (kW×set)	Torque (kN·m)		Revolution (min ⁻¹)		Steering Jack (kN×st×set)	Hydraulic unit (kW)	Piping in shield body (mm)
				50Hz	60Hz	50Hz	60Hz			
1000	1240 × 3405	10	7.5 × 5	72	60	5.0	6.0	400 × 50 × 4	2.2	100
1100	1360 × 3450	11	7.5 × 5	79	67	4.5	5.4	500 × 50 × 4	2.2	100
1200	1460 × 3500	12	11 × 5	108	89	4.9	5.9	600 × 50 × 4	2.2	100
1350	1640 × 3550	15	15 × 5	146	122	4.9	5.9	750 × 50 × 4	2.2	100
1500	1820 × 3620	18	18.5 × 5	193	161	4.6	5.5	900 × 50 × 4	3.7	150
1650	1990 × 3750	20	22 × 5	250	208	4.2	5.0	1100 × 50 × 4	3.7	150
1800	2160 × 3830	26	22 × 5	310	260	3.4	4.1	630 × 50 × 8	3.7	150
2000	2385 × 4000	32	30 × 5	400	336	3.4	4.0	750 × 100 × 8	3.7	150
2200	2620 × 4200	40	30 × 5	520	440	2.8	3.3	1000 × 100 × 8	3.7	150
2400	2840 × 4440	52	37 × 5	680	570	2.6	3.0	1100 × 100 × 8	3.7	150

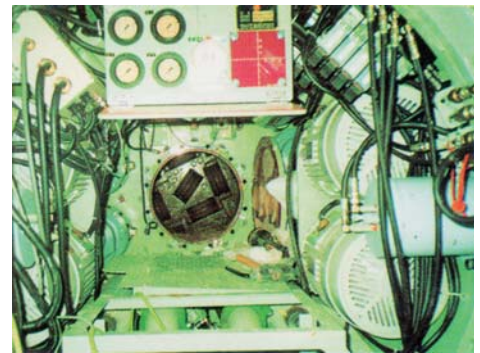
voltage 400V



1 Cutter disk



2 Inside of chamber



3 Inside of machine



Bit replacement inside of machine



Project

Korea in 1999

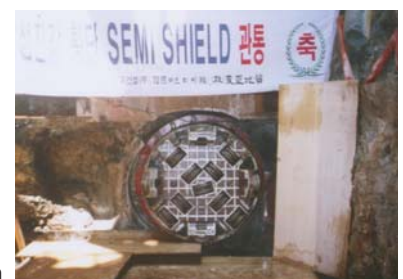
Total distance	310m
Soil Condition	Rock and boulder
Max. boulder	2500mm
Compressive strength	100MPa
Remarks	across river



DHL 1000



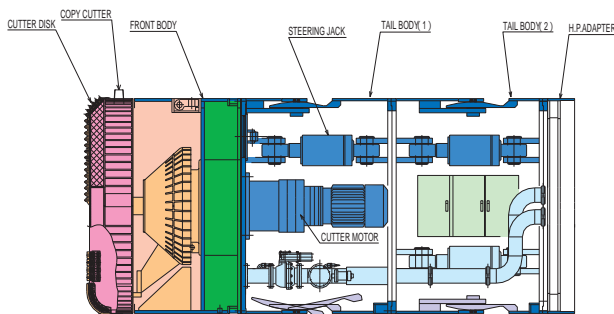
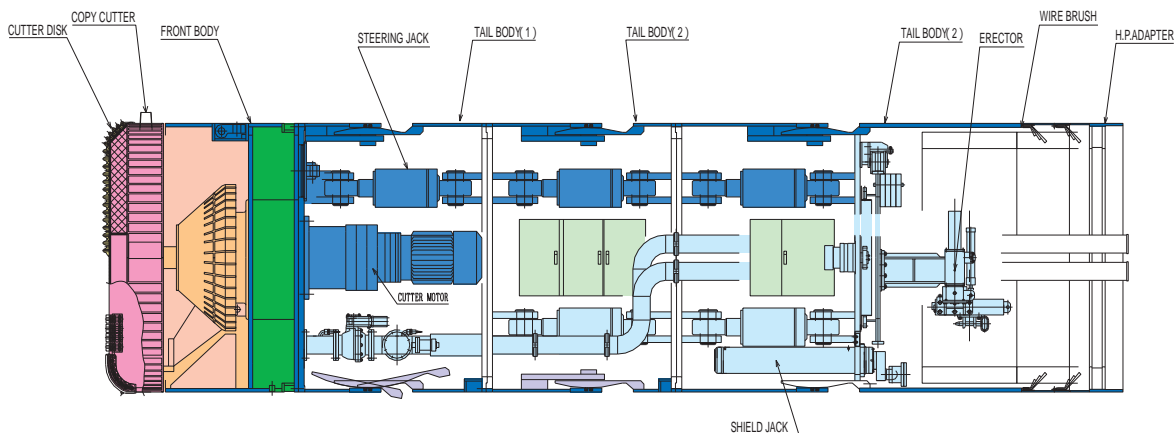
Sumjin river in Korea



Breakthrough

DH-U FOR SHARP CURVE

DH-U
1800 ~ 2400mm



Features

Like the DH type, DHU incorporates a cutter disk and also a powerful cutter motor and cone crusher that can cope with various kinds of soil. The main body has two direction correction sections each consisting of a spherically formed structure, enabling the system to cope with sharp curves as well.

The top of the machine has an inspection hatch to enable wear of the bit to be checked during long distance propulsion.

The use of the dual shield system increases the work accuracy.

By combining a gyro-navigation and data logging system with the dual shield system, work management is facilitated.

Specifications of DH-U

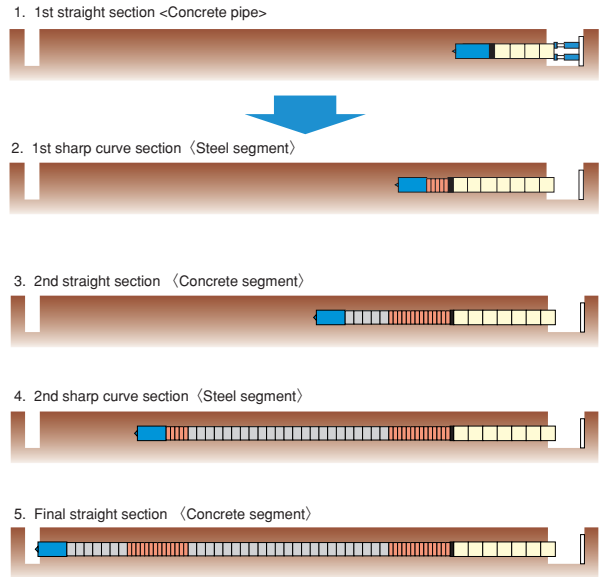
I.D.	Dimensions (mm) D x L	Weight (t)	Power (kW x set)	Torque (kN·m)		Revolution (min ⁻¹)		Piping in shield body (mm)
				50Hz	60Hz	50Hz	60Hz	
1800	2190 x 4770	26	45 x 2	367	306	2.3	2.8	150
2000	2460 x 4810	30	55 x 2	467	389	1.8	2.2	150
2200	2670 x 5000	40	55 x 2	525	437	2.0	2.5	150
2400	2890 x 5285	50	37 x 4	678	565	2.0	2.5	150

voltage 400V

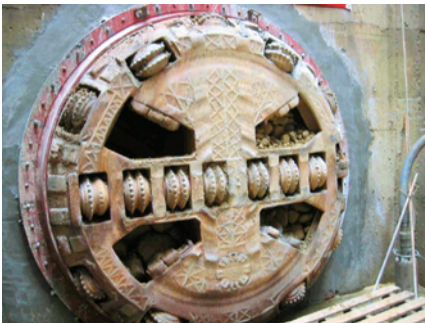
Dual Shield System

Features

The Dual Shield System is design for projects which undertakes long and sharp curve pipeline projects. First, the pipe jacking method is adopted over a fixed distance of straight line and thereafter the segmental shield method is adopted to complete the sharp curve section and balance works of the pipeline construction. This system, which combines the pipe jacking and segmental shield method provides a safe, reliable and economical solution to your pipeline construction works.



Project c/w Dual Shield System



Size: $\Phi 2000\text{mm}$
 Length: 360m/1sp
 Condition: Boulder 500mm
 Curve: R30m X 2 sections
 Use: Hume pipe, steel/concrete segment

ME河箱(倒灌)

R30

R1

推進方向

R30

M3

MG沉箱

沉箱(發進)



Segmental Shield



DHL 3530 Segmental Shield



DT 3000 Segmental Shield



Breakthrough



Breakthrough

Gyro Navigation System

Optimum control machine position for curved pipe jacking

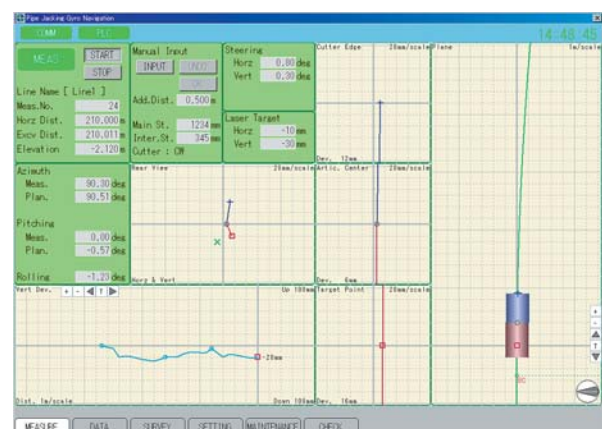
The north seeking gyrocompass is an absolute directional sensor that detects direction from the North Pole. This sensor has been used with extremely satisfactory results in curved pipe jacking systems.

Real time machine coordination and position can be determined by absolute direction and distance data. This systems allows drastic reduction in survey work.



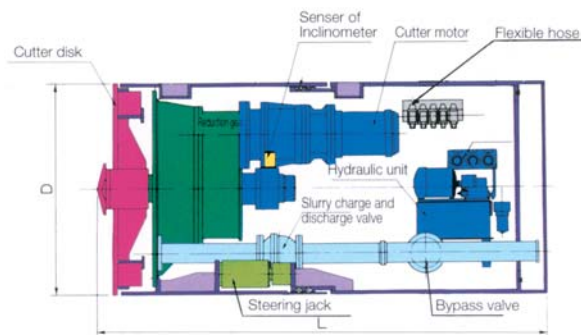
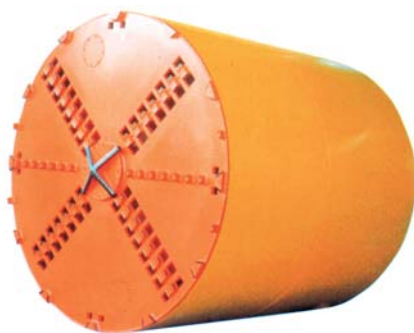
Features

- * Absolute direction
Gyrocompass detects absolute direction.
Servo type acceleration meter measures pitch and roll.
- * Real time machine position
Machine position is determined in real time and maintained in accurate alignment by the gyrocompass and distance meter.
- * The increase in efficiency of the work
Reduction in amount of surveying which improves work efficiency.
- * Graphical survey image
Input of survey results executes transverse calculation and deviations relative to design tunnel alignment will be displayed.
- * Easy-handling and user-friendly software.
Graphic user interface navigate operator clearly.
- * Data saving
Various related values saved in database every 10cm.



DT FOR ORDINARY SOIL

DT
600 ~ 3000mm

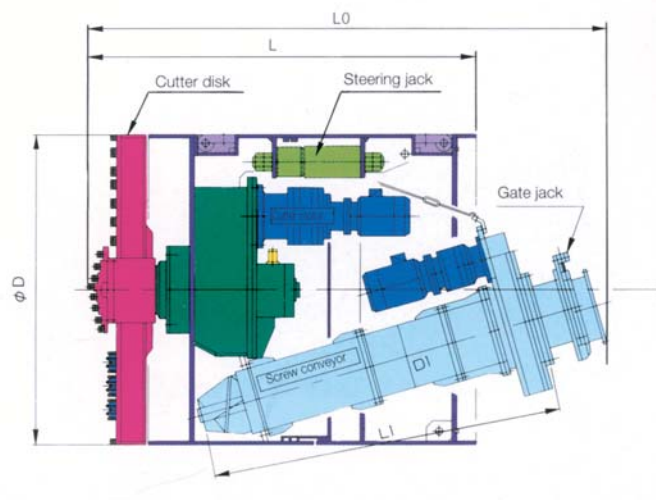
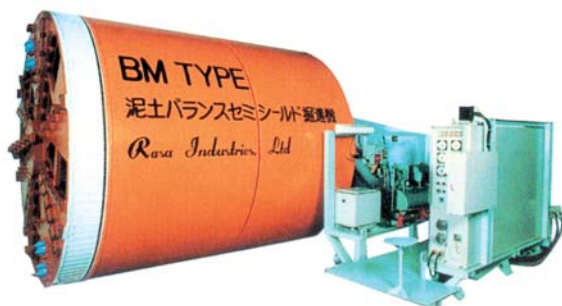


Standard specifications of RCM(DT)

I.D.	Dimensions (mm) D×L	Weight (t)	Power (kW×set)	Torque (kN·m)		Revolution (min ⁻¹)		Steering Jack (kN×st×set)	Hydraulic unit (kW)	Piping in shield body (mm)
				50Hz	60Hz	50Hz	60Hz			
600	780×2400	2.5	5.5×1	6.5	5.5	8.0	9.6	130×30×4	0.75	80
700	902×2325	3.0	5.5×1	9.5	7.9	5.6	6.7	200×30×4	0.75	100
800	983×2610	3.5	7.5×1	14	12	5.2	6.2	200×30×4	0.75	100
900	1103×2250	4.0	3.7×2	21	17	3.5	4.2	270×50×4	0.75	100
1000	1223×3620	4.5	5.5×2	24	20	4.4	5.3	270×50×4	0.75	100
1100	1333×2450	5.5	7.5×2	35	29	4.2	5.0	420×50×4	1.5	100
1200	1453×2515	6.0	7.5×2	46	37	3.2	3.9	420×50×4	1.5	100
1350	1620×2840	7.0	11×2	65	55	3.2	3.9	420×50×4	1.5	100
1500	1800×3050	9.0	15×2	91	75	3.2	3.9	270×50×8	3.7	150
1650	1970×3202	11.0	18.5×2	122	101	3.0	3.6	420×50×8	3.7	150
1800	2140×3200	14.0	18.5×2	139	116	2.6	3.1	420×50×8	3.7	150
2000	2375×3340	18.0	22×2	240	200	1.8	2.1	550×100×8	3.7	150
2200	2610×3340	21.0	22×3	337	270	1.9	2.3	750×100×8	3.7	150
2400	2840×3340	28.0	22×3	337	270	1.9	2.3	750×100×8	3.7	150
2600	3060×3340	32.0	18.5×4	442	369	1.6	1.9	1000×100×8	3.7	150
2800	3300×3210	35.0	22×4	659	549	1.3	1.6	1000×100×8	3.7	150
3000	3530×3210	40.0	22×4	659	549	1.3	1.6	1000×100×12	3.7	150

BM EARTH PRESSURE BALANCED TYPE

BM
1200 ~ 3000mm



BIOS EXCEED



Specification

Material	Organic resin/ inorganic silicate salt
Appearance	Powder/Yellow
Gravity	0.9-1.1
Packing	1kg vinyl pack

Normal mixing ratio

Put BIOS EXCEED into the specified quantity of water and stir about 10 minutes until the powder dissolves.

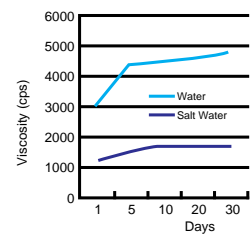


EX.) 1000 liter lubricants

It is important for reduction thrust force in long distance and curve project. BIOS EXCEED is easy to use and make and keep quality for long time.

1. Insoluble / High viscosity
2. Long life quality
3. Anti-seepage
4. Easy making
5. Ecological material

Viscosity at after mixing is low and easy to pour. It keeps viscosity for long time and help lubricating pipe clearance.



The Yellow River Crossing 2003



The Yellow River



DH-1500



Breakthrough

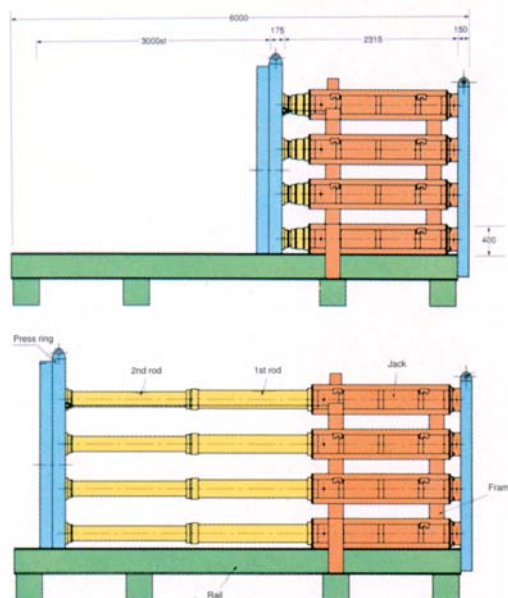
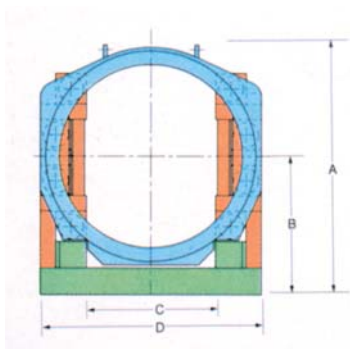
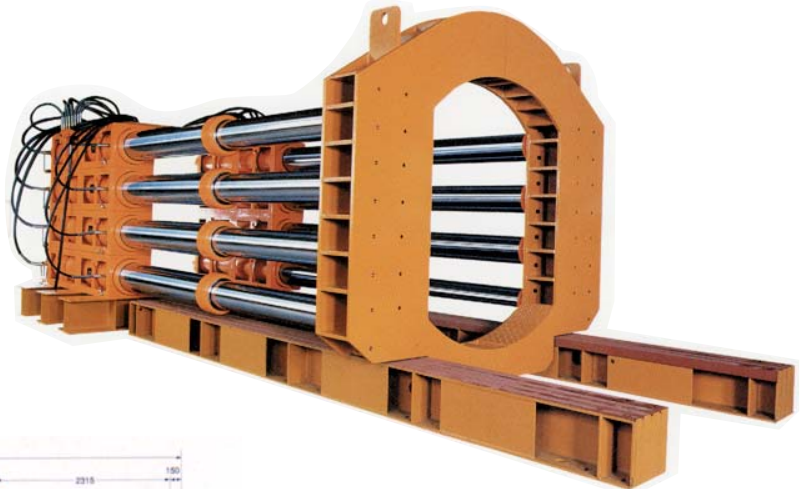
L1=1175m L2=1166m L3=1259m

For the laying of 3 span of 1175m, 1166m, and 1259m in length across the Yellow River near the city of Zheng Zhou in China, the RASA BIOS EXCEED special lubricant was used to reduce friction force thus reducing main jacking force.

Thrust jacking equipments

Features

- Long stroke, 3000mm, jacking system by multi stage mechanism
- Light weight and small size with high-pressure jack
- Open shield Combination
- Multi stage mechanism is able to operate at same pressure, speed, and power.
- Jacking speed adjustable in alignment to the set speed of shield machine.



I.D.	Q'ty	A	B	C	D
2000	8	2790	1561	1600	2700
2200		3010	1670	1700	
2400		3250	1819		2900
2600	10	3500	1928	1920	3300
2800		3730	2073		
3000		3980	2200	2100	3500

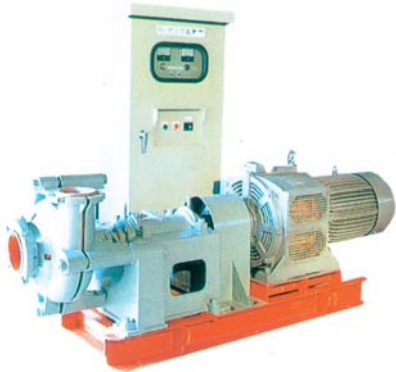
(mm)

Treatment / Transportation system

Standard specifications of sand dehydrator



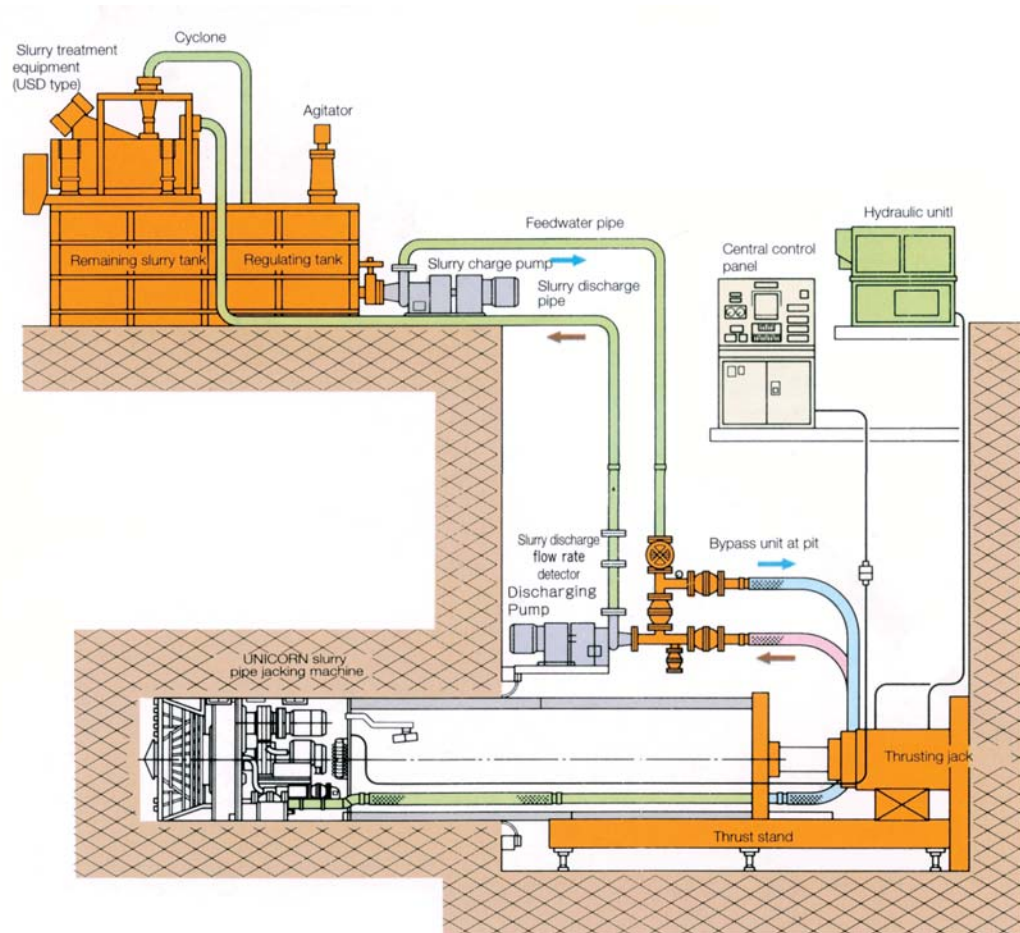
Model		MSD-0.5	MSD-1	USD-2	USD-4
Capacity	(m ³ /min)	0.45	0.9	1.8	3.6
Wet type	Size (mm)	500 x 1500 x 2D	600 x 1800 x 2D	750 x 2400 x 2D	1200 x 3600 x 2D
vibrating screen	Power (kW x set)	0.75 x 2	1.2 x 2	2.2 x 2	5.5 x 2
Wet type cyclone	(Type x set)	MD-6 x 1	MD-9 x 1	MD-9 x 2	MD-9 x 4
Slurry pump power	(kW x set)	7.5 x 1	11 x 1	15 x 2	22 x 2
Regulating Circulation Tank	(m ³)	2-tank system 4	2-tank system 10	4-tank system 27	2-tank system 30
Agitator	(kW x set)	2.2 x 1	2.2 x 1	2.2 x 1	2.2 x 2
Cross weight	(t)	2.0	3.5	10.5	14.5
External dimensions	(L x W x H)(m)	3.1 x 1.7 x 2.3	4.2 x 2.5 x 3.9	9.4 x 3.5 x 4.3	9.4 x 3.5 x 4.9
Feed pump	(kW x set)			3.7 x 1	1.5 x 1



Specifications of Warman pump

Pipe diameter (mm)	80		100		150	
Model	4/3SCEO V/L3VM		6/4SCEO V/L3VM		8/6SCEO V/L3VM	
	P1	P2	P1	P2	P1	P2
Capacity (m ³ /min)	0.8	0.8	1.4	1.4	4.0	4.0
Head (m)	19	23	25	30	26	28
Electric motor output (kW)	11	15	22	30	45	55
Type of electric motor	Variable speed					
Dimensions, L x W x H (mm)	1000 x 650 x 1100	1000 x 650 x 1100	1300 x 1700 x 850	2400 x 950 x 850	1700 x 2300 x 1200	3600 x 1000 x 1300

Layout of slurry pipe jacking system





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