



6 Inch & 8 inch (150 & 200mm) Submersible Pumps

Installation and Operation Manual

“SC” Series All Stainless Steel

General Information and Precautions

Submersible pumps are precision equipment designed for years of trouble free service, provided that they are properly installed and maintained. Refer to “Warnings & Specifications” on Page 4.

The pump package includes pump, motor, motor tail lead, and cable splicing kit on all units. Magnetic starters, equipped with the correct quick trip thermal overloads, are required for three phase units. Properly grounded lightning arrestors are recommended on all installations that do not have built-in lightning protection in the motor.

WARNINGS:

1. All electrical connections must be performed by qualified personnel working in accordance with National and Local Electrical Codes. Failure to comply with these codes could result in serious injury or death from electrical shock, or cause serious damage to the pump unit.
2. The bore must be clean and straight. Submersible pumps are designed to allow the passage of a small amount of sand; however, pumping sand for a prolonged period will shorten the life of any pump.
3. The pump should be installed at least 3 metres (10 feet) above the bottom of the bore to prevent sediment from covering the motor, which could result in overheating and damage to the motor windings. Where possible, the pump should be installed at least 4.5 metres (15 feet) below the lowest pumping water level. A motor cooling shroud is recommended.
4. Never support the weight of the pump on the electrical cable. Support it with the rising main or an auxiliary rope during installation. Throughout installation, take care not to damage the insulation on the cable.

Instructions for Coupling Pump End Assembly to Motor (if not assembled)

The pump end is designed to be coupled to an electric submersible motor equipped with a NEMA flange and shaft protrusion. To assemble the pump and motor:

1. Make sure that the pump and motor rotors rotate freely.
2. Carefully clean the surfaces to be joined.
3. For motors with separate leads clean and dry any moisture from both the cavity on the motor and the rubber end of the electrical cable connection. Insert the cable connection (using no lubrication) and tighten with a torque wrench set at 70-80Nm (51-59 ft.lbs).
4. Align cable with cable protector and push the motor lead through the suction inlet and under the cable guard. Do not slacken nuts on pump straps.
5. Couple the pump to the motor making sure that the motor shaft freely enters the splined slot on pump coupling. A layer of waterproof grease should be applied to the coupling splines to help with this operation and to protect against wear caused by any abrasive particles remaining.
6. Tighten the four motor bolts with a torque wrench set at 50Nm (37 ft.lbs).

Pre-Installation Tests

Complete as many pre-installation tests as possible prior to taking the pump to the installation site.

1. Be careful not to damage the motor, pump, and motor lead. Visually inspect for possible damage. Check the lead for abrasions or cuts. Make certain the check valve operates freely.
2. Check the motor, pump, and control equipment to be certain they are matched. Check quick trip thermal overloads in the magnetic starter against motor requirements specified on the motor label.
3. Mount the pump end on the motor, if needed (see previous section). Splice the cable to the furnished lead with the supplied splice kit, following the splice kit instructions. Use only the size cable recommended in the Cable Selection Table (Page 4) to assure adequate voltage at the motor.



IMPORTANT

For future reference, record details of your pump unit here.

Date installed/...../.....

Southern Cross
Submersible Pump

Model:

Serial No:

Q. m³/hr (@BEP) **CE**

H. m (@BEP)

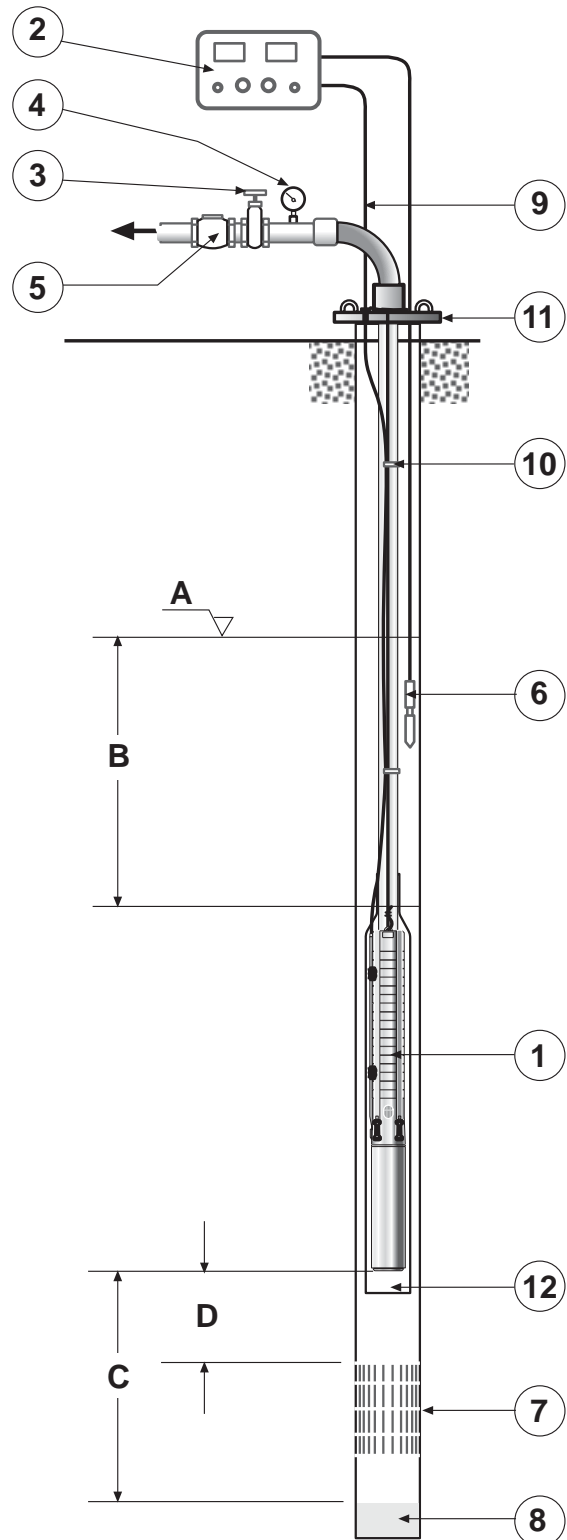
P. kW Hz

RPM..... Max H..... m

A division of **tyco** Flow Control Pacific Pty Ltd



4. Remove cover from control box on magnetic starter. Do not connect line voltage at this time. Connect cable to control box. Make certain each lead is connected to the proper terminal as indicated in the instruction on the control box (also refer to the section on Wiring the Pump).
5. Submerge the pump in clean water in a test tank. Make certain that the water is at least five inches above the inlet screen.
6. Make certain mains isolation switch is off. Connect line from disconnect switch to control box. Turn on power at mains isolating switch. Pump should start immediately. Do not run pump at wide open discharge in test tank. Throttle pump down with a gate valve.
7. As soon as the unit is running, line current reading should be taken and matched against those in the Cable Selection Table. Run the pump only a few minutes in the test tank. Stop. After one minute, start pump again.
8. If pump operates satisfactorily, turn off power at the mains isolation switch. Disconnect power supply from the control box and the control cable.
9. Replace the pump in the shipping crate to protect it during transportation to the bore site.



- | | | | |
|----|-------------------|----|----------------|
| 1 | Submersible Pump | 2 | Control Panel |
| 3 | Gate Valve | 4 | Pressure Gauge |
| 5 | Non-return Valve | 6 | Cut-off Device |
| 7 | Bore Screen | 8 | Bottom of Bore |
| 9 | Submersible Cable | 10 | Cable Clips |
| 11 | Bore Cap | 12 | Cooling Shroud |
-
- | | |
|----|--|
| A. | Water Level |
| B. | Distance between Water Level & Pump Outlet - Min. 4.5 metres |
| C. | Distance from Bottom of Bore to Bottom of Motor - Min. 3 metres |
| D. | Distance between Motor and Bore Screen (if applic.) - Min. 1 metre |

Installation in the Bore

1. Recheck the system's electrical ratings. If the cable has been spliced, make certain that the colour code has been followed.
2. If there is a possibility the water level will drop enough to let air into the pump, a low water level electrode protective relay must be fitted to the starter. This can be either a manual reset type (only two electrodes required) or an automatic reset type (three electrodes required).
3. Attach first section of pipe to pump and tighten. If plastic riser is being used, nylon or stainless steel safety cable **must** be attached to support the pump.
4. Connect a pipe vice or collar clamp firmly to the upper end of the pipe to keep it from slipping and dropping into the bore. Lower the pipe column into the bore. Do not lower the unit by its electric cable. A nylon or stainless steel safety rope may be attached to the pump to aid in lowering it. **NOTE:** Where the riser pipe exceeds 100 metres, a non-return valve should be installed to limit damage caused by water hammer. This extra valve should be positioned halfway up the riser pipe, and must always be incorporated if the pump is being used to supply a pressurised system.
5. Lower the pipe into the well as each section is added. Make sure that the pump is installed at least 3 metres (10 feet) above the bottom of the bore to prevent sediment from covering the motor. **NOTE:** Motor must be set above level at which water enters the bore, or above bottom of casing or top of bore screen. If this is not possible, a “cooling shroud” must be used. Tape or clamp the electrical cable to the pipe at 3 metre (10 feet) intervals, being careful not to cut the insulation. The cable can be checked for insulation breaks as it is attached to the pipe. Any damaged spots should be cleaned carefully and repaired using self-amalgamating waterproof tape or adhesive lined heatshrink tubing. Do not drag cable over the bore casing or allow it to become pinched. At the top of the last length of pipe, install a tee, which can be used for lifting when adjusting the bore seal and when making final adjustment of the pump setting. A gate valve can be installed temporarily for testing bore and pump capacity.

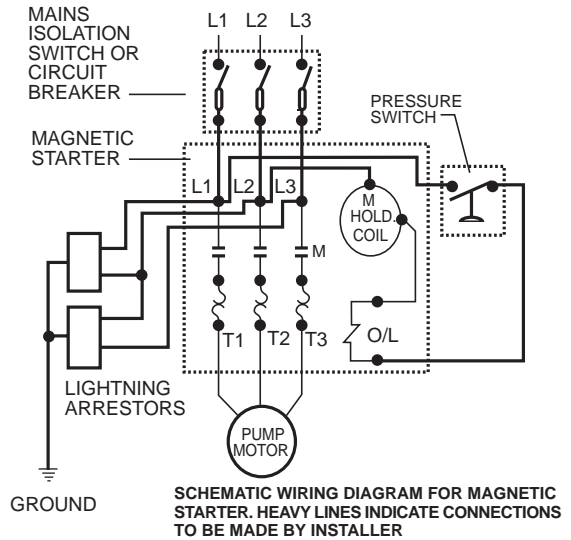
NOTE: For the motor to function correctly, a specific minimum flow speed of water over the outside of the motor is necessary. (Refer to Table on page 5).

Wiring the Pump - Three Phase

Three wire installation.

1. Make sure the power is turned off at Mains Isolation Switch.
2. Connect the three wires of the motor drop cable to the LOAD terminals in the magnetic starter.
3. The Automatic Control Switch - ie. Pressure Switch, (if used), will be wired to the Magnetic Starter to serve as a pilot control. See instructions with the magnetic starter. Use correct size quick trip thermal overloads.
4. Connect three leads from the LINE terminals of the three pole magnetic starter to the fused disconnect switch. Be sure correct size fuses are used to give proper motor protection.
5. Properly grounded lightning arrestors are RECOMMENDED.
6. When power is applied, check for correct rotation. If motor is running in the wrong direction, the pump capacity will be below rated capacity. With the pump in the bore, rotation can be checked one of two ways:
 - a: Discharge method - Connect the leads to the magnetic starter as in Step 2. Run the pump open discharge. Change any two leads and run the pump at open discharge again. The larger quantity of water indicates the correct rotation.
 - b: Pressure method - Connect the leads to the magnetic starter as in Step 2. Run unit with closed discharge and note the maximum pressure reading. Change any two leads and run pump with closed discharge again. Note maximum pressure reading. The higher pressure reading indicates the correct rotation.
7. After the pump has been installed and run, subsequent electrical work near the installation may change the rotation. Whenever a three phase pump does not seem to be performing properly, the rotation should be checked before the unit is pulled.

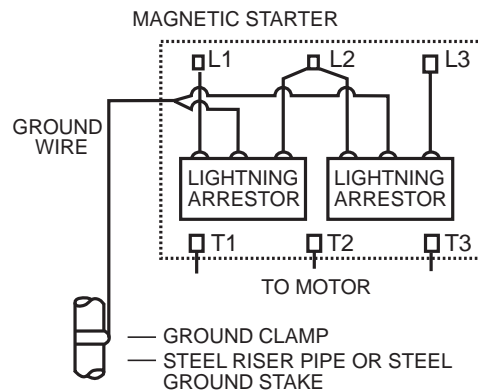
All electrical connections must be performed by qualified personnel working in accordance with National and Local Electrical Codes.



Lightning Arrestors

It is highly recommended that lightning arrestors be installed in the starter or control box to ground voltage surges. Lightning arrestors should be grounded to metal riser pipe with ground clamp, or to other suitable ground if plastic drop pipe is used. Three phase units require two arrestors, and should be connected to the control as shown at right.

If a lightning arrestor has already been installed at the lead-in power lines and is within 15 metres (50 feet) of the pump installation, additional arrestors are not necessary. Arrestors should be installed at the control on overhead supply lines longer than 15 metres (50 feet). If the supply line to the control is underground, an arrestor is not needed at the control.



System Connections & Operation

1. Thread the cable through the hole in the bore cap. Be careful not to let the cable become pinched or damaged. Make certain the bore cap is vented. Ample slack should be left in the cable below the bore cap and in the trench (if the cable is buried underground) to allow for expansion and contraction.
2. Install a shut-off (gate) valve and a union to facilitate installation and servicing. Use of a gate valve also permits throttling for a weak supply.
3. Start the pump with the gate valve slightly open. If rotation is incorrect, the gauge will show the pressure much lower than it should be. To reverse rotation in a 3-phase motor, swap over two of the phase wires.
4. Do not let the pump run in the wrong direction for more than 4 minutes. With the pump working, gradually open the delivery gate valve using an ammeter to check the current does not exceed that shown on the plate. If necessary, lower the amps by reducing delivery through the gate valve and adjusting the protection relay settings accordingly. The overload settings should never exceed the those on the plate.
5. With the motor running, check that the power supply voltage is $\pm 5\%$ of the nominal supply.



Final Checks

1. Make certain all connections are properly made.
2. Turn on current at mains isolation switch. Pump should start and water should flow within a few seconds, depending on depth of setting of pump.
3. Check the amperage with an ammeter and the voltage with a voltmeter. Compare the readings with pre-installation tests and limits shown in Cable Selection Table.
4. It is also recommended that a resistance reading be made. Power supply must be disconnected to make resistance readings. These tests will determine if there is damage to the cable when installing or if motor windings are down to earth.
5. Also check line voltage at the control box or magnetic starter during start and run conditions.

WARNINGS & SPECIFICATIONS

All electrical connections must be performed by qualified personnel working in accordance with National and Local Electrical Codes.

Check that the details on the pump’s specifications plate correspond to your order.

Check that the pump has not been damaged during transit, paying particular attention to the electrical cables.

Never support the weight of the pump on the electrical cable.

Do not use these pumps in swimming pools.

Never run the pump dry - even briefly - as this will cause **serious damage**.

Only for use with chemically and physically non-aggressive water.

Maximum solid content: 25gr/m³.

Maximum temperature of liquid to be pumped: 30°C.

Maximum time for running pump with gate valve closed: 2 minutes.

Maximum number of starts (at even intervals) per hour: 20.

Maximum voltage variation to motor: ± 5% of specified voltage.

CABLE SELECTION & OVERLOAD PROTECTION

CABLE SELECTION 6 & 8 INCH FRANKLIN SUBMERSIBLE MOTORS

THREE PHASE MOTOR - Maximum cable length metres (Motor to service entrance)

Cable spec - 3 core with earth, P.V.C. insulated, P.V.C sheathed, copper conductors.

Motor kW	F.L.A.	CABLE SIZE mm ²																
		1.5	2.5	4	6	10	16	25	35	50	70	95	120	150	185	240	300	400
4 INCH MOTORS																		
1.1 kW	3	340	570	910	1360	2240	3200	5350	7280	9890								
1.5 kW	4	260	430	700	1040	1720	2340	4120	5630	7690								
2.2 kW	6	170	290	460	700	1150	1600	2770	3790	5190	6950	8950						
3.0 kW	7.3	120	210	340	510	840	1230	2030	2770	3790	5070	6530	7840	9190				
3.7 kW	9	100	170	270	410	680	980	1650	2260	3090	4140	5340	6420	7540	8750			
4.0 kW	10.4	90	150	250	370	610	920	1480	2020	2770	3700	4750	5710	6680	7740	9180		
5.5 kW	13	70	110	190	280	470	690	1140	1560	2140	2870	3700	4460	5240	6090	7250	8330	9700
6 INCH MOTORS																		
7.5 kW	16.2	50	80	130	200	330	530	810	1110	1510	2030	2610	3130	3670	4250	5040	5770	6680
11 kW	24.1	0	60	90	140	240	360	590	810	1120	1510	1950	2350	2770	3230	3860	4450	5200
15 kW	31	0	0	70	110	180	270	450	620	860	1160	1500	1820	2150	2520	3020	3490	4110
18.5 kW	38.5	0	0	0	80	140	210	350	490	680	910	1190	1440	1700	1990	2390	2770	3260
22 kW	45.5	0	0	0	0	120	180	300	410	570	770	1000	1210	1440	1680	2010	2330	2740
30 kW	64.6	0	0	0	0	0	130	220	310	420	570	740	900	1060	1230	1470	1700	1990
37 kW	77.9	0	0	0	0	0	110	180	240	340	460	590	710	840	980	1170	1350	1580
45 kW	93.2	0	0	0	0	0	0	150	200	280	380	490	600	700	820	980	1130	1330
8 INCH MOTORS																		
55 kW	108	0	0	0	0	0	0	120	170	240	330	420	510	610	710	860	990	1170
75 kW	145	0	0	0	0	0	0	0	0	180	240	320	390	460	530	640	740	880
93 kW	191	0	0	0	0	0	0	0	0	0	190	240	290	350	400	480	550	650

OVERLOAD PROTECTION OF 6 & 8 INCH FRANKLIN SUBMERSIBLE MOTORS

Subtrol-Plus protection kits are recommended for use with Franklin 6 and 8 inch submersible motors to guard against overloads, underloads, overheating and rapid cycling.

MOTOR COOLING

IMPORTANT: In all cases the water must enter the casing from below the motor, or for bores fitted with perforated casing, or wells where the water enters from above the pump, a cooling shroud **MUST** be fitted to ensure cooling water continuously flows past the motor.

The following table shows the minimum required water flow past motor for cooling. For example a 150mm (6") Franklin motor and pump installed in 254mm inside diameter bore casing and delivering 200 litres per minute would require 340 litres per minute to maintain proper cooling. In this case the installation of a 203 mm or smaller motor cooling shroud is necessary for correct cooling.

Minimum Litres per Minute Required for Motor Cooling in Water up to 30°C

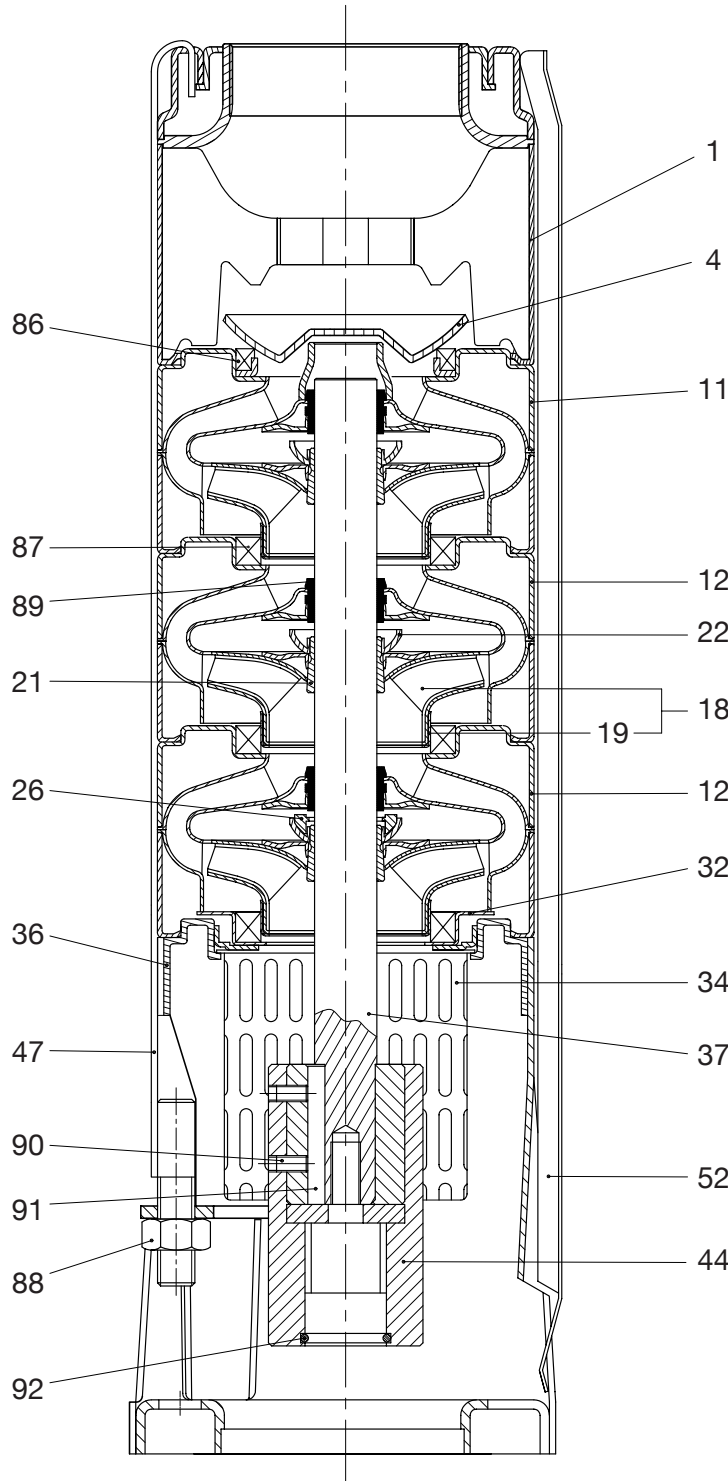
Casing or Shroud I/D mm	4 Inch (100mm) High Thrust Motor (7.62 cm/sec) l/min	6 inch (150mm) Motor (15.24 cm/sec) l/min	8 Inch (200mm) Motor (15.24 cm/sec) l/min
102	4.5	—	—
127	26.5	—	—
152	49	34	—
178	76	95	—
203	114	170	40
254	189	340	210
305	303	530	420
356	416	760	645
406	568	1060	930

TROUBLE SHOOTING CHART

Problem	Possible Cause of Trouble & Remedy
Pump will not run.	<ol style="list-style-type: none"> 1. No power. Replace fuses or reset circuit breaker. Contact electrician if required. 2. Incorrect voltage. Contact electrician if necessary. 3. Incorrect fuses. Replace with proper fuses. 4. Defective pressure switch. Clean contact points or replace points. 5. Defective wiring. Check for loose or corroded connections. 6. Control box malfunction. Check wiring circuits and components. Correct wiring and/or replace defective components. Press prong connectors to assure contact. 7. Bound or defective pump. Sand bound three phase units can sometimes be corrected by temporarily reversing any two leads (except earth wire), running for 5 to 10 seconds, then returning to normal. Pull pump and repair if unsuccessful. 8. Defective cable or motor winding. Pump must be pulled and the motor or electrical cable repaired or replaced.
Pump runs, but delivers little or no water.	<ol style="list-style-type: none"> 1. Check valve. Reverse check valve. 2. Pump rotation wrong. For three phase units, swap any two leads (except earth wire). 3. Incorrect wiring. For three-wire single phase units, check wiring connections. 4. Leak in riser pipe. Raise pipe, check for leak and replace damaged section. 5. Pump screen blocked. Clean screen and reset at less depth. Bore may have to be cleaned. 6. Air locked pump. Normal delivery may resume if pump is started and stopped at one minute intervals. 7. Low water level. Throttle pump output or reset pump at lower depth if possible. 8. Worn pump. Pull pump and repair or replace. 9. Loose or broken motor or shaft. Check for damaged shaft if coupling is loose. Replace worn or defective unit.
Pump will not turn off. (Automatic Control)	<ol style="list-style-type: none"> 1. Pressure switch. Clean points or replace switch. 2. Low water level. Throttle pump output or reset pump at lower depth if possible. 3. Leak in system. Repair or replace tank or pipe section. 4. Worn pump. Pull pump and repair or replace.
Pump starts too often. (Automatic Control)	<ol style="list-style-type: none"> 1. Pressure switch. Reset switch limits or replace switch. 2. Check valve. Remove and replace if defective. 3. Leak in system. Repair or replace tank or pipe section. 4. Water logged tank. Clean or replace air volume control. Drain and recharge tank.

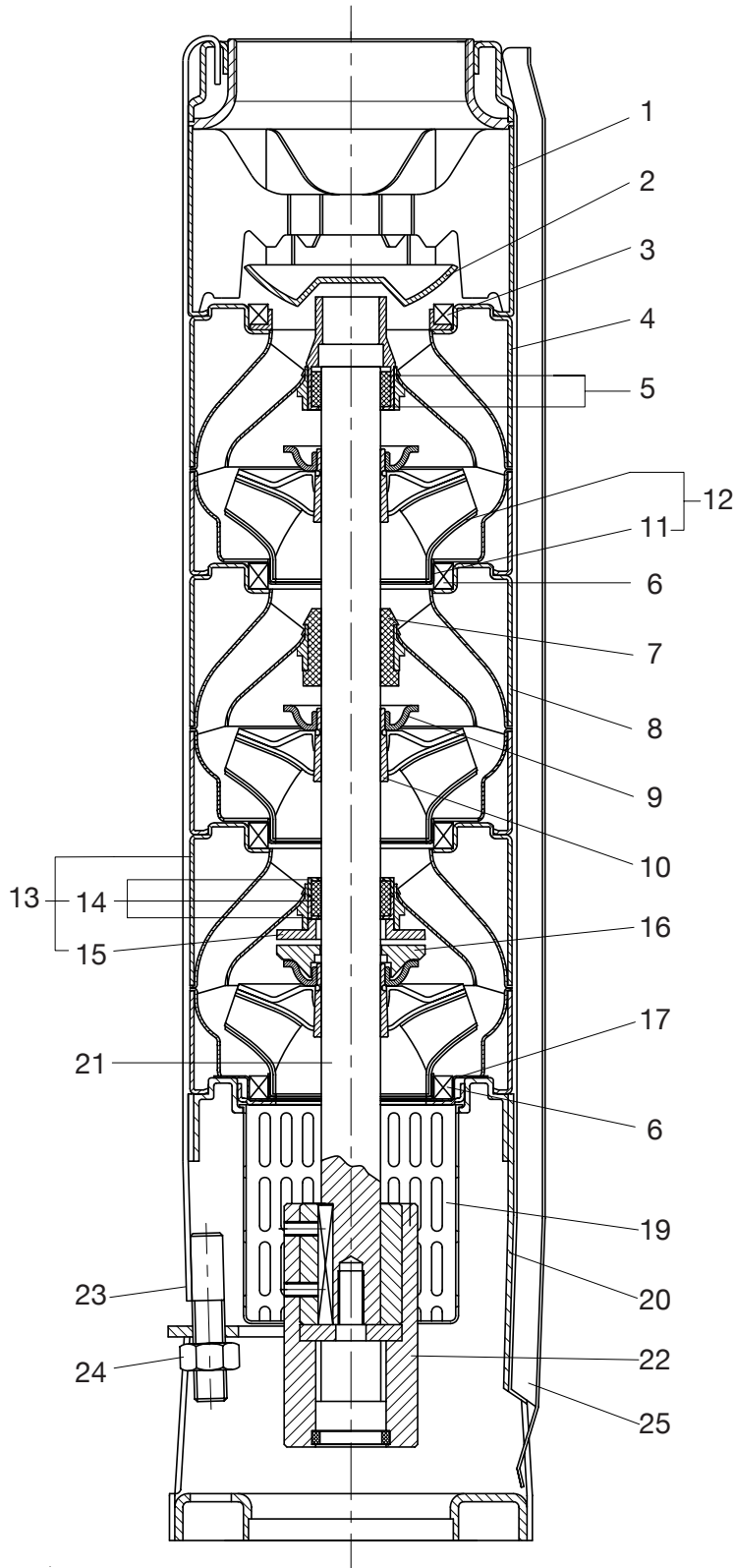
If none of the above remedies the problem please contact your local Southern Cross Dealer or call Tyco pumping Systems on 131 786

PARTS AND MATERIALS Model SC18



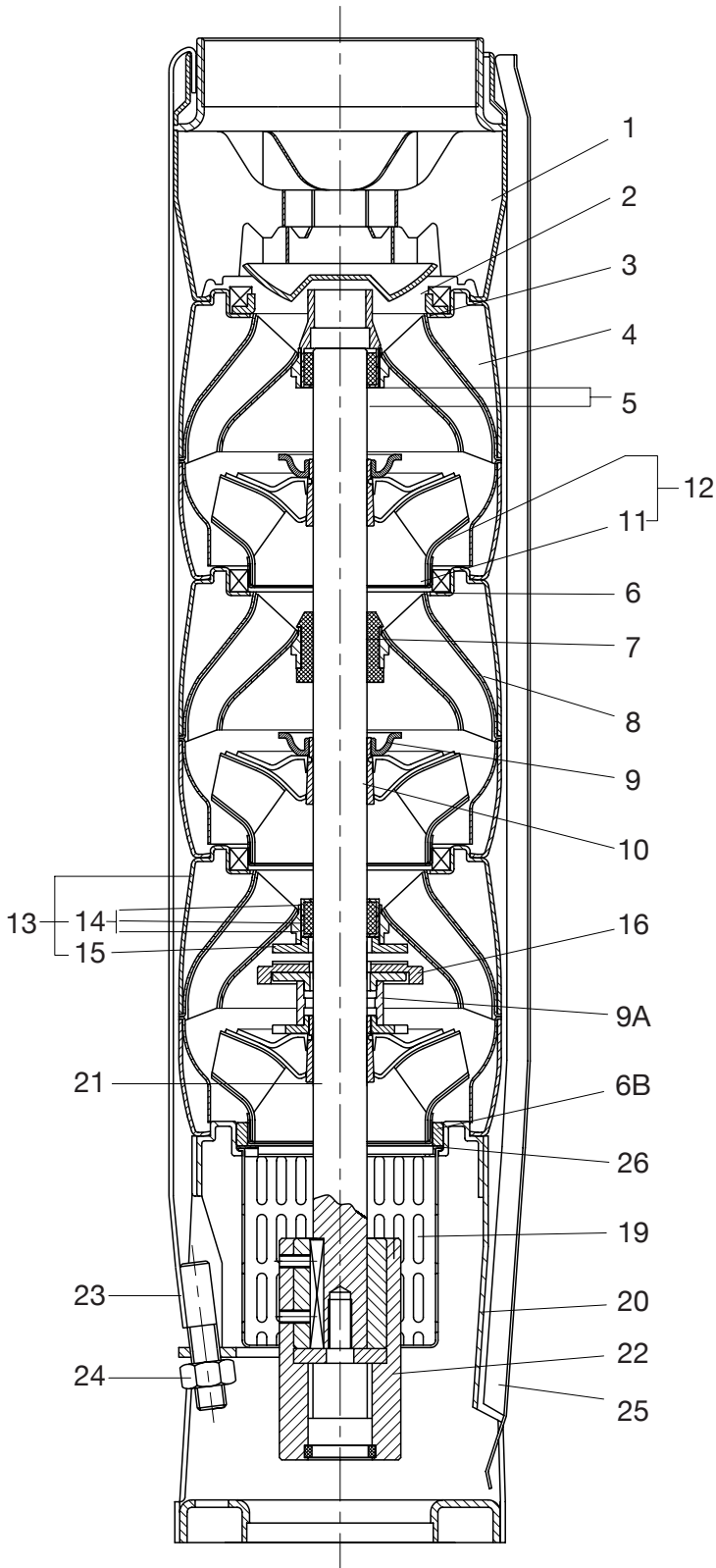
Part	Material	
1	Discharge	304 Stainless Steel
4	Valve Cone	304 Stainless Steel
11	Top Diffuser	304 Stainless Steel
12	Diffuser	304 Stainless Steel
18	Impeller	304 Stainless Steel
19	Ring of Impeller	304 Stainless Steel
21	Split Cone	304 Stainless Steel
22	Split Cone Nut	304 Stainless Steel
26	Spacing Washer for Stop Ring	PTFE +CF
32	Neck Ring Retainer	304 Stainless Steel
34	Strainer	304 Stainless Steel
36	Suction Interconnector	304 Stainless Steel
37	Pump Shaft	431 Stainless Steel
44	Coupling	304 Stainless Steel
47	Strap	304 Stainless Steel
52	Cable guard	304 Stainless Steel
86	Valve Seat	304 SS / NBR
87	Neck Ring	304 SS / NBR
88	Nut	304 Stainless Steel
89	Bearing	NBR
90	Screw	304 Stainless Steel
91	Key	304 Stainless Steel
92	O-Ring	NBR

PARTS AND MATERIALS Model SC30



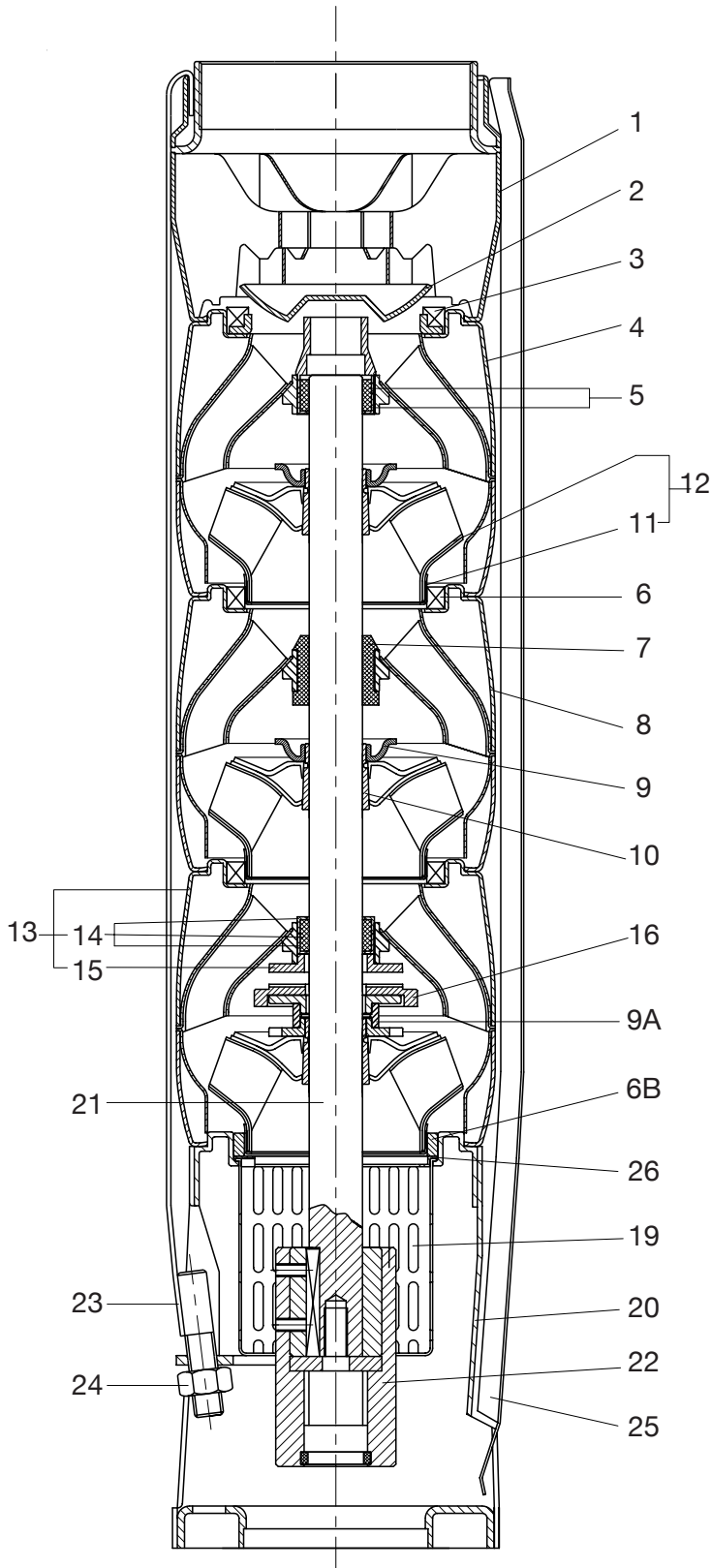
	Part	Material
1	Discharge	304 Stainless Steel
2	Valve Cone	304 Stainless Steel
3	Valve Seat	304 SS / NBR
4	Top Diffuser	304 Stainless Steel
5	Upper Bearing	304 SS / NBR
6	Neck Ring	304 SS / NBR
7	Bearing	NBR
8	Diffuser	304 Stainless Steel
9	Split Cone Ring	304 Stainless Steel
10	Split Cone	304 Stainless Steel
11	Ring of Impeller	304 Stainless Steel
12	Impeller	304 Stainless Steel
13	Bottom Diffuser	304 Stainless Steel
14	Lower Bearing	304 SS / NBR
15	Stop Ring	304 Stainless Steel
16	Spacing Washer for Stop Ring	PTFE +CF
17	Neck Ring Retainer	304 Stainless Steel
19	Strainer	304 Stainless Steel
20	Suction Interconnector	304 Stainless Steel
21	Pump Shaft	431 Stainless Steel
22	Coupling	304 Stainless Steel
23	Strap	304 Stainless Steel
24	Nut	304 Stainless Steel
25	Cable guard	304 Stainless Steel

PARTS AND MATERIALS Model SC50



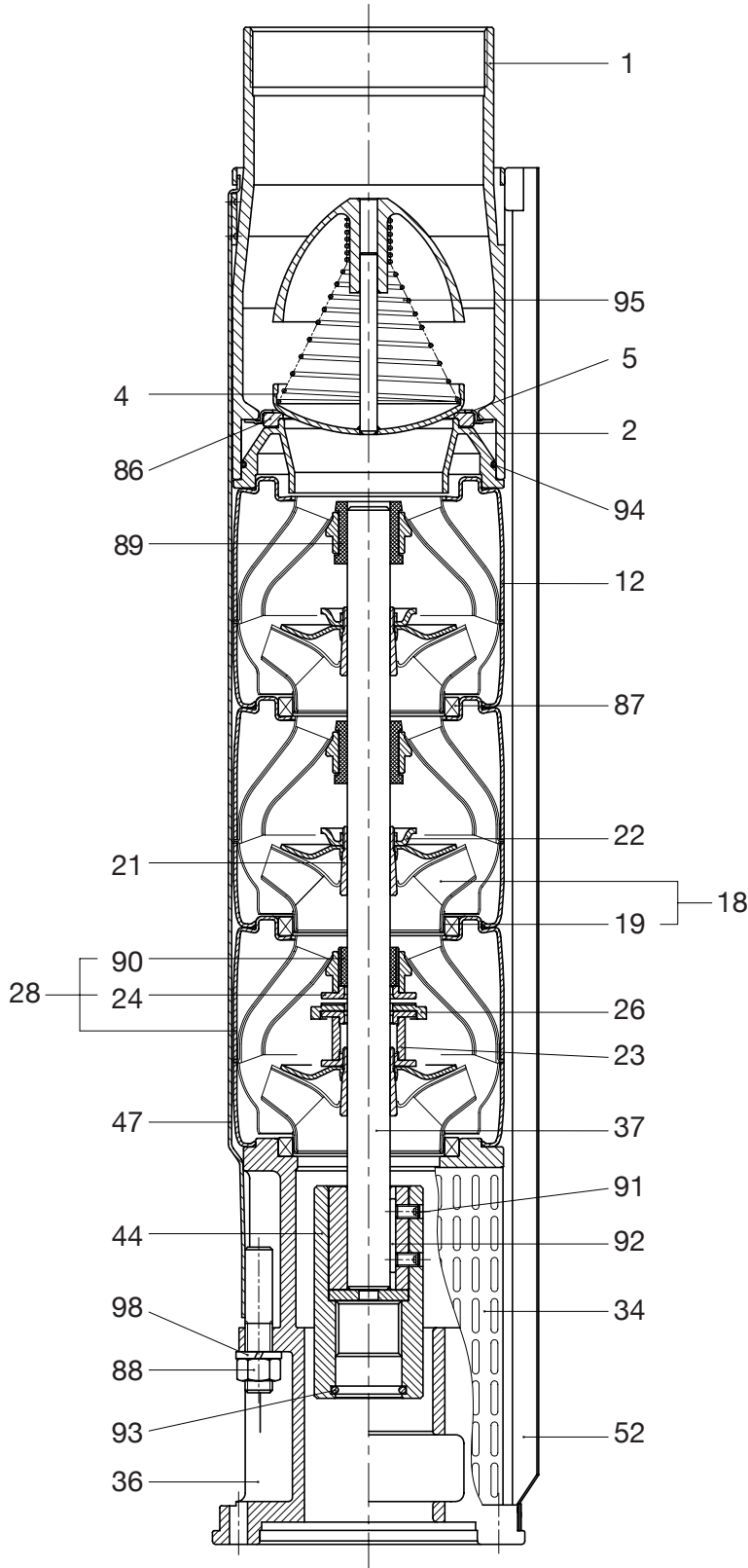
Part	Material	
1	Discharge	304 Stainless Steel
2	Valve Cone	304 Stainless Steel
3	Valve Seat	304 SS / NBR
4	Top Diffuser	304 Stainless Steel
5	Upper Bearing	304 SS / NBR
6	Neck Ring	304 SS / NBR
6B	Bottom Neck Ring	PTFE + CF
7	Bearing	NBR
8	Diffuser	304 Stainless Steel
9	Split Cone Ring	304 Stainless Steel
9A	Nut for Stop Ring	304 Stainless Steel
10	Split Cone	304 Stainless Steel
11	Ring of Impeller	304 Stainless Steel
12	Impeller	304 Stainless Steel
13	Bottom Diffuser	304 Stainless Steel
14	Lower Bearing	304 SS / NBRI
15	Stop Ring	304 Stainless Steel
16	Spacing Washer for Stop Ring	PTFE +CF
19	Strainer	304 Stainless Steel
20	Suction Interconnector	304 Stainless Steel
21	Pump Shaft	431 Stainless Steel
22	Coupling	304 Stainless Steel
23	Strap	304 Stainless Steel
24	Nut	304 Stainless Steel
25	Cable guard	304 Stainless Steel
26	Strainer Cap	304 Stainless Steel

PARTS AND MATERIALS Model SC65



Part	Material	
1	Discharge	304 Stainless Steel
2	Valve Cone	304 Stainless Steel
3	Valve Seat	304 SS / NBR
4	Top Diffuser	304 Stainless Steel
5	Upper Bearing	304 SS / NBR
6	Neck Ring	304 SS / NBR
6B	Bottom Neck Ring	PTFE + CF
7	Bearing	NBR
8	Diffuser	304 Stainless Steel
9	Split Cone Ring	304 Stainless Steel
9A	Nut for Stop Ring	304 Stainless Steel
10	Split Cone	304 Stainless Steel
11	Ring of Impeller	304 Stainless Steel
12	Impeller	304 Stainless Steel
13	Bottom Diffuser	304 Stainless Steel
14	Lower Bearing	304 SS / NBRI
15	Stop Ring	304 Stainless Steel
16	Spacing Washer for Stop Ring	PTFE +CF
19	Strainer	304 Stainless Steel
20	Suction Interconnector	304 Stainless Steel
21	Pump Shaft	431 Stainless Steel
22	Coupling	304 Stainless Steel
23	Strap	304 Stainless Steel
24	Nut	304 Stainless Steel
25	Cable guard	304 Stainless Steel
26	Strainer Cap	304 Stainless Steel

PARTS AND MATERIALS Models SC80/100



	Part	Material
1	Discharge	304 Stainless Steel
2	Lower Valve Seat Retainer	304 Stainless Steel
4	Valve Cup	304 Stainless Steel
5	Upper Valve Seat Retainer	304 Stainless Steel
12	Diffuser	304 Stainless Steel
18	Impeller	304 Stainless Steel
19	Impeller Ring	304 Stainless steel
21	Split Cone	304 Stainless Steel
22	Split Cone Nut	304 Stainless Steel
23	Nut for Stop Ring	304 Stainless Steel
24	Stop Ring	304 Stainless Steel
26	Spacing Washer for Stop Ring	MoO ₂ + PTFE
28	Bottom Diffuser	304 Stainless Steel
34	Strainer	304 Stainless Steel
35	Lock for Strainer	304 Stainless Steel
36	Suction Interconnector	304 Stainless Steel
37	Pump Shaft	431 Stainless Steel
44	Coupling	304 Stainless Steel
47	Strap	304 Stainless Steel
52	Cable Guard	304 Stainless Steel
86	Valve Seat	NBR
87	Neck Ring	304 SS / NBR
88	Nut	304 Stainless Steel
89	Bearing	NBR
90	Bearing	304 SS / NBR
91	Screw	304 Stainless Steel
92	Key	304 Stainless Steel
93	O-Ring	NBR
94	O-Ring	NBR
95	Spring	304 Stainless Steel
96	Screw	304 Stainless Steel
97	Screw	304 Stainless Steel
98	Spring Washer	304 Stainless Steel





Form 2811 August 2006



Telephone 131 786

A division of **tyco** Flow Control Pacific Pty Ltd
A.B.N. 83 000 922 690