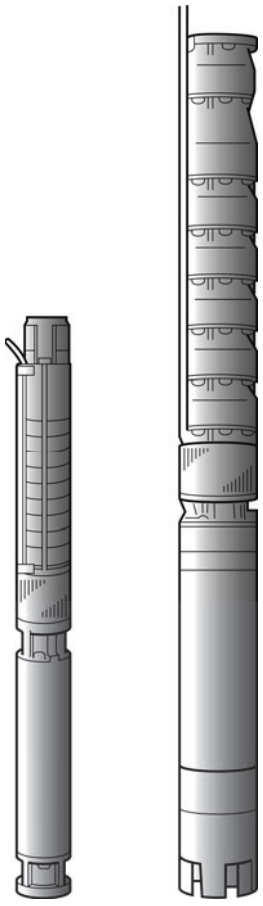
Instruction Manual
Installation Manual

Deep Well Submersible Pump
Model MSU/MSUS



Thank you for your purchase of the Deep Well Submersible Pump.

To the customers

- Instruct the dealer (installation contractor) to install the pump.
- Thoroughly read this manual to properly use the pump. Keep this manual carefully after use, and read it when needed.
- Note that we are not liable for any product failures or accidents caused by improper use.

To the dealers (installation contractor)

- Properly install the pump according to the installation manual.
- After the completion of installation, be sure to submit this manual to the customer.
- Note that we are not liable for any product failures or accidents caused by improper installation or improper use.

Contents

Instruction Manual for the customer

Installation manual for the dealer (installation contractor)

Teral Inc.

Instruction Manual [for the customer]

Safety precautions

Be sure to observe the following.

The following symbols and labels indicate the instructions that the user must observe in order to prevent personal injury and property damage.

■ Levels of possible injuries and damage due to improper use in defiance of the instructions are classified by the following symbols and labels.

⚠	**WARNING**	indicates that incorrect handling may lead to death or severe injury.
⚠	**CAUTION**	indicates that incorrect handling may lead to injuries or property damage.

■ The following symbols indicate the types of instructions to be observed. (The following are only part of all symbols.)

⊘	This symbol indicates "prohibited" actions that you must NOT do.
❗	This symbol indicates "mandatory" actions that you must do.

⚠ WARNING

Never disassemble, repair, or modify the product.


Do not disassemble

It may lead to ignition or malfunction, thus causing injuries.

- For repairs, contact the dealer (installation contractor).

Do not operate the control panel or ground fault interrupter with wet hands.


Don'ts

An electric shock may occur.

Do not damage the submersible cables, apply an excessive force to them, or tie them in a bundle.


Don'ts

A fire or electric shock may occur.

If the underwater cables or above-ground wires are damaged, do not use the product.


Don'ts

A fire or electric shock may occur.

- Instruct the dealer (installation contractor) to repair them.

Do not put anything heavy on submersible cables or the above-ground wires, pinch them, or modify them.


Don'ts

It may damage the submersible cables or above-ground wires, thus causing a fire or electric shock.

Do not run the product in mud.


Don'ts

An electric shock or accident may occur.

Do not use the product while the door of the control panel is open.


Don'ts

It may cause rainwater or dust to enter the control panel. As a result, insulation degradation or other problems may occur, thus resulting in an electric shock or fire.

Do not put anything inside the control panel.


Don'ts

It may cause overheating, thus resulting in ignition and fire.

Do not perform zero discharge operation for over 10 minutes.


Don'ts

It may lead to hot water, thus resulting in an electric shock, injury, or accident.

Regularly inspect your equipment and perform maintenance on each component.

Do not fix the position of the reset button of the motor protective relay with tape etc.


Don'ts

It may overheat the motor or the wires in the event of a failure, thus resulting in ignition and a fire.

If the motor protective relay is tripped, contact the dealer (installation contractor).

Be sure to turn off the power before maintenance or inspection.

An electric shock or injury may occur.

⚠ WARNING

Electric motor or control panel insulation degradation may result in electric leakage, electric shock, or fire.
Keep the ambient temperature at 0 to 40°C with sufficient ventilation to prevent damage to the equipment and deterioration of its life.Avoid dust, corrosive or explosive gases, salinity, humidity, condensation. For indoor installations avoid direct sunlight or wind and rain.

If motors or control panels are used for more than a certain period of time, it may cause ignition or other accidents due to aging deterioration.

⚠ CAUTION

Do not open the door of the control panel.

Don'ts

An electric shock or accident may occur.

- If the product is not working properly, immediately turn off the power and contact the dealer (installation contractor).

Never run the pump dry (when it is not submerged in water).

Don'ts

A fire, electric shock, or accident may occur.

- If water does not flow out, immediately turn off the power and contact the dealer (installation contractor).

If you do not use the product for a long time, be sure to turn off the power.

It may cause an electric shock through insulation degradation or a fire through electric leak.

If the product does not work or if there is anything wrong with it, immediately turn off the power.

It may cause an electric shock, or electric leak or short circuit, thus resulting in a fire.

- For repairs or inspection, be sure to instruct the dealer (installation contractor) from which you purchased the product.

Instructions for proper use

- Once adjusting the water discharge rate, do not open or close the sluice valve.
  - Excessively opening the valve may make water cloudy or get sand mixed into water.
- If the product is used in a well that contains a large amount of sand in the water, the discharge rate decreases rapidly due to wear of the impeller or clogging with sand.
  - Contact the dealer (installation contractor).
- Pay attention to the needle of the ammeter.
  - If the deflection of the meter needle is large or the current exceeds the rated value, contact the dealer (installation contractor).
- Close the cock of the compound pressure gauge.
  - Keeping the cock open may damage the compound pressure gauge by a shock during startup or stop.
- If no water has been pumped out for over 3 or 4 days, open the water tap to run water for a while before use.
  - In such a case, the lifting pipe and the above-ground pipe may contain cloudy water inside.
- Even if you do not plan to use the pump for a long time, run it periodically (once a month or so).
- For maintenance and safety, it is recommended to inspect the insulation resistance and operating conditions (electric current, vibration, discharge rate, etc.) periodically (once a month or so).
  - Contact the dealer (installation contractor).

Be sure to confirm the following installation points from the dealer (installation contractor).

If the product is for indoor use, confirm that measures are taken against water leakage.

- If water flows out during repairs or inspection or in the event of a failure, it may drench surrounding areas and downstairs areas, thus resulting in serious compensation issues.

Confirm that the product is securely grounded and that the dedicated ground fault interrupter is installed.

- An electric shock may occur in the event of a failure or electric leak. (You are required by law to connect a ground wire.)

Check that no ground wire is connected to a gas pipe or water pipe.

- An explosion or electric shock may occur.

Check that measures are taken against freezing of the above-ground section and the pipe.

- Even in a warm region, an unexpected cold wave may freeze and damage the above-ground section and piping in winter.

Name and function of each part

- **Refer to page 7 for the installed system of the pump and the above-ground section.**
- **Refer to the separate Instruction Manuals for the control panel and the above-ground units.**

Troubleshooting

If there is a problem, carry out troubleshooting according to the following table. If the problem still persists, contact the dealer (installation contractor).

Problem	Possible Cause	Action
No rotation of motor (The motor does not run.)	● The power (ground fault interrupter) is turned off. ● The selector switch of the control panel is turned off.	● Turn on the power (ground fault interrupter).
The motor is running, but no water flows out, or the discharge rate is low.	● The sluice valve of the above-ground section or a valve installed in the pipe is closed.	● Open the sluice valve and the valve in the pipe.

Instructions

If the light comes on at any (orange or red) alarm indicator of the motor protective relay, such as the overcurrent indicator, open-phase indicator, inching indicator, or water shortage indicator, be sure to instruct the dealer (installation contractor) for inspection.

After-sales service

For repairs, handling, maintenance, and other work for the product, contact the dealer from which you purchased the product.

- Before instructing the dealer to repair the product, check the items shown in the "Troubleshooting" on this page. If the problem still persists, first turn off the power and the ground fault interrupter, and then contact the dealer (installation contractor) from which you purchased the product.

Standard specifications

Applicable well diameter (mm)		75(3B)	100 (4B) or more		125 (5B) or more	150 (6B) or more		
Applicable model		25MSU3	25MSUS4-_ _ _ _S	25MSUS4 32MSUS4 40MSUS4 50MSUS4	40MSU5	40MSU6	50MSUS6 65MSUS6 80MSUS6	50A-MSUS6 65A-MSUS6 65B-MSUS6 80B-MSUS6
Liquid to be pumped	Liquid quality	Fresh water						
	Allowable liquid temperature	0 to 25°C	0 to 40°C			0 to 30°C		
	pH	5.8 to 8.6						
	Chlorine content	200 mg /L or less						
	Contained sand quantity	50 mg/L (Size: 0.1 to 0.25mm) or less						
Maximum depth allowed for pump submersion (m)		50 m	70 m	0.6 to 2.2 kW: 70 m 2.7 kW or more: 210 m	100 m	350 m	M4: 1.9 to 2.2 kW: 70 m M4: 2.7 to 3.7 kW: 210 m M6: 3.7 to 15 kW: 350 m	
Minimum depth required for pump submersion (m)		1m	0.5m				1.0m	
Minimum inside diameter of well (mm)		75 (VP available)	100		125 (VP available)	146 (VP available)		
Pump	Range Bore (mm)	25		25 to 50	40		50 to 80	
	Range Motor output (kW)	0.4 and 0.75	0.45 and 0.6	0.6 to 3.7	1.5 to 3.7	5.5 to 7.5	1.9 to 15	
Submersible motor	Frame number	M3	M4			M6	M4: 1.9 to 3.7 kW M6: 3.7 to 15 kW	
	Type	Canned type						
	Number of poles, phase, voltage	2-pole, 3-phase 200V	2-pole, single-phase 100V	2-pole, 3-phase 200V				
	Starter type	Direct on line starting	Capacitor start operation	Direct on line starting			7.5kW or less: Direct on line starting 11kW or more: Star-delta starting	
	Insulation type	Class E	Class A		1.5kW: Class F 2.2kW or more: Class E	Class F	M4: Class A M6: Class F	
Pipe joint	Pump body	Thread type					Flange type	
	Discharge bend (above-ground side)	Flange type						

Applicable well diameter (mm)		200 (8B) or more			250 (10B) or more	300 (12B) or more	350 (14B) or more	400 (16B) or more
Applicable model		80MSU8 100MSU8	80MSUS8 100MSUS8	80C-MSUS8	100MSU10 125MSU10	150MSU12	200MSU14	250MSU16
Liquid to be pumped	Liquid quality	Fresh water						
	Allowable liquid temperature	0 to 25°C	0 to 30°C		0 to 25°C			
	pH	5.8 to 8.6						
	Chlorine content	200 mg /L or less						
	Contained sand quantity	50 mg/L (Size: 0.1 to 0.25mm) or less						
Maximum depth allowed for pump submersion (m)		18.5 kW or less: 350 m 22kW or more: 100 m	18.5 kW or less: 350 m 22kW or more: 150m		3.7 to 18.5 kW: 350 m 22kW or more: 100 m		100 m	
Minimum depth required for pump submersion (m)		1.5m			2.5m	3.5m	5.5m	7.5m
Minimum inside diameter of well (mm)		205			254.2	304.7	339.8	390.6
Pump	Range Bore (mm)	80 and 100		80	125	150	200	250
	Range Motor output (kW)	3.7 to 37			7.5 to 55	11 to 75	30 to 75	22 to 75
Submersible motor	Frame number	M6: 3.7 to 18.5 kW M8: 22 to 37 kW			M6: 7.5 to 18.5 kW M8: 22 to 37 kW M10: 45 to 55 kW	M6: 11 to 18.5 kW M8: 22 to 37 kW M12: 45 to 75 kW	M8: 30 to 37 kW M12: 45 to 75 kW	M12
	Type	M6: Canned type M8: waterproof insulation	Canned type		M6: Canned type M8: waterproof insulation M10: waterproof insulation	M6: Canned type M8: waterproof insulation M12: waterproof insulation	waterproof insulation	
	Number of poles, phase, voltage	2-pole, 3-phase 200V						4-pole, 3-phase 200V
	Starter type	7.5kW or less: Direct on line starting 11kW or more: Star-delta starting						
	Insulation type	M6: Class F M8: Class Y	M6: Class F 22kW: Class F 26kW or more: Class E		M6: Class F M8, M10 and M12: Class Y		Class Y	
Pipe joint	Pump body	Flange type						
	Discharge bend (above-ground side)	Flange type						

Safety precautions

Be sure to observe the following.

The following symbols and labels indicate the instructions that the installation worker must observe in order to prevent personal injury and property damage.

- Levels of possible injuries and damage due to improper use in defiance of the instructions are classified by the following symbols and labels.

WARNING	indicates that incorrect handling may lead to death or severe injury.
CAUTION	indicates that incorrect handling may lead to injuries or property damage.

- The following symbols indicate the types of instructions to be observed. (The following are only part of all symbols.)

	This symbol indicates "prohibited" actions that you must NOT do.
	This symbol indicates "mandatory" actions that you must do.

WARNING

Do not connect the ground wire to a gas pipe or water pipe.

Don'ts

An explosion or electric shock may occur.

Do not operate the control panel or ground fault interrupter with wet hands.

Don'ts

An electric shock may occur.

Do not use the submersible cables for above-ground wiring. Use them for the connection of only up to the conduit, terminal box, etc.

Don'ts

It may cause overheating, thus resulting in ignition and fire.

Do not use the product at any voltage other than specified.

Don'ts

A fire or electric shock may occur.

Do not damage the submersible cables, apply an excessive force to them, or tie them in a bundle.

Don'ts

A fire or electric shock may occur.

- Cut off any excess of the submersible cable above the ground, and connect the cable to the control panel or the terminal box.

Do not use the product for any liquid other than fresh water (salt water, oil, chemicals, etc.) or for warm water exceeding the allowable temperature limit provided in the specifications.

Don'ts

An explosion, fire, electric shock, or accident may occur.

Carry out installation work safely and securely.

Otherwise, there may be a danger; for example, the pump falls on the worker, thus resulting in injury. Furthermore, inadequate work may cause water leak, electric shock, or fire.

- Only specialist contractors are allowed to carry out the installation work.

Carry out wiring work safely and securely in accordance with the technical standards for electrical facilities and the indoor wiring regulations.

Improper wiring work may cause an electrical shock or fire.

- Only electricians are allowed to carry out the electrical wiring work.

Be sure to install the ground fault interrupter.

An electric shock may occur in the event of a failure or electric leak. (You are required by law to install the ground fault interrupter.)

- If electric leak occurs, it turns off the power immediately.

Be sure to turn off the power before grounding work.

An electric shock may occur.

Be sure to connect a ground wire (Class D grounding).

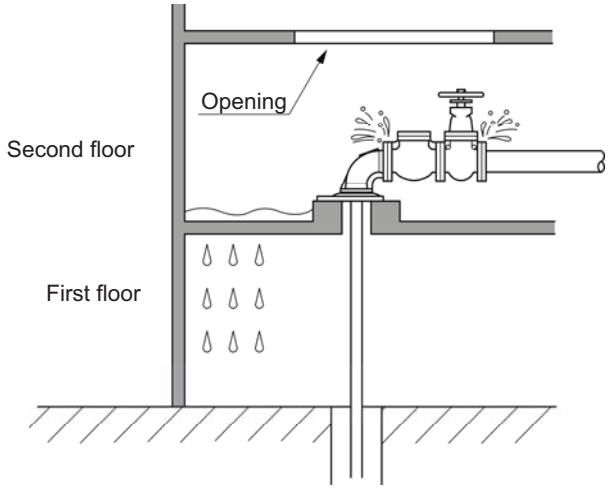
Connect a ground wire

An electric shock may occur in the event of a failure or electric leak. (You are required by law to connect a ground wire.)

- Connect a ground wire to the ground terminal of the well lid, and bury the ground rod in the ground.
- Only electricians are allowed to carry out the grounding work in accordance with the technical standards for electrical facilities.

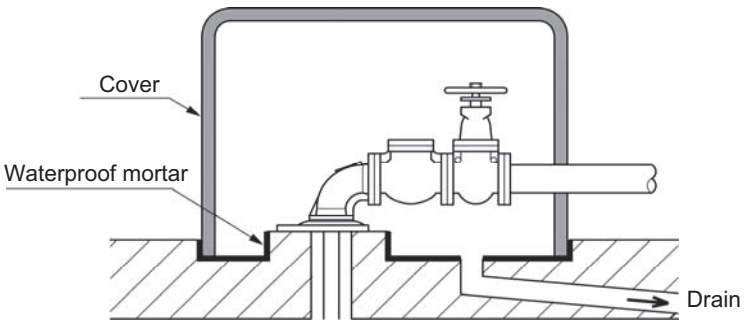
⚠ CAUTION

Install the pump outdoors. If you need to install it indoors, be sure to take measures against water leakage.



- If water flows out during repairs, inspection, or a failure, it may drench surrounding areas and downstairs areas, thus resulting in serious compensation issues.
- Provide space around the unit for repairs and inspection. Also provide an opening in the ceiling for lifting and installing the unit and components.

Example of measures against water leakage



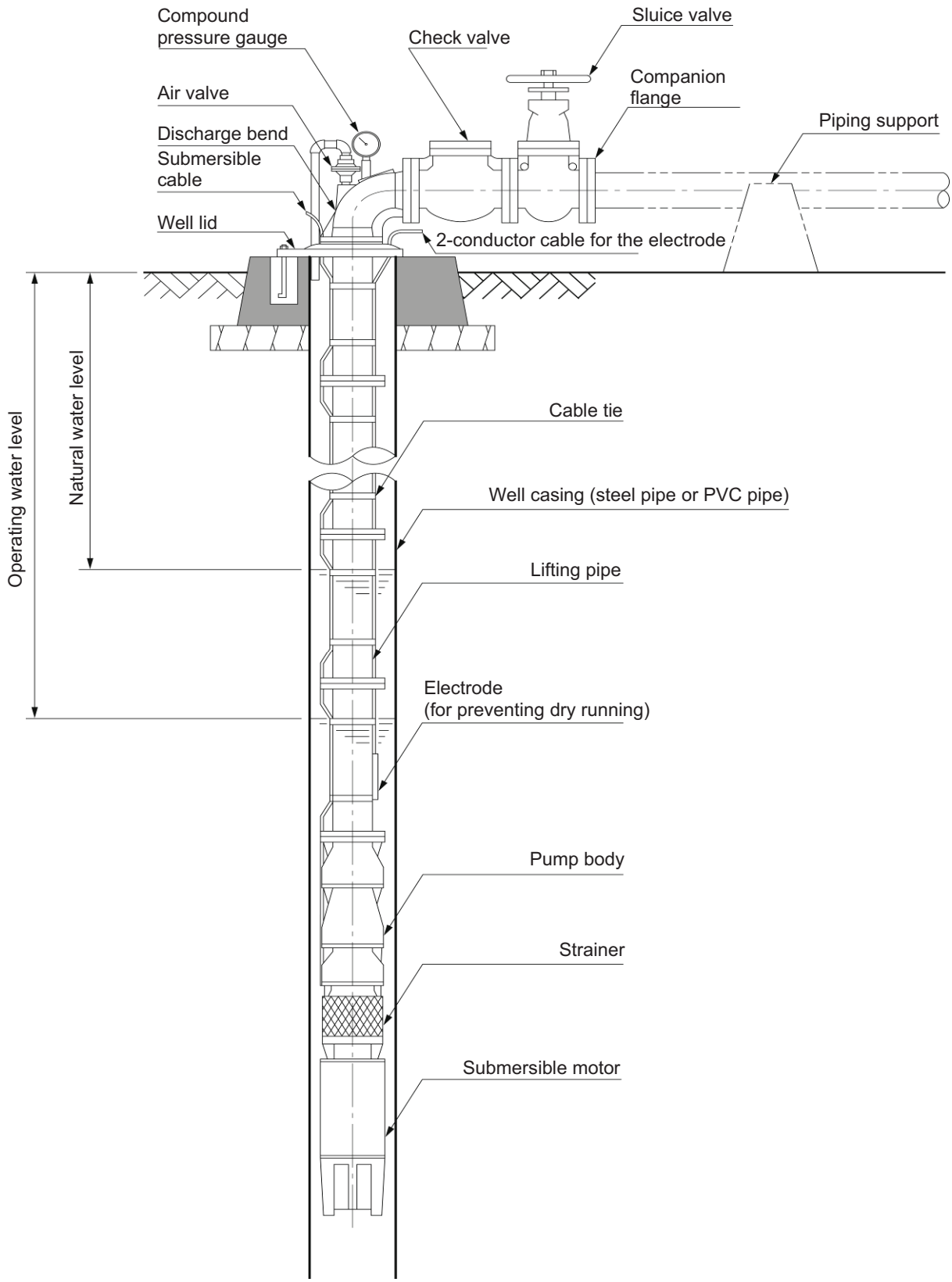
- To ensure to drain any spouting water, take measures such as—providing a waterproof cover and applying waterproof mortar.

Before installing the pump, check that the sealing liquid inside the motor is full. If it is not full, add fresh water.

Insufficient sealing liquid may cause an accident.

- To fill the motor with sealing liquid, refer to page 9.
  (There is no need to inject sealing liquid for motors made by Franklin Electric.)

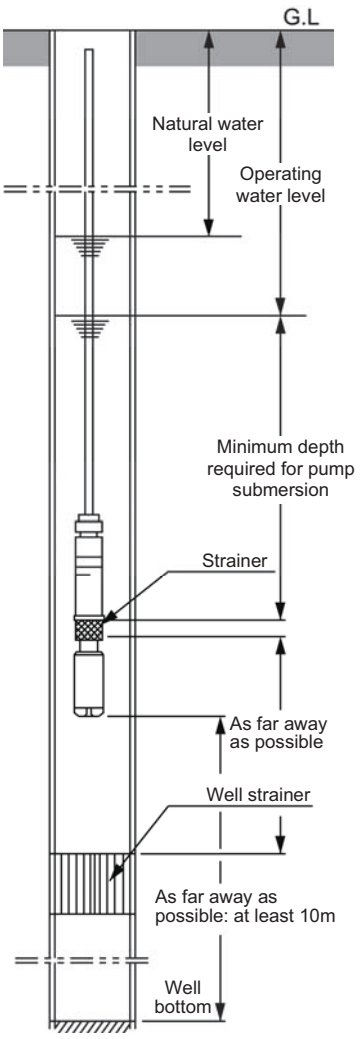
Installed pump system and names



Instructions for installation

■ Installation position of the pump

If the inlet port of the pump is located near the well strainer, it sucks a large amount of sand, which not only reduces the service life of the pump, but also causes an accident. Install the pump above the well strainer as far away as possible. If the pump needs to be installed between two or more well strainers, install it slightly below the middle.
Ensure that the pump is installed at a point as far from the well bottom as possible. During an extended period of use, the pump may be buried under the mud and/or sand deposited at the bottom of the well.



■ Thorough cleaning of the well

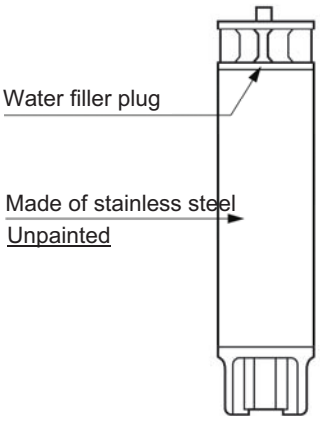
Be sure to clean the well before installation. If the pump is installed without the well being cleaned, a large amount of sand deposits may cause an accident in a short time. Using an air compressor, cleaning pump (with a higher suction power than the pump to be newly installed), or other methods, thoroughly remove sand until no fine sand is lifted.

■ Operating water level

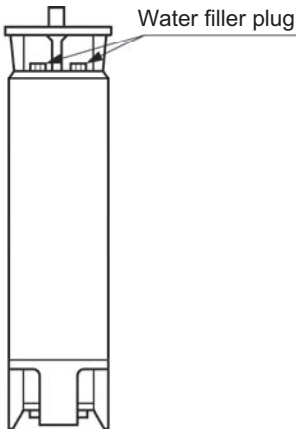
Carefully check the operating water level at the maximum discharge rate of water. Ensure that the upper part of the pump is below the water surface at this minimum operating water level. Install the pump so that the inlet port of the pump is deeper than the minimum operating water level by at least [the minimum depth required for pump submersion].
For a well whose water level may become lower than the minimum level during a drought period or under any other conditions, it is recommended to install a liquid level controller.

■ Injecting sealing liquid into the motor

Canned type
0.4kW to 37 kW



Waterproof insulated wire type
22 kW to 75 kW



① Remove the water filler plug, and check that the water level is full.
② If it is insufficient, add fresh water (drinking water).
③ Reinstall and tighten the water filling plug.

* There is no need to inject sealing liquid for all stainless steel submersible motors (made by Franklin Electric).

CAUTION

Don'ts

Never run the pump dry (when it is not submerged in water).

A fire, electric shock, or accident may occur.

- If water does not flow out, immediately turn off the power and contact the dealer (installation contractor).

■ **Submersible cable**

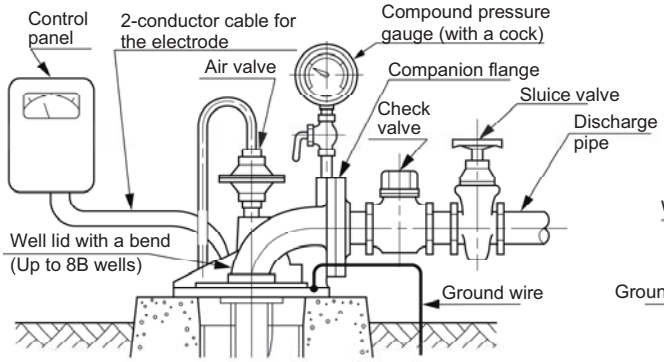
- Before and after installing the cable, be sure to measure the **insulation resistance and continuity**. Although the submersible cable is shipped after strict testing and inspection along with this product, check for any flaws and measure the insulation resistance before installation, just in case. Be careful **not to damage the submersible cables** during installation, and measure the insulation resistance and continuity again after installation. If the measured value is **10MΩ** or less, contact the vendor or our sales office.
- During installation, keep the submersible cables from contact with the well casing, and do not damage them.
- Securely fix the submersible cables to the lifting pipe with a cable tie so that there is no "slack."

Instructions

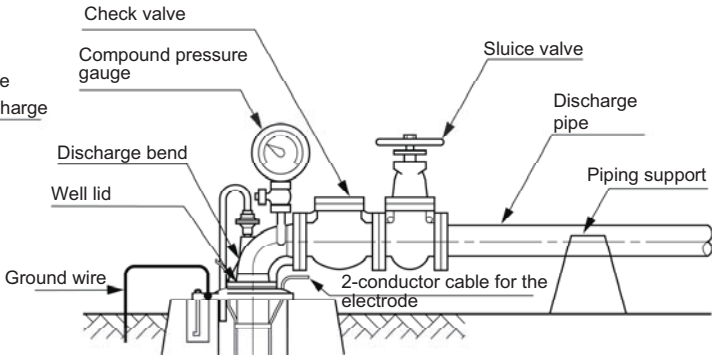
- Be sure to measure the insulation resistance of the submersible cables.
- If the measured value is **10MΩ** or less, contact the vendor or our sales office.

■ **Above-ground section**

For wells with a diameter of 100 or 125 mm



For wells with a diameter of 150 mm or larger



- Well lid
  If the lid is not installed on a level or even surface, excessive load is applied to the long lifting pipe, thus resulting in vibration and a failure.

CAUTION

If the closed expansion tank is used, do not attach the air valve. (Refer to page 12.)

Instructions for installation

- For installation of the sluice valve, check valve, and compound pressure gauge
  To adjust water volume and facilitate future inspection, be sure to install the sluice valve, check valve, and compound pressure gauge. If the weight of the discharge section is applied to the discharge bend at an abnormally high level, install an adequate pipe support.

Control panel

■ Be sure to install the specified control panel.

⚠ WARNING

Do not install the control panel in a place with a risk of ignition, generation of corrosive gas, or exposure to vibrations, dust, high temperatures (40°C or more) or high humidity (90% or more). If the panel is of an indoor type, do not install it in a place possibly exposed to rainwater. Don'ts An explosion, fire, or electric shock may occur.	Be sure to install the control panel. It may lead to motor burnout, a fire, or electric shock. ● Be sure to install it even for short-time operations.

Instructions

- The most essential role of the control panel is to prevent motor burnout. The submersible motor pump is located deep in the well, and the only way to carry out a diagnosis above the ground is through the control panel. Therefore, a reliable control panel must be used. Be sure to use the control panel specified by us because it was manufactured exclusively for the "submersible motor pump."
- We are not liable for any failures in the pump or motor if a control panel made by other manufacturers is used.
- Only electricians are allowed to carry out the installation work.
- Be sure to check the power supply voltage.
- Vertically install the control panel as close to the pump as possible or in a place where it is easy to operate or inspect.
- For details, refer to the separate Instruction Manual for the control panel.

Wiring work

■ Be sure to connect a ground wire to prevent an electric shock.

- Only electricians are allowed to carry out the grounding work in accordance with the technical standards for electrical facilities (Class D grounding).
- Connect the ground wires to the ground terminals of the well lid and control panel, and bury the ground rod in the ground.

■ Perform wiring work safely and securely in accordance with the technical standards for electrical facilities and the indoor wiring regulations.

- The users must provide wiring materials on their own between the power supply and the control panel as well as between the control panel and the terminal box, and perform wiring work in accordance with the technical standards for electrical facilities and the indoor wiring regulations.
- The voltage applied to the motor must be within ±10% of the rated voltage during operation.
- Use wires thick enough to keep a voltage drop at the terminal box within 5% of the rated voltage during operation.
- If you add any wires to the supplied submersible cable, use wires thick enough to keep a voltage drop at the submersible cable within 5% of the rated voltage during operation.

⚠ WARNING

Don'ts

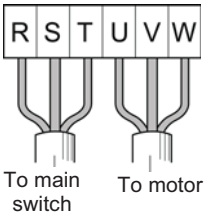
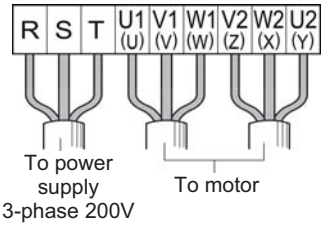
Do not install any added wires in water.

An electric shock may occur.

- Keep the voltage imbalance of each phase within ±2.5%.
- For the connection of the control panel, refer to the separate Instruction Manual for the control panel.
- Check the rotation direction – normal or reverse (for three-phase motors only).
  ① Open the sluice valve about a half to one turn.
  ② Close the cock of the compound pressure gauge.
  ③ Turn on the switch of the control panel.
  ④ Close the sluice valve, read the compound pressure gauge, and open the sluice valve about one turn.

Total shutoff head (m)
≈ Reading of the compound pressure gauge (m) + Natural water level (m)

If both sides of the above equation are roughly equal, the motor rotates in the normal direction.
To rotate the motor in the reverse direction, change the connection according to the following diagram.

Direct on line starting	Star-delta starting
Terminals at operation panel  Swap V with W.	Terminals at operation panel  Swap V1 with W1, and W2 with U2.

Instructions
- Only electricians are allowed to carry out the wiring work.
- Be sure to check the power supply voltage.

WARNING

Water tight insulated-wire motors should not be direct on line starting. Vibration under the starting may cause premature failure.

Anti-freeze measures

(Be sure to read the following instructions even if the product is used in a warm region.)

Even in a warm region, an unexpected cold wave may freeze and damage the above-ground piping in winter. Therefore, be sure to take the following measures against freezing.

Heat insulation with heat insulating materials

- Wrap felt or other material around the following above-ground section to keep them warm: discharge bend, check valve, sluice valve, and the exposed area of piping.
  Bury any horizontal piping in the ground. (Determine the depth of piping to be buried depending on the temperature and the nature of the soil in the region.)
- In a region where the outside air is especially cold, construct a concrete pit or shed, and wrap a heat insulating material around the exposed areas of the above-ground section and piping. If a concrete pit has been constructed, provide a heat insulating material to the inside of the pit.

Instructions
- For the pits and shed, provide space to allow for repairs, inspection, and lifting. In addition, construct them to allow for draining.

Commissioning

WARNING

Don’ts

Do not run the product if the insulation resistance between the control panel and the submersible motor is not higher than 1 MΩ.

A fire or electric shock may occur.

CAUTION

Maintain the minimum operating head when running the product.

An accident may occur.

- Refer to the minimum operating head on page 14.

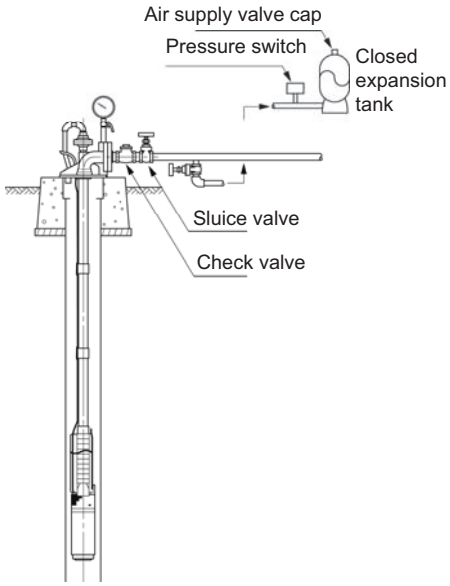
① Open the sluice valve a half to one turn.
② Close the cock of the compound pressure gauge.
③ Turn on the switch of the control panel.
④ When water flows out, close the sluice valve, open the cock of the compound pressure gauge, determine whether the rotation direction is normal or reverse, and ensure that the motor rotates in the normal direction. (To determine the rotation direction, refer to "Check the rotation direction -- normal or reverse" on page 11.)
⑤ With the sluice valve opened a half to one turn, keep running the pump until muddy water becomes clear without any sand.
⑥ When water becomes clear without any mixture of sand, gradually open and adjust the sluice valve—while observing the pumping condition—until the water discharge rate reaches the specified value.

Instructions

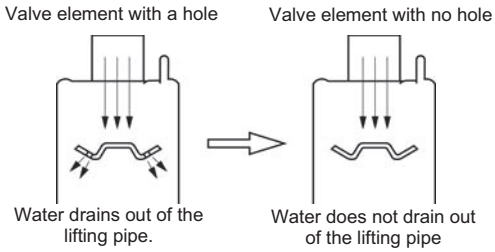
- Do not open the sluice valve in one go.
  If the pump discharges a large amount of water from the start, it may also suck up a large amount of sand, thus resulting in a failure.
- Pay attention to the needle of the ammeter.
  The deflection of the meter needle indicates sand being sucked up. Therefore, decrease the opening of the sluice valve to reduce the discharge rate.

Use of the closed expansion tank

The closed expansion tank was designed to separate the air room from the immersion room.
Since there is no contact surface between water and air, the tank can always deliver clean water.
Use of the closed expansion tank controlled by a pressure switch may make water in the piping milky due to entrapped air, and it may also cause the pump to start and stop frequently. Therefore, be sure to take the following measures.



- Do not attach the air valve. Air may accumulate in the closed expansion tank due to the mixing of air, and water in the piping may become cloudy.
- Be sure to install the check valve and sluice valve.
- For the submersible pump, be sure to use a valve element with "no hole."



- Do not remove the air supply valve cap of the closed expansion tank or touch the air supply valve.
  Escaping of gas from the tank may cause the pump to start and stop frequently, thus resulting in an accident.

Instructions

- If the pump discharges no water from the faucet or it starts and stops frequently, contact the vendor or our sales office.

Appropriate operating range of the pump

Ensure that the discharge rate of the pump meets the specifications (refer to the commercial drawing.)
If the discharge rate is too low, the motor may overheat and burn out.
If you use the product for a well with a diameter larger than the applicable well diameter, ensure to run the pump at the following minimum flow rate or more.
However, the following minimum flow rate is not applicable to MSU3, MSUS4, MSU5, or MSU14.

- Minimum flow rate (m^3/min)

Well diameter / Pump	150 6B	200 8B	250 10B	300 12B	350 14B
MSUS6		0.165m^3/min	0.200m^3/min	0.350m^3/min	
MSU8			0.200m^3/min	0.350m^3/min	0.550m^3/min
MSUS8					
MSU10				0.350m^3/min	0.550m^3/min
MSU12					0.550m^3/min

Note 1: ▭ Applicable well diameter

Allowable number of starts

The number of pump starts should be as per the table below.

Type	Frame	Phase	Motor output	Per hour Allowable number of starts	Per day Allowable number of starts	startup interval
canned	M4	single	0.6kW or less	60	-	At least 1 minute of operation
		three	3.7kW or less	12	-	At least 1 minute of operation
	M6		3.7kW～22kW	8	-	At least 1 minute of operation
	M8		22kW	6	-	At least 3 minutes after shutdown
			26kW or more	4	-	At least 3 minutes after shutdown
water tight insulated-wire	M8～M12	three	18.5kW or less	4	20	At least 10 minutes after shutdown
			22 kW or more	2	10	At least 20 minutes after shutdown

Storage.

If the pump is not to be operated for a long period of time, the following points should be taken into account.

(1) If there is a risk of freezing inside the pump in winter, etc., prevent freezing by installing a heat insulator or heater, or drain the pump.

(2) The sliding surfaces may stick and make it difficult to rotate, so operate the pump from time to time (periodically) to prevent sticking. Also, check for sticking by turning the pump by hand before operation.

(3) The maximum storage period for the pump in an unused condition is 2 years (storage temperature below 37°C). Operation after the storage period has expired may result in malfunctions, so ask the company to inspect the pump.

Minimum operating head

- Use the Deep Well Submersible Pump within the allowable operating range. Using the pump outside the operating range may cause malfunction and an accident.
  Particularly when running the pump with a low head, maintain the following minimum operating head. (The operating water level plus the compound pressure gauge pressure of the above-ground section must be equal to or larger than the following minimum operating head.)

Applicable well diameter (mm)	Diameter (mm)	50Hz		60Hz	
		Model	Minimum operating head (m)	Model	Minimum operating head (m)
100 (4B)	25	25MSUS4-5.6-11	6.5	25MSUS-6.6-7	6
		25MSUS4-5.75-13	7.5	25MSUS4-6.75-8	6.5
		25MSUS4-51.1-19	11	25MSUS-61.1-11	9.5
		25MSUS4-51.5-26	15	25MSUS-61.5-16	13
		25MSUS4-52.2-38	19	25MSUS4-62.2-22	15.5
		25MSUS4-52.2-44	22	25MSUS-62.2-26	18.5
	32	32MSUS-5.75-10	5	32MSUS-67.5-6	6
		32MSUS-51.1-15	7.5	32MSUS-61.1-9	9
		32MSUS-51.5-13	6.5	32MSUS-61.5-12	12
		32MSUS-51.5-15	7.5	–	–
		32MSUS-51.5-18	9	–	–
		32MSUS-51.5-20	10	–	–
		32MSUS-52.2-30	15	32MSUS-62.2-18	18
		32MSUS-53.7-36	18	32MSUS4-62.7-22	22
		32MSUS-53.7-50	25	32MSUS-63.7-30	30
	40	40MSUS-5.75-5	10	40MSUS-67.5-3	9
		40MSUS-51.1-7	14	40MSUS-61.1-4	12
		40MSUS-51.5-10	20	40MSUS-61.5-5	18
		40MSUS-52.2-14	28	40MSUS-62.2-9	27
		40MSUS-53.7-18	36	40MSUS-63.7-11	33
		40MSUS-53.7-23	46	40MSUS-63.7-14	42
	50	50MSUS-5.75-3	3	50MSUS-6.75-2	3
		50MSUS-51.1-5	5	50MSUS-61.1-3	4.5
		50MSUS-51.5-7	7	50MSUS4-61.5-4	6
		50MSUS-52.2-10	10	50MSUS-62.2-6	9
		50MSUS-53.7-13	13	–	–
		50MSUS-53.7-17	17	50MSUS-63.7-10	15
125 (5B)	40	40MSU5-51.5-7	19	40MSU5-61.5-5	20
		40MSU5-52.2-11	30	40MSU5-62.2-7	28
		40MSU5-53.7-18	50	40MSU5-63.7-11	44
		–	–	40MSU5-63.7-13	52
		40MSU6-55.5-25	69	40MSU6-65.5-15	60
		–	–	40MSU6-65.5-18	72
		40MSU6-57.5-35	97	40MSU6-67.5-23	92

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