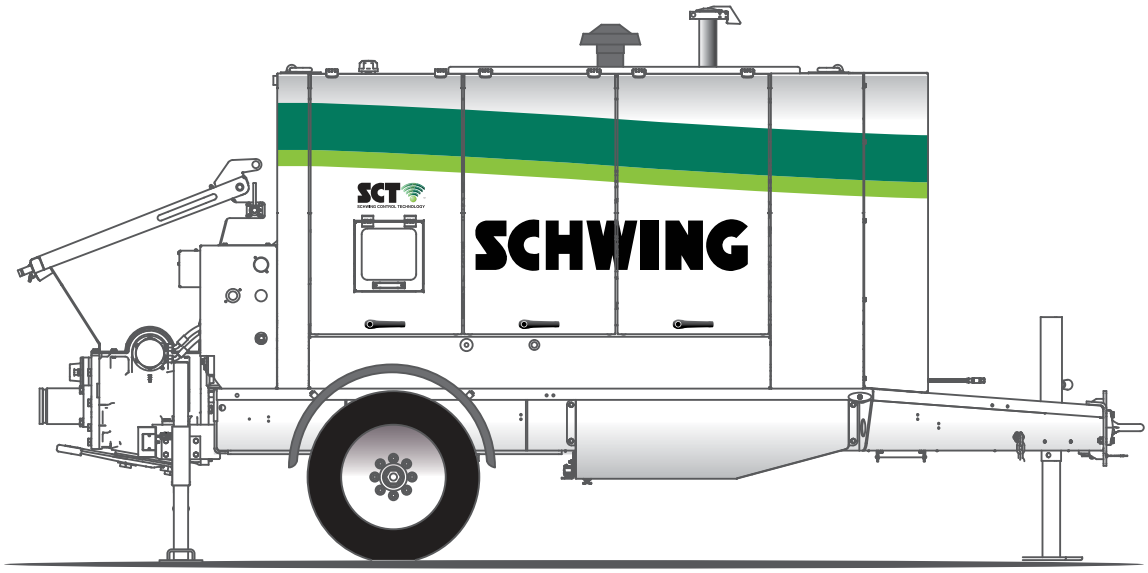
Operation Manual

SP 500 / 750-15 / 750-18 / 1000 / 1250



Part# 98418850
Revision: 1.1
Date: 02/13/17

SCHWING AMERICA INC.

5900 Centerville Road
St. Paul, MN 55127
1-888-SCHWING (724-9464)
www.schwing.com

CALIFORNIA

PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

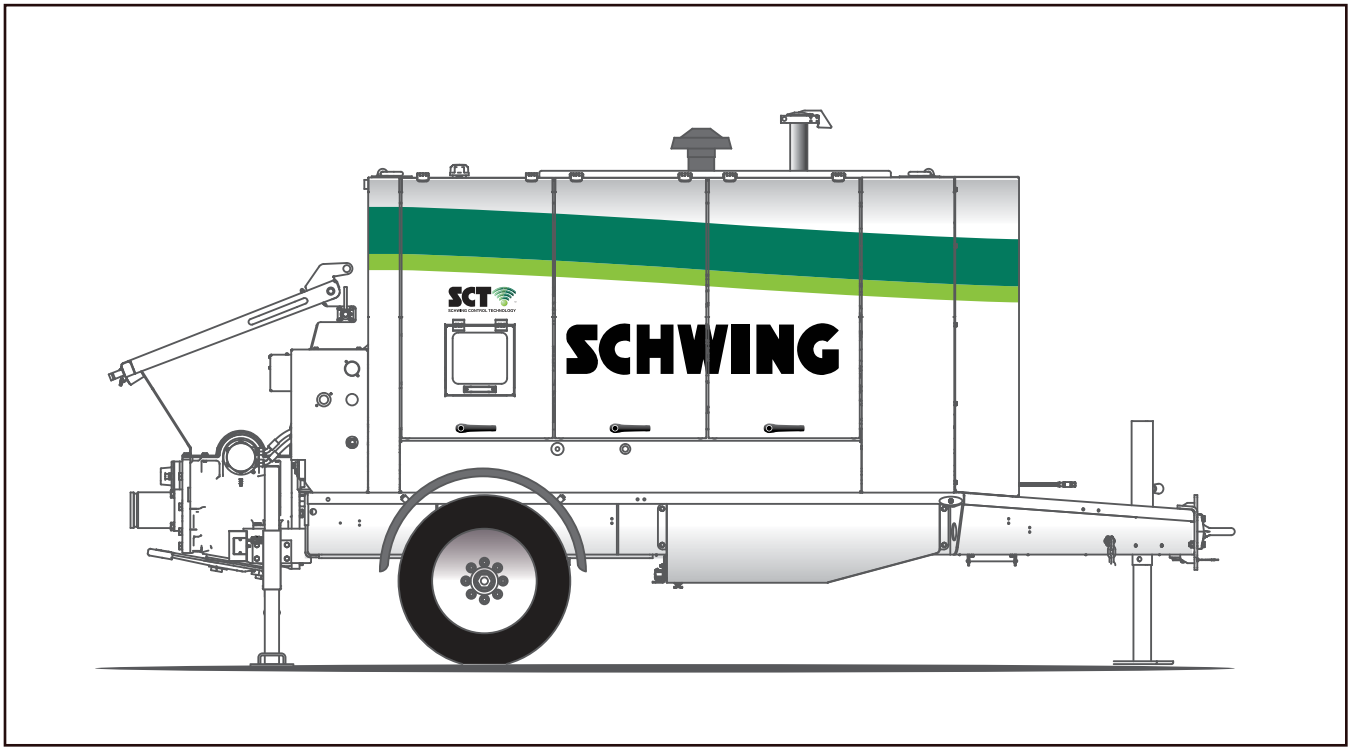


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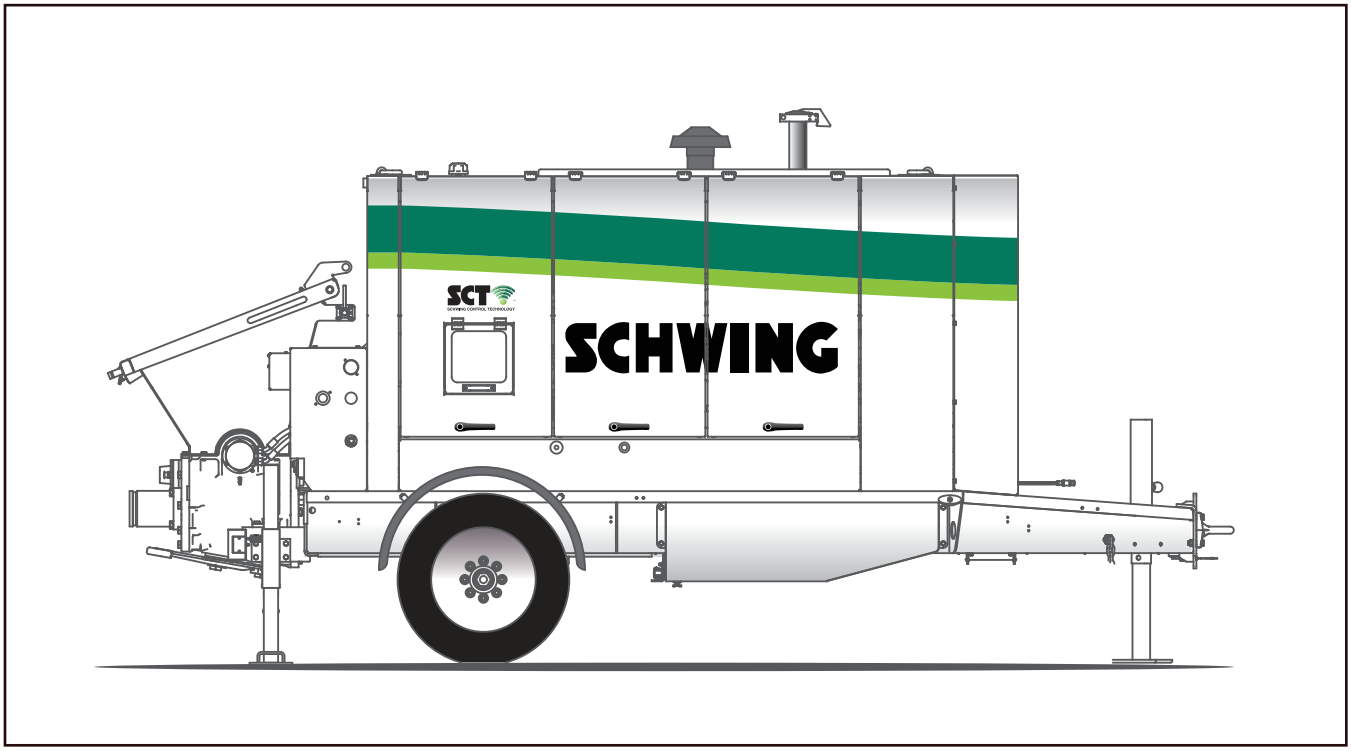
Table of Contents



Introduction

Manufacturer's Statement

Schwing America is a member of the Schwing Group, a worldwide designer, manufacturer and distributor of premium concrete production and handling equipment, headquartered in Herne, Germany. Schwing, committed to supporting its customers' success, excels in producing high quality concrete equipment used in even the most demanding construction applications, through innovative engineering, premiere manufacturing and optimum after-sales support. Schwing America, located in St. Paul, Minnesota, offers industry leading concrete pumps, truck mixers, batch plants, reclaimers and genuine parts for distribution in North and Latin America.

The information contained in this operation manual is absolutely necessary for the setup, operation, maintenance, and servicing of your concrete pump. All operators should become familiar with the information in this manual as it will promote safety, efficiency of operation and long life of the equipment. Keep this manual and all included literature in a safe and convenient location.

Read and understand this manual before operating, repairing, or adjusting your Schwing concrete pump. The individuals who operate and maintain it must be trained and have knowledge of the equipment. Death or severe injury can occur if this equipment is misused or poorly maintained.

The illustrations contained in this manual are intended to clarify text passages. They may look slightly different from your concrete pump, but this has only been allowed if it does not fundamentally change the factual information.

Technical modifications that are made to this machine will be documented in each new edition of the operation manual.

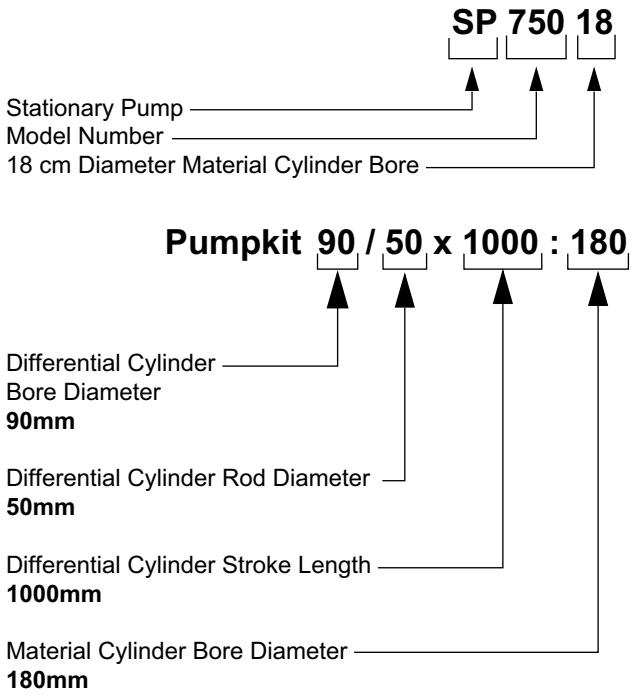
Concrete Pump Nomenclature

The complete model number of a Schwing concrete pump is designated by the following code:

SP 750-18

90/50 x 1000:180

The code is broken down as follows:



How to reach us

If you encounter a circumstance that is not covered by this manual, Schwing America's Service Center will be more than happy to assist you with all of your parts and service needs.

- Service Center **1-888-292-0262**
- Spare Parts **1-800-328-9635**
- Spare Parts FAX **(651) 429-2112**
- Minnesota (main office) **(651) 429-0999**

To place an order for spare parts, go online to **Schwingparts.com**, or call our toll free parts line from anywhere in the continental United States. Spare Parts hours are Monday through Friday, 6:00 AM to 6:00 PM (central time). Orders will also be accepted via fax, 24 hours/day.

When contacting the Service Center please provide the concrete pump model and serial number. You can find the model and serial number on the Main ID tag that is mounted to the subframe of the unit (Figure 2).

Identification Tag (ID Tag)

The ID tag (Figure 1) lists the model and serial number of the concrete pump. This tag also provides information on the pumpkit, weights, year of manufacture, material and hydraulic system pressures.

ID tags and serial numbers shown in this manual are for "REFERENCE ONLY". Locate each of the tags on your own unit to determine specific information for your pump.

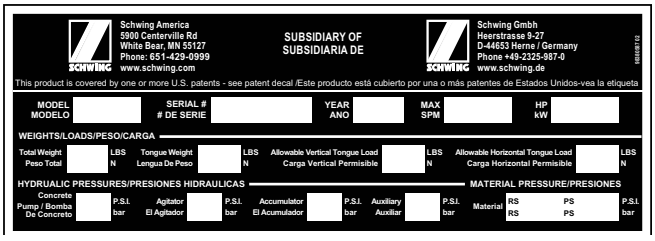


Figure 1
ID Tag

How to order missing tags

If ID tags are missing or have been removed, you can order new tags through Schwing America's Service Center. Simply provide the serial number of your concrete pump and new ID tags can be created. The serial number is punched into the steel subframe near the ID Tag (Figure 2).

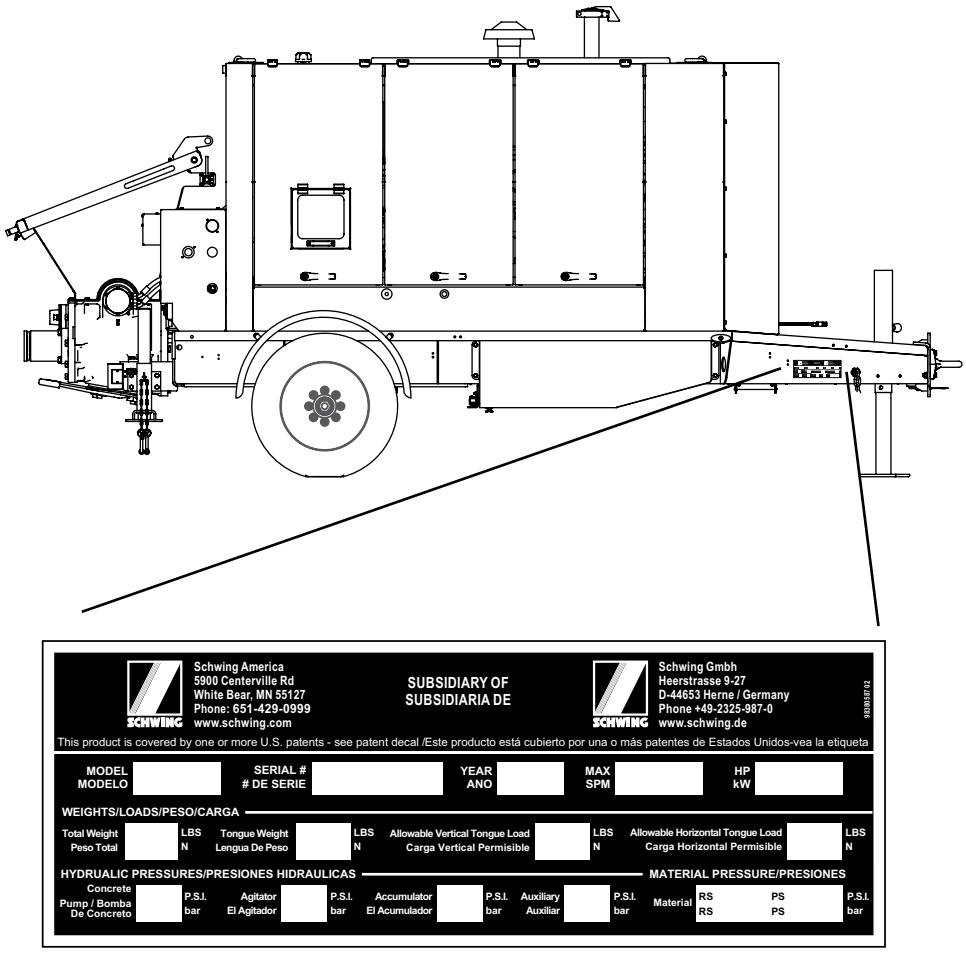
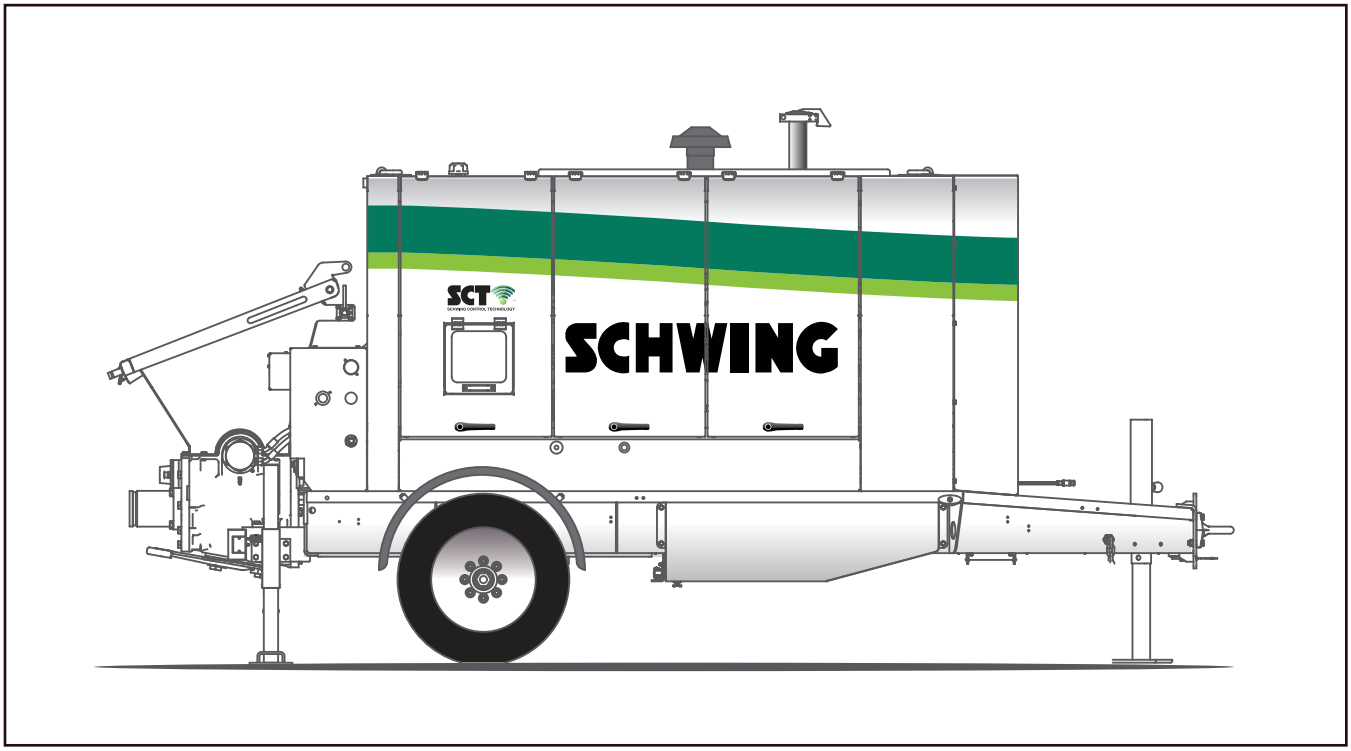


Figure 2
ID Tag Location



Specifications

Concrete Pump Specifications

SP 500

Concrete Pumpkit	80/50 x 1000:150	
Concrete Valve	Long Rock	
Maximum Strokes/minute	32.5	
Maximum Concrete Volume	45 cu. yd^3/hr	35 cu. m^3/hr
C4.4 Tier 3 - Diesel Motor	80 hp	60 Kw
C3.4 Tier 4 - Diesel Motor	74.5 hp	55.5 Kw
Electric Motor	75 hp	56 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	3872 psi	267 bar
Maximum Pressure on Concrete	1100 psi	75.8 bar
Maximum Aggregate Size	1.5”	38.1 mm
Pumping Cylinder Diameter	6”	152.4 mm
Stroke Length	39“	990.6 mm
Differential Cylinder Diameter	3”	80 mm
Charging Hopper Height	50.5”	1280 mm
Fuel Tank Capacity	33.5 gal.	127 L
Hydraulic Tank Capacity	53 gal.	200 L
Gross Weight	N/A	N/A
Length	186”	4712 mm
Width	72”	1833 mm
Height (Tier 3)	82”	2080 mm
Height (Tier 4)	88”	2226 mm
Remote Control Cable Length	100’	30.5 m

* Max RPM of the hydraulic pumps is calculated while the pump is under a full load. Depending on the unit it is acceptable for the max RPM to vary slightly from the published estimate.

SP 750-15

Concrete Pumpkit	80/50 x 1000:150	
Concrete Valve	Long Rock	
Maximum Strokes/minute	35	
Maximum Concrete Volume	50 cu. yd^3/hr	38 cu. m^3/hr
C4.4 Tier 3 - Diesel Motor	100 hp	75 Kw
C3.4 Tier 4 - Diesel Motor	100 hp	75 Kw
Electric Motor	100 hp	75 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	3872 psi	267 bar
Maximum Pressure on Concrete	1100 psi	75.8 bar
Maximum Aggregate Size	1.5”	38.1 mm
Pumping Cylinder Diameter	6”	152.4 mm
Stroke Length	39“	990.6 mm
Differential Cylinder Diameter	3”	80 mm
Charging Hopper Height	51”	1292 mm
Fuel Tank Capacity	40 gal.	150 L
Hydraulic Tank Capacity	112 gal.	424 L
Gross Weight	N/A	N/A
Length	197”	4997 mm
Width	76”	1929 mm
Height (Tier 3)	96”	2438 mm
Height (Tier 4)	102”	2590 mm
Remote Control Cable Length	100’	30.5 m

* Max RPM of the hydraulic pumps is calculated while the pump is under a full load. Depending on the unit it is acceptable for the max RPM to vary slightly from the published estimate.

SP 750-18

Concrete Pumpkit	90/50 x 1000:180	
Concrete Valve	Long Rock	
Maximum Strokes/minute	35	
Maximum Concrete Volume	70 cu. yd^3/hr	53.5 cu. m^3/hr
C4.4 Tier 3 - Diesel Motor	100 hp	75 Kw
C3.4 Tier 4 - Diesel Motor	100 hp	75 Kw
Electric Motor	100 hp	75 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	4350 psi	300 bar
Maximum Pressure on Concrete	1100 psi	75.8 bar
Maximum Aggregate Size	1.5”	38.1 mm
Pumping Cylinder Diameter	7”	177.8 mm
Stroke Length	39“	990.6 mm
Differential Cylinder Diameter	3.5”	90 mm
Charging Hopper Height	51”	1292 mm
Fuel Tank Capacity	40 gal.	150 L
Hydraulic Tank Capacity	105 gal.	400 L
Gross Weight	9320 lbs.	41.4 kN
Length	200”	4840mm
Width	76”	1835 mm
Height (Tier 3)	96”	2438 mm
Height (Tier 4)	102”	2590 mm
Remote Control Cable Length	100’	30.5 m

* Max RPM of the hydraulic pumps is calculated while the pump is under a full load. Depending on the unit it is acceptable for the max RPM to vary slightly from the published estimate.

SP 1000

Concrete Pumpkit	90/50 x 1000:180	
Concrete Valve	Long Rock	
Maximum Strokes/minute	35	
Maximum Concrete Volume	70 cu. yd^3/hr	53.5 cu. m^3/hr
Diesel Motor (C4.4 Tier 3)	139 hp	104 Kw
Diesel Motor (C4.4 Tier 4)	137 hp	102 Kw
Electric Motor	125 hp	93 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	4350 psi	300 bar
Maximum Pressure on Concrete	1100 psi	75.8 bar
Maximum Aggregate Size	1.5”	38.1 mm
Pumping Cylinder Diameter	7”	177.8 mm
Stroke Length	39“	990.6 mm
Differential Cylinder Diameter	3.5”	90 mm
Charging Hopper Height	51”	1292 mm
Fuel Tank Capacity	40 gal.	150 L
Hydraulic Tank Capacity	105 gal.	400 L
Gross Weight	9150 lbs.	40.7 kN
Length	200”	4840mm
Width	76”	1835 mm
Height (Tier 3)	96”	2440 mm
Height (Tier 4)	94”	2400 mm
Remote Control Cable Length	100’	30.5 m

SP 1000HP

Concrete Pumpkit	90/50 x 1000:150	
Concrete Valve	HP Short Rock Valve	
Maximum Strokes/minute	26	
Maximum Concrete Volume	35 cu. yd^3/hr	26.7 cu. m^3/hr
Diesel Motor (C4.4 Tier 3)	139 hp	104 Kw
Diesel Motor (C4.4 Tier 4)	137 hp	102 Kw
Electric Motor	125 hp	93 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	4032 psi	278 bar
Maximum Pressure on Concrete	1450 psi	100 bar
Maximum Aggregate Size	0.5”	152 mm
Pumping Cylinder Diameter	6”	152.4 mm
Stroke Length	39“	990.6 mm
Differential Cylinder Diameter	3.5”	90 mm
Charging Hopper Height	51”	1292 mm
Fuel Tank Capacity	40 gal.	150 L
Hydraulic Tank Capacity	105 gal.	400 L
Gross Weight	9125 lbs.	40.5 kN
Length	200”	4840mm
Width	76”	1835 mm
Height (Tier 3)	96”	2440 mm
Height (Tier 4)	94”	2400 mm
Remote Control Cable Length	100’	30.5 m

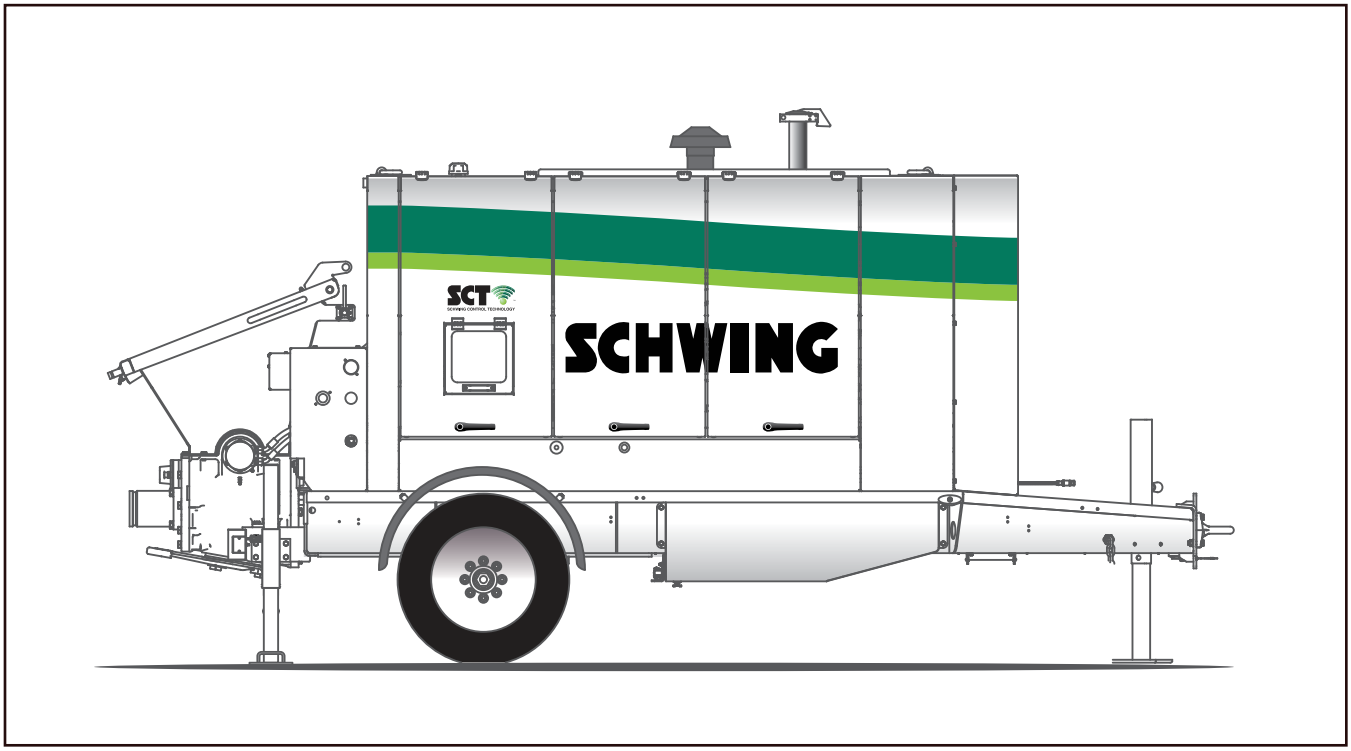
SP 1250

Concrete Pumpkit	80/55 x 1400:180	
Concrete Valve	Long Rock	
Maximum Strokes/minute	34	
Maximum Concrete Volume	95 cu. yd^3/hr	73 cu. m^3/hr
Diesel Motor (C4.4 Tier 3)	173 hp	129 Kw
Diesel Motor (C4.4 Tier 4)	173 hp	129 Kw
Electric Motor	150 hp	112 Kw
Output - Hydraulic Pumps	65 gpm	240 L/min
Hydraulic Pumps RPM- Diesel	2200 rpm	
Hydraulic Pumps RPM- Electric	1800 rpm	
Maximum Hydraulic Pressure	4786 psi	330 bar
Maximum Pressure on Concrete	942 psi	65 bar
Maximum Aggregate Size	1.5”	38.1 mm
Pumping Cylinder Diameter	7”	177.8 mm
Stroke Length	55“	1397 mm
Differential Cylinder Diameter	3.5”	90 mm
Charging Hopper Height	51”	1293 mm
Fuel Tank Capacity	53 gal.	200 L
Hydraulic Tank Capacity	112 gal.	424 L
Gross Weight	N/A	N/A
Length	241”	6128 mm
Width	76”	1929 mm
Height (Tier 3)	95”	2411 mm
Height (Tier 4)	102”	2585 mm
Remote Control Cable Length	100’	30.5 m

Optional Equipment

For more information on optional equipment, see “Optional Equipment” on page 88

- Autogreaser - Rock Valve
- Auxiliary Hydraulic Circuit
- Water Pump - Hydraulic
- Air Compressor
- Aux Hydraulic Connection
- Carbide Wear Parts
- Wireless Remote Control - SCT Scanreco
- Hydraulic Oil Level Sensor - Electronic
- Fuel Level Sensor - Electronic
- Vibrator 12v - Hopper Mounted
- Hydraulic Outrigger Legs
- Hydraulic Outrigger Legs - Protective Cover
- Skid Mount Frame
- Tandem Axle Chassis
- Work Light
- Truck Mount Frame
- US Electric Motor & Panel
- Candadian Electric Motor & Panel
- EURO Electric Motor & Panel
- Hopper Grate Assy CE - small aggregate
- EURO tow ring Hitch Assy
- 125mm outlet
- Track Kit (Rubber) - Air, Water, RRC (1250 only)
- Track Kit - Water Tank Heater (1250 only)



Safety

Safety Alert Symbols

The triangle with the exclamation point inside is used to alert you to an important safety point and is called a safety alert symbol. One of the following signal words will appear after the safety alert symbol:

- If the safety alert symbol is followed by the signal word **DANGER**, it indicates a hazardous situation which, if not avoided, **WILL** lead to **death or serious injury.**
- If the safety alert symbol is followed by the signal word **WARNING**, it indicates a potentially hazardous situation which, if not avoided, **COULD** result in **death or serious injury.**
- If the safety alert symbol is followed by the signal word **CAUTION**, it indicates a potentially hazardous situation which, if not avoided, **MAY** result in **minor to moderate injury**.
- The signal word **CAUTION** used without the safety alert symbol means the hazard **COULD** cause damage to **equipment or property.**

The keywords listed above will be displayed throughout the text of this manual in the form of information boxes like the ones shown in (Figure 1).

The text in the black area of the information box will describe the hazard to beware of and the consequences which can occur if that hazard is encountered.

All persons working near the concrete pump must be able to recognize hazardous situations. They must know how to avoid these situations and how to re-act quickly and appropriately whenever hazardous situations arise.

⚠ DANGER	Indicates a hazardous situation which, if not avoided, **WILL** lead to death or serious injury.
⚠WARNING	**I**ndicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, **COULD** result in minor to moderate injury.

Figure 1
Safety alert information boxes

Safety Manual

The Safety Manual is a separate document from the rest of this manual, containing it's own page numbering and formatting. This was done to allow the Safety Manual to be inserted in many different publications while appearing exactly the same in all places. The Safety Manual has its own alphabetical index, which is found at the end of this section.

How to Order Additional Safety Manuals

To order additional Safety Manuals, you can call our toll free parts line from anywhere in the continental United States. Parts center hours are Monday through Friday, 6:00 AM - 6:00 PM (Central Time). Orders will also be accepted via fax, 24 hours/day.

Schwing phone numbers

- Service Center **1-888 292-0262**
- Spare Parts **1- 800- 328 - 9635**
- Spare Parts FAX **(651) 429 - 2112**
- Minnesota (main office) **(651) 429 - 0999**

We will ship one set of each of the following manuals free of charge for each unit that is listed with its serial number and current location:

Manual	Part Number
Safety Manual, English	30327535
Safety Manual, Spanish	30381024
Co-worker Safety, laminated, English	30381022
Co-worker Safety, Spanish	30381027
Small line Safety Manual, English	30381680
Small line Safety Manual, Spanish	30381841

Warning Labels (Decals)

Every concrete pump is equipped with a set of Warning Labels. Warning Labels MUST be replaced if they are damaged, faded, missing, or unreadable. Ultraviolet radiation, rain, steam cleaning, and other factors cause these labels to fade over time. Re-apply warning labels to any parts or components that have been replaced.

For replacement labels, call the Spare Parts Department with your concrete pump serial number. Reference the Decal Location Guide (Figure 2), found in the parts book, for installation locations and part numbers. You may order complete sets or single labels. Decal sets do not include metal ID Tags, which can be ordered separately.

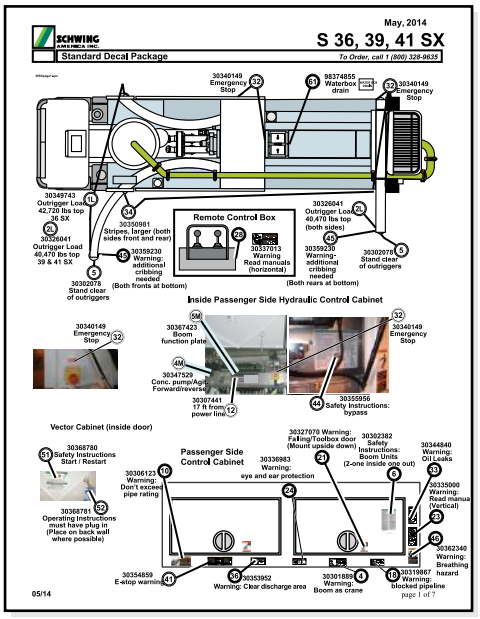
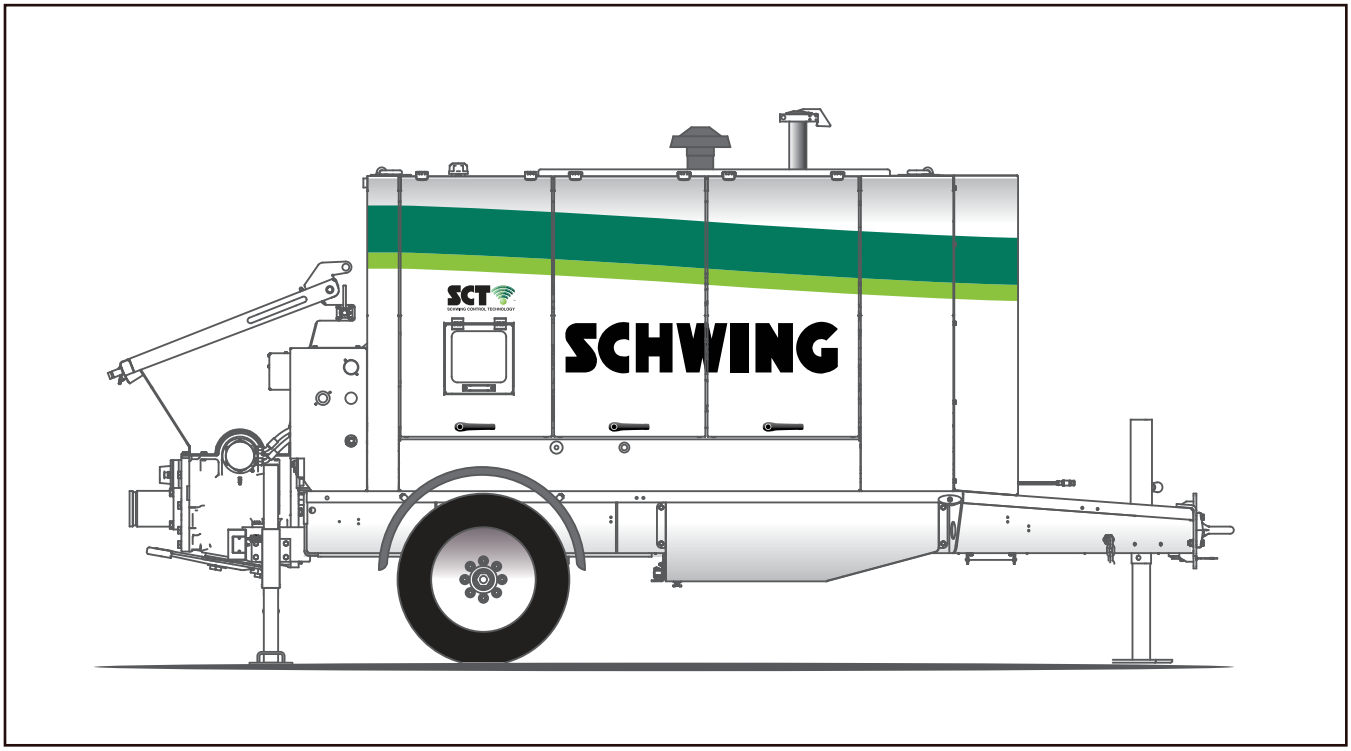


Figure 2
Sample Decal Location Guide



Product Overview

This section provides an overview of the safety devices, machine components and SCT controller of the stationary pump. It is recommended that you read this section of the manual while you are near the stationary pump so that you can identify the components as they are described.

This section is not intended to be used for information on operating the pump. Operating procedures, along with their applicable warnings and cautions, are contained in the Operation section of this manual.

Concrete Pump Circuit Overview

The Schwing concrete pump has a fully hydraulic, twin-cylinder, reciprocating design. The pumpkit consists of:

- Two differential hydraulic cylinders.
- A waterbox.
- Two material cylinders.
- A concrete valve (“Rock Valve”).

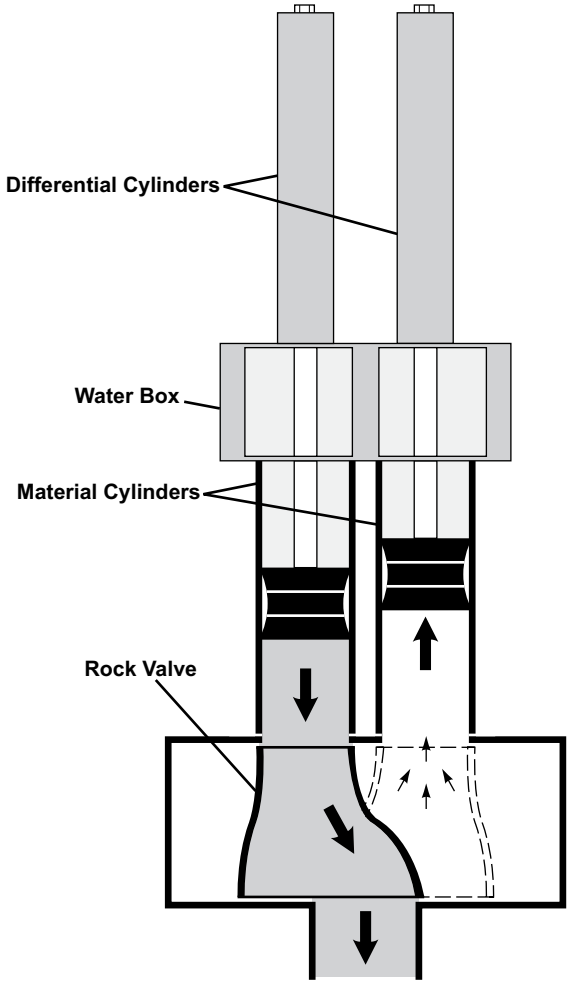
The waterbox acts as a mounting structure for the differential cylinders and as a container to hold flushing water. The concrete valve directs the flow of concrete from the hopper to the outlet piping.

During operation, the two hydraulic cylinders move back and forth (i.e., reciprocate) in perfect synchronization. That is, when one hydraulic cylinder reaches the end of its stroke, both cylinders then shift direction, and the cylinder that had been pushing the concrete now begins to suck concrete from the hopper. The cylinder that had been sucking concrete from the hopper now begins to push it into the pipeline. When the machine runs in reverse mode, concrete is sucked from the pipeline and pushed into the hopper.

It is the job of the Rock Valve to shift the direction of the two hydraulic cylinders. These cylinders are connected via hydraulic plumbing and share hydraulic oil on one side of their pistons. This shared oil, called rocking oil, keeps the two cylinders moving. A third hydraulic cylinder (the Rock Valve slewing cylinder) cycles the Rock Valve back and forth.

The hydraulic pumps that supply oil to the concrete pumpkit adjust the amount of oil they deliver by internal pressure-sensing devices and by external valves (the stroke limiter and the dampener valves).

Each hydraulic cylinder has an area difference referred to as an “area differential” between the two sides of the piston. This area differential exists because the rod extends from only one side of the piston. This is in contrast to the rock slewing cylinder, for example, which has a rod extending from both sides of the piston, and,therefore has the same area on both sides of the piston.



Twin-circuit switching vs Single-circuit

Twin-circuit systems have a hydraulic circuit to move the differential cylinders, and a separate circuit to switch the Rock Valve. On single circuit machines, the main hydraulic pumps moved both the main differential cylinders and the Rock Valve.

There are advantages to having a separate hydraulic circuit to switch the Rock Valve. For instance, with a stiff, lean mix and high pressure, a single-circuit system does not always have enough pressure available to move the Rock Valve. Generally, this deficit occurs when the mix is being pumped straight up. The Rock Valve must dislocate a column of concrete that still has pressure on it from the stroke. The next stroke cannot begin until the Rock Valve has completed its travel. In a twin-circuit system, as soon as the S-3 spool changes direction, oil is routed to the Rock Valve so it can change direction, as well as to the valve that changes the direction of the differential cylinders. If the Rock Valve cylinder has enough pressure available to switch, it will do so. If it has insufficient pressure, it will wait.

When the differential cylinders change direction, one of the following happens:

- If the Rock Valve has already switched, concrete is drawn immediately from the hopper and pushed into the pipeline with a normal stroke, or
- If the Rock Valve has not already switched, concrete begins to be drawn from the pipeline and pushed into the hopper. This reduces the pressure in the pipeline to zero. As soon as pipeline pressure is relieved, the Rock Valve moves across. Once the Rock Valve has moved, concrete accelerates out of the pipeline in its normal fashion.

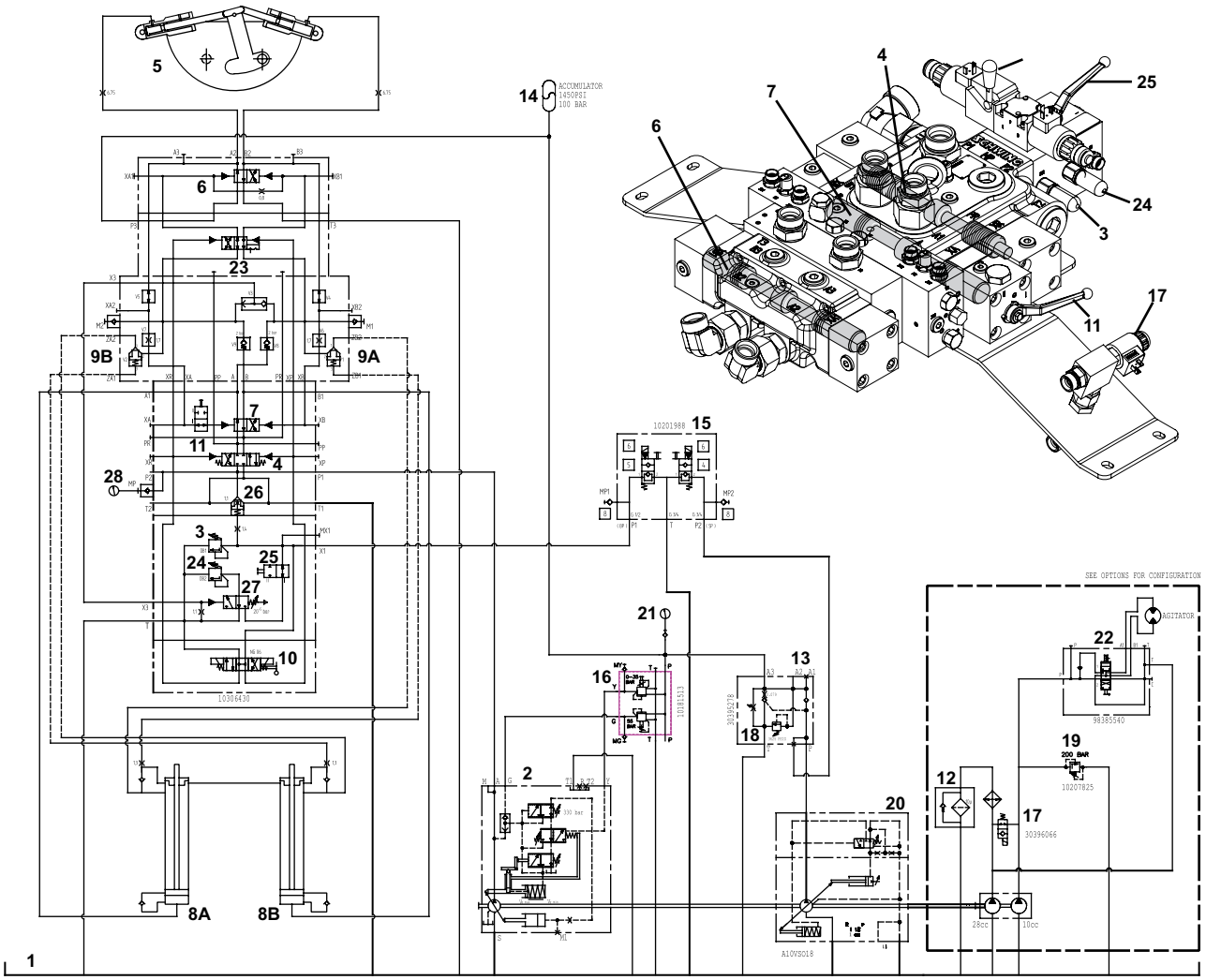
The concrete is not pumped in reverse, because as soon as the pressure in the pipeline drops to zero, the Rock Valve switches. This system has the added benefit of reducing wear on the cutting ring, the spectacle plate, the kidney seal and kidney plate, and the Rock Valve slewing cylinder.

One advantage of single circuit machines is a lack of an accumulator. When the engine is shut-off, no hydraulic pressure exits in the system, hydraulic lines can be safely opened. This is not the case with twin-circuit machines. Even with the engine shut-off, pressure could be stored the accumulator. If a line is removed, oil could be discharged, raising the possibility of injury.

Whenever you work with accumulators, be sure to follow these simple rules.

Accumulator Safety Rules

1. Never assume that the accumulator has no stored pressure. Check the gauge before removing any lines, valves, or fittings. Verify zero pressure, and periodically check that the gauge is in good working order.
2. Recharge an accumulator (i.e., add dry nitrogen) only after you read and understand all the instructions for recharging accumulators. Accumulators are charged with dry, not liquid, nitrogen. Complete recharging instructions can be found in the Maintenance section of this manual.
3. Never charge an accumulator with oxygen or compressed air. Under pressure, oxygen can contact some of the molecules of hydraulic oil and lower the flash point of the oil to below room temperature. If the oil flashes, the accumulator will explode.
4. Never work on the accumulator, the Rock Valve cylinder, the cutting ring, or any other connected component with the engine running. After shutting off the engine, remove the key and place it in your pocket. Then verify zero pressure on the accumulator gauge before opening or working on any of these items.
5. Never improvise the tools or equipment needed to recharge the accumulator. The correct tools are shown in the Maintenance section of this manual.
6. Do not operate the machine, if the accumulator develops a gas leak, an oil leak, or a ruptured bladder. Replacement bladders can be ordered through Schwing's spare parts department or can sent in for repair. If you any have questions, call Schwing America's Service Department at (888) 292-0262 for assistance.



1	Hydraulic oil reservoir	15	E-Stop Manifold
2	Main hydraulic pump	16	Stroke Limiter
3	Main pressure relief valve	17	Agitator Dump Valve
4	Directional control valve S-1	18	Accumulator safety relief valve
5	Rock Valve slewing cylinder	19	Agitator Relief Valve
6	Directional control valve S-3	20	Accumulator hydraulic pump
7	Directional control valve S-2	21	Accumulator Gauge
8A/8B	Differential hydraulic cylinder	22	Agitator Circuit
9A/9B	Switching valves	23	NG 10 valve for forward/reverse
10	Forward/Reverse Valve	24	Soft Switch relief valve
11	1/4” Turn - Shutoff Valve	25	Soft Switch shutoff handle
12	Hydraulic oil filter with bypass valve	26	Main relief poppet valve
13	Accumulator unloading valve	27	Soft Switch valve
14	Accumulator	28	Concrete Pump Pressure Gauge

Safety Devices

The following paragraphs describe the safety devices found on the stationary pump. The devices listed here must be maintained in good working condition to avoid injury. Bypassing a safety device for servicing or emergency clean out should only be done by qualified personal. All bypassed devices must be set back to their original position upon completion of the service or emergency procedure.

Emergency Stop Buttons (E-Stop)

There are three emergency stop buttons located on the concrete pump and one on the cable remote. Emergency stop buttons are located near the following:

- Driver side hopper
- Passenger side hopper
- Waterbox
- Cable/Radio Remote

Pushing the Emergency Stop Button (E-Stop) disables the hydraulic circuit.

To reset the E-stop and enable the hydraulic circuit, turn the E-Stop button clockwise and press the horn button on the operator panel or cable/radio remote.

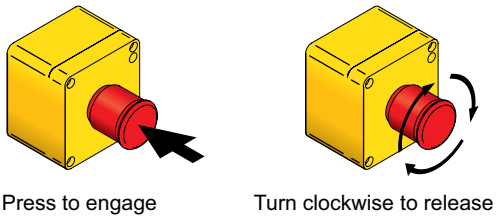


Figure 1
Emergency stop button

Dump Valve

The dump valve (Figure 2) is a safety device that consists of a 2-way solenoid valve with override button.

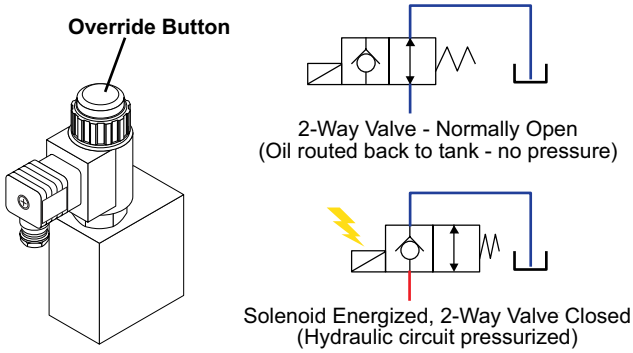


Figure 2
Dump Valve with Override Button

The 2-way solenoid valve is in the normally open position. When electrical current is applied to the dump valve solenoid, the 2-way valve will over take the spring and put the valve in a the closed position. This will block the hydraulic oil from escaping to tank, allowing pressure to build in the circuit.

If an E-stop button is pressed, the electrical current to the solenoid is lost, the spring will return the 2-way valve to the normally open position. Hydraulic oil will be routed back to tank and pressure in that circuit will be lost.

To bypass the dump valve, press and hold the override button.

Emergency Stop (E-Stop) manifold

The emergency stop manifold is a safety device that consists of two dump valves with override buttons.

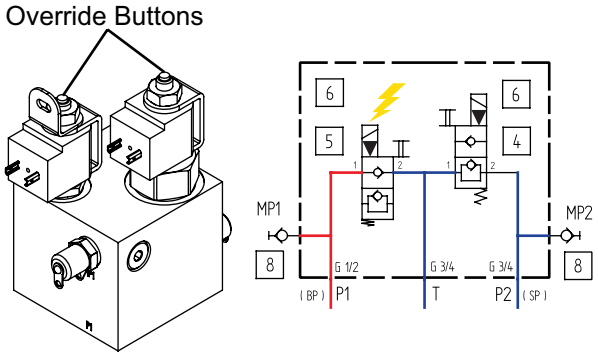


Figure 3
Emergency stop manifold

The dump valves are a normally open, which means that electricity must be present before the valve can close and pressure can develop in the hydraulic circuits. If there is an electrical problem or an emergency stop switch is activated, power is lost to the solenoids, the dump valves open and route all oil from the hydraulic pump directly back to the hydraulic tank, causing a loss of hydraulic pressure and disabling the hydraulic circuit.

If power is lost to the emergency stop dump valves, press and hold the override buttons (Figure 3) to restore hydraulic pressure. The concrete pump can now be placed into forward or reverse with handle located on the S1/S2 control block. You can also restore power by connecting the Emergency Power Cable Plug to the emergency stop manifold, see “Electrical power loss” on page 87.

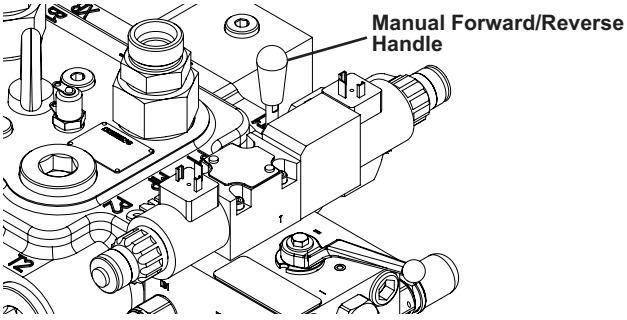


Figure 4
Concrete pump forward/reverse handle

Hopper Grate Interlock Switch

The Hopper Grate Switch consists of a switching cam and pressure roller switch. The switching cam is attached to the hopper grate. The pressure roller switch is wired through the concrete pump forward / reverse solenoids and the agitator dump valve. When the hopper grate is lifted, the pressure roller switch will move out of the switching cam groove and break the circuit. The concrete pump will go into the neutral position and the agitator will stop moving.

Shutting the hopper grate will reconnect the electrical circuit, the concrete pump will remain in neutral until you activate a forward or reverse function, the agitator will continue moving.

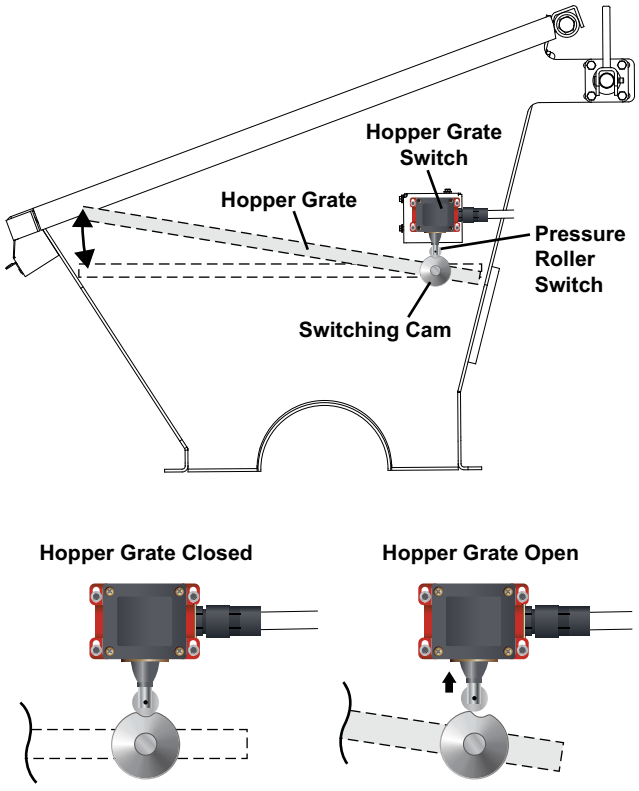


Figure 5
Hopper grate switch

⚠WARNING Never put any part of your body in the hopper or in the concrete valve, either from above (through the hopper) or from below (through the outlet pipe or clean out door). Serious injury can result.

Manual Bleed-Off Valve

The accumulator should dump pressure when the engine is stopped or E-stop button is pressed. If pressure still exists (check accumulator pressure gauge), relieve the remaining accumulator pressure using the manual bleed valve on the accumulator manifold.

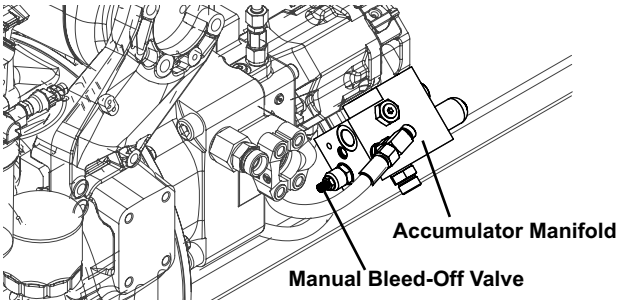


Figure 6
Accumulator manual bleed-off valve

Pressure Relief Valves

Pressure relief valves limit maximum pressure in a hydraulic circuit by diverting excess oil to the hydraulic tank when maximum pressures are exceeded. The relief pressures listed on the hydraulic schematics are not nominal figures. They are the hydraulic relief pressures that the concrete pump was designed to work with and that the components were designed to accommodate.

Under no circumstances should you raise hydraulic relief pressures. Conversely, lowering the hydraulic relief pressure settings may cause poor performance, heat, and related premature component failure. In some extreme cases, raising or lowering hydraulic relief pressures may cause dangerous operation. Check with the Schwing America Service Center before changing any hydraulic relief pressure settings.

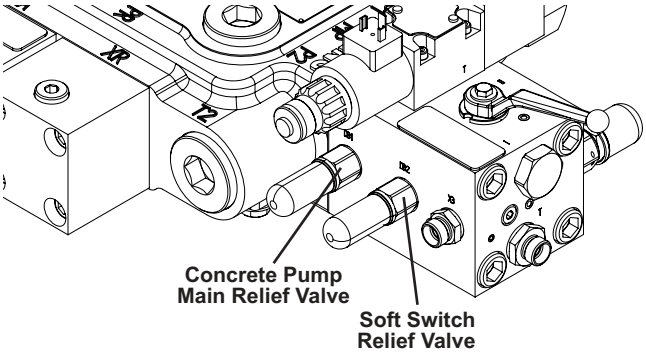


Figure 7
Example of a pressure relief valves

Safety guards

Safety guards were placed for your protection. Do not operate the machine unless all the safety guards are in place. If they become damaged, lost, stolen, or inoperable for any reason, they must be replaced before operation continues.

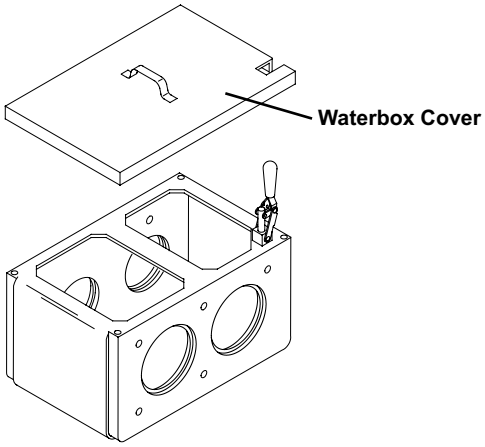


Figure 8
Example Safety Guard - Waterbox Cover

Fuses and circuit breakers

Fuses and circuit breakers protect against circuit overload. They do so by melting or opening when the current in an electrical circuit becomes higher than it was designed for. Here are a couple of examples of causes for circuit overload:

- Short circuits (positive goes to negative without resistance)
- Component malfunction (a coil that has to move a sticky valve)
- Mechanical interference (a shovel handle stuck through the oil cooler fan blade)

To maintain this safety device, simply replace a blown fuse with the correct size and type fuse, and never bypass a fuse. A very good rule of thumb for fuses is this: If it blows once, replace it. If it blows again, something is wrong. Find the cause of the problem, and repair it before activating the circuit again.

Warning Horn

A warning horn is mounted on the stroke limiter valve, at the rear of the engine. It can be activated manually or when an SCT warning message is displayed, such as high oil temperature.

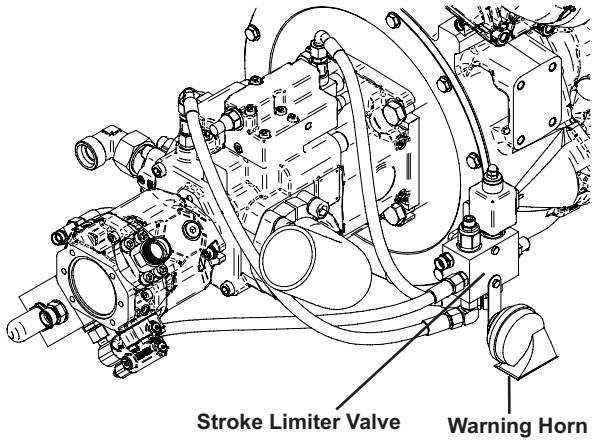


Figure 9
Warning horn mounted on stroke limiter valve

Manual Activation

The horn can be manually sounded by pressing any horn button. Horn buttons are located on the cable and radio remote as well as on the passenger side of the hopper.

SCT Warning Message

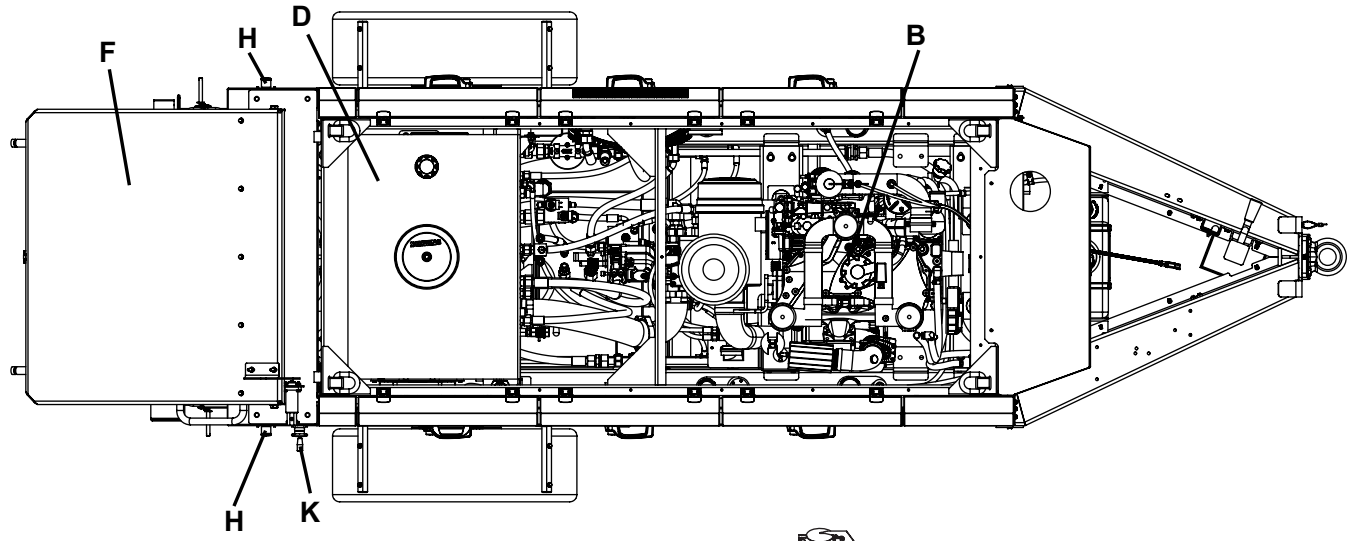
When a warning message is displayed, the horn will beep continuously, until the horn silence button is pressed on the HMI panel.

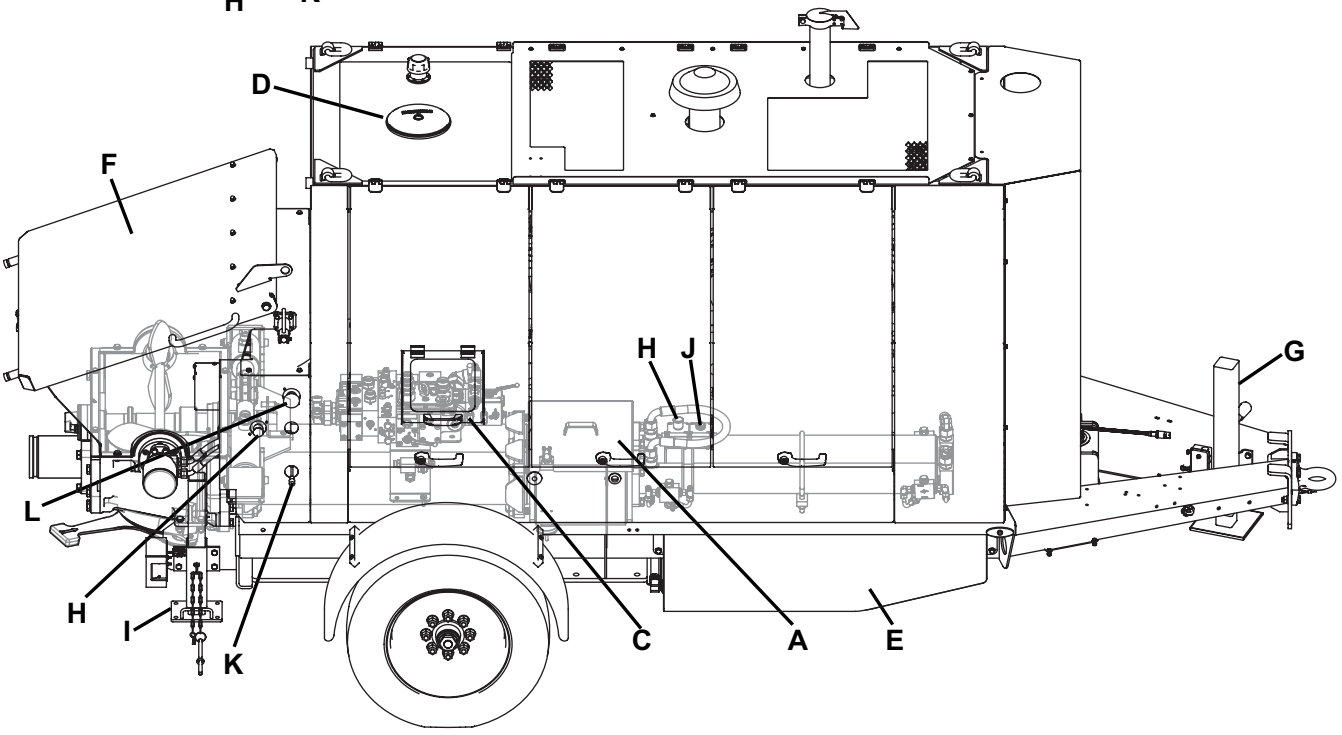
Reset Procedure

The horn must be sounded to reset the machine after an emergency stop button is reset.

Machine Overview

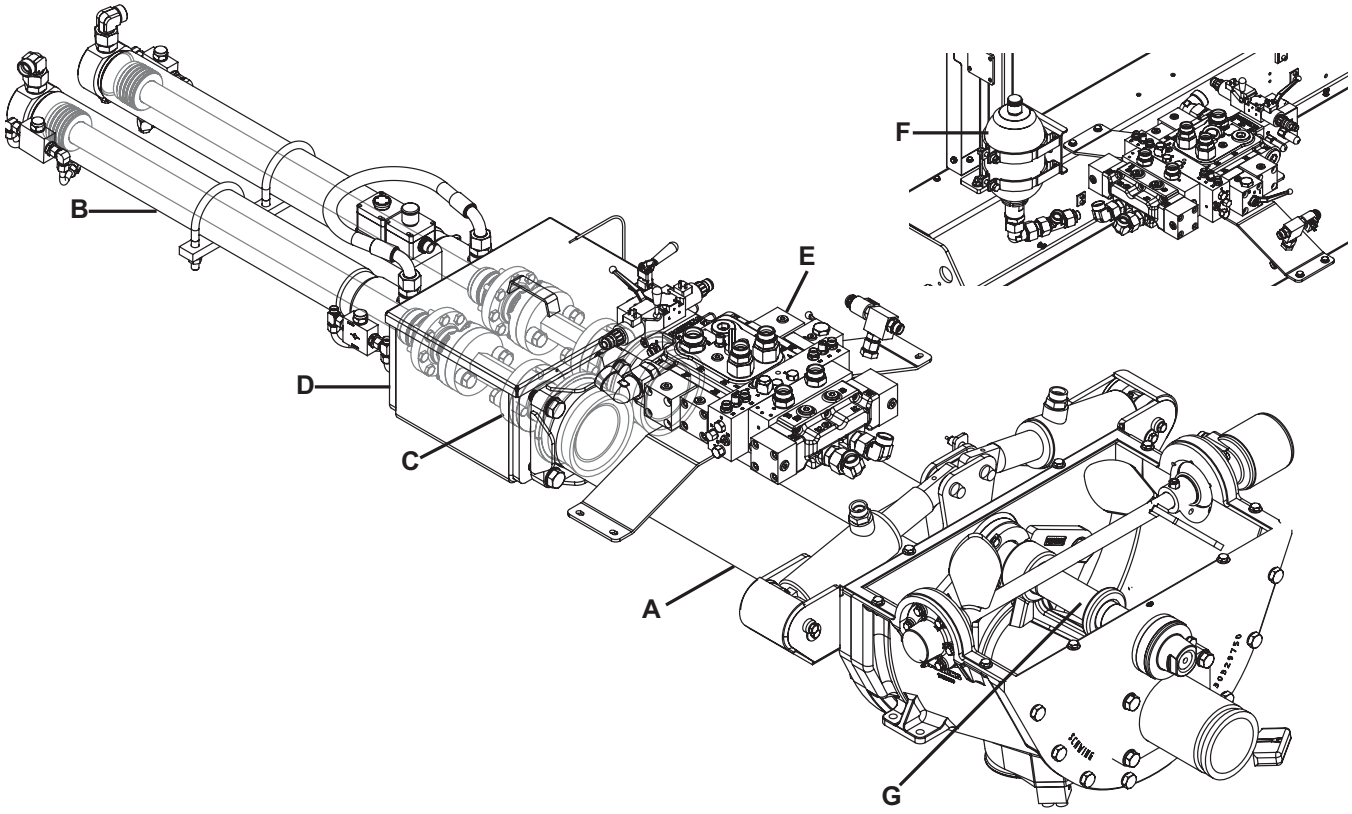
A. Pumpkit
B. Power Pack
C. Rear Control Station (SCT)
D. Hydraulic Tank
E. Fuel Tanks
F. Hopper
G. Jack Stand
H. E-stop Stations
I. Rear Outrigger
J. Ram Change Station
K. Agitator Handvalve
L. Horn Button





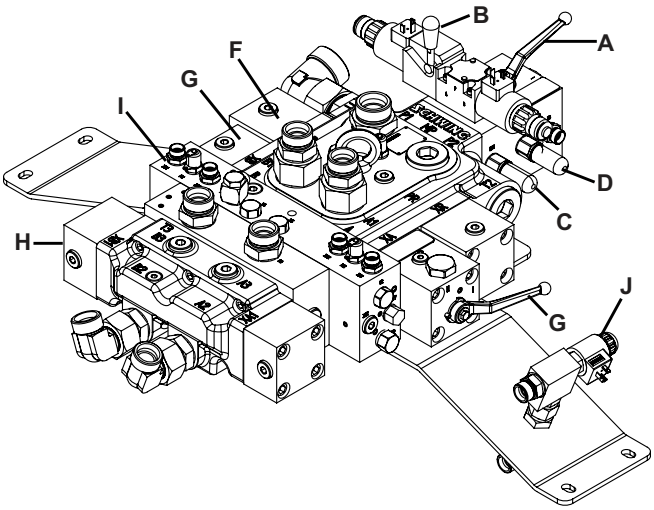
Pumpkit Overview

A. Material Cylinders
B. Differential Cylinders
C. Rams
D. Water Box
E. Control Valve (S1/S2/S3)
F. Accumulator
G. Rock Valve



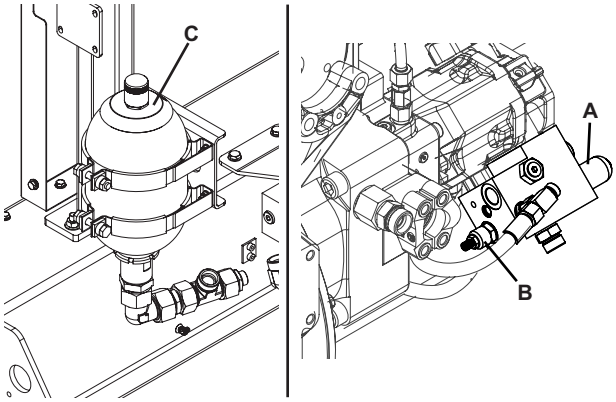
S1/S2/S3 Control Valve

A. Soft Switch 1/4 Turn Handle
B. Concrete Pump Manual Forward/Reverse Handle
C. Main Pressure Relief
D. Soft Switch Pressure Relief
E. 1/4 Turn Valve (Shut-off Valve)
F. S1 Spool (Internal)
G. S2 Spool (Internal)
H. S3 Spool (Internal)
I. MPS Valve
J. Agitator Dump Valve



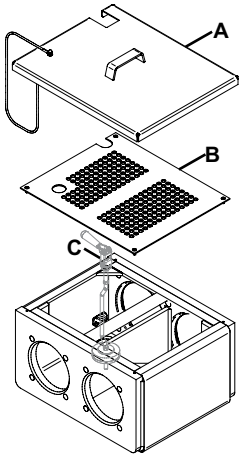
Accumulator / Accumulator Manifold

A. Pressure Relief Valve
B. Manual Bleed Off Valve
C. Accumulator



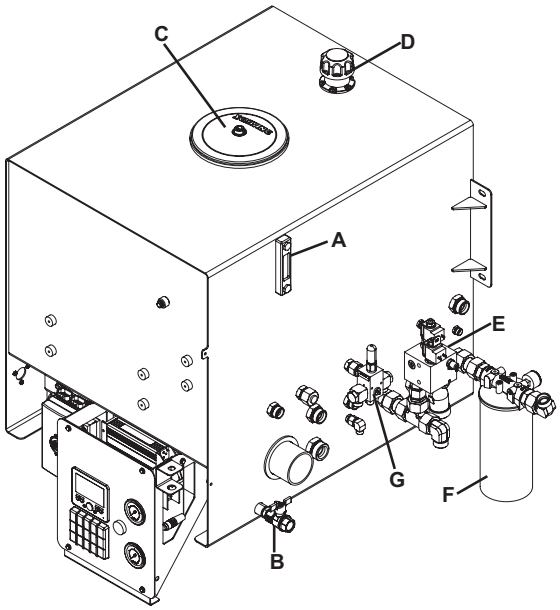
Waterbox

A. Cover
B. Safety Guard
C. Drain



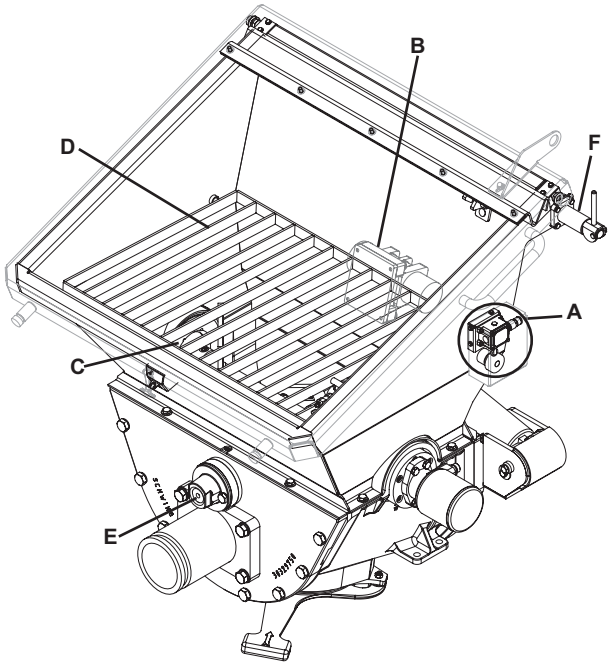
Hydraulic Tank

A. Hydraulic Oil Level / Temperature Gauge
B. Drain
C. Cleanout Cover
D. Breather
E. E-Stop Manifold
F. Main System Filter
G. Agitator Relief Valve



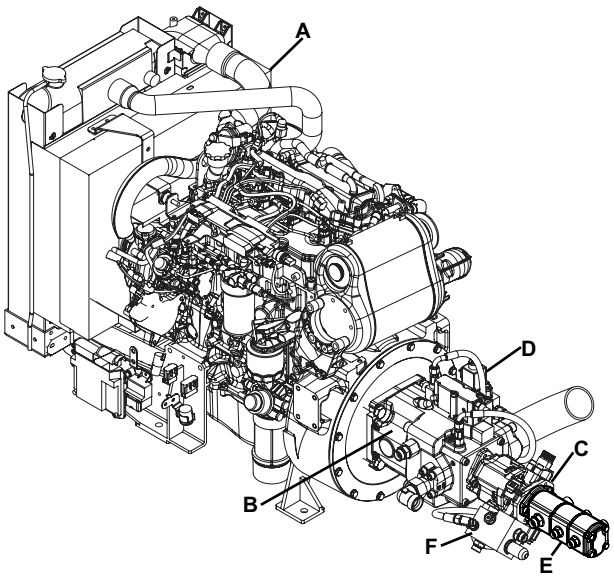
Hopper

A. Hopper Grate Switch
B. Vibrator (Optional)
C. Agitator
D. Hopper Grate
E. Tension Nut
F. Locking Pin



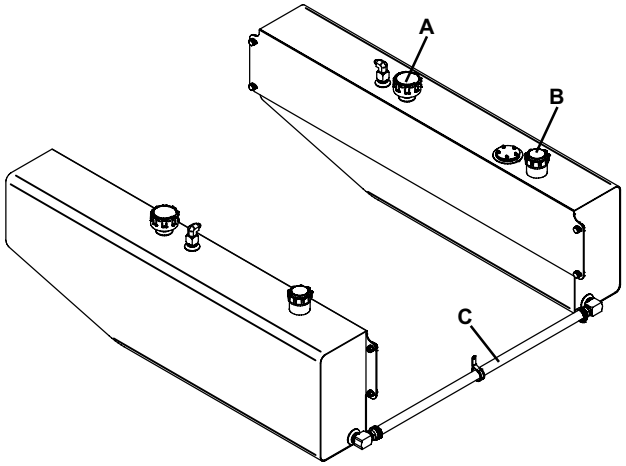
Power Pack

A. Engine
B. Main Hydraulic Pump
C. Accumulator Pump
D. Stroke Limiter
E. Gear Pumps
F. Accumulator Manifold



Fuel Tanks

A. Breather
B. Fuel Cap / Gauge
C. Cross Over Hose



SCT (Schwing Control Technology)

The SCT system allows the operator to electronically run all functions of the concrete pump. The system includes the Operator Panel, Cable Remote and optional Radio Remote.

The Operator Panel contains the following item:

A. HMI (Human Machine Interface)
B. Ignition Switch
C. Operator Panel Keypad

Operator Panel

Cable Remote

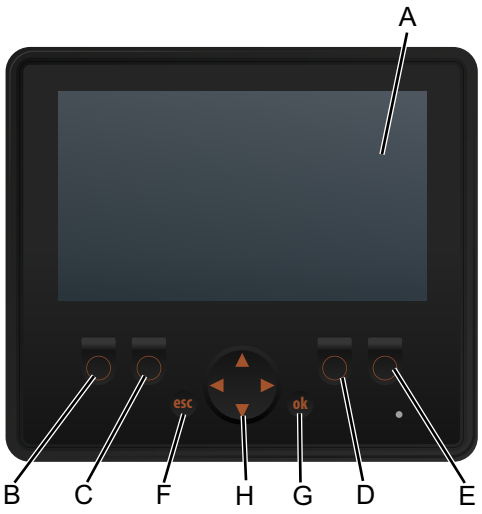
Radio Remote

HMI (Human Machine Interface)

The HMI is primary interface between the operator and the concrete pump. From the HMI, operators can view and set machine parameters.

The HMI contains the following:

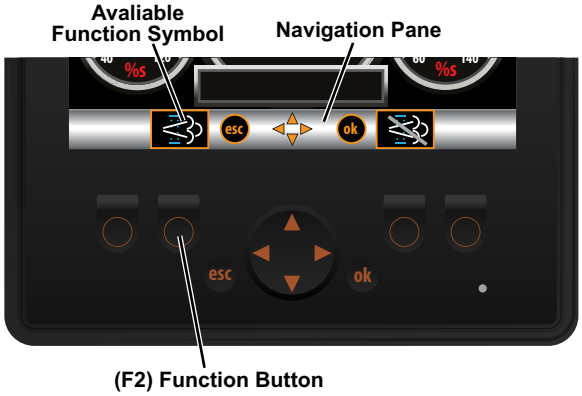
A. LCD Screen
B. (F1) Function Button
C. (F2) Function Button
D. (F3) Function Button
E. (F4) Function Button
F. ESC Button
G. OK Button
H. Navigation Arrows Button



Navigation Pane

The Navigation Pane displays the available functions and menu actions for each screen. If the “OK” symbol appears on the Navigation Pane, the operator can push the “OK” button to execute a menu action. If a symbol appears above a Function Button, pressing that button will activate the function.

Example: The Forced Regeneration-Start symbol appears above the (F2) Function Button. Pressing this button will activate the Forced Regeneration-Start function.



Arrows in the center of the Navigation Pane, represent which direction you can push the Navigation Arrows button. The Navigation Arrows button can be pushed in four directions. Not all directions are available on every screen. This button is used to navigate to other screens or to scroll through menu items.

To assist the reader, we will represent the symbols as follows:

ok = OK

esc = Escape

= Navigation Arrows Left/Right

= Navigation Arrows Up/Down

= Navigation Arrows Left/Right /Up/Down

LCD Screens

Start up Screen

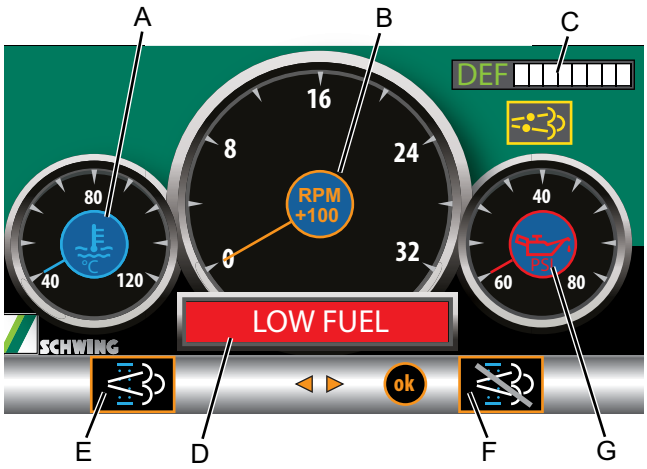
When the ignition switch is put into the RUN position, power will be supplied to the Operators Panel. The Start-up screen will briefly appear on the HMI LCD screen.

Engine Status Screen

The Engine Status Screen, appears after the Start up Screen and displays the following information:

A. Coolant Temperature
B. Engine RPMs
C. DEF Tank Level (if equipped)
D. Message Display
E. Forced Regeneration - Start (if equipped)
F. Forced Regeneration - Stop (if equipped)
G. Engine Oil Pressure

- Press ok to go to the Menu screen.
- Press the ◀▶ to go to the Pump Status Screen

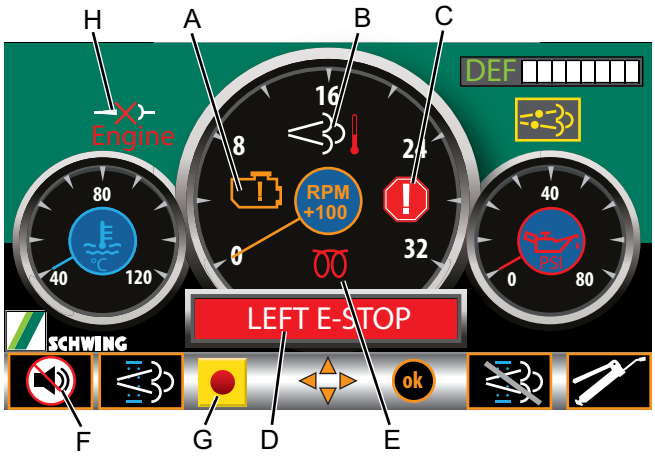


NOTE On SP500/750-15 Tier 3 machines, coolant temperature and oil pressure are not displayed. The icons will only appear if a high coolant temperature or low oil pressure alarm sounds.

Warning Messages and Symbols

Engine warnings and concrete pump faults will appear as warning symbols on the Engine Status Screen.

A. Engine Fault
B. Regeneration Fault
C. Engine Shut Down
D. Warning Message
E. Glow Plug (Wait to Start engine)
F. Horn Silence Symbol
G. E-Stop Pressed Symbol
H. IO Module to PLC Communication Loss icon (SP500/750-15 Tier 3 engines only see “Starting the Machine” on page 70)

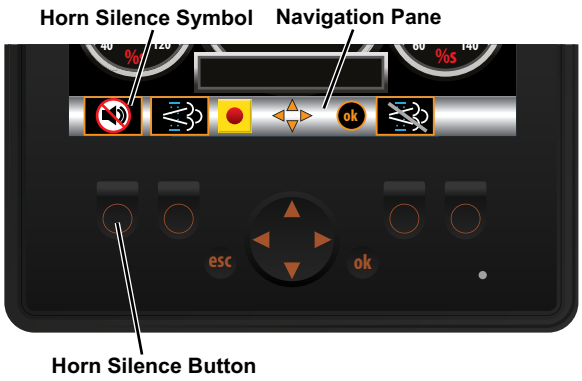


For a complete list of engine faults, press ok and then navigate to the Engine Codes Screen. For the definition of the fault codes, please reference your Caterpillar operation manual.

Concrete pump faults are listed on the Pump Codes Screen. Reference the “Concrete Pump Error Codes” on page 59 to cross reference the error codes.

Warning Messages

The Message Center will flash through all E-stop and warning messages that are present. When a warning message is displayed, the horn will beep continuously, until the Horn Silence button is pressed on the HMI. The horn will shut off, but the message will remain until the fault is corrected.



E-stop Warnings

Warning Message	Description
LEFT E-STOP	Left side hopper E-Stop is pressed
RIGHT E-STOP	Right side hopper E-Stop is pressed
WATERBOX E-STOP	Waterbox E-Stop is pressed
REMOTE E-STOP	Remote E-Stop is pressed
GRATE OPEN	Hopper grate is open
RESET REQUEST	Press Horn button on the Operator Panel or Remote to reset. The horn button next to the hopper will not reset the E-stop

General Warnings

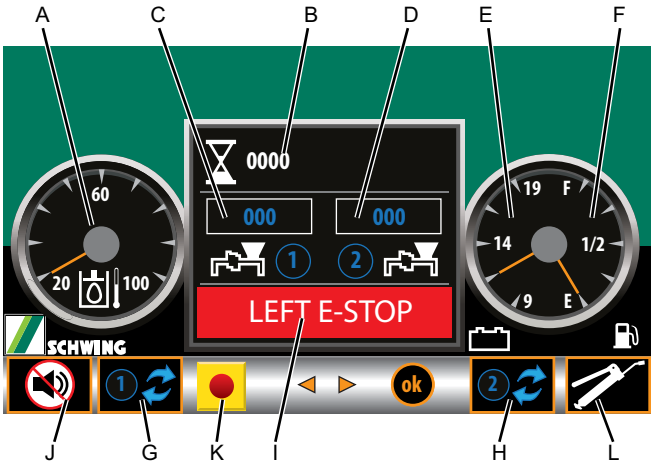
Warning Message	Description
LOW FUEL	If enabled - Fuel level below 10%
LOW GREASE	If enabled - Grease in pot below sensor
PUMP FAULT	Check Pump Codes screen
LOW HYD OIL	If enabled - Oil level is below oil level sensor
LOW BATTERY	Battery is below 10 volts
HYD OIL TEMP	If enabled - Temperature is above alarm set point
ENGINE FAULT	Check Engine Codes screen
RAM CHANGE MODE	Disables the Operator Panel and Remote controls. Idle goes to minimum, strokes go to minimum.

Pump Status Screen

The Pump Status Screen provides information on battery voltage along with installed options:

A. Hydraulic Oil Temperature
B. Hour Meter
C. Stroke Counter Readout -1
D. Stroke Counter Readout -2
E. Battery Voltage
F. Fuel Gauge
G. Stroke Counter Reset Symbol -1
H. Stroke Counter Reset Symbol -2
I. Message Center
J. Horn Silence Symbol
K. E-Stop Pressed Symbol
L. Manual Cycle - Auto Greaser

- Press ◀▶ to go to the Engine Status Screen
- Press esc to go to the Menu screen



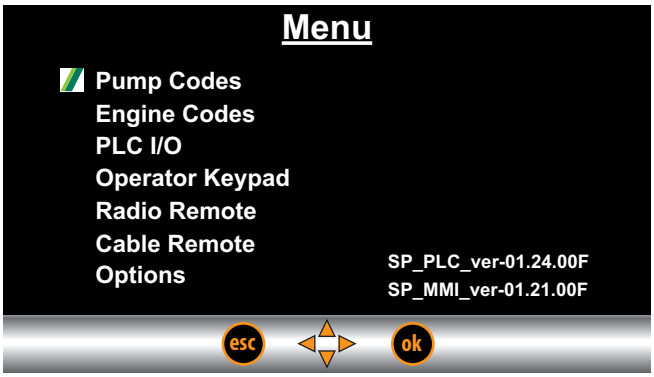
Menu Screen

The Menu Screen displays additional status and parameter settings screens indicated below:

- Pump Codes
- Engine Codes
- PLC I/O
- Operator Keypad
- Radio Remote
- Cable Remote
- Options

A small Schwing logo indicates which menu item is currently selected. Use the ▲▼ to scroll up and down the menu items. When you have moved the Schwing logo to the screen you would like to access, press the ok button.

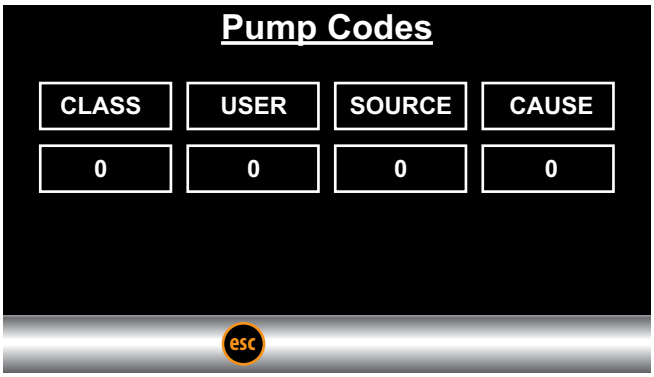
- Press esc to return to the Engine Status Screen.



Pump Codes Screen

Displays pump code faults.

- Press esc to return to the Menu screen.



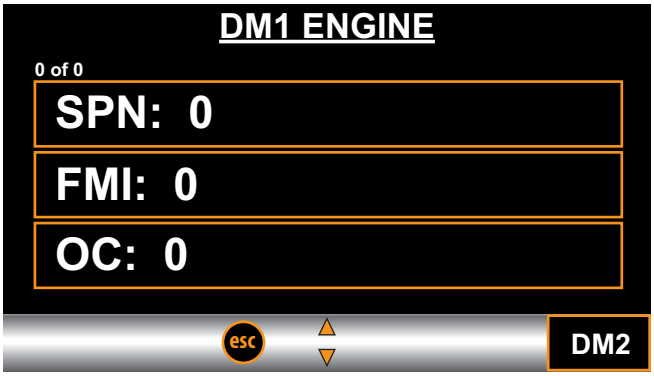
Engine Codes Screen

Displays engine code faults using two diagnostic message screens, DM1 and DM2.

- Use the ▲▼ to scroll through the engine codes.
- Press esc to return to the Menu screen.

Press the F4 function button under DM2 to go to the diagnostic message screen 2.

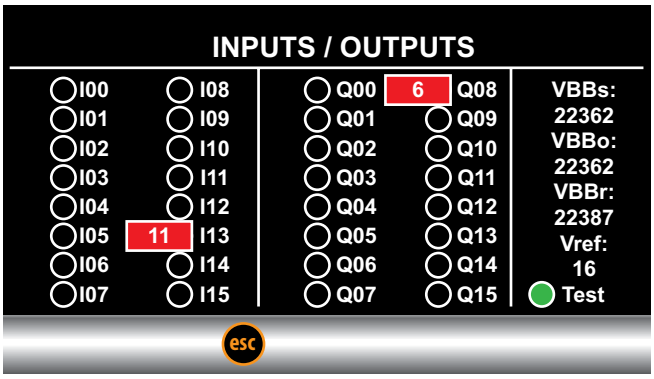
NOTE On SP500/750-15 Tier 3 machines, engine fault codes will not be displayed.



PLC I/O Screen

Displays the electronic input and output signals. This screen can be used to assist in troubleshooting electrical issues.

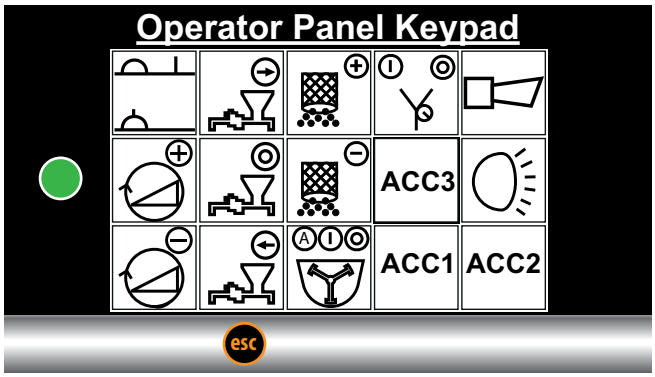
- Press esc to return to the Menu screen.



Operator Keypad Screen

Displays active functions on the Operator Keypad. Green dot = connected, Red dot = not connected.

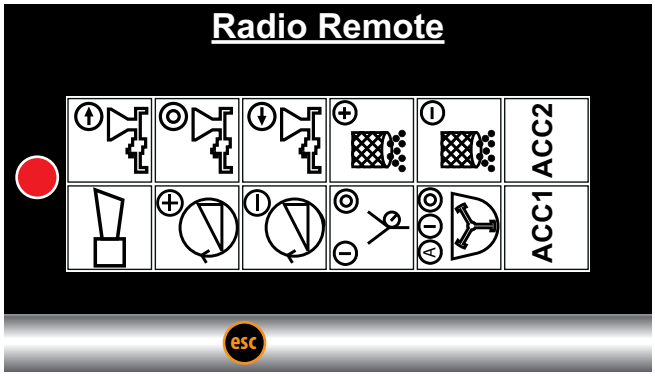
- Press esc to return to the Menu screen.



Radio Remote Screen

Displays active functions on the optional Radio Remote.

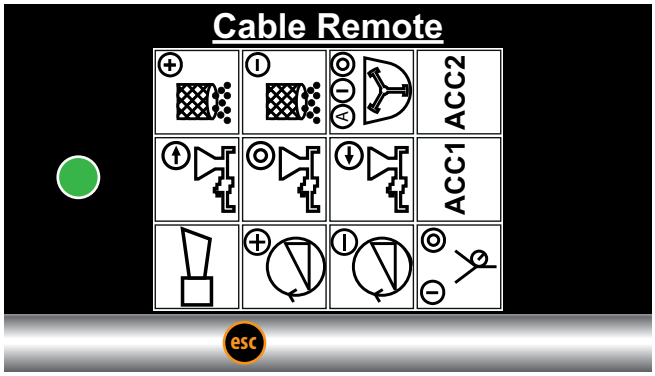
- Press esc to return to the Menu screen.



Cable Remote Screen

Displays active functions on the Cable Remote

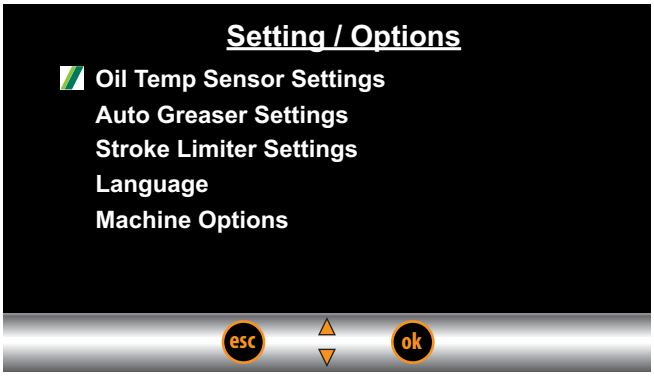
- Press esc to return to the Menu screen.



Options Screen

Provides additional information and allows you to set parameters on any installed options.

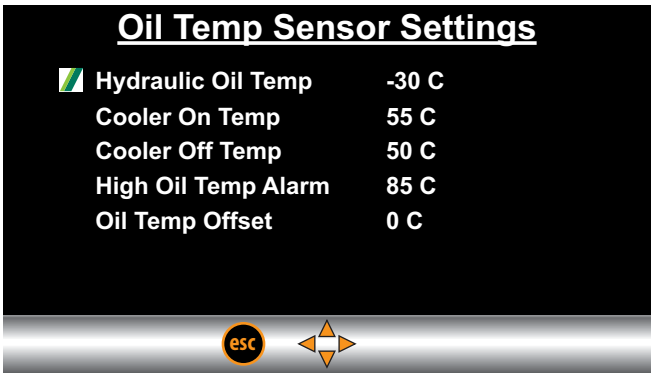
- Use the ▲▼ to move the icon through the list of screens.
- Press ok to go to the selected screen.
- Press esc to return to the Menu screen.



Oil temperature Sensor Settings Screen

Used to change the parameters of the concrete pump hydraulic oil sensors.

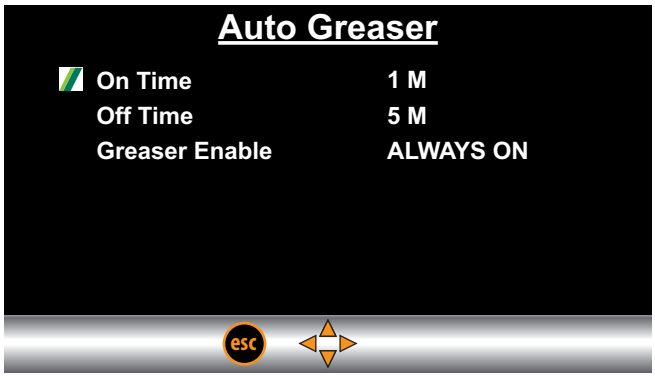
- Use the ▲▼ to move the icon through the list of sensors. When the icon appears next to the sensor parameter you would like to change, use the ◀▶ to increase or decrease the parameter setting.
- Press ok to store the parameter setting
- Press esc to return to the Menu Screen



Greaser Settings Screen

Used to change the parameters of the Auto Greaser System. From this screen you can change the greaser On Time and Off Time. These parameters are set in minutes. You can also set if you want the Auto greaser to always remain on (ALWAYS ON) or only if the pump is in Forward (PUMP FWD).

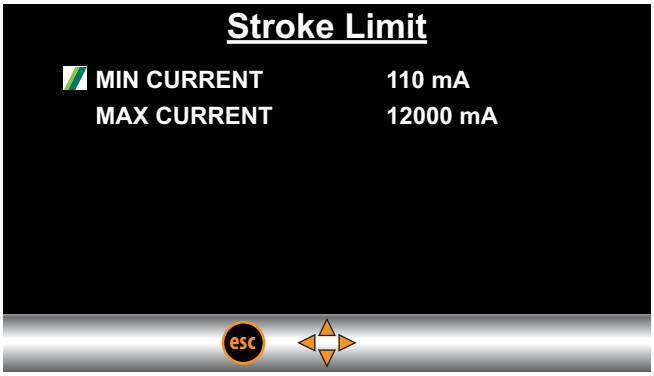
- Use the ▲▼ to move the through the list of greaser parameters. When the icon appears next to the ON TIME or OFF TIME parameter you would like to change, use the ◀▶ to increase or decrease the parameter setting.
- For GREASER ENABLE menu item, the ◀▶ will change between ALWAYS ON and PUMP FWD.
- Press esc to return to the Menu Screen



Stroke Limit Settings Screen

Used to change the parameters of the Stroke Limiter. From this screen you can change the Minimum Current (MIN CURRENT) and the maximum current (MAX CURRENT). Settings are in milliamps.

- Use the ▲▼ to move the ▰ between the MIN CURRENT and MAX CURRENT settings. When the icon appears next to the parameter you would like to change, use the ◀▶ to increase or decrease the parameter setting.
- Press esc to return to the Menu Screen



Language Screen

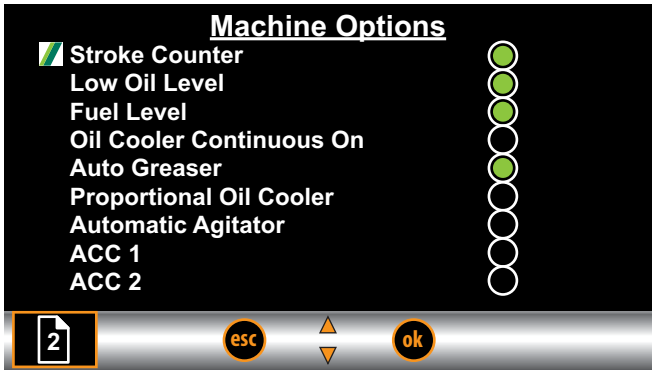
Used to change the current language of the HMI screens

- Use the ◀▶ to move the through the list of languages.
- Press esc to return to the Menu Screen

Machine Options Screen

Used to enable functionality of any installed options. As options are added, you must select the added option from the menu in order to enable them.

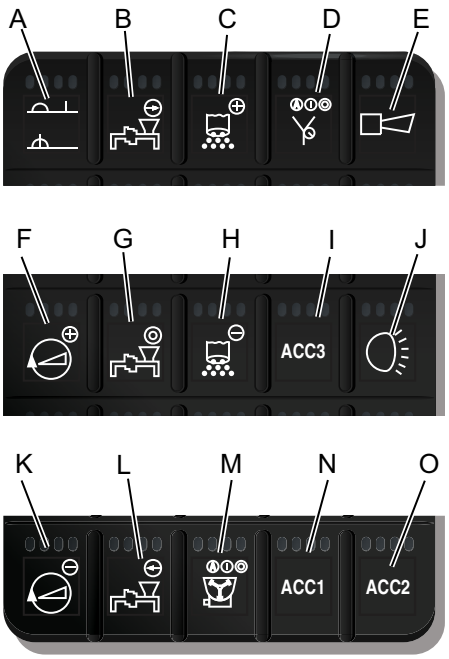
- Use the ▲▼ to move the ▰ between the option settings. When the icon appears next to the setting you would like to add, press the ok to turn the setting on or off.
- Press esc to return to the Menu Screen



Operator Panel Keypad

The Operator Panel Keypad contains 15 buttons used to control various functions of the concrete pump. Each button contains four indicator lights. These lights are used to provide feedback on currently active functions. Not every indicator light is used. Reference each button for functionality. Buttons are as follows:

A. Local / Remote Control
B. Concrete Pump Forward
C. Stroke Limiter (+)
D. Vibrator Auto/Manual - On/Off
E. Horn
F. Throttle (+)
G. Concrete Pump - Off
H. Stroke Limiter (-)
I. Optional Accessories 3
J. Work Light - On/Off
K. Throttle (-)
L. Concrete Pump - Reverse
M. Agitator - On/Off
N. Optional Accessories 1
O. Optional Accessories 2



Keypad Buttons

Local/ Remote Button
Switches between the Local (Operator Panel) mode and the Radio or Cable Remote mode . Upon start-up, the button defaults to Local mode.

- Press once to change to Remote mode. Press again to change back to Local mode.

 = Local Mode

 = Remote Mode

Concrete Pump - Forward
Puts the concrete pump into forward. This is called the pumping position. Press once to put the concrete pump in forward. If the concrete pump is in reverse, press and hold to change from pump reverse to pump forward.

 = Inactive

 = Pump/Forward

Concrete Pump - Off
Stops the concrete pump. Press once to shut the concrete pump off.

 = Inactive

 = Pump/Off

Concrete Pump - Reverse
Puts the concrete pump in the reverse. This is typically used for cleaning out or unclogging jams in the pipeline. Press once to put the concrete pump in reverse. If the concrete pump is in forward, press and hold to change from pump forward to pump reverse.

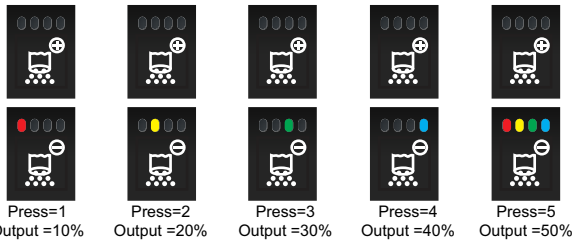
 = Inactive

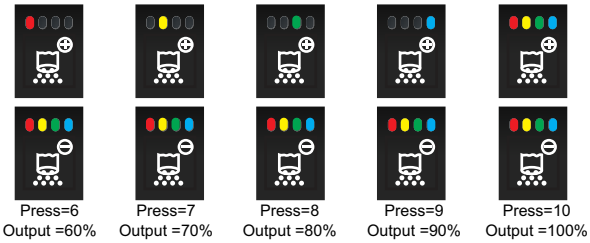
 = Pump/Reverse

Stroke Limiter (+)

The stroke limiter buttons controls the amount of strokes per minute the concrete pump is outputting. Press once to increase strokes per minute by 10%. The Red LED on the Stroke Limiter (-) button will illuminate. Each press of the button will illuminate the next LED indicator. When the entire Stroke Limiter (-) button LED's are lit, the stroke limiter is at 50% output. Pressing the Stroke Limiter (+) a fifth time, will illuminate the Red LED light on the Stroke Limiter (+) button. When all the button LED's are lit, the Stroke Limiter is at 100% output. You can also press and hold the Stroke Limiter (+) button to continually ramp up the strokes per minute in 10% increments.

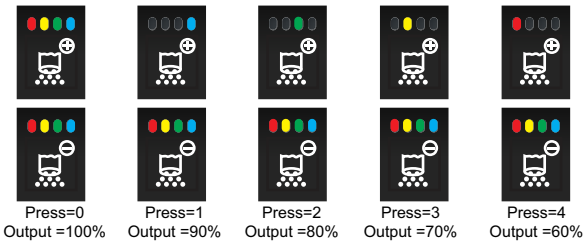

Press=0
Output =0%

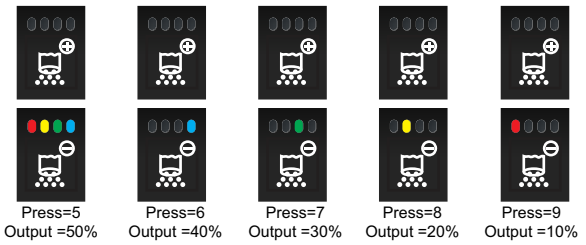

Press=1
Output =10%
Press=2
Output =20%
Press=3
Output =30%
Press=4
Output =40%
Press=5
Output =50%


Press=6
Output =60%
Press=7
Output =70%
Press=8
Output =80%
Press=9
Output =90%
Press=10
Output =100%

Stroke Limiter (-)

Press once to decrease strokes per minute by 10%. You can also press and hold the Stroke Limiter (-) button to continually ramp down the strokes per minute setting. If the current output is at 100%. Pressing the Stroke Limiter (-) button once, will turn the Blue LED on the Stroke Limiter (+) button off. Each press of the button will change the LED lighting as shown below.


Press=0
Output =100%
Press=1
Output =90%
Press=2
Output =80%
Press=3
Output =70%
Press=4
Output =60%


Press=5
Output =50%
Press=6
Output =40%
Press=7
Output =30%
Press=8
Output =20%
Press=9
Output =10%


Press=10
Output =0%

Vibrator Auto/Manual/Off
This button works in conjunction with the Concrete Pump-Forward button. When the Vibrator Auto button is pressed once, the Vibrator will turn on when the concrete pump is in the forward position. When the concrete Pump-Off or Reverse button is selected, the vibrator will shut off. If you press the button again, the vibrator will be in manual mode and will run until the vibrator is shut off. Pressing the button a third time will turn the vibrator off.


= Vibrator OFF

= Vibrator Auto ON

= Vibrator Manual ON

Horn
Press once or press and hold to sound the horn.


= Horn / Off

= Horn / On (Push/Hold)

Throttle (+)
Press once to increase engine throttle. Press and hold or press multiple times to ramp up engine throttle.


= Inactive

= Throttle (+) (Push/Hold)

Throttle (-)
Press once to decrease engine throttle. Press and hold or press multiple times to ramp down engine throttle.


= Inactive

= Throttle (-) (Push/Hold)

Lights
Press to turn on the lights. Press again to shut the lights off.


= Lights / Off

= Lights / On

Agitator On/Off
Works in conjunction with the agitator valve manual forward/reverse handle to control the agitator located inside the hopper. Pressing the button and moving the agitator handvalve to either the forward or reverse position, will activate the agitator. Pressing th button again or moving the handle to the neutral position will stop the agitator.


= Agitator/OFF

= Agitator/ON

Optional Accessories Button 1 and 2
This button can be used with optional accessories installed on the concrete pump. Press once to activate the installed function.

= Optional Accessories / Off


= Optional Accessories / On

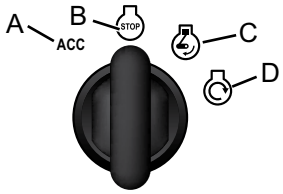

= Optional Accessories / Off


= Optional Accessories / On

Ignition Switch

The ignition switch has 4 positions.

A. (P) Accessory - On
B. (O) OFF
C. (I) RUN
D. (III) START



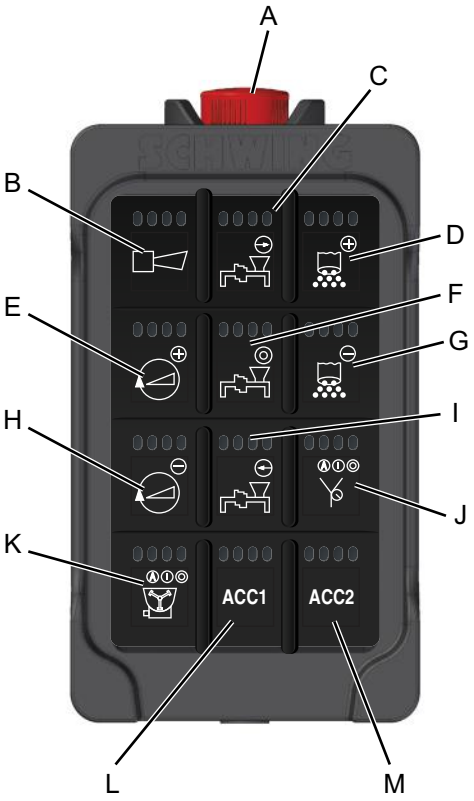
Turn the key switch to the RUN position and wait a few seconds, this will allow the controller to boot-up. Turn and hold the key switch in (III) START position, until the engine is starts - then release.

If the engine does not start, you must move the ignition switch to the OFF position and then back to the START position.

Cable Remote

The cable remote includes the following buttons:

A. E-Stop Button
B. Horn
C. Concrete Pump Forward
D. Stroke Limiter (+)
E. Throttle (+)
F. Concrete Pump - Off
G. Stroke Limiter (-)
H. Throttle (-)
I. Concrete Pump - Reverse
J. Vibrator Auto/Manual - On/Off
K. Agitator - On/Off
L. Optional Accessories 1 - On/Off
M. Optional Accessories 2 - On/Off



Keypad Buttons

E-Stop Button
Pushing the Emergency Stop Switch (E-Stop button) disables the hydraulic circuit.

To reset the system and enable the hydraulic circuit, turn the E-Stop button clockwise and press the horn button on the cable or radio remote.

Concrete Pump - Forward
Puts the concrete pump into forward. This is called the pumping position. Press once to put the concrete pump in forward. Press and hold to change from pump reverse to pump forward.

 = Inactive

 = Pump/Forward

Concrete Pump - Off
Stops the concrete pump. Press once shut the concrete pump off.

 = Inactive

 = Pump/Off

Concrete Pump - Reverse
Puts the concrete pump in the reverse. This is typically used for cleaning out or unclogging jams in the pipeline. Press once to put the concrete pump in reverse. Press and hold to change from pump forward to pump reverse.

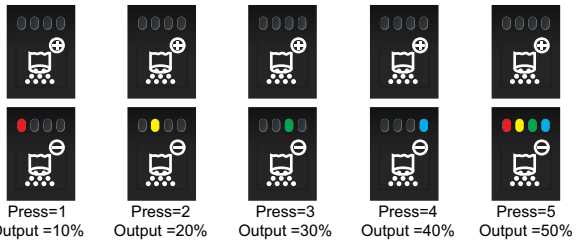
 = Inactive

 = Pump/Reverse

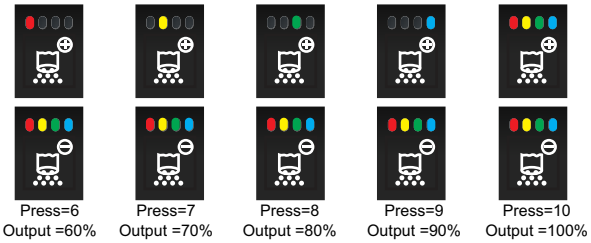
Stroke Limiter (+)

The stroke limiter buttons controls the amount of strokes per minute the concrete pump is outputting. Press once to increase strokes per minute by 10%. The Red LED on the Stroke Limiter (-) button will illuminate. Each press of the button will illuminate the next LED indicator. When the entire Stroke Limiter (-) button LED's are lit, the stroke limiter is at 50% output. Pressing the Stroke Limiter (+) a fifth time, will illuminate the Red LED light on the Stroke Limiter (+) button. When all the button LED's are lit, the Stroke Limiter is at 100% output. You can also press and hold the Stroke Limiter (+) button to continually ramp up the strokes per minute in 10% increments.

Press=0
Output =0%



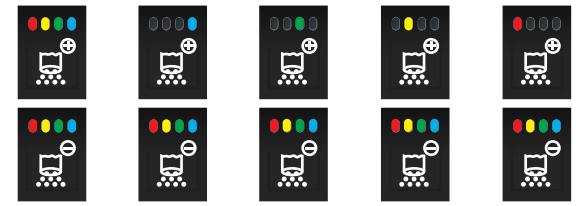
Press=1
Output =10%
Press=2
Output =20%
Press=3
Output =30%
Press=4
Output =40%
Press=5
Output =50%



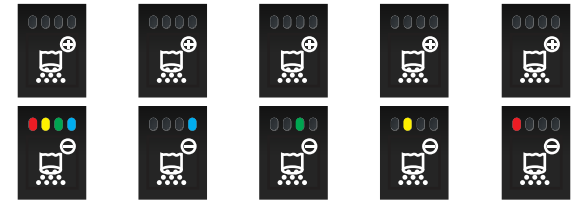
Press=6
Output =60%
Press=7
Output =70%
Press=8
Output =80%
Press=9
Output =90%
Press=10
Output =100%

Stroke Limiter (-)

Press once to decrease strokes per minute by 10%. You can also press and hold the Stroke Limiter (-) button to continually ramp down the strokes per minute setting. If the current output is at 100%. Pressing the Stroke Limiter (-) button once, will turn the Blue LED on the Stroke Limiter (+) button off. Each press of the button will change the LED lighting as shown below.



Press=0
Output =100%
Press=1
Output =90%
Press=2
Output =80%
Press=3
Output =70%
Press=4
Output =60%



Press=5
Output =50%
Press=6
Output =40%
Press=7
Output =30%
Press=8
Output =20%
Press=9
Output =10%

Press=10
Output =0%

Vibrator Auto/Manual/Off

This button works in conjunction with the Concrete Pump-Forward button. When the Vibrator Auto button is pressed once, the Vibrator will turn on when the concrete pump is in the forward position. When the concrete Pump-Off or Reverse button is selected, the vibrator will shut off. If you press the button again, the vibrator will be in manual mode and will run until the vibrator is shut off. Pressing the button a third time will turn the vibrator off.


= Vibrator OFF


= Vibrator Auto ON


= Vibrator Manual ON

Throttle (+)

Press once to increase engine throttle. Press and hold or press multiple times to ramp up engine throttle.


= Inactive


= Throttle (+) (Push/Hold)

Throttle (-)

Press once to decrease engine throttle. Press and hold or press multiple times to ramp down engine throttle.


= Inactive


= Throttle (-) (Push/Hold)

Horn

Press once or press and hold to sound the horn.


= Horn / Off


= Horn / On (Push/Hold)

Agitator On/Off

Works in conjunction with the agitator valve manual forward/reverse handle to control the agitator located inside the hopper. Pressing the button and moving the agitator handvalve to either the forward or reverse position, will activate the agitator in that direction. Pressing the button again or moving the handle to the neutral position will stop the agitator.


= Agitator/OFF


= Agitator/ON

Optional Accessories 1 and 2

This button can be used with optional accessories installed on the concrete pump. Press once to activate the installed function.

= Optional Accessories / Off

= Optional Accessories / On

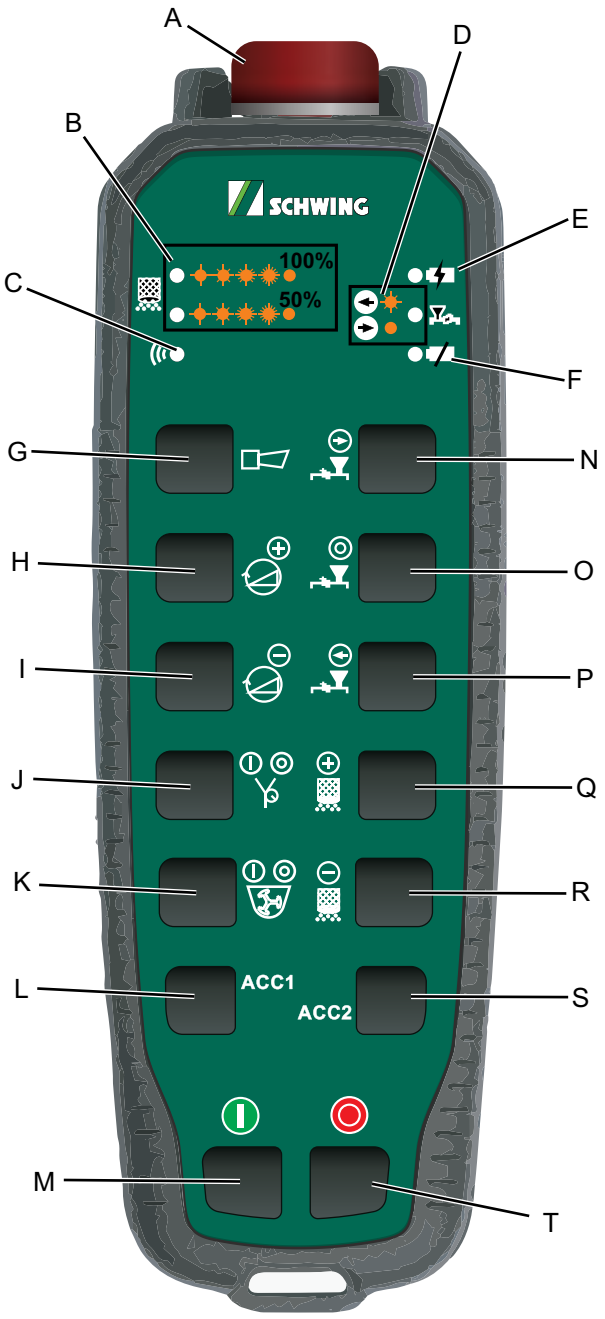
= Optional Accessories / Off

= Optional Accessories / On

Radio Remote (Optional)

The radio remote includes the following lights and buttons:

A. E-Stop Button
B. Stroke Limiter Indicator Lights
C. Link Active Light
D. Concrete Pump Fwd/Rev Indicator Light
E. Battery Charging Light
F. Battery Low Warning Light
G. Horn
H. Throttle (+)
I. Throttle (-)
J. Vibrator Auto - On/Off
K. Agitator - On/Off
L. Optional Accessories 1
M. Remote - On
N. Concrete Pump Forward
O. Concrete Pump - Off
P. Concrete Pump - Reverse
Q. Stroke Limiter (+)
R. Stroke Limiter (-)
S. Optional Accessories 2
T. Remote - Off

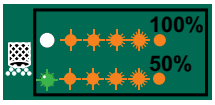


Radio Remote Buttons and Lights

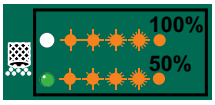
E-Stop Button
Pushing the Emergency Stop Switch (E-Stop button) disables the hydraulic circuit.

To reset the system and enable the hydraulic circuit, turn the E-Stop button clockwise and press the horn button on the Radio or Cable Remote.

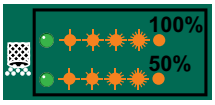
Stroke Limiter Indicator Lights
Displays the percentage of maximum stroke limiter output. When the Stroke Limiter (+) button is pressed, the lower stroke limiter indicator light will slowly flash green. Each press of the button will increase the speed of the flashing light. When 50% of maximum output is achieved, the light will turn solid green. Pressing the Stroke Limiter (+) button again, will cause the upper stroke indicator light to flash slowly, while the lower indicator light remains solid green. With each press of the Stroke Limiter (+) button, the light will flash faster. When 100% of maximum output is achieved, both the upper and lower light will be solid green.



20% = Output



50% = Output



100% = Output

Link Active Light
Gives a visual indication if the radio remote is linked to the receiver.

Linked = Solid Green

Unlinked = Flashing Green

Concrete Pump Fwd/Rev Indicator Light
Indicates if the concrete pump is in the forward, neutral or reverse pumping position. If the light is flashing green, the pump is in forward. If the light is solid green, the pump is in reverse. The light is off, the pump is in neutral.


Forward


Reverse


Neutral

Battery Charging Light
Gives a visual indication if the battery in the radio remote is being charged.

Charging = Solid Blue

Not Charging = No light

Battery Low Warning Light
Indicates if the battery is low on power or if there is a loss in CAN bus communication between the controller and the receiver.

Low Battery = Flashing Red

Loss of signal to receiver = Solid Red


Horn
Press once or press and hold to sound the horn.


Throttle (+)
Press once to increase engine throttle. Press and hold or press multiple times to ramp up engine throttle.


Throttle (-)
Press once to decrease engine throttle. Press and hold or press multiple times to ramp down engine throttle.


Vibrator Auto Mode
This button works in conjunction with the Concrete Pump-Forward button. When the Vibrator Auto button is active, the Vibrator will turn on when the concrete pump is in the forward position. When the concrete Pump-Off or Reverse button is selected or the Vibrator Auto Mode button is pressed again, the vibrator will shut off.


Agitator On/Off
Works in conjunction with the agitator valve manual forward/reverse handle to control the agitator located inside the hopper. Pressing the button and moving the agitator handvalve to either the forward or reverse position, will activate the agitator in that direction. Pressing the button again or moving the handle to the neutral position will stop the agitator.

Concrete Pump - Forward
Puts the concrete pump into forward. Press once to put the concrete pump in forward. Press and hold to change from pump reverse to pump forward. When the concrete pump is in forward the Concrete Pump Fwd/Rev Indicator Light will flash green.

Concrete Pump - Off
Press once to shut the concrete pump off.

Concrete Pump - Reverse
Puts the concrete pump in the reverse. This is typically used for cleaning out or unclogging jams in the pipeline. Press once to put the concrete pump in reverse. Press and hold to change from pump forward to pump reverse. When the concrete pump is in reverse the Concrete Pump Fwd/Rev Indicator Light will be solid green.

Stroke Limiter (+)
The Stroke Limiter (+) button is used to increase the strokes per minute the concrete pump is outputting. Press once to increase strokes per minute by 10%. You can also press and hold the Stroke Limiter (+) button to continually ramp up the strokes per minute setting. The Stroke Limiter Indicator Lights will flash or become solid depending upon the current output.

Stroke Limiter (-)
The Stroke Limiter (-) button is used to decrease the strokes per minute the concrete pump is outputting. Press once to decrease strokes per minute by 10%. You can also press and hold the Stroke Limiter (-) button to continually ramp down the strokes per minute setting. The Stroke Limiter Indicator Lights will flash or become solid depending upon the current output.

Optional Accessories 1 and 2
These buttons are used with optional accessories installed on the concrete pump. Press once to activate the installed function.

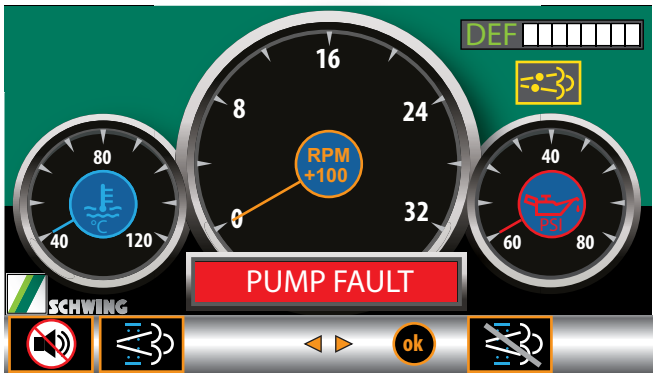
Remote Power On
When pressed, turns the radio remote ON

Remote Power Off
When pressed, turns the radio remote OFF

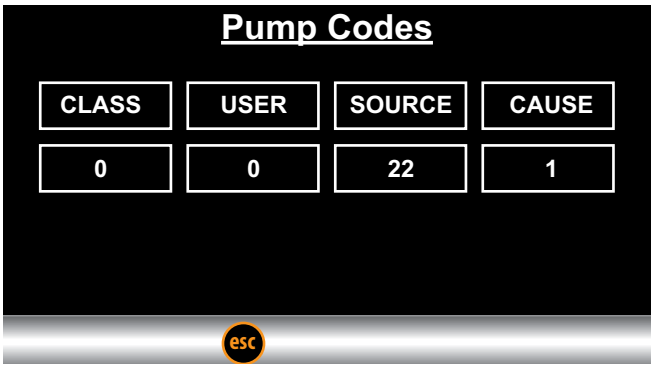
Concrete Pump Error Codes

Pump Codes Screen

If a concrete pump errors occurs, the “Pump Fault” message will appear in the display window. Press the button below icon to shut-off the audible alarm. To find the pump fault error code, navigate to the Pump Codes screen. Press ok button to go to the Menu screen. Ensure the is next to the Pump Codes menu item. If not, use the to scroll up or down until is next to the Pump Codes menu - then press the ok button.



The error code will be displayed on the Pump Codes screen. Match the number under the SOURCE column with the number on the Input/Output Error code tables. Then match the number under the CAUSE column to determine if it’s a break or short in the wire. If the SOURCE or CAUSE number do not match the error code tables, contact Schwing Service Department.



Input Error Codes

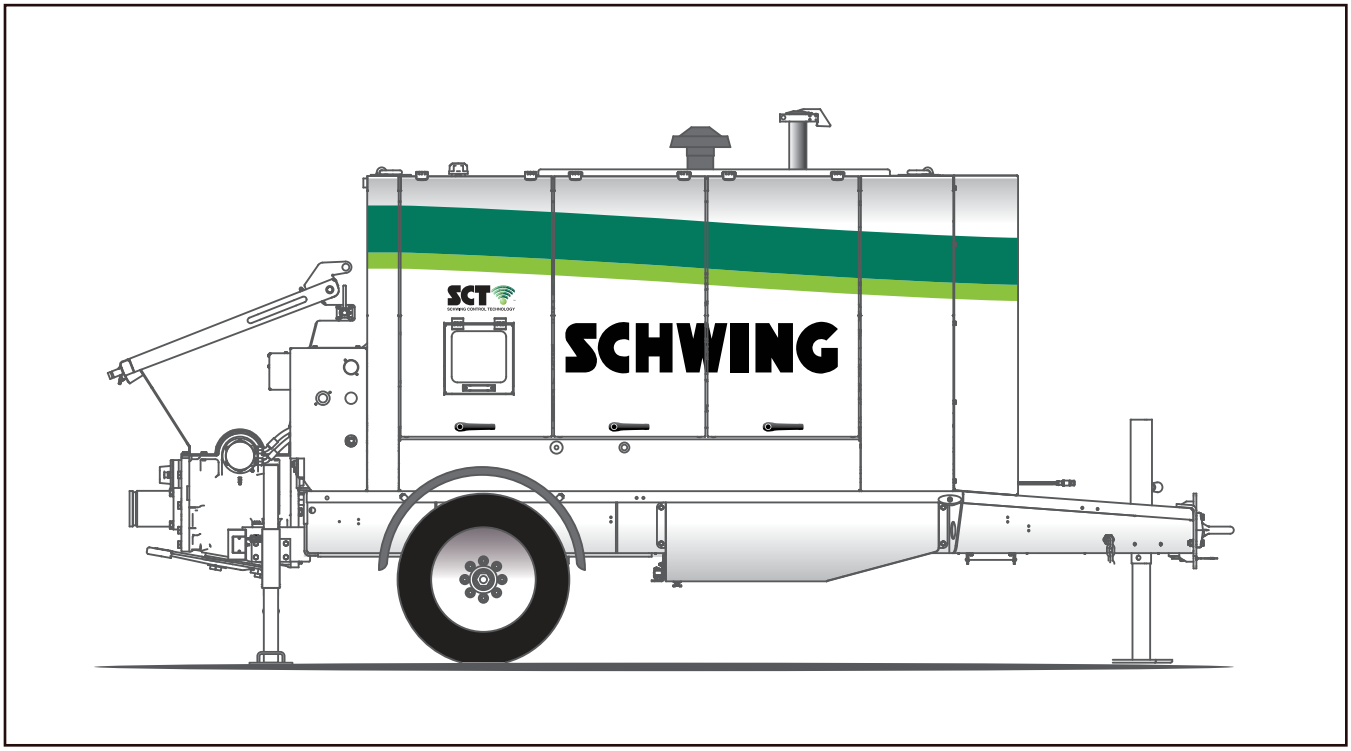
Source	Input	Function
16	B1	Stroke counter
17	S10	Horn
18	B2	Hydraulic oil - Level
19	S4	Driver Side Hopper - E-Stop
20	S2	Passenger Side Hopper - E-Stop
21	-	
22	S3	Water box - E-Stop
23	-	Remote - E-Stop
24	S6	Hopper gate end limit switch
25	S7	Ram Change
26	S11	Low Grease Level
27	-	
28	B4	Diesel tank - Level
29	B3	Hydraulic oil - Temperature

Output Error Codes

Source	Output	Function
64	Q00	Concrete pump E-Stop
65	Q01	Pressure accumulator E-Stop
66	Q02	Concrete pump forward
67	Q03	Concrete pump reverse
68	-	
69	-	
70	Q06	Water pump
71	Q07	Compressor
72	Q08	Stroke Limiter
73	Q09	Oil Cooler
74	Q10	Agitator on
75	Q11	Grease lubrication
76	Q12	
77	Q13	Concrete vibrator
78	Q14	Horn
79	Q15	Work Light

Error Cause

Cause	Description
1	Break
2	Short



Operation

Preparing for the Job

Personal Protection

Concrete is made from lime, which is very alkaline. If it stays on your skin long enough, it will cause severe burns, and in extreme cases the affected skin will simply fall off. Because of this, always wear water proof gloves and steel toed work boots. There are boots made especially for concrete work that will protect your feet from lime and accidental impact.

Wear a hard hat at all times to protect yourself from falling objects on the job site.

Safety goggles protect you from getting splashed concrete in your eyes. Anytime that there is danger of ricocheted rocks or sand (when shotcreting, for example), wear a full face shield.

Snug fitting work clothes will help prevent accidents involving moving parts.

Concrete pumps may generate higher sound pressure levels than O.S.H.A. allows for constant exposure. You can protect yourself by wearing hearing protection when on or near the concrete pump.

When mixing grout, or anytime that there will be airborne cement or other fine powder nearby, wear breathing protection.

Figure 1
Protective clothing

Pipeline and Clamps

Find out what kind of concrete you will be pumping. You should use a pipe and/or hose system that is three to four times bigger than the largest rock in the mix. You can use the chart below to select the correct pipe diameter for the job.

Largest stone size	Minimum pipe/hose diameter
3/8” (peagravel)	1 - 1/2”
1/2”	2”
3/4”	3”
1”	4”
1 - 1/4”	5”
1 - 1/2”	5”

Will you need extra pipe sections to make the pour? Use the following checklist for pipeline needs:

- Pipe sections
- Adapter pipes
- End hoses
- Reducers
- Clamps for all pipe end styles and sizes
- Clamp Pins

Have all pipe and pipe accessories inspected for condition, loaded, and secured for travel before moving the unit. Keep in mind the pressure rating of your unit when you inspect the condition of pipe accessories - see the chart regarding pipe-wall thickness versus pressure in the Appendix section of this manual.

Tools and Accessories

Below is a recommendation for common tools and accessories used for concrete pumping:

- Shovel
- Bucket / Barrel for mixing slurry
- Pipeline lubrication mixes
- Grease gun and grease tubes
- Spray can filled with form oil
- Clean-out balls
- Water hose and nozzle
- Clean-out rake
- Working lamps for night work
- An approved air blow-out cap
- Hand tools
- Hammer

Tow Vehicle

The following items are recommended you carry on the vehicle you are towing the stationary pump with:

- Valid driver's license
- Fuel permit
- Registration / Insurance card
- First aid kit
- Flares
- Reflector signs
- Fire extinguisher
- Job ticket
- Map(s)
- Job site phone number and contact person
- Check with your local Depart of Transportation for any other requirements.

Tow Vehicle Pre-Check

- Truck engine oil level and condition.
- Antifreeze / coolant level in the radiator.
- Battery fluid level and condition.
- Tire condition and proper air pressure.
- Brake system air pressure
- Clean the windows/mirrors of ice, frost, mud, etc.
- Keep the cab free of debris, especially on the floor. Accidents can happen when foreign objects get stuck between the clutch or brake pedal and the fire wall.

Stationary Pump Pre-Check

- Check diesel fuel level (Fill with Ultra low sulfur diesel only)
- Check DEF tank fluid level. (if applicable)
- Verify diesel engine oil level.
- Radiator coolant level should be full.
- Check battery and battery cable connections
- Check condition of belts and hoses.
- Verify all safety guards are in place.
- Grease Agitator bearings.
- Clean any dirt or debris from engine air intake.
- Check condition of tires and air pressure.

DEF Tank

A small DEF tank, mounted on the front subframe, must be refilled regularly, typically at every diesel fuel refill interval. You can use any brand DEF fluid that meets ISO 22241-1. DEF cleanliness is extremely important as contaminants can degrade the life of DEF and SCR system components. Clean the fill area prior to refilling and use a clean filling spout.

Structural integrity of the stationary pump

Give the unit a visual inspection. Look for cracks, chipped paint, rust (especially rust under the paint), and missing parts. Clean and repaint areas that have chipped paint to avoid damage to structural steel. Replace missing parts before using the unit. Report any structural abnormalities to Schwing's Service Department before using the unit. If the Schwing determines that repair is necessary for safe operation, DO NOT OPERATE THE UNIT UNTIL REPAIRS ARE COMPLETED.

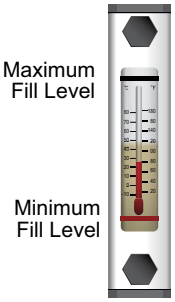
Pipeline and Clamps

Pipeline must be complete and free of dents, cracks and holes. Pipe must have sufficient wall thickness to handle the maximum pressure of the pump. (Inspect weekly, see Maintenance section of this manual.)

Hydraulic oil level and condition.

The oil should be clear and clean looking. 'Milky' looking oil, or oil with a lot of air bubbles should be changed right away.

NOTE Oil that is holding air bubbles overnight should be replaced, but it is not an oil problem if it is becoming bubbly on the job. In that case, it will be a problem with the integrity of the hydraulic seals somewhere in the system.



Top off oil levels ONLY with the same type of oil that is in the reservoir. Do not mix name brands, even if they have the same viscosity. Each oil manufacturer uses different additive packages to accomplish anti-foaming, silt settling, anti-wear, etc. The mixing of these different chemical additive packages may render them useless.

Drain water from the hydraulic reservoir each morning. Open the drain valve at the bottom of the reservoir. When the liquid changes from water to clean oil, close the valve. Always use a drain pan or bucket to capture the drained liquid. Because of condensation, which increases with drastic heating–cooling cycles, there may be a small amount of water in the tank every day. However, it should settle to the bottom of the tank overnight. The water that is drained should be clean and so should the oil that follows it.

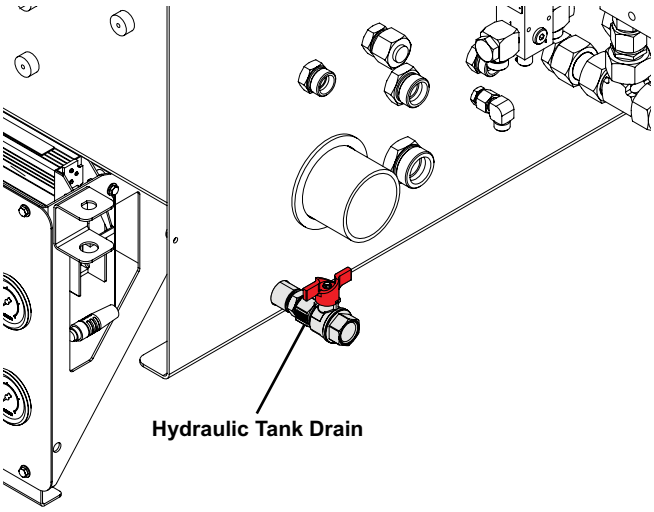


Figure 2
Hydraulic tank drain

Visually check the unit for hydraulic leaks. Repair any leaks and replace the lost oil before operating the machine. Lost hydraulic oil harms the environment and is expensive to clean up.

Be sure that everything on the unit is ready for road travel. This includes securing all accessories and miscellaneous equipment.

⚠WARNING Don't overload the stationary pump by using it as a cargo trailer. The chassis was designed to carry only the weight of the trailer. Never travel with concrete in the hopper.

Attaching the Tow Hitch

Use the following steps to hook the stationary pump to the towing vehicle:

1. With the attached jack, raise your stationary pump pintle hitch, high enough to clear the receiver mount on the tow vehicle.
2. Open receiver mount latch by removing the safety pin and lifting lock.

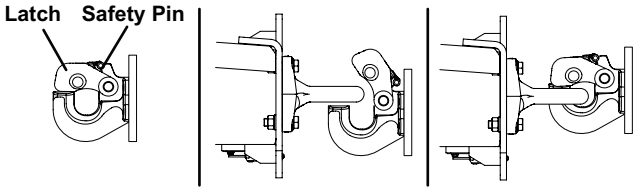


Figure 3
Receiver mount

3. Line up the center of your vehicle with the center of your stationary pump. Stop the vehicle once the pintle hitch is over the receiver mount.
4. Lower the pintle hitch onto the receiver mount until the full weight of the stationary pump is on the mount. The stationary pump must be level with the tow vehicle (Figure 4).

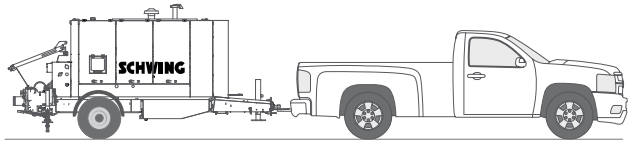


Figure 4
Stationary pump level with tow vehicle

5. Close latch and re-insert safety pin.
6. Raise the front jack all the way up.
7. Run the safety chains under the tongue so they cross one another. This keeps the trailer tongue from hitting the ground if it accidentally comes loose from the hitch while moving.
8. Plug in the electrical connections for the trailer brake lights and hook up the breakaway switch cable (Figure 5).

9. You should check to make sure the pintle hitch and receiver mount are firmly attached.
10. Pull your tow vehicle forward a few feet.
11. Stop the vehicle, put it in park, set the emergency brake, and turn on the vehicle lights.
12. Check and make sure the lights and the stoplights are working on the stationary pump and nothing has worked loose at the hitch.

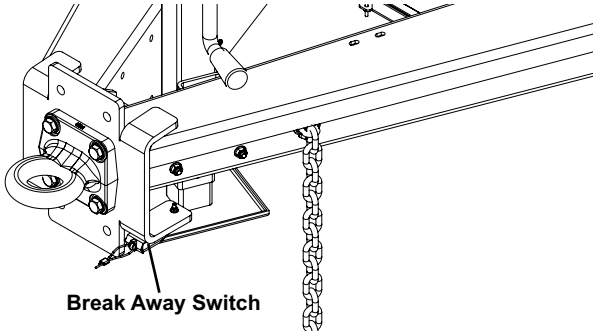


Figure 5
Break Away Switch

Towing the Stationary Pump

Before towing the stationary pump, make sure you're familiar with driving your vehicle-stationary pump combination. A good way to get used to maneuvering, including some practice backups, is to drive in an open parking lot, or at least a familiar area. Backing up can be especially difficult; try turning in the opposite direction you want to go. So if you want the stationary pump to go right, turn the wheel left.

The most difficult part of driving with a stationary pump is making turns. While it does not seem like there might be a need for it, drivers pulling stationary pumps must overshoot their turns, taking them wide enough so that the stationary pump 's path does not put it off the road or in contact with telephone poles or other street-side obstacles (Figure 6). Cutting a corner with a stationary pump will put the stationary pump, as well as pedestrians, other drivers, and yourself, in danger of collision.

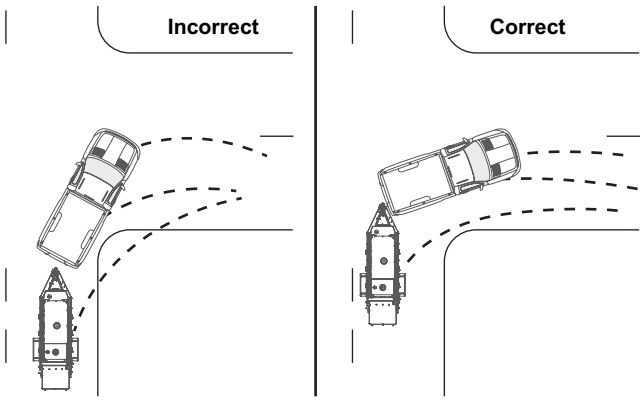


Figure 6
Use caution while making turns

If you start a corner too tight and get into trouble, stay calm and stop. Make sure the roadway behind you is clear, back up a little bit, and take the turn again wider.

Remember that the larger the load, the longer it will take you to stop. Keep an extra safe distance behind cars in front of you, and test the stopping power of your vehicle and stationary pump before you have to stop suddenly.

The other big thing to avoid when pulling a stationary pump is "jackknifing." Named for the position of the vehicle and stationary pump, this is most common when backing up with a stationary pump. It is basically a situation where the angle between the vehicle and the stationary pump it is pulling is less than 90 degrees, or beyond an L shape to a V shape.

Avoid this by never letting the stationary pump position get beyond the L shape. When reversing with a stationary pump, just take it slow and get a feel for the stationary pump. Keep your movement of the steering wheel to a minimum, and remember, you can pull forward to straighten out. Jackknifing will damage the hitch and stationary pump, so be aware of it

Make sure you are within your vehicle's towing capacity. Schwing stationary pumps have a braking mechanism that helps slow the stationary pump along with the vehicle.

Machine Loading/Unloading

Lifting with a Crane

When lifting the stationary pump with a crane, use suitable slings and only attach them to the machines lifting eyes.

⚠ DANGER Do NOT exceed load capacity of lifting eyes due to additional weight of accessories and left over pumping material. Determine weight of loads before lifting.

When lifting, determine the center of gravity of the stationary pump by lifting carefully. All cables or chains on the lifting gear must be tensioned evenly and the stationary pump must be raised evenly at all support points.

Chain lengths that are too short lead to serious strain on the subframe, the individual chain lengths must be a minimum 8’.

For more information on safe lifting practices, reference ASME B30.

Lifting with a Forklift

Skid mounted stationary pumps can be lifted with a forklift using the installed lifting channels.

For more information on safety standards for rough terrain forklift trucks, reference ASME B56.

Loading on a flatbed trailer

To safely load a trailer, you must consider, overall load weight, load weight distribution and securing the load properly.

The gross machine weight is shown on the Main ID tag “Figure 1” on page 12. The weight does not included added accessories or left over pumping material.

Load the cargo onto the trailer with approximately 60% of the cargo in the front half of the trailer. Secure the stationary pump to the trailer using appropriate straps, chains and tensioning devices. The stationary pump has brackets on all four corners to attach tie down straps.

⚠WARNING Shifting cargo can result in loss of control of the trailer, and can lead to death or serious injury.

Unit Setup

Selecting the setup location

When you arrive on the job, check with the job supervisor to determine where you should set up. If possible, choose a flat, firm, and dry location that allows hopper access for two ready-mix trucks. When a suitable area has been found:

1. Remove safety chains from the tow vehicle. Open receiver latch by removing safety pin and lifting lock on the receiver mount.
2. Place suitable cribbing below the foot of the front jack.
3. Use the front jack to raise the pintle hitch off the receiver mount.
4. Drive tow vehicle away from the set-up area.
5. Lower front jack to level the Stationary pump.
6. Place suitable cribbing below the outrigger feet. Remove pins from rear outriggers and gently lower the outriggers to the ground using the outrigger handle.
7. Place pins in the next available hole, secure with safety clip.

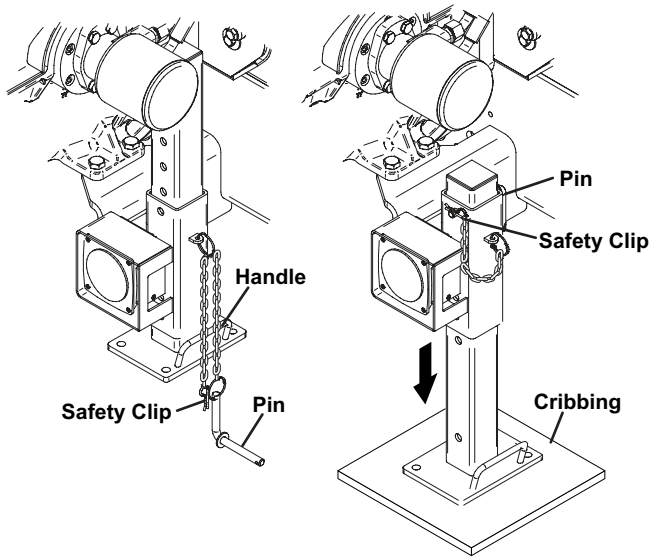


Figure 7
Setting rear outriggers

Laying out the pipeline

Start at the point of discharge and work your way back to the pump. In most cases, you will need rubber hose at the point of discharge. Placing crews always prefer 3 or 4-inch rubber hose over 5-inch hose. This means that you will need a reducer at the discharge end.

If you will have to reduce to smaller-diameter pipe or hose for the placing crew, always make the long part of the run with the larger diameter, and reduce as close as possible to the point of discharge.

Use the fewest hoses possible. Hose has greater resistance to flow than pipe does, so more pressure is needed to push through hoses than through pipe.

Use the largest-diameter hose the crew will allow you to use. The diameter of the hose determines the largest-size stone you can pump. If you will be pumping stone larger than 1 inch in diameter, you will not be able to use hose that is 3 inches or smaller. To attempt to do so would result in a blockage.

Do not use hose for changing pipeline direction. Pipe elbows are available with many degrees of bend, and pipes require less pumping pressure than hose.

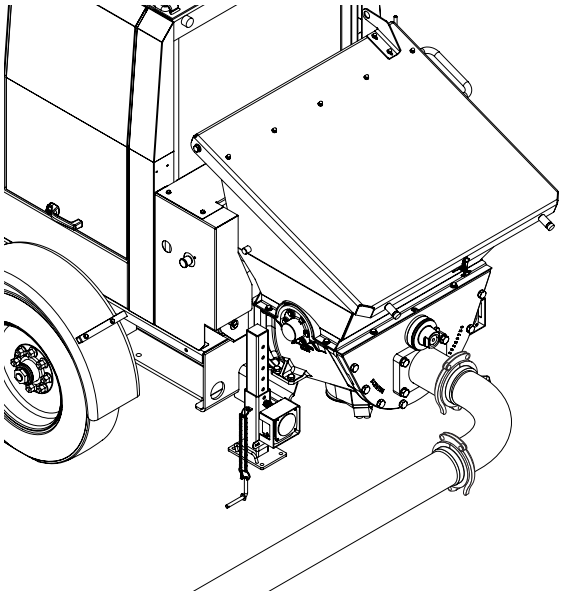
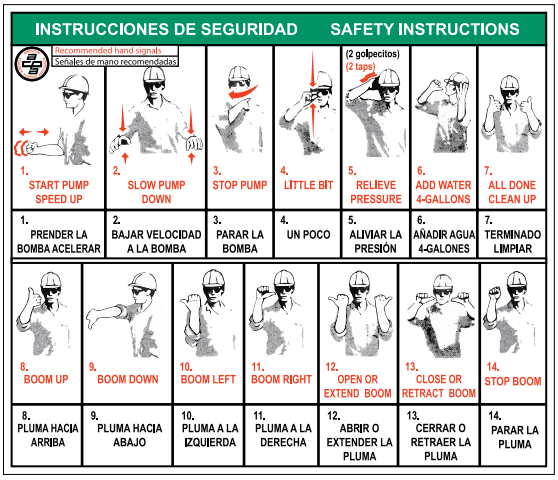


Figure 8
Laying pipeline

Machine Preparation

If you have completed setup before the first ready-mix truck arrives on the job, use this time to get some things ready for the day.

- Find out who will be giving you signals throughout the day. To avoid conflicts in instructions, only one person should give you signals. Make sure both of you understand what signals will be used. The American Concrete Pumping Association (ACPA) has standardized hand signals for concrete pumping.



- Talk to the placing crew foreman to make sure the placing crew is aware of the safety rules described in the Safety Manual. Make sure the crew members especially understand the importance of not kinking the tip hose.
- Review the safety rules with any oilers or laborers who have been assigned to work with you at the pump. Show them the Concrete Pump Stop switch and Emergency Stop buttons.
- If an oiler or laborer will be backing ready-mix trucks up to your hopper, emphasize the danger they are in when they place themselves between the pump and the ready-mix truck.
- Place your water hose where it will be out of the way but still handy for washing pipes and clamps and spraying down the hopper.
- When using the Cable Remote, position the remote box and cable where they will be out of the way.

Filling the waterbox

Remove the waterbox cover and fill the waterbox with water (Figure 9). **Do not remove the waterbox grate for this procedure. Place the water hose or nozzle in the access hole provided.**

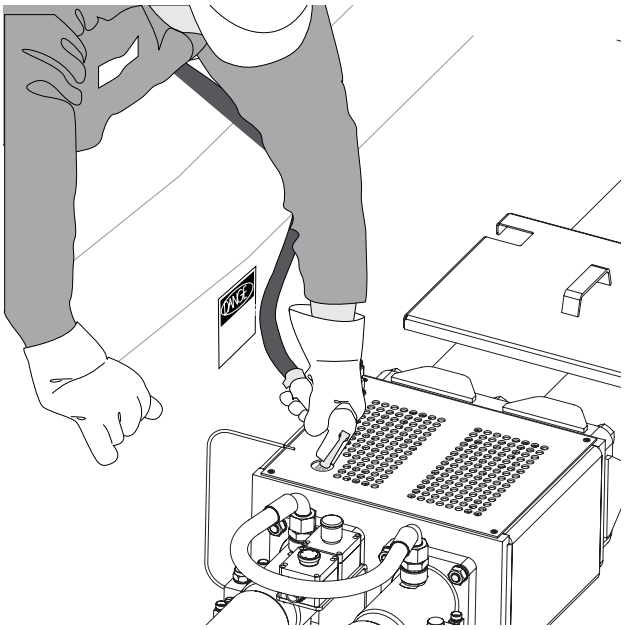
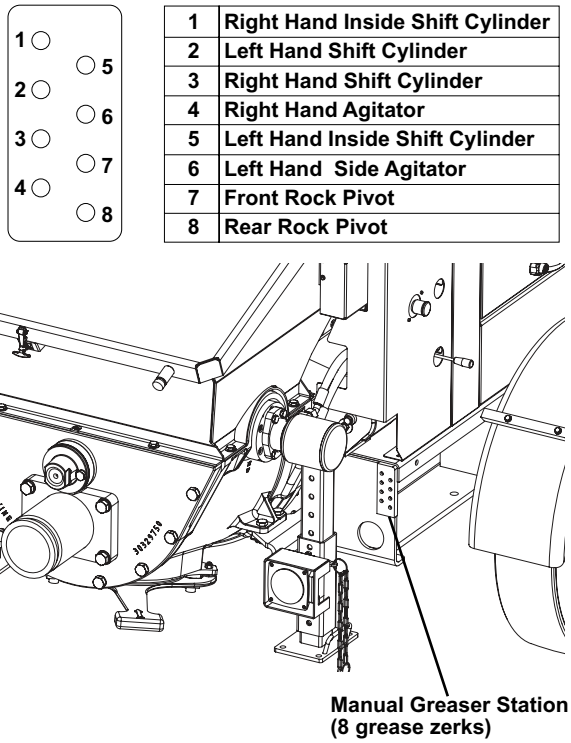


Figure 9
Fill Waterbox

Greasing the Rock Valve

Grease the agitator bearings. The grease zerks for the agitator are located on the manual greasing station (Figure 10). Do not pump in grease until you see it come out around the agitator shaft. When you grease the agitator bearings, watch the rubber grease cones located inside the hopper. You want the cones to bulge slightly when they are full of grease. You do not want the grease to come out around the shaft, because wherever grease comes out, concrete will be able to go in.

Once concrete gets inside the grease cone, the bearings will wear out quickly. When re-greasing after the hopper is full of concrete and you can no longer see the cones, give the zerks a couple of squirts. This is one of the few times when it is better to under-grease than to over-grease. Re-grease agitator bearings every 2 or 3 hours, as the pour allows.



1	Right Hand Inside Shift Cylinder
2	Left Hand Shift Cylinder
3	Right Hand Shift Cylinder
4	Right Hand Agitator
5	Left Hand Inside Shift Cylinder
6	Left Hand Side Agitator
7	Front Rock Pivot
8	Rear Rock Pivot

Figure 10
Manual greaser station

Grease the Rock Valve lubrication points before the pour begins. Once started, grease them every couple of hours. The Rock Valve has eight grease zerks, located on a central greasing block (Figure 10).

Starting the Machine

- Be sure all safety guards are in place.
- From the Rear Operator Panel, turn ignition switch to the RUN position. The SCT controller will initialize, the Schwing logo will appear on the screen. When the system has finished initializing, the Engine Status screen will be displayed. When the glow plug indicator icon disappears, turn and hold the key switch in (III) START position; when the engine starts - release. You can't start the engine until the SCT controller has initialized.

NOTE On SP500/750-15 Tier 3 machines, if communication is lost between the IO module and PLC, the engine can still be started, but is limited to a 10 second window after ignition power is applied.

- After starting, the engine may be held at low speed for a duration between 1 to 25 seconds to allow engine systems to stabilize. The duration will depend on the ambient temperature, time since last run and other factors.

NOTE In ambient temperatures from 32 to 140°F (0 to 60°C), the warm-up time is approximately 3 minutes. In temperatures below 32°F (0°) additional warm-up time may be required.

Start-Up Screen | Engine Status Screen

Figure 11
Start up and Engine Status screen

- With the engine properly warmed-up, press the Horn button, to clear the E-Stops.
- Use the Throttle Up button (Figure 16) to increase engine RPM's. Press and hold this button until the engine is at maximum RPM.

Checking the machine

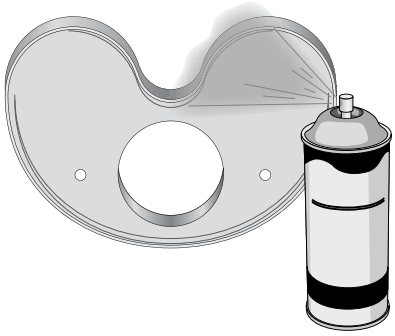
- Raise the hopper cover and secure with locking pin.

⚠WARNING Crushing hazard. Always secure the hopper cover with the locking pin.

- Press the agitator enable button. Place the agitator handvalve in either the forward or reverse position. Carefully lift the hopper grate cover. Ensure the agitator stops when lifted. If the agitator continues to move, shut down the machine and check the hopper grate switch.

⚠WARNING Do not operator the machine, if the hopper grate switch is malfunctioning.

- Check your hydraulic pressures. See "Check hydraulic pressures" on page 99.
- Lubricate the outlet wear plate with water or WD40. Spray inside the outlet pipe and in front of the Rock Valve. DO NOT put your hand inside the outlet pipe, spray from the outside only. Never operate the Rock Valve without first lubricating the outlet wear plate. Moving the kidney seal against a dry plate will cause excessive wear and premature failure.



- Fill the waterbox if you haven't done so already.
- With the outlet wear plate lubricated and the waterbox filled, stroke the machine a couple of times by putting the concrete pump in the forward position.
- If the machine is stroking properly, you can either shutdown the machine or begin pumping the job, see "Pumping the Job" on page 77 to continue.

Shutting the Machine Down

NOTE

Stopping the engine immediately after the engine has been working under load, can result in overheating and accelerated wear of engine components.

Avoid accelerating the engine prior to shutting down the engine.

Avoiding hot engine shutdowns will maximize turbocharger shaft bearing life.

To shut the machine down, put all functions in the neutral or OFF position. Reduce engine RPM to a low idle, allow the engine to idle for 5 minutes in order to cool.

When the engine has cooled, turn the ignition keyswitch to the OFF position.

After key-off, the DEF pump will circulate the DEF fluid for a given time, in order to cool the DEF injector. The DEF pump will also purge the DEF system of fluid to protect the lines from freezing in cold conditions. The SCT screen will remain ON during this process. When finished the SCT system will shut off and the screen will go blank.

Disconnecting the battery power too soon may prevent purging of the DEF fluid lines after the engine has shutdown. Do not disconnect the battery until “Wait to Disconnect” symbol is no longer displayed on the SCT screen (Figure 23).

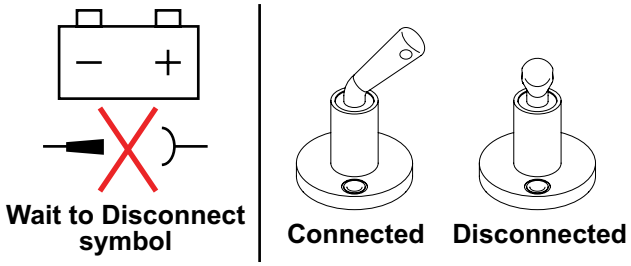


Figure 12
Wait to Disconnect symbol / Battery switch

Lubricating Slurry

Shovel a couple loads of sand or dirt into the bottom of the Rock Valve housing, above the cleanout door. This will prevent concrete from filling the door area and setting during the course of the day. See (Figure 13).

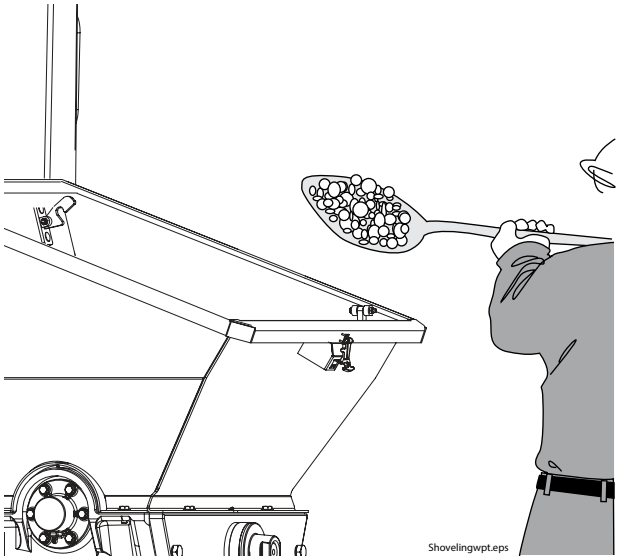


Figure 13
Sand to Cover Hopper Cleanout Door

Lubricating the pipeline

When the ready-mix trucks arrive on the job, the pipeline can be lubricated. Schwing America highly recommends that you pre lubricate the pipeline each time you pump into dry pipe. In some parts of the United States and Canada, the concrete is so rich with cement fines that operators do not pre lubricate before beginning pumping operations. This practice is not recommended. The time you save by skipping pre lubrication is far less than the time you will spend removing pipe sections from a separately laid pipeline to remove a rock jam caused by dry pipe. Most importantly, the blockages caused by failure to lubricate can be dangerous (see the information on blockages in the Safety Manual.)

There are commercially available products that will lubricate a pipeline with much less volume (meaning much less weight) than portland cement and water. These products usually come in sandwich sized plastic bags, and lubricate about 100 feet of 5 inch pipe per bag. Instructions for mixing vary by the different manufacturers. These products are less expensive than

portland cement, and do not set like cement. If you use these products, pay close attention to the instructions and warnings on the package.

If you only have portland cement for lubricating your pipeline, you will have to wrestle with the weight. Before you begin to mix the slurry, put on your breathing mask and the rest of your personal protection equipment. Choose one of the methods shown below, based on the job situation.

Barrel Method

If you have a helper assigned to work at the pump, you can mix the slurry in a barrel. The barrel method allows you to get good consistency and to break up clumps of cement in the slurry (Figure 14). However, you will need to lift the barrel, which weighs 200 to 300 pounds, and pour the slurry into the hopper. You should not attempt to lift this barrel alone. To use this method, lay a sack of portland on top of the barrel that has been filled with about 25 gallons of water. Use a shovel blade to break open the sack, allowing the cement to fall into the barrel. When the bag is empty, set it off to the side and mix the cement and water with the shovel blade. Break up any cement clumps and continue mixing until the mixture is smooth and creamy. You will need a helper to assist in lifting the barrel and pouring the mixture into the hopper (Figure 15). It may not cover the openings to the material cylinders, but this is not important at the moment.

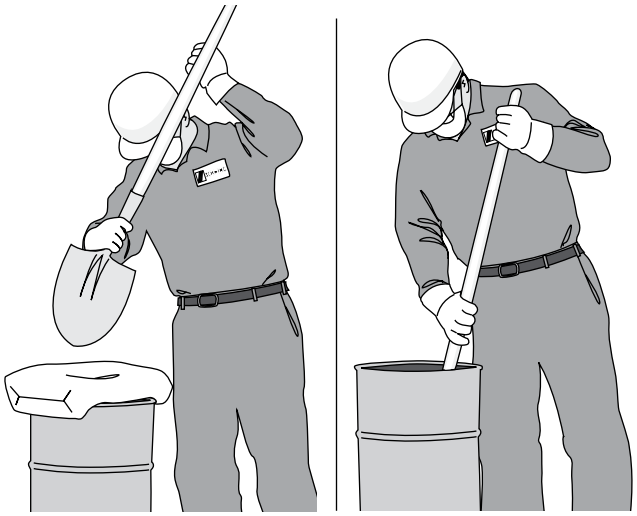


Figure 14
Mixing Slurry In Barrel

Make one barrel of mix for each 100 feet of laid pipeline that the concrete. If the concrete will be going through more than 200 feet of pipe, you, your boss, or the job site supervisor should arrange to have a grout mixture supplied to you by the ready-mix plant. Unless you have at least 1/2 yard of grout mixture delivered to the pump, do not try to pump this mix yet. Using the barrel method, you can add a little sand, if needed, to stretch the amount of slurry mixed. This is helpful if you must pump through 300 feet of line, but you have only two sacks of cement available.

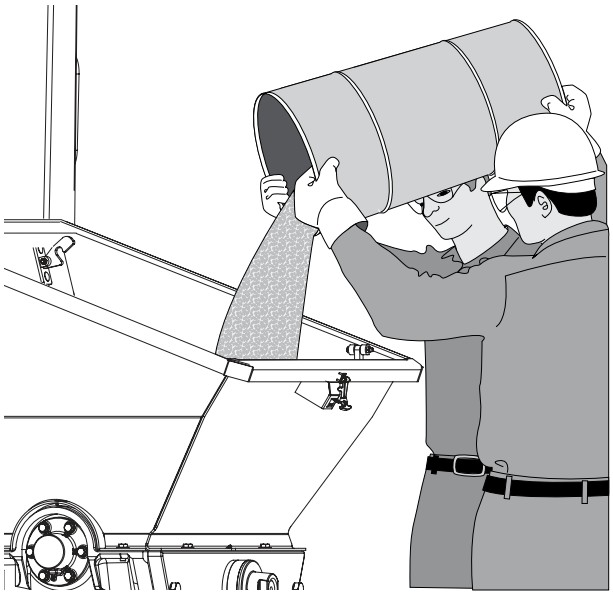


Figure 15
Pouring Slurry into Hopper

Hopper Method

If you have no one to help you lift the barrel, lay the sack of cement on the hopper grate and break it open.

⚠WARNING Amputation/crushing hazard. Never stand on hopper grate.

Get a water hose and direct the spray into the hopper, aiming at the edge of the pile of cement. This will wash the cement into the bottom of the valve housing and will mix the cement as well. Try to break up clumps of cement with the spray, but do not put your hands or any other body part into the hopper. Mix more slurry as needed for the length of the pipeline, as described above.

- With the cement washed to the bottom of the hopper, start the machine. Follow the “Starting the Machine” on page 70. Press back and forth, between the Concrete Pump Forward and Concrete Pump Reverse button (Figure 16) to cycle the Rock Valve a few times. This will agitate the mix a little more. Do not try to pump this mix until you can add concrete.

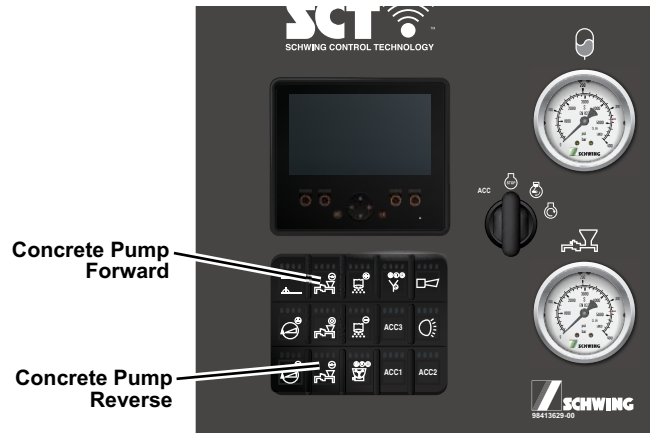
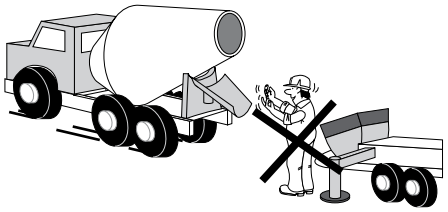


Figure 16
Rear Operator Panel

- After the correct amount of slurry has been placed in the hopper, direct the first ready-mix truck to backup to the hopper. Do not stand between the ready mix truck and the concrete pump. You could be crushed between the machines.

⚠WARNING Never allow anyone to stand between the concrete mixer truck and the pump. Crushing hazard.



- Look at the concrete before putting it into your hopper. If the mixing fins of the truck are badly worn, the rock, sand, cement, and water will not be properly mixed. Do not allow a chute full of gray rocks to be put into your hopper; you will almost certainly plug the line before you get concrete out of the pipe. If the first chute full is all rock, have the driver dump it off to the side and show you the next chute full. The second chute full will almost always look much better than the first. If it does not, dump it to the side, too. You will learn by experience what mixes can and cannot be pumped. When the mix looks good, place the pump in forward using the Concrete Pump Forward Button. Take a couple of strokes to get some of the slurry into the pipeline ahead of the concrete. Position the Rock Valve so the open cylinder is on the opposite side of the hopper from the ready-mix chute, and shut off the pump. This allows the concrete to push the remaining slurry, below the Rock Valve, into the open cylinder. It also helps to place the agitator in reverse to pull the rocky part of the first chute full of concrete toward the end of the hopper, and direct the creamy concrete below the Rock Valve. Have the driver fill the hopper, and as the slurry is pushed into the open cylinder, you can put the pump in forward and begin pumping.

- Pump slowly and watch the concrete pump circuit pressure gauge until the slurry starts to escape from the pipe or hose. If the line plugs, immediately switch the pump to reverse mode, and notify the ready-mix driver to stop dumping. To remove the plug, rock the concrete by alternately pumping a few strokes in forward and a few in reverse, or remove the plug manually. Rocking the concrete in forward and reverse usually only works well when pumping vertically, so gravity can help to create a vacuum in the line.

⚠WARNING Expulsion hazard. Never remove a clamp from, or open a pressurized pipeline.

You must not open a blocked pipeline without first sucking the concrete back into the hopper. Operating the pump into reverse for several strokes will release the pressure on the blockage. Understand the safety rules for opening a blocked pipe explained in the Safety Manual.

- Once concrete has emerged from the point of discharge, stop pumping. Wait for the start signal from your spotter before you start pumping.

Controlling the Concrete Pump

Stroke Limiter


Stroke Limiter (+)


Stroke Limiter (-)

The stroke limiter is a hydraulic device that can be electrically adjusted with the stroke limiter (+) and (-) buttons, located at the rear operators station or cable remote. Its function is to raise and lower the output of the hydraulic pumps that operate the concrete pumpkit. This has the advantage of allowing the engine to remain at higher RPM, where horsepower is at the maximum.

The stroke limiter has an adjustment range of 95 percent. That means it can go from as low as 2 strokes per minute to maximum strokes per minute. The stroke limiter only adjusts the output of the hydraulic pumps while the differential cylinders are moving. That means that when the differential cylinders are stopped at the end of the stroke and the Rock Valve is moving, the pumps don't return to maximum output until the Rock Valve cylinder has completed its travel.

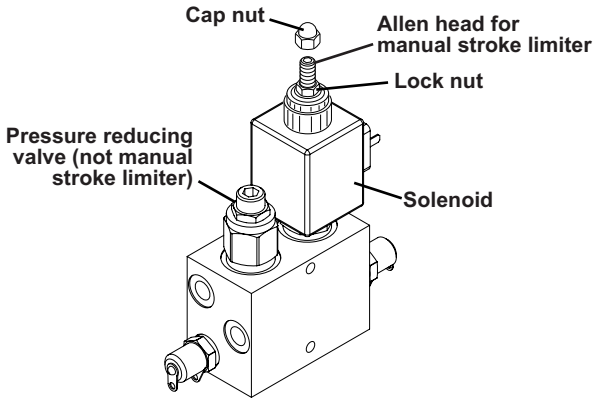


Figure 17
Stroke limiter control block

If electrical control of the stroke limiter is lost, it can be adjusted manually by removing the cap nut located on the top of the solenoid assembly and loosening the lock nut with a 1/2 inch wrench. The adjustment is then accomplished with a 5/32 inch allen wrench by turning the screw in (clockwise) to decrease strokes or out (counter clockwise) to increase strokes. Always return the manual stroke limiter to maximum strokes (full counter clockwise out position) when electrical power is restored.

Cable Remote

To use the cable remote, remove the dummy plug from the rear socket and replace it with the cable remote plug. At the operator control panel, put the Local/Remote button in the remote position. Clear the E-stop by releasing the E-stop button on the Cable remote and pressing the horn button.

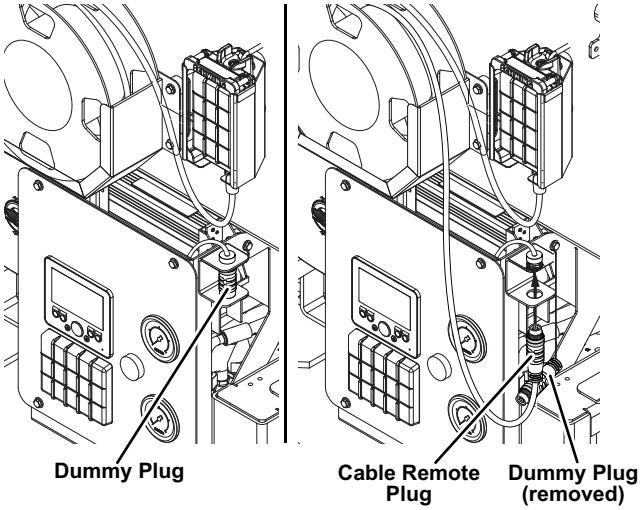


Figure 18
Connecting the radio remote

Wireless Remote (Optional)

To use the wireless remote, remove the dummy or cable remote plug from the socket and install the receiver plug. At the operator control panel, put the Local/Remote button in the remote position. On the wireless remote, unlock the E-stop button by turning it clockwise. Press the Power ON button and then press the horn button. If the transmitter's signal light does not flash, check the battery orientation.

To turn off the transmitter, press the Power OFF button or the E-Stop button.

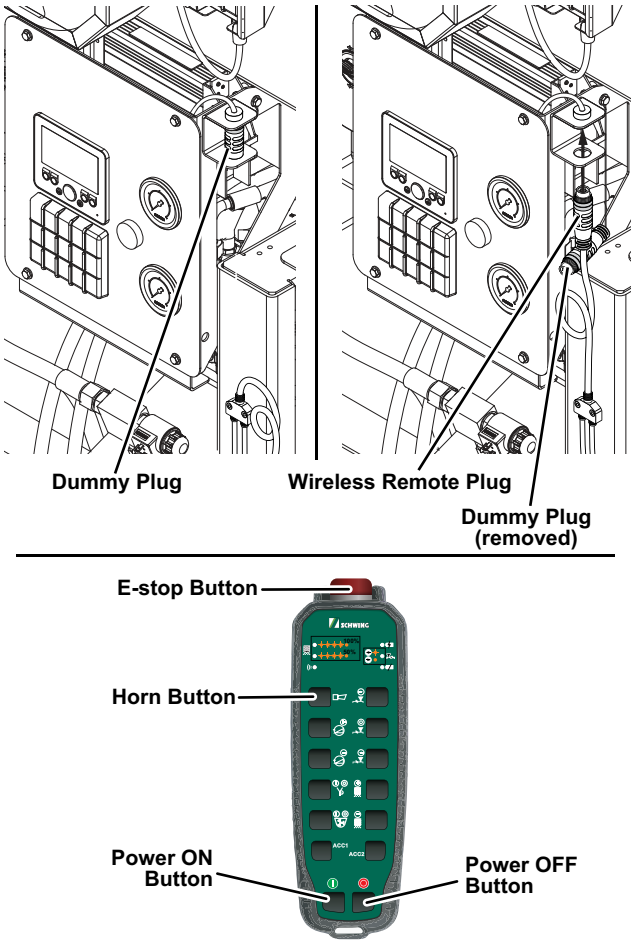
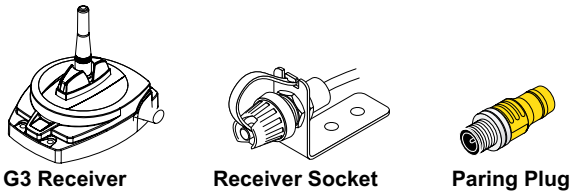


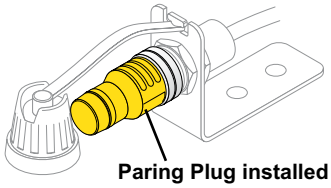
Figure 19
Connecting the wireless remote

Safe pairing of Transmitter to Receiver

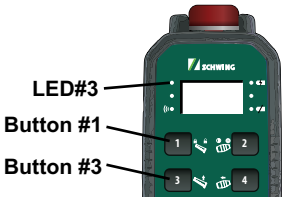
Safe pairing is used to get a unique assignment between a single Transmitter and a single G3 Receiver. To exchange the Transmitter and Receivers ID's when replacing either the Receiver or Transmitter in a system follow the Safe Paring procedure below:



1. Remove power to the Receiver by turning the engine off.
2. Install the paring plug into the receiver socket.



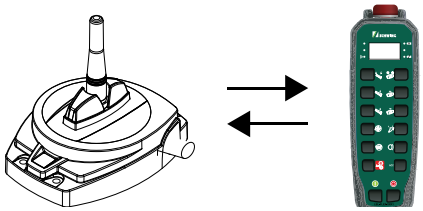
3. Simultaneously press button #1 and button #3 on the Transmitter. LED#3 will light indicating the Transmitter is ready for Safe Pairing.



4. Re-apply power to the Receiver by putting the ignition switch in the RUN position. (Step 4 must be done within 10 seconds of step 3).
5. The Transmitter will confirm the download is complete by flashing LED#3 eight times.

6. The Receiver LED Display will flash Po-Id.

7. Turn off the power to the Receiver by shutting off the engine. Remove the pairing plug from the receiver socket. Restart the truck engine to power up the Receiver. The Transmitter has now been paired to the Receiver.



NOTE If pairing is performed during low battery on the Transmitter it may look like the paring works but it does not. This is related to a safety precaution. Replace battery and repeat the paring procedure.

Pumping the Job

Operate this machine from the ground to avoid falling and other possible hazards.

If you cannot see the point of discharge from where you are operating the unit, be sure your spotter is in position before you start the pump.

As soon as the spotter gives you the start signal, put the pump in forward and alert the ready-mix driver to start dumping.

⚠WARNING You cannot completely empty the hopper, because air will be drawn into the concrete cylinders. This air will compress during the pushing stroke and explode into the hopper when the transfer tube switches

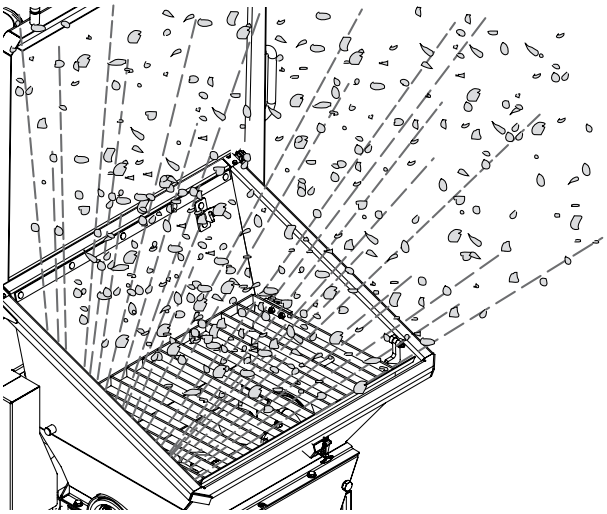


Figure 20
Concrete exploding from hopper

Concrete must always cover the openings of the material cylinders so air will not be sucked into the material cylinders. If that occurred, concrete would be rapidly expelled as compressed air escaped on the next stroke. This can be extremely dangerous, so be sure the ready-mix driver understands the situation. If air has entered the material cylinders, you can cushion the expulsion by stopping the concrete pump and filling the hopper with concrete before the next stroke. When the hopper is full, it is still not safe to resume pumping. Even with the hopper full of concrete, some compressed air will be introduced into the delivery pipeline. When it reaches the discharge point, the air will cause the concrete to be expelled forcefully. If the hose handler is walking a wall or column or is in another precarious position when this occurs, an accident could easily occur. It is best to avoid ever sucking air into the material cylinders. **If you do accidentally suck air into the material cylinders, warn the hose handler and clear the immediate area around the hose until the air is released and concrete is flowing steadily.**

Point out the emergency stop buttons to the driver if you will be standing somewhere other than at the operator's panel. That way, the driver can warn you or stop the machine if he sees a dangerous situation developing.

Always keep an eye on the point of discharge or on your spotter. If the hose person is giving you signals, he will have his hands full and will not be able to jump up and down or wave his hands to get your attention. On a typical job site, it is doubtful that you could hear him yelling.

As the day progresses and the crew removes pipe sections from the end of the slickline, wash the pipes, clamps and gaskets with water as soon as possible. If you do not wash them until the pour is finished, you will not be able to get the hardened concrete out of them. This job can be done between loads of concrete, or by an oiler or laborer at almost any time.

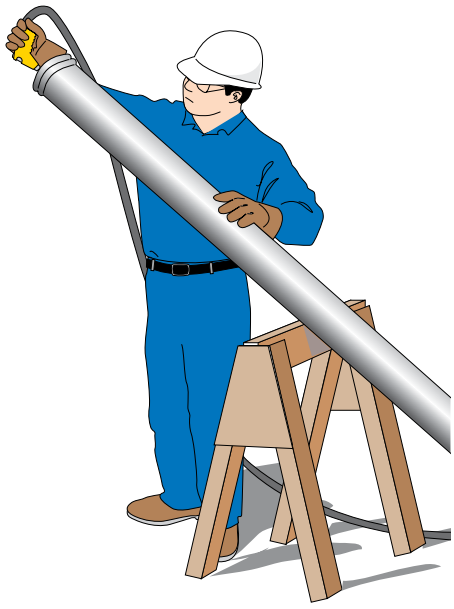


Figure 21
Wash system as it's removed

Time constraints

Remember, if anything goes wrong on the unit while it is pumping, you only have 15 to 30 minutes to solve the problem before the concrete sets. (Less with old concrete on a hot day, more with fresh concrete on a cool, cloudy day). If you know that it will take longer than 30 minutes to fix the problem, clean out before you begin repairs. If concrete is beginning to set, you will have to clean out in a very quick an efficient manner. There are special instructions which you will find in the Operation section of this manual. If you don't panic and keep moving, you can usually avoid cleaning or replacing the pipes. Old concrete and hot days is the worst case scenario. Under certain hot weather and old concrete circumstances, the concrete may go from being pumpable to setting very, very quickly. This is called 'flashing', and if it happens, you may lose some pipe. See also the section on delays described in the "" on page 85.

Cold conditions

Always keep the hopper at least half full. If any problem arises with the unit while it is pumping, you have just 15 to 30 minutes to solve it before the concrete begins to set, and possibly less time if the temperature is extremely cold. If you know you will need more time, clean out before you begin repairs. If the concrete is beginning to set or freeze, you will have to clean out quickly and efficiently. Review the special instructions for quick cleanout and delays in the Operation section of this manual.

Delays

Expect delays on the job. Sometimes you will have to wait for concrete. Sometimes the workers will need to finish the next form to be pumped. Sometimes a form will fail. You can make good use of this idle time by washing pipe, clamps, and gaskets that have been removed from the delivery system, washing splashed concrete from your hopper area, eating lunch, or taking care of miscellaneous tasks. Remember that concrete begins to set as soon as it becomes motionless. Every 5 minutes or so, give the pump a stroke. This will make the concrete in the elbows and reducers change its shape, thus breaking the set. Concrete setting in the pipeline acts like a blockage. Blockages can be dangerous, because the pump will create maximum pressure on the concrete. Always keep the hopper at least half full. If the concrete is getting stiff, add water to the hopper while you are waiting. A word of warning regarding this procedure: The concrete will eventually set up anyway. If you wait so long that the concrete is setting, it is a good idea to clean out and then start over when the fresh concrete has arrived.

- If you are waiting for a form to be finished or repaired, or anytime that the delay has nothing to do with waiting for concrete, you can give the pump one or two strokes in 5 minute intervals for a longer time, because the ready-mix truck will be able to refill your hopper. Be careful about where the concrete is going when you are giving the machine these one- or two-stroke cycles. If the form is broken, you will complicate matters by putting more concrete in it.
- Eventually, you will have to make the call; once concrete begins to set while it is being pumped, you have only minutes to get the machine cleaned out. For this procedure, see "Cleanout."
- Another thing to consider is the condition of the concrete in the ready-mix trucks. If three or four trucks have been waiting on the site for a period of time, their concrete may be setting up. If it is a hot day and the concrete is setting up, you are risking a pipe cleaning party by pumping this concrete. The concrete pump operator must make the decision to use or not to use this concrete.

Keep the water box full

Remember to check the water in the waterbox regularly (stopping the pump before opening the waterbox covers). Water is very important for cooling the differential cylinders and for lubricating the rubber rams.

Under no circumstances should you remove the hopper grate while the machine is operating, nor should the machine be operated when the grate is not in place. If your grate is in place, it will catch all types of foreign objects: mixer fins, clumps of unmixed cement, cats, dogs, rebar, golf clubs, tools of all sorts, and so on. If any of these items made it into your hopper, they would probably cause a blockage, which is always dangerous.

⚠WARNING Amputation/crushing hazard. Keep hopper grate in place during operation and cleaning.

Blockages

If you have a blockage in your pipeline that you cannot remove by the backward/forward rocking motion (two strokes in reverse, then go back to forward), you will have to disassemble the pipeline to find it. Before you disassemble the pipeline, you must relieve the pressure by pumping in reverse for several strokes.

- When you go to the pipeline to find the blockage, take your hammer with you. Wear all of your personal protective devices for this procedure. Most of the time, you will find the blockage in a reducer, hose, or elbow. The act of reversing the pump will make the pipeline sound different when tapped with a hammer than if it were pressurized. “Tapped” is a key word here. You can damage the pipe by striking it hard. You should be able to hear the difference. An empty pipe has a definite reverberating “tong” sound. A full pipe without pressure will have a meaty “thak” sound, and a pressurized pipe full of concrete will have a thin “tik” sound because the forces on the steel will not allow it to vibrate. **Once you have located the blockage, *carefully* remove the clamps from the blocked pieces. If you are not wearing a full face shield, turn away from the clamp as you pull the handle. If you have relieved pressure by stroking in reverse, you should be fine, but sometimes a blockage will store pressure because there is another blockage upstream or downstream. It is better to be safe than sorry. Once the clamps are removed, the danger is past.** Displace the blocked piece enough that you can push a piece of rebar or another long poking device into it. If the blockage is in a hose, it will help to hit the outside of the hose with the hammer. Again, do not damage the hose by hitting it so hard that the steel braids inside get permanently disfigured. When the blockage is loosened, elevate one end of the pipe or hose and dump out all remaining concrete.

- Once the blockage is removed, clean up the clamp, gasket, and pipe end with a rag or, in a pinch, wipe the concrete off with your hands (always wear rubber gloves when working with concrete. Reassemble the pieces, and pin the clamps. Return to the pump and start pumping in forward again, slowly at first, until you are sure that there are no more blockages. If you encounter another blockage, relieve the pressure again by pumping in reverse for several strokes before finding the remaining blockages.

- Do not use compressed air to remove a blockage. Your concrete pump has at least six times more pressure available than an air compressor. If the pump won’t push the plug, air certainly won’t. In addition, air that is compressed builds a reservoir of pressure that will continue to be dangerous even when the compressor is shut off.

Cleanout

You will often have to wait for the “balance load” of concrete to arrive. This is usually 1 or 2 yards that the contractor ordered at the last minute. This often happens late in the day, so typically four of the five ready-mix drivers you worked with all day have gone home. The same person who brought the next-to-last load will have to go and get the balance load. This gives you time to get ready for cleanout and to stow pipeline, clamps, and accessories, but if the concrete in your machine will be old by the time the ready-mix driver returns (This is the most dangerous time for concrete setting in the machine), be aware of it, and take any steps necessary to keep the concrete alive. Clean out, if you must, but if the balance load is very small, refilling the hopper, material cylinders and pipeline may use up the entire balance load without ever delivering concrete to the form. In that case, another balance load would need to be ordered, and no one is going to be happy about that.

The balance load is usually fresh concrete. That means that if you pump at least 1/2 yard, your machine will be filled with fresh concrete for cleanout, which is to your advantage. The worst thing that can happen is that, on a hot day, the balance load is only one wheelbarrow full. You will not be able to get fresh concrete all the way through the pipe when you pump the balance load, so the concrete that is in the end of the pipe for cleaning is as old as the next-to-last load. Be careful! With old concrete, it is imperative that the pipe be cleaned immediately upon finishing the pour.

- Check your water supply! You will need water for cleanout.
- If you will be cleaning the pipeline by forcing a sponge ball through the line with air or water, wet the ball first. You can start soaking your sponge ball in your 5-gallon bucket when 1/2 hour of pumping remains, or you can start soaking the ball in the morning; if you let the ball soak all day, however, it will not last as long.

⚠WARNING Hose whip hazard! Never use compressed air to clean out rubber hose. The result could be a violent whip of the hose as the air is released. If water must be conserved, dump the hoses manually and rinse them with the water nozzle.

Clean the Hopper

Do not do the following procedure while the pump is engaged in either Forward or Reverse. The pump must be in OFF or Neutral position.

⚠WARNING Amputation hazard. Stop pump before cleaning the Rock Valve and hopper.

Using your hammer, tap on the T-handle that opens the cleanout door on the bottom of the hopper (Figure 15). When the door opens, the concrete at the bottom of the hopper should fall out.

If the concrete does not fall out, aim your hammer upward and pound any material that is lodged in the cleanout door. A couple of taps will probably free the material, but if you need to, keep tapping until it all material is free. **You can minimize or eliminate this procedure by putting sand or dirt in the bottom of the Rock Valve housing before you begin pumping.**

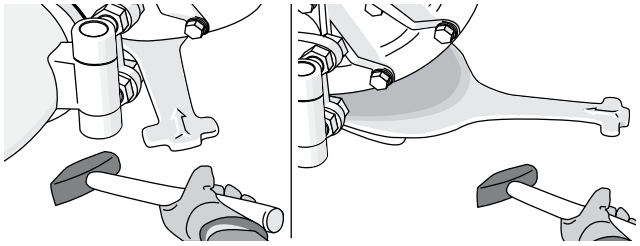


Figure 22
Opening the Hopper Cleanout Door

For the following procedure, be sure of your footing and keep the hopper grate in place. Spray water into the hopper from above (Figure 22).

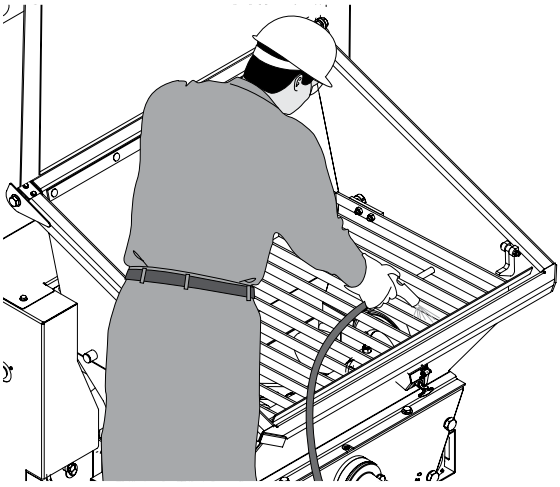


Figure 23
Clean Agitator and Hopper

- Keep the agitator turning until you have sprayed the blades clean (Figure 23). Wash the material from the hopper out of the cleanout door on the bottom.
- Stop the agitator from turning with the agitator switch on the control panel. Do not proceed to the next step until this is done. Visually confirm that the agitator has stopped by looking into the hopper.
- Poke any material that has set in the corners of your hopper with a piece of rebar or another stiff, long bar (Figure 24). Do not remove the hopper grate for this cleanout procedure. This procedure must be done with the hopper grate in place. **Do not spend too much time on this procedure**, or the concrete will have time to set up in the Rock Valve and material cylinders.

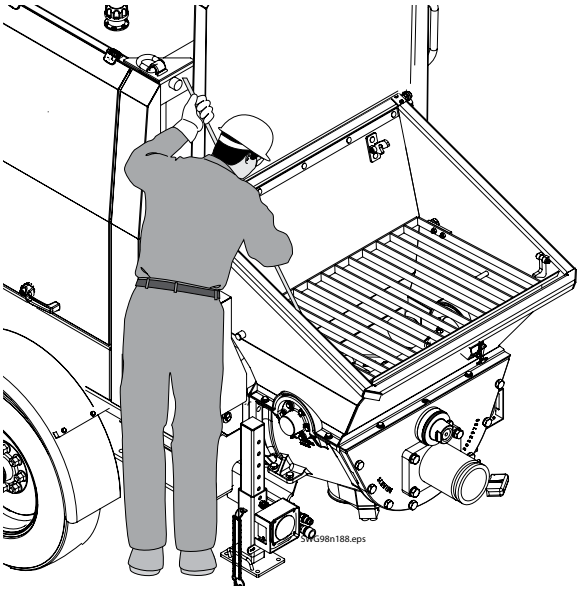


Figure 24
Remove Hardened Concrete From Hopper

If concrete in the hopper has completely set, you will need to use a chipping hammer or another power tool to clean it. The grate is removable for this purpose.

⚠WARNING Amputation/crushing hazard. Never work inside the hopper without disabling the hydraulic system.

For safety reasons, return to your shop before you remove any concrete that has completely set. Once the concrete has set, there is no advantage to chipping it away at the job site.

Cleaning the Rock Valve

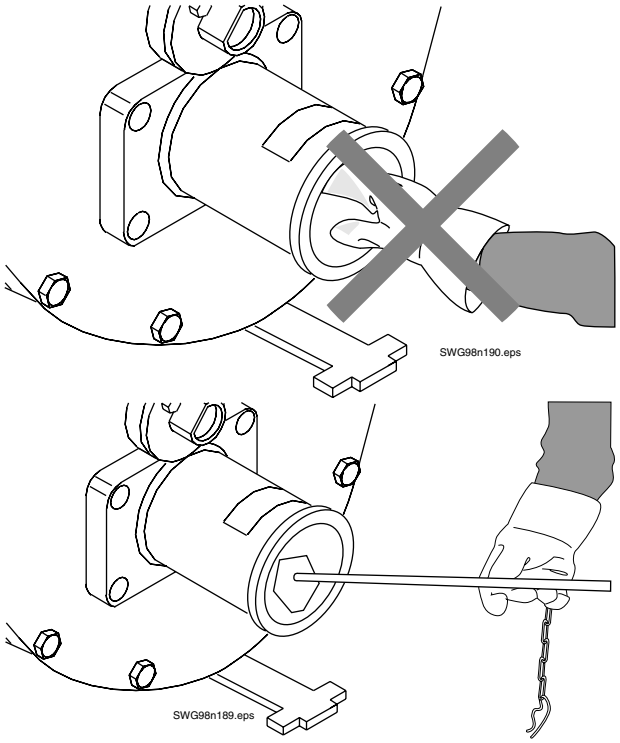


Figure 25
Rock Valve and Material Cylinder Cleanout

Once the hopper is clean, you should clean out the Rock Valve and material cylinders. Before you begin this step, bring the engine speed to an idle. Stroke the concrete pump one complete stroke in reverse, until the Rock Valve shifts across, then stop the pump. This step ensures that the exposed material cylinder will have the rubber ram extended to the end, thereby eliminating the need to pull material from deep inside the cylinder.

⚠WARNING Amputation hazard. Stop pump before cleaning the Rock Valve and hopper.

Be sure that the concrete pump is turned to the OFF position before proceeding. Using your cleanout rake, pull any material from the exposed material cylinder, the Rock Valve, and the outlet pipe (Figure 25).

- Spray water into the opening, washing the end of the rubber ram, the material cylinder, the Rock Valve, and the outlet pipe (Figure 26). Continue washing until the water that leaves the valve is clear and clean. Visually inspect that no rocks, sand, or clumps of concrete remain. If there is still material, continue spraying water.

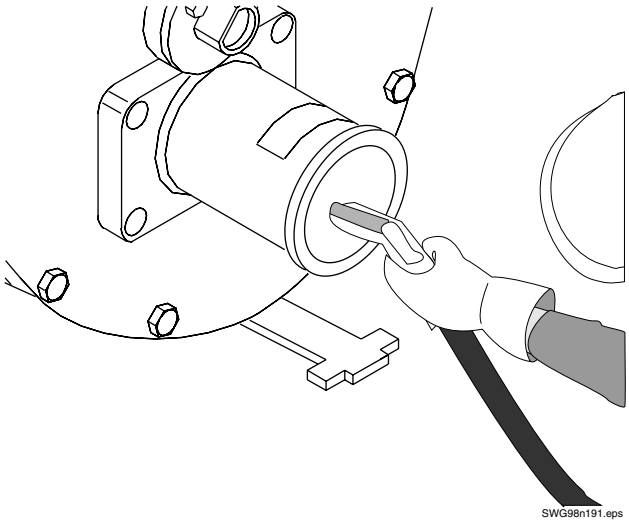


Figure 26
Spraying out Rock Valve

- Be sure that your rake and other tools are out of the Rock Valve area, then cycle the machine in reverse for one more stroke. This will expose the opposite material cylinder, and completely extend its rubber ram. Remove any loose material with the clean out rake, then spray out the material cylinder as in the previous step.
- By putting the pump into reverse mode, you are sucking from the direction of the pipeline (which is not connected during the cleanout procedure) and pumping into the hopper. Because of this, you may find that you now have some material in the bottom of the hopper again. You need to wash this material out.
- Spray off the clamps, gaskets, and wedges.
- Close the hopper cleanout door, and reattach the bungy cord, if used.

Clean the waterbox

To clean the waterbox,(Figure 27) start by lowering the engine RPM to an idle. Leave the waterbox cover in place for now. Open the drain and allow the existing water to flow out the bottom. When water stops flowing, give the unit a stroke or two in either forward or reverse. This will force the water in the extended cylinder back into the waterbox and out the drain. The waterbox is empty when no more water flows out the drain, even after the unit is cycled.

⚠WARNING Crushing/amputation hazard. Disable the hydraulic system before removing waterbox guards.

Stop the pump and secure it against unintentional starting by pushing the emergency stop button.

Remove the waterbox covers and spray the waterbox and cylinders through the safety grate, until all cement fines and grout are flushed.

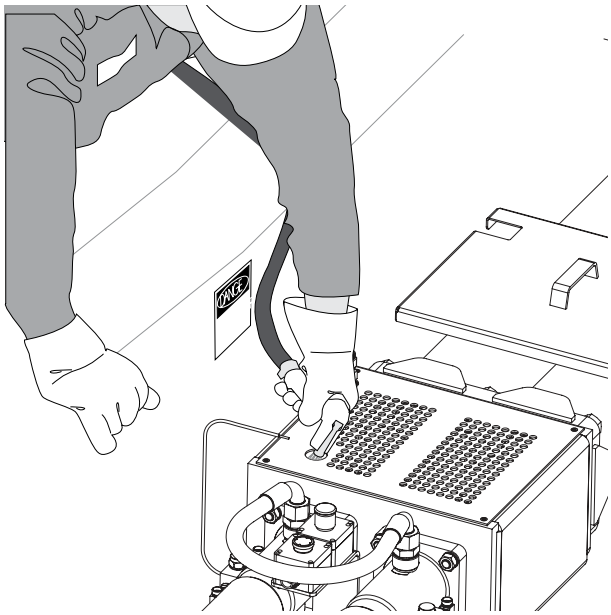


Figure 27

If you will not be filling the waterbox again until just before the next pour, follow this procedure:

- Replace the waterbox cover.
- Put the pump into forward or reverse for one or two strokes to force the clean water out the drain.
- Close the drain.

If you will be refilling the waterbox immediately, simply close the drain and finish filling the waterbox. Remember to replace the waterbox cover before restarting the unit.

If the concrete pump will be transported or stored in below freezing temperatures, you must drain all the water from the waterbox. (See “” on page 85.)

Preparing for travel

Securely store your cleanout rake, sponge ball, grease gun, hammer, shovel, and accessories for travel.

- If you collected concrete delivery tickets on your job, hand them to the concrete supervisor when you turn in your job ticket for signing.
- Before you leave, walk around the tow vehicle and stationary pump. Look for items you may be forgetting, look under the unit for personnel and obstructions. Check tires for pressure and wear. Many driving accidents happen on the way back to the shop after a job, or on the way to a second job. The walk around check before going on the road may prevent these accidents. Think about your route, bearing in mind the time of day, road construction, and other conditions.

External Cleaning

We recommend washing the exterior of the stationary pump during breaks to prevent concrete from setting. We also recommend spraying the outside of the hopper with form oil. Form oil is designed to inhibit the bond between your stationary pump and the concrete. Use only environmentally friendly oils and make sure no oil gets inside the hopper.

High Pressure Washer

Observe the operating instructions of the high-pressure washer and wear the appropriate personal protective covering.

⚠WARNING Never point or aim the gun/wand at yourself or anyone else. Never put your hand, fingers or body directly in front of the spray nozzle.

NOTE Do not spray directly at electronics or electrical components.

Newly painted surfaces may only be cleaned with a garden hose and cold water during the first 3 months of operation. New paint needs 3 months to properly cure. This also applies to repainted areas. Use a soft brush, if necessary.

No high pressure should be used in areas with mechanical paint damage, because this can cause painted areas to separate even more. Damaged painted surfaces should be repaired as soon as possible and in a professional manner.

Use the following guidelines for high pressure washing:

- Maximum water temperature of 140° F.
- Do not use additives.
- Maximum water pressure 100 bar / 1450 psi.
- Minimum permissible spraying distance 12”.

If the high pressure washer used generates a higher water pressure, the spraying distance must be increased accordingly.

Use of Cleaning Agents

Do not use aggressive cleaning agents. They can affect different materials (e.g. rubber) and painted surfaces.

Commercially available paint-cleaning and - care products can be used, provided they do not exceed a pH value of 9 or fall below a pH value of 4.

Always rinse off cleaning agent with clean water. Do not leave puddles.

Protecting New Paint

First 30 to 45 days

- Park stationary pump in the shade. Whenever possible, avoid extreme hot and cold conditions.
- Paint can easily chip from gravel road debris during the first 30 to 45 days. Avoid towing on gravel when possible.
- Tree sap or factory emissions can spot or mar a freshly painted surface. If possible, watch where you park.
- Clean bird droppings as soon as possible. Droppings have high acid content and will damage freshly painted surfaces.
- Solvents such as gas, oil, antifreeze, transmission fluids or windshield cleaners can damage a new finish. If contact occurs, immediately rinse with water; do not wipe.
- Ice and snow should not be scraped from newly painted surfaces. Remove loose material with a soft brush.

Special Pumping Situations

The following paragraphs describe operations that may be required due to timing or weather conditions.

Quick cleanout

If concrete is setting up in the machine, you must clean out in a hurry. Accidents happen when you panic. Stay calm and work as fast as you can without skipping any safety rules.

Prioritize the order of cleanout by calculating the amount of time and money involved to replace any components that are ruined by failure to clean before the concrete completely sets. To help you make these calculations, use the following list, which is arranged in order from most expensive and difficult to replace, to easiest and least expensive to replace.

- Rock Valve cast housing
- Rock Valve
- Material cylinders
- Hopper
- Pipeline

An experienced operator will dump the hopper and material cylinders, and then rake out the bulk of the material from the valve in just a couple of minutes, moving immediately to the pipeline. The rest of the material in the hopper and valve can be chipped out if it will not wash clean. Be sure to disable the hydraulic system on the unit by stopping the engine, putting the key in your pocket, and putting a “Do Not Operate” tag on the ignition switch before entering the valve or hopper area for chipping.

When cleaning a machine with concrete setting up, do not worry about getting each part perfectly clean before moving on to the next part. Once you have used water to remove the bulk of the concrete from a component, it will be thinned enough to not completely set until you can return to it.

Cold-weather pumping

It is possible (and routine in some parts of the world) to pump concrete with outside temperatures as low as -10° Fahrenheit, and even colder under certain circumstances. This can present a variety of problems compared with pumping in moderate temperatures, such as:

- Water in the waterbox freezes while you are driving to the job.
- The hydraulic components are slow in responding to your commands.
- Slurry freezes in the pipeline when you are starting the pour.
- Concrete freezes in the line or the hopper while you are pumping.
- The concrete is loaded with calcium chloride or an equivalent to allow the concrete to set before it freezes. This additive accelerates setting time in much the same way that hot weather accelerates setting.
- Washing components with water causes them to become coated with ice, which will not melt until the temperature rises above freezing.
- Machine parts that you sometimes stand on or grasp become very slippery when they become coated with ice.

Some of these potential problems can be solved or tolerated, but others cannot. Here are some tips for cold-weather pumping:

- In locations that have cold winters, store the machine indoors. If you do not have a heated shop, consider renting one.
- Do not put water in the waterbox before driving to the job. If possible, contact the ready-mix company and arrange for the first truck to be loaded with hot water to fill your waterbox and to mix your slurry. Arrange for the last truck to be filled with hot water and to be prepared to let you clean out using this water.
- If you are expecting cold weather for extended period, change your oil to a thinner viscosity type, such as an ISO VG 32. Be aware, however, that this oil cannot protect the components to as high a temperature as the standard oil shipped with your unit (ISO VG 46).

Pours that require a separate pipeline are usually canceled when the weather is very cold. If the pour is not canceled, be sure that any pipeline laid outside is covered with insulated blankets and has a hot air supply flowing through it from a torpedo heater or a similar heat source. If the pipeline is not heated, the concrete will probably not be able to get through the line because the slurry will freeze against the walls of the pipe. This can result in a blockage. To clear the line, take all normal steps to clear the block, and work fast enough that the concrete will not freeze again as soon as it starts moving.

If the concrete freezes in the pipeline, you are finished pumping until you have warmed up the line. The good news is that the concrete will not set when it is frozen. If you bring the pipeline into a warm place, you will be able to clean it out.

If the concrete freezes in the hopper, you are finished pumping. Find a warm place to bring the machine and clean it as it warms.

If the concrete contains calcium chloride, keep the concrete alive using the same techniques used for pumping on hot days. The calcium chloride accelerates setting, but if it does freeze, the setting stops. When you do begin to warm the machine, the concrete will begin to set again, even more quickly than on the job, because you are now in a warm area. Do not waste time when cleaning a machine in these conditions.

Be very careful of ice when pumping in cold conditions. Never stand on ice-coated pipes or other round objects.

Emergency Procedures

Electrical power loss

If there is an electrical malfunction, the E-stop circuit dump valves will open, disabling the hydraulic circuit. To continue use, remove the cable connector from the E-Stop harness and replace it with the Emergency Power Cable Plug. This will restore power to the dump valves and allow the system to build hydraulic pressure. Hydraulic functions can now be controlled by the override handles.

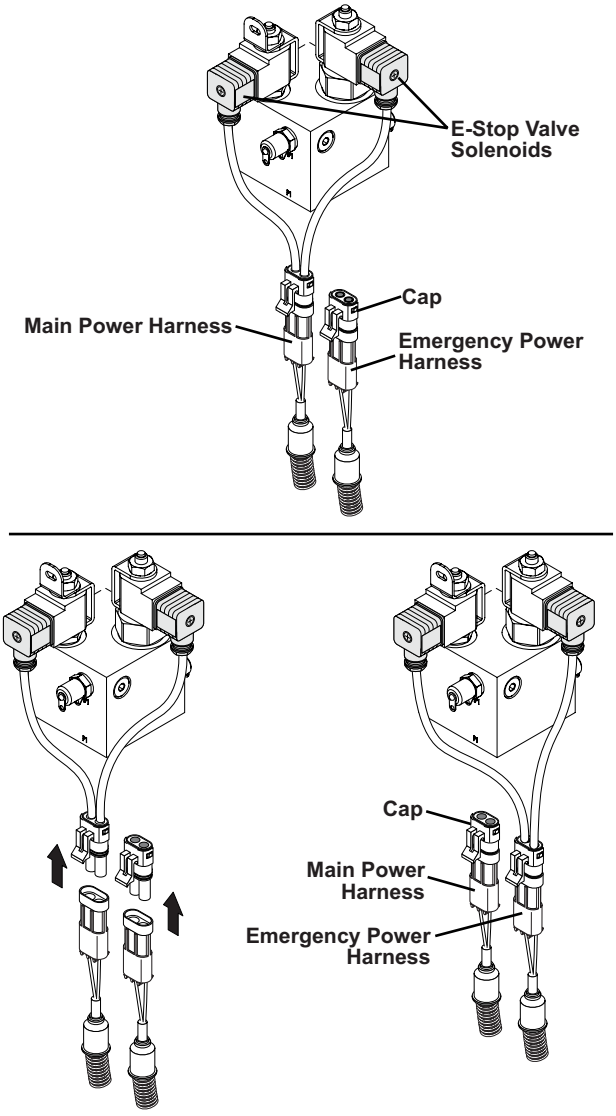


Figure 28
Connecting the Emergency Power Harness

Emergency Override Button

If you cannot correct the electrical power loss problem, try activating the dump valves by pushing the two override buttons on the E-stop while another person activates the concrete pump forward/reverse handle, on the S1/S2 Control Block. Activating the three valves will close the dump valves allowing the accumulator to shift the concrete valve and the pump to be cleaned out.

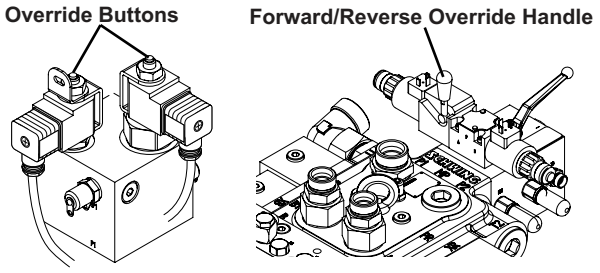


Figure 29
E-stop override buttons / Concrete Pump forward/reverse override handle

For information on where to look and what to do if you lose electricity on the unit, contact the Schwing Service Center at (888) 292-0262.

Loss of Radio/Cable remote

The Radio/Cable Remote is considered the primary control source for the stationary pump. If you lose the remote control for any reason, you can still operate the stationary pump from the rear operator panel.

If your Radio Remote stops functioning and the battery LED is off, the battery is probably dead. Remove the battery from the Radio Remote, and replace it with a fully charged battery. The dead battery should then be placed in the charger.

Disposal of spent batteries

NiCd and NiMH batteries are recyclable. You can help preserve our environment by returning your unwanted batteries to the nearest collection point for recycling or proper disposal. Call 1-800-822-8837 toll free for infomation about spent battery collection.

NOTE Do not dispose of nickel cadmium or nickel metal hydride batteries in household or business trash.

Optional Equipment

Hydraulic Outriggers

If your machine is equipped with hydraulic outriggers, use the following steps to enable.

1. Select a proper setup area, see “Unit Setup” on page 67
2. Start the machine, see “Starting the Machine” on page 70
3. Place proper cribbing below the outrigger feet.
4. Push the Agitator On/Off button, this will enable the hydraulic outrigger circuit.
5. Move the outrigger valve handle towards the hopper (rear of machine) to lower the outrigger cylinder.
6. Increase or decrease the speed of the outrigger by adjusting the needle valves installed on the outrigger cylinders.
7. Move the outrigger valve handle towards the front of machine to raise the outrigger cylinder.

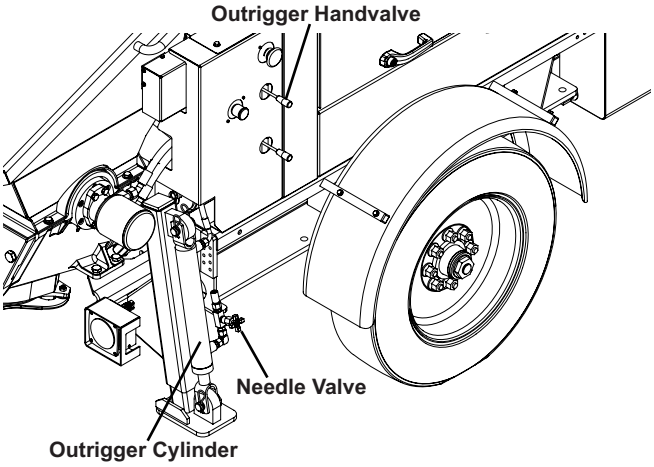


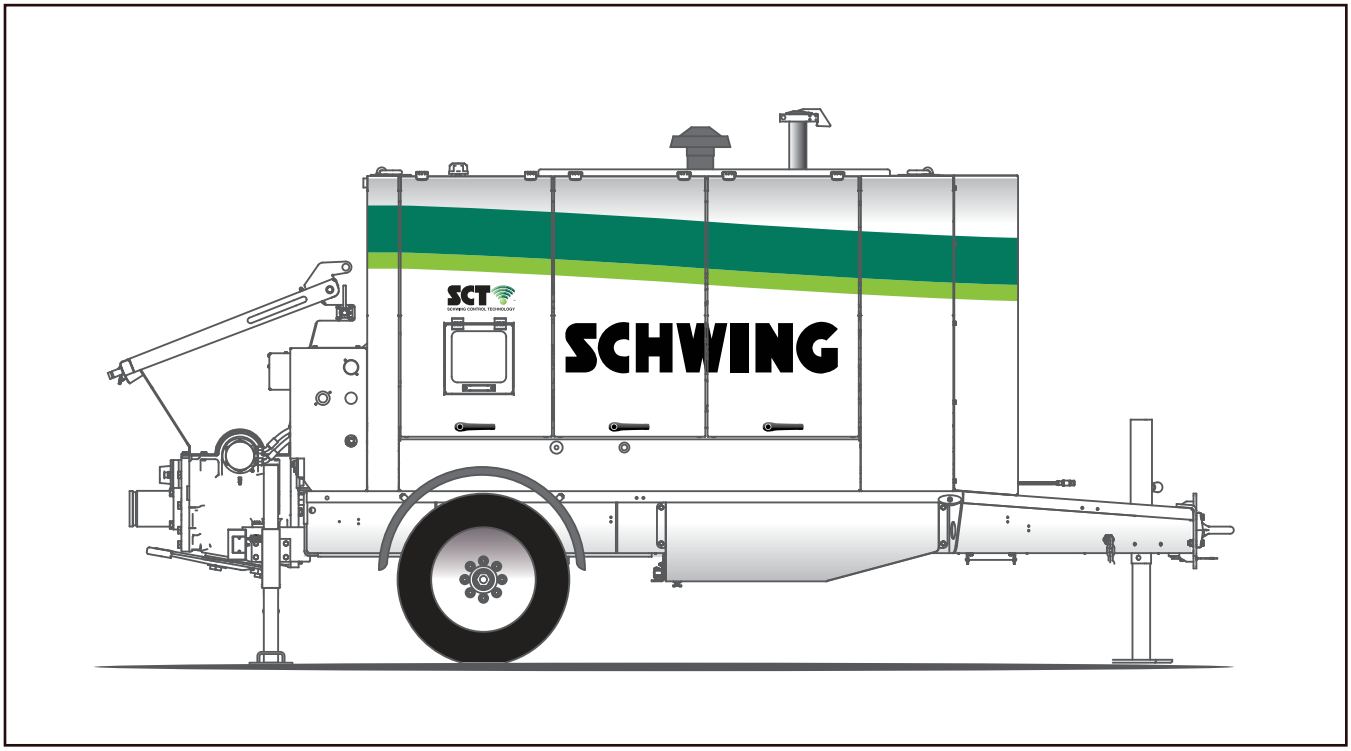
Figure 30
Hydraulic outrigger components

Hopper Vibrator

This device is an electric motor that has eccentric weights attached to a shaft at each end. When the motor spins, the weights shake the unit, and whatever is attached to it (the hopper grate or hopper, in our case). The purpose of this device is to assist low slump concrete in falling through the grate, and into the concrete cylinders. If your use of this machine includes pumping of low slump concrete, you will find this option invaluable.

Auto Greaser

For information on setting or adjusting the autogreaser, reference “SKF Piston Pump Units with Reservoir” manual that came with your machine.



Maintenance

Keeping your machine in good working condition requires regular maintenance. There are two kinds of maintenance: preventive and scheduled. Preventive maintenance will help you avoid unnecessary repairs, but eventually even well-maintained machine parts wear out and require repair or replacement.

Scheduled maintenance needs to be done on a timely basis. That may be daily, weekly, monthly, quarterly, semiannually, or annually. It is a good idea to make a checklist that will tell you what maintenance is due and when. Keep accurate records of maintenance performed and when the work was completed.

Hoses and Fittings

Schwing uses metric fittings and hoses with metric threads on the couplings. There are six sizes of tubes and fittings and six sizes of hoses, all measured by diameter.

All block threads are metric or BSPP.

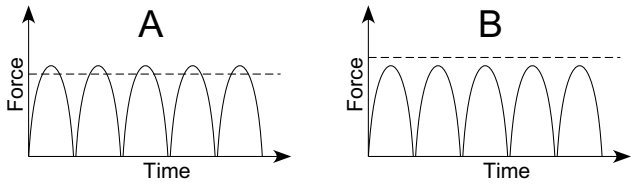
Hose Size	Hose ID (mm)	Connects with Fitting and Tube Size
8	8	12
13	13	16
16	16	20
20	20	25
25	25	30
32	32	38

Tube and Fitting Size	Tube and Fitting OD (mm)	Connects with Hose Size	Tube and Fitting ID (mm)
12	12	8	8
16	16	13	13
20	20	16	16
25	25	20	20
30	30	25	25
38	38	32	32

Torque specifications

When performing maintenance that requires removal and replacement of bolts, you must adhere to the torque specifications for those bolts.

The graph below demonstrate what happens to a bolt if it is not properly torqued. The dashed line represents the pres-tress or tightness of the bolt. As the device that uses the bolt goes through its normal functions, the bolt in Example A, which is not tight enough, gets stretched and relaxed with every duty cycle, because the bolt is pres tressed under the maximum force of the cycle. In Example B, the torque on the bolt has been raised to the proper level, which is more than the maximum force of the duty cycle, so the bolt doesn't ever feel the cycle. In this example, bolt B would last much longer than bolt A. The torque specifications for bolts used on this concrete pump are found in the Appendix section of this manual.



Welding precautions

To avoid possible electronic component damage, check the owners manual of the truck to see if anything other than the battery must be disconnected prior to welding anywhere on the unit.

Adjusting relief valves

Take care when raising relief valve pressure settings. In extreme cases, this can cause hoses or fittings to burst or other components to fail. To be safe, you should begin the adjustment procedure by turning the adjustment device to the lowest possible setting, and then bring the device back up to the proper setting.

Removing safety devices

Sometimes you will have to remove a safety guard (Figure 1) or another safety device to perform maintenance. For these situations, you must take extra care to ensure your own safety and that of your co-workers. If you have to put your hands, feet, or any other body part into a part of the machine that would normally be guarded, be sure use an approved “Lock Out—Tag Out” procedure.

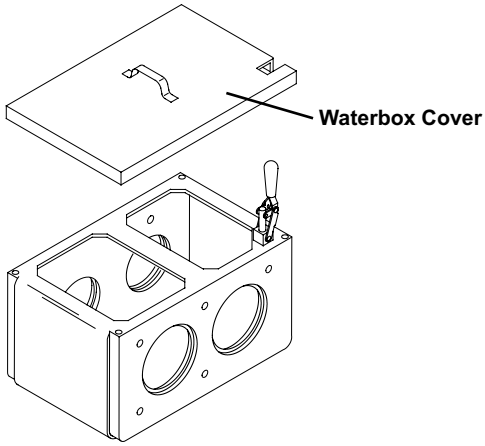


Figure 1
Example safety guard - waterbox cover

Lock Out - Tag Out procedure

Schwing includes approved warning devices with all new concrete pumps and recommends the following procedure prior to performing any maintenance in an area of the unit that would normally be guarded:

Stop the diesel engine.

- Remove the key from the Operator Control Panel, and put it in your pocket.
- Put the static cling “DO NOT OPERATE” label next to the Operator Control Panel.
- Perform the needed service on the unit.
- Remove the labels, and reinstall the key

Store the label in the document holder for future use.

Before restarting the machine after performing maintenance, be sure to put away all tools, parts, and supplies, and clear the area of personnel.

Before starting the unit at any time, yell “Clear!” and allow enough time for response before proceeding.

Replacing the hydraulic pump

It is highly recommended prior to the installation of any model/manufacture of hydraulic pump(s) that the drive spline be lubricated with a special pre-assembly grease (Figure 2). Schwing recommends Optimoly Paste White T to add extended life to the spline and related parts.

Optimoly Paste White T is available in cartridge or aerosol form, and can also be used in other pre-assembly work.

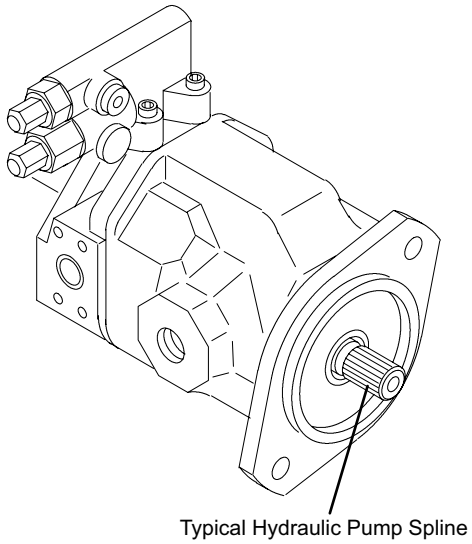


Figure 2
Hydraulic pump spline

Hydraulic Oils

General information

Hydraulic oils are rated for viscosity, heat dissipation, foaming characteristics, pour point, anti-wear additives, anti-corrosive additives, lubricating qualities, compressibility, temperature range, temperature stability, and other functions. Although many different brands of oil meet these specifications, they may use different chemical additive packages to achieve the end result. For this reason, you should not mix two different brands of oil. The additive package from one brand may be incompatible with the additive package from the other, rendering both packages useless.

Recently a few manufacturers have introduced biodegradable hydraulic oils onto the market. These oils are based on vegetable extracts instead of mineral extracts. They are considered safer for the environment in the event of a spill, although the additive packages are not inert. These oils must not be mixed with mineral-based hydraulic oils, even in very small amounts. If you will be pumping a job in an environmentally sensitive location and want to use this type of hydraulic oil, please contact the Schwing Service Department at (888) 292-0262 for instructions on making the change from mineral oil. Reference ISO 15380 for more information.

Viscosity of hydraulic oil is similar in concept to the different weights of motor oil. For example, in the winter you may run 5W-30 in your car, while in the summer you run 10W-40. The same is true for hydraulic systems. If you live in a climate where the weather is changing from extremely hot conditions to extremely cold conditions, you should consider changing the weight of the hydraulic oil that you use by the season. The International Standards Organization (ISO) has developed a method of grading hydraulic oils for viscosity. For summer in northern North America, we recommend ISO VG 46 weight oil, while in the winter we recommend ISO VG 32 or even VG 22, depending on how cold it gets in your area. For southern North America and Central America, we recommend ISO VG 46 for the winter and ISO VG 68 or VG 100 for the summer, depending on how hot it gets. The lower the ISO VG number the thinner the oil and the lower the pour point of the oil. On the other hand, the thinner the oil, the lower the temperature will have to be before it breaks down the lubricating film that protects your components.

The quality of the oil needed for use in a Schwing concrete pump is in the DIN system. The ratings have to do with the chemical additive package that is introduced into the oil. Both the DIN rating HLP and HV qualities are approved for use in our concrete pumps.

Specific information

New Schwing factory equipment is filled with Texaco Rando HD 46 hydraulic oil, which has an ISO viscosity rating of VG 46. If you want your new concrete pump filled with a different brand or different viscosity oil, you should specify it when ordering.

Many other brands of oil have been approved for use in Schwing equipment, including:

- Mobil Univis
- Shell Tellus oil
- BP Energol
- Aral Vitam
- Esso Nuto
- Esso Univis
- Total Azolla
- Wintershall Wiolan

The order of the brands listed is not significant. Any oil that meets the quality and viscosity standards described above can be used.

Filter all new oil to meet ISO 4406 18/16/13.

“Industrial” gear lubricant codes

CLP - An “industrial” gear lubricant oil with additives to improve corrosion protection, aging stability, and protection against wear in areas with many types of friction, and to increase gear stability under load. Meets DIN 51517.

Vehicle gear box oil codes

GO 90 - BI standard lubricant, a gear box oil that meets API-GL 5.

Hydraulic Oil Recommendations

Viscosity (ISO):	VG32		VG 46		VG68	
Quality (DIN):	HLP	HVLP	HLP	HVLP	HLP	HVLP
ARAL-Vitam	GF 32	HF 32	GF 46	HF 46	GF 68	/
BP-Energol HLP BP-Bartran	HM 32	HV 32	HM 46	HV 46	HM 68	HV 68
KLÜBER-Lamora	HLP 32	/	HLP 46	/	HLP 68	/
MOBIL DTE MOBIL Nuto MOBIL DTE 10 MOBIL Univis	24 H 32	Excel 32 N 32	25 H 46	Excel 46 N 46	26 H 68	Excel 68 N 68
SHELL-Tellus	32	T 32	Multi Grade Hydraulic Oil Tellus T 46*			
TEXACO-Rando	HD 32	HDZ-32	HD 46	HDZ 46	HD 68	HDZ 68
WINTERSHALL- Wiolan	HS 32	HV 32	HS 46	HV 46	HS 68	HV 68

Biodegradable Hydraulic Oils

Type of fluid	Synthetic hydraulic fluids based on Polyglycol, HEPG			Synthetic hydraulic fluids based on esters, HEES			
ISO-viscosity class Manufacturer ↓	VG 22	VG 32	VG 46	VG 22	VG 32	VG 46	VG 68
ESSO		Univis WEPG 32	Univis WEPG 46			Univis HEES 46	
MOBIL/USA					Envirosyn 32 H	Envirosyn 46 H	Envirosyn 68 H
PETRO-Canada					Premium ECO HT-E 32	Premium ECO HT-E 46	
SHELL					Naturelle HF-X 32 [1)]	Naturelle HF-E 46 Naturelle HF-X 46 [1)]	Naturelle HF-E 68
VALVOLINE			Ultrasyn PG 46		Unisyn HLP 22/46	Unisyn HLP 32/68	

Filtration

General information

Filtration is the single most important method of keeping your unit's hydraulic system operational. Particles that could damage the components are introduced into the oil by the differential cylinders and the valves, through the reservoir breather, and by internal wear in the components. Additionally, when you change hydraulic oil, the new oil is not clean enough to be used in a concrete pump without being pre-filtered. In fact, new hydraulic oil is only filtered at the refinery to 40µ (40 microns). The oil in your unit needs to be filtered to a MINIMUM of 25µ, and preferably finer than that. Filters are rated by:

- the size of particles they trap, and whether that size is nominal or absolute
- the dirt holding capacity, in grams
- the clean element pressure drop for a given flow rate (in PSI and gallons per minute or bar and liters per minute), and
- the ratio of particles of a given size encountered versus particles passed (referred to as the beta ratio). An example of a beta ratio would be β25 = 200 (pronounced beta twenty five equals two hundred). This means that for every 200 particles of 25 microns or larger that hit the filter media, one makes it through. A finer filter would be, for example, β12 = 200. A courser filter example would be β25 = 75. For concrete pumps, medium to fine filtration is required.

Specific information

Here are some facts regarding filtration as they relate to your pump:

- Your unit has a separate oil conditioning circuit, which includes an oil cooler and a filter. The oil is pumped from the reservoir, through the cooler and filter, back to the reservoir.
- As delivered from the factory, your concrete pump is equipped with a filter that is rated at 10 micron (shown as 10µ) absolute.
- The beta ratio is β10 = 200. In our case, the beta ratio means that for every 200 particles of dirt that hit the filter media that are 10 micron or larger in size, 1 will make it through. Although we are not happy about the one particle that is allowed through, we do not use finer filtration because the components don't require it. Additionally, a finer filter would plug up with dirt too often, resulting in high maintenance costs to you. We have settled on a compromise that should afford long service life and minimum maintenance costs. Don't be fooled by the one particle that gets through, this is a high quality element with very good trapping characteristics.
- The clean element pressure drop is about 3 PSI at 22 gallons per minute (element only) + 2.5 PSI for the housing, making a total of 5.5 PSI DP (drop in pressure) when the element is clean. The pressure drop varies with the viscosity of the oil, which means pressure in the filter will be high until the oil is heated to normal operating temperatures. The filter will hold 55 grams of dirt, when operating at a flow rate of 27 GPM (gallons per minute). The flow rate is important, because the filter would hold more if you operated at a lower flow rate. Good filtration is not cheap, but it will save you thousands of dollars by preventing component failure.
- Your concrete pump is equipped with a recirculation type of filtration system, meaning that there is a pump that sucks oil from the reservoir, pumps it through the filter and cooler, and back to the tank. Whenever the engine is running, oil is being filtered. The filtration is done with a spin-on filter assembly (Figure 3). It is equipped with an integral bypass check valve set at 35 PSI. The bypass valve protects the filter element from damage, as explained below. The assembly is equipped with an anti-back-flow check valve, which prevents oil from draining out of the tank while you are changing the spin-on element. There is a dirty filter indicator to tell you when the element is dirty. You should replace the element whenever the indicator enters the yellow area and the oil is heated above 20 degrees Celsius. Under normal circumstances, the element will need replacement about every 6 months. The element has been designed to remove all particles large enough to cause undue wear and jobsite breakdowns (beta 10 = 200). You can keep the hydraulic system running year after year by replacing the element when replacement is due. Do not substitute "will fit" elements in this housing.

Bypass Check valve

The filter is equipped with an integral bypass check valve with a 35 P.S.I. pressure-to-open rating.

When the filter is clogged with dirt, oil is having a hard time making it through, the pressure difference between the filter inlet and the outlet rises. This pressure difference (commonly referred to as a pressure differential) is called delta P and is shown on the schematic as DP. When the DP reaches 35 PSI, the check valve opens and the oil returns to the tank unfiltered. If the filter did not have the bypass check valve, it would simply break apart when it was clogged.

All of the dirt ever trapped by the filter, plus the filter itself, could go directly into the system.

The filter could also split open and leak to the ground, draining the reservoir, and contaminating the environment.

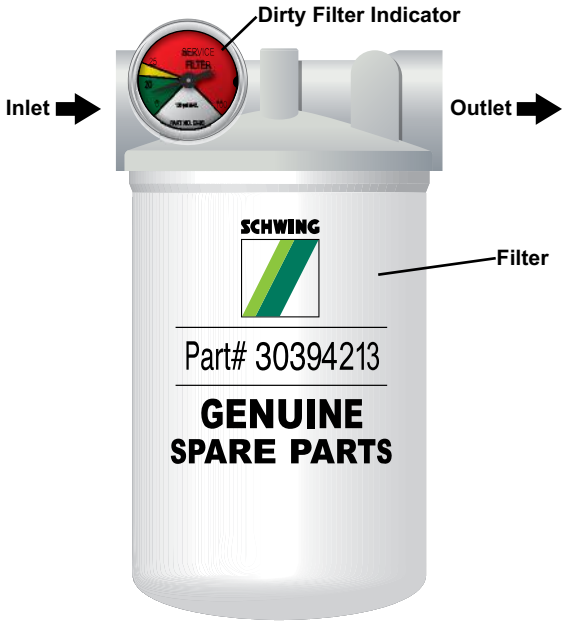


Figure 3
Hydraulic Oil Filter

Scheduled Maintenance

Maintenance Chart

Component	Daily	Weekly	Monthly	Quarterly	Semi-Annually	Annually	Page
Check Engine Fluid Levels	√						98
Check Tires	√						98
Check Hydraulic Oil	√						98
Bleed Moisture From Hydraulic Tank	√						98
Check Differential Cylinder Rod Packings	√						98
Inspect Bolts On Rams	√						99
Grease Rock Valve and Agitator Bearings	√						99
Inspect For Damage and Leaks	√						99
Check If Maintenance Is Due	√						99
Check Hydraulic Pressures	√						100
Adjust the Rock Valve Tension Nut		√					101
Inspect Cutting Ring/Rotate If Needed		√					101
Lubricate Mechanical Moving Parts		√					102
Check Unit Mounting Hardware			√				103
Clean Hydraulic Oil Cooler Fins			√				103
Check The Pre-charge Of The Accumulator				√			103
Change Hydraulic Oil For Seasonal Reasons					√		104
Change Hydraulic Oil Return Filter					√*		104
Change Hydraulic Oil For Age Reasons						√	105

* or as needed

Daily maintenance

Check Engine Fluid Levels

Check the levels and condition of the lubricants and coolant in the engine. Follow the manufacturer's recommendations for quantity and type.

Check/Fill DEF tank fluid levels

Refill DEF tank fluids if necessary. You typically add DEF fluid when you refill the diesel fuel. You can use any brand DEF fluid that meets ISO 22241-1.

A remote fill spout is located on the on the front of the stationary pump (Figure 4). DEF cleanliness is extremely important as contaminants can degrade the life of DEF and system components. Filtering is recommended when filling the DEF tank. Prior to filling the DEF tank, clean the blue colored DEF tank filler cap and surrounding area. Avoid filling the DEF tank from a contaminated container or funnel and overfilling of the tank.

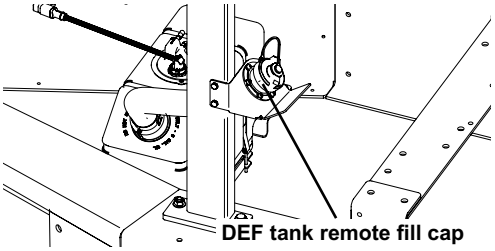
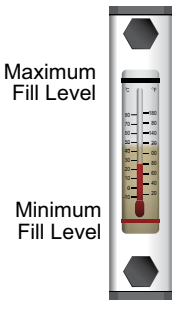


Figure 4
DEF tank remote fill spout

Check Tires

Check the condition of the tires on the stationary pump. Do not tow the unit with bald, cracked, or damaged tires.

Check Hydraulic Oil



Check the level and condition of the hydraulic oil. Fill it, if necessary, with the same brand and type of oil. Add only filtered oil. Use a filter cart to pump oil into the tank. New oil contains more contaminants than Schwing approves for their machines. Replace milky looking oil, which is a sign of water contamination. Try to determine the source of the water. If the oil has turned milky quickly, such as from one day to the next, then simply replacing the oil will not solve your problem.

Bleed Moisture from Hydraulic Tank.

Bleed the water out of the bottom of the hydraulic oil tank by opening the drain valve, at the bottom of the reservoir. Place a drain pan under the drain valve, open the valve, and watch the liquid as it leaves the valve. When the liquid changes from water to clean oil, close the valve. Because of condensation, which increases with dramatic heating–cooling cycles, there may be a small amount of water in the tank every day. However, it should settle to the bottom of the tank overnight. The water that is drained should be clean and so should the oil that follows it.

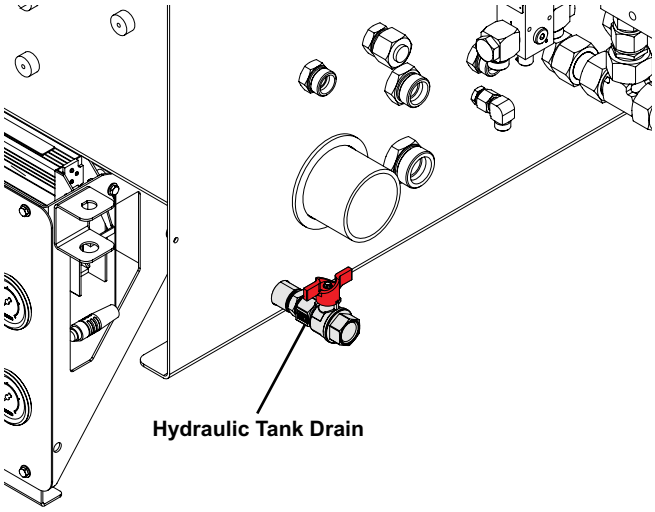


Figure 5
Hydraulic tank oil drain

Check the Differential Cylinder Rod Packings

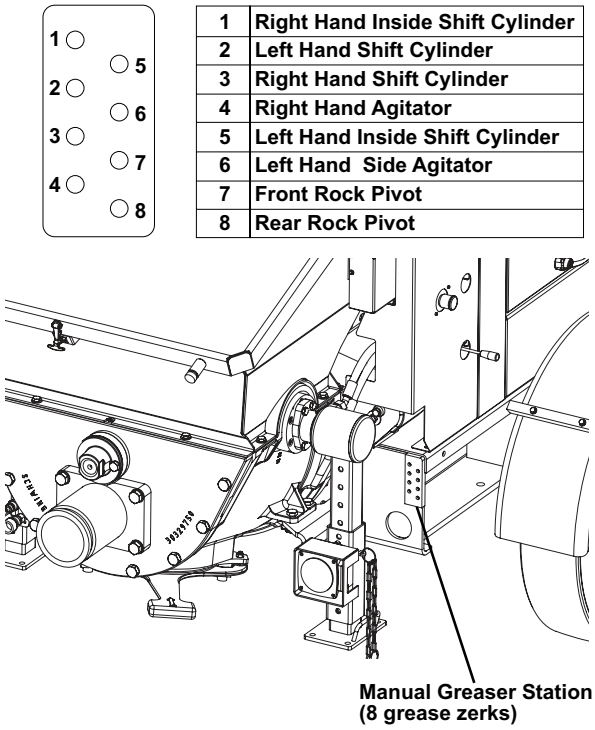
With the engine turned off, remove the waterbox cover. Remove the waterbox safety guard, or use a flashlight and look through the waterbox safety guard holes. Check for excessive hydraulic oil around or below the differential cylinder rod. Excessive oil in the waterbox is an indication that the rod packings are worn out. Failure to replace worn rod packings will result in water and debris from the waterbox entering the differential cylinder, damaging the cylinder components and contaminating the hydraulic oil. You should replace your differential cylinder rod packings every year.

Inspect Bolts on Rams

Each day, visually inspect the bolts on the rubber rams. If you see something unusual, shut off the engine, put the key in your pocket and remove the waterbox covers and inspect with a wrench. If you find that they are loose, tighten with a torque wrench to the “Torque Specifications for Metric Bolts” listed in the Appendix section. Remember to replace the waterbox covers before using the machine.

Grease the Rock Valve and Agitator Bearings

Grease the Rock Valve and agitator bearings using the manual greasing station located on the rear, passenger side of the stationary pump (Figure 6). If your unit was equipped with the optional automatic greasing system, check the grease levels each day and check for any damage or leaks in the system.



1	Right Hand Inside Shift Cylinder
2	Left Hand Shift Cylinder
3	Right Hand Shift Cylinder
4	Right Hand Agitator
5	Left Hand Inside Shift Cylinder
6	Left Hand Side Agitator
7	Front Rock Pivot
8	Rear Rock Pivot

Figure 6
Agitator Grease Points

Inspect for Damage or Leaks

Visually inspect the unit for damage or leaks each day. Repairs should be made before the unit is operated.

Check if Maintenance is due

Check your “Scheduled Maintenance Checklist” to see if any weekly, monthly, semiannual, or annual maintenance is due.

Check hydraulic pressures

Check your main pressure cut-off, soft switch and accumulator pressure cut-off settings. Pressure relief settings are shown below and on the hydraulic schematic that shipped with this unit. Changes in pressures may indicate trouble in one or more hydraulic components.

Pressure Cut-Off	300 bar	
Main Relief	320 bar	
Soft Switch	100 bar	
Accumulator Pressure Cut-Off	200 bar	

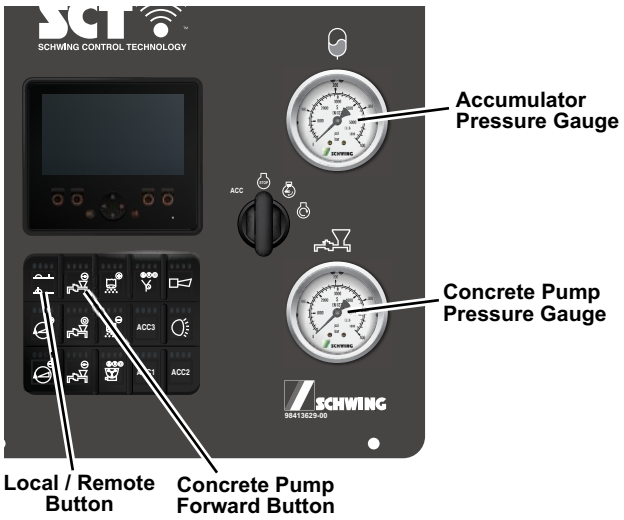


Figure 7
Rear operator panel and pressure gauges.

Checking Main Pressure Cut-Off

With the engine running and E-Stops cleared, increase the throttle to maximum RPM. Close the quarter turn and soft switch valve (Figure 8). Put the concrete pump into forward using the Concrete Pump Forward button. With the quarter turn valve closed, the concrete pump will not be able to shift. The reading on the concrete pressure gauge will show pressure cut-off (Figure 10). If the reading is different from your schematic, refer to “Setting main relief / Pressure cut off” on page 113.

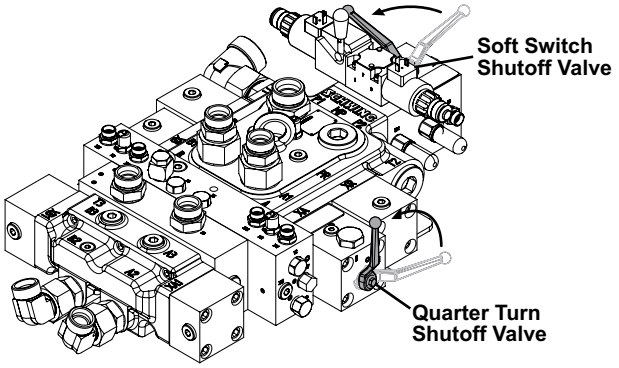


Figure 8
Close the Soft switch and quarter turn valve

Checking Soft Switch Pressure

With the engine running and E-Stops cleared, increase the throttle to maximum RPM. Close the quarter turn valve (Figure 9). Put the concrete pump into forward using the Concrete Pump Forward button. With the quarter turn valve closed, the concrete pump will not be able to shift. The reading on the concrete pressure gauge will show softswitch pressure (Figure 10). If the reading is different from your schematic, refer to “Setting the soft switch relief pressure” on page 114.

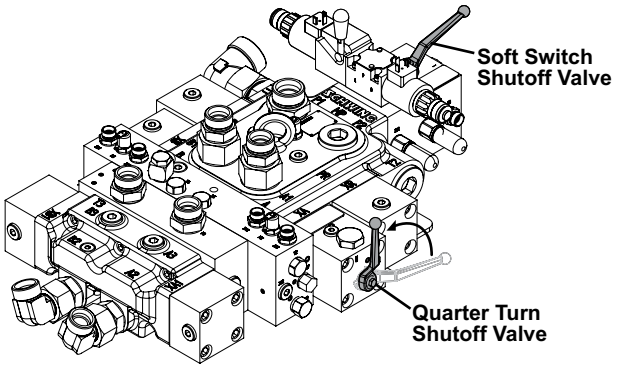


Figure 9
Open Soft switch quarter turn valve

Checking Accumulator Pressure

With the engine running and E-Stops cleared, the reading on the accumulator pressure gauge (Figure 10) will show the accumulator pump pressure cut-off. If the reading is different from your schematic, refer to “Set accumulator pressure cut-off” on page 115.

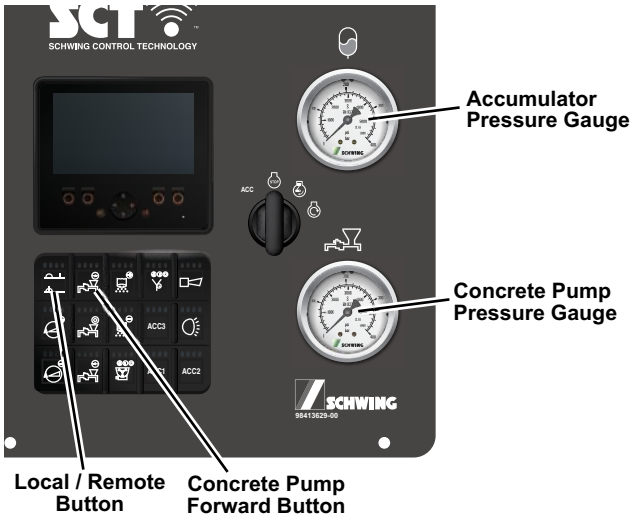


Figure 10
Concrete pump and accumulator pressure gauges

Weekly maintenance

Adjust the Rock Valve Tension Nut

Remove the 16-mm keeper bolt, grasp the tension nut by hand, and turn it clockwise (Figure 11). There are holes for the keeper bolt on the spacer behind the tension nut. The object is to place the keeper bolt in the furthest hole that you can reach when you turn the tension nut by hand. If the tension nut will turn enough to get all the way to the next hole, then turn it back to the previous hole. Do not put a wrench on the tension nut to get it to go to the next hole. Replace and tighten the keeper bolt. Over-tightening the tension nut will cause premature wear on the kidney seal.

The tension nut adjusts the spacing of the Rock Valve on the kidney seal end. Spacing between the spectacle plate and cutting ring is compensated for by the pressure spring as the spectacle plate wears.

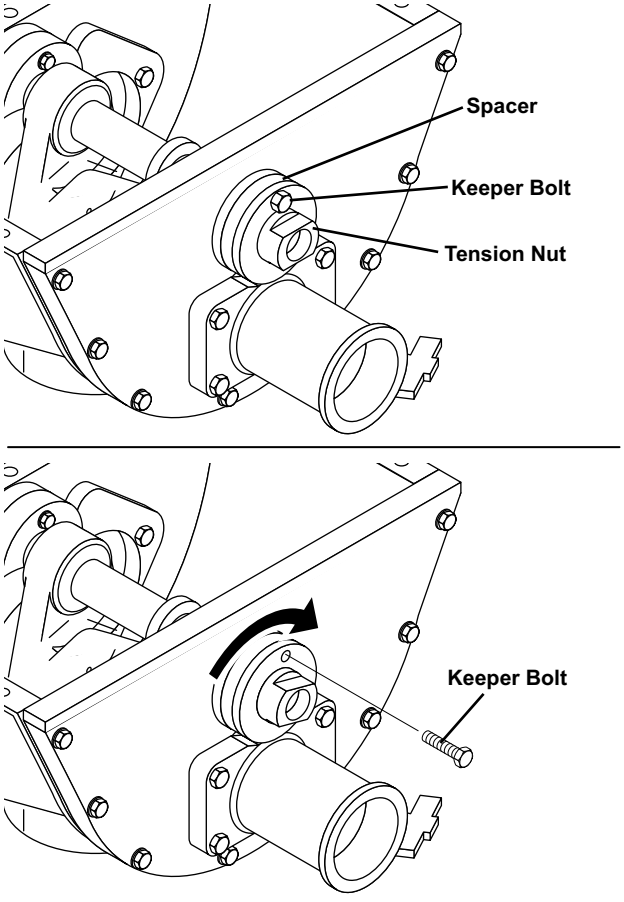


Figure 11
Adjusting the Rock Valve tension nut

Inspecting / Rotating the Cutting Ring

Needing to rotate the cutting ring depends more on the type of concrete and the number of cubic yards pumped than on a time schedule, but you should at check it for wear at least once per week, and rotate it as needed.

To rotate the cutting ring:

1. Turn off the engine and put the key in your pocket.
2. Loosen the tension nut as explained in “Adjust the Rock Valve Tension Nut”.
3. Loosen the eight cover bolts a couple of threads, but do not remove the bolts (Figure 12).
4. Loosen the 12 x 30 bolt on the end of the rock shaft by the slewing lever.
5. The Rock Valve will slide far enough out for you to loosen the cutting ring.

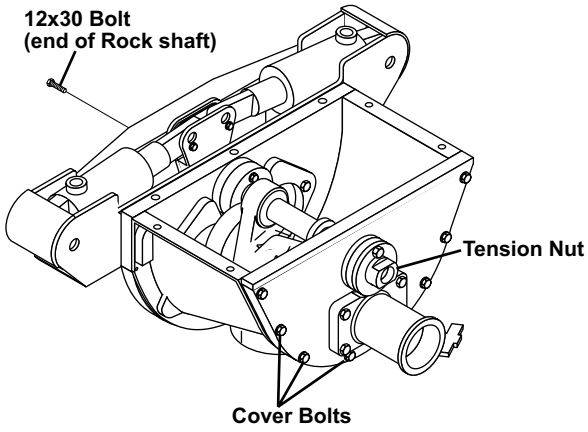


Figure 12
Loosen bolts on Rock valve cover and shaft

6. Lift the hopper grate and secure with locking pin.

7. From inside the hopper, tap the cutting ring forward, towards the spectacle plate. The ring should come loose. (If it does not, loosen the cover bolts a little more, then gently pry the Rock Valve rearwards a little more). Rotate the ring 90° clockwise (Figure 13). It does not matter which way you rotate, but to keep from forgetting which way you went last time, we recommend going clockwise each time.

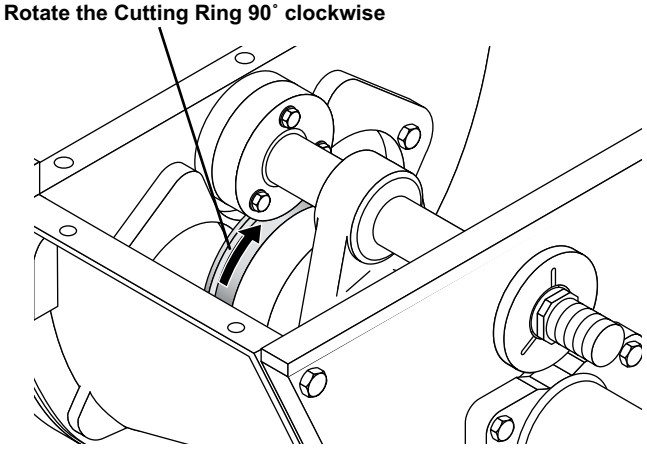


Figure 13
Rotate the cutting ring

8. Center the cutting ring in the Rock Valve. Tighten the cover bolts slightly, if needed, to be sure that the ring is not crooked.

9. Tighten the cover bolts just enough to bring the back plate up against the rock housing. Then tighten each bolt equally, using a torque wrench. Alternate which bolts you tighten, as you would when tightening a wheel on a car. The torque specs for these bolts (M20 x 65, 8.8 hardness) is 300 foot/lbs.

10. Tighten the tension nut according to the instructions in the “Check the Rock Valve tension nut” procedure. Tighten the keeper bolt.

Lubricate mechanical moving parts
Lubricate mechanical moving parts with oil or a lubricant such as WD-40. This applies to pins, hinges, valve handles and other components.

Monthly maintenance

Check the unit mounting hardware

Check for bolt tightness, cracks, and other abnormalities on the subframe, hydraulic tank, pumpkit, differential cylinders, and material cylinders.

Clean the hydraulic oil cooler fins.

Spray out the coils of the oil cooler with a high- velocity water nozzle or pressure washer (Figure 14). If you use a pressure washer, be careful not to get so close that you damage the electric motor or bend the cooler fins.

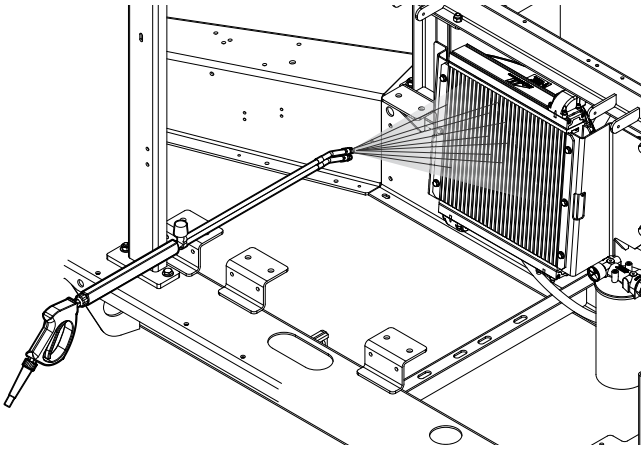


Figure 14
Pressure washing oil cooler

Never point or aim the gun/wand at yourself or anyone else. Never put your hand, fingers or body directly in front of the spray nozzle.

Do not spray directly at electronics or electrical components.

Quarterly maintenance

Check the pre- charge of accumulators

Check the accumulator gas pre-charge as shown:

- 1st check- one week after first use
- 2nd check-one month after first use
- 3rd check- quarterly

If the accumulator requires charging, read all of the instructions before beginning the job. Accumulators must be charged only with dry nitrogen. Never use compressed air or oxygen, as the oxygen molecules will combine with the hydraulic oil and lower the flash point of the oil to below room temperature. You will create a major explosion by using compressed air or oxygen to charge accumulators. People have died using compressed air or oxygen to charge accumulators. Use dry nitrogen, not liquid nitrogen. To charge the accumulator see “Accumulator Charging Procedure” on page 110

Semi-annual maintenance

Change hydraulic oil for temperature reasons.

If the machine will be used in a location where seasonal temperature changes are extreme, replace the machine's hydraulic oil every 6 months. Use an oil of the correct viscosity for the temperature in which the machine will be operated. If the used oil is saved in clean barrels that are then properly stored, the same oil can be reinstalled in the machine when another seasonal temperature change occurs. Hydraulic oil can be used for a maximum of two 6-month seasons. Contact your hydraulic oil dealer to obtain clean barrels and the proper storage procedures. If you ignore proper storage procedures, the oil will become so contaminated that reuse will become destructive to the machine. Use a filter cart for transferring hydraulic oil. If you do not own one, consider buying or renting one. When you change the hydraulic oil for temperature reasons, use the same procedure "Change hydraulic oil for age reasons" on page 105

Change hydraulic oil return filter

1. Make sure the engine is shut off. Put the key in your pocket to prevent someone else from starting the engine.
2. Position a pan or bucket under the filter housing to catch drips. The check valve built into the filter, which prevents back flow, should not allow much leakage oil, but there will be some. Oil spills contaminate the environment.
3. Unscrew the filter element. Use an oil filter wrench, if needed.
4. Remove the spin-on element, and pour the oil out into the catch pan. Do not reuse this oil.
5. Remove the old element and replace with a new element.
6. Apply light grease around the gasket of the new filter, such as Lubriplate 105.
7. Tighten by hand, with the oil filter wrench, tighten another half turn.
8. Start the engine, and check for leaks.

Annual maintenance

Change hydraulic oil for age reasons

Change hydraulic oil annually. If you have recently changed the hydraulic oil because of changing weather conditions, you can ignore this procedure. The same filling rules that apply to adding hydraulic oil apply to filling the tank after draining and cleaning. Use the following procedure to change the hydraulic oil:

1. The engine must be shut off. Put the key in your pocket.
2. The oil should be cool. This is for safety reasons. Do not change oil that is above 120°F (50°C).
3. Drain the old oil into barrels or another waste oil receptacle. The oil can be pumped out of the inspection cover on the top of the tank, or be drained out of the bottom of the tank.
4. Once the oil is drained, clean the tank through the inspection cover, using cleaning solvent and lint-free rags. Do not use gasoline! Remove all silt from the bottom of the tank.
5. Close the drain, if open. Refill by pumping new hydraulic oil out of the barrels with a filter cart. If no cart is available, rent one.

   Unfiltered new hydraulic oil is not clean enough to install in your unit. Filter oil to meet ISO 4406 code 18/16/13.

6. If you ignore this step, you may begin having trouble with pumps and valves immediately or within the first few days. See the information at the beginning of this chapter for specific information about hydraulic oils that are approved for use in Schwing machines.
7. Change the main return filter before restarting the unit. See “Change hydraulic oil return filter” on page 104.

Unscheduled maintenance

The following items will have to be maintained on your pump. The time of service that you get from these parts varies dramatically from unit to unit because of the wide range of applications to which these machines are subjected. Differences in concrete and pressure play a major role in the wear of these components.

Changing rams

When you begin to see small bits of sand or pebbles in your waterbox at the end of the day, it is time to change the rams.

To assist in ram replacement, Schwing offers a Ram Change Mode feature. This feature drops engine RPM’s and stroke limiter outputs to minimal levels. The differential cylinders will now move as slow as possible allowing the operator to easily position the rams inside the waterbox for replacement.

When changing rams, you will have to put your hands in the waterbox on several occasions. **You must stop the engine each and every time before putting your hands into the waterbox.**

Ram Change Mode

To activate Ram Change mode, press the ram change button located next to the waterbox. When pressed, engine RPM’s and stroke limiter outputs will be reduced to minimal levels. You must use the cable remote to control the concrete pump forward and reverse. All other functions on the rear operator panel keypad or cable remote will be disabled. Once enabled - you can only deactivate Ram Change Mode by shutting off the engine and restarting the machine.

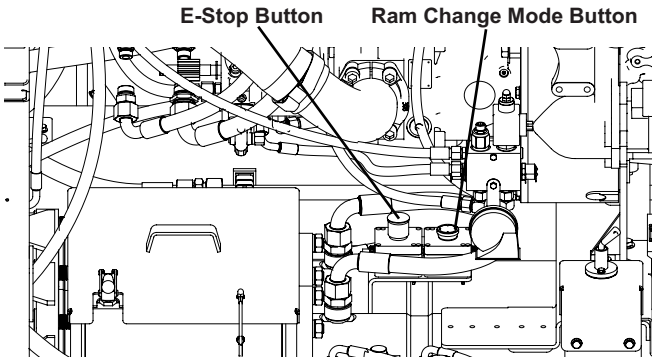


Figure 15
Ram Change Mode button

Remove the old rams

1. Close the concrete pump quarter turn shutoff valve located on the concrete pump control block (Figure 16).

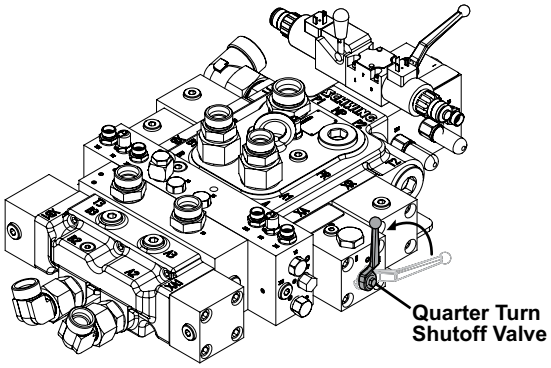


Figure 16
Close the quarter turn valve

2. Drain the waterbox. Remove the waterbox cover, and the bolt-down grate.

3. Using the cable remote, press and hold the concrete pump forward or reverse button, while simultaneously pressing the Ram Change mode button. Both buttons must be pressed within a half second of each other, in order to move the differential cylinders. To stop the differential cylinders, release either the concrete pump forward/reverse button or Ram Change Mode button. To activate the differential cylinder again - release any pressed button, then simultaneously press both the concrete pump forward/reverse and Ram Change Mode button again.

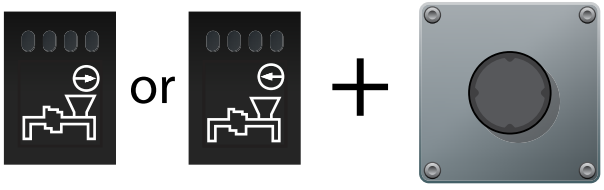


Figure 17
Press concrete pump forward or reverse button with and ram change button to move differential cylinders

4. Retract the left-hand side differential rod almost all the way into the waterbox (Figure 18). Leave about 1.5 inches of travel, which will allow you to remove the spacer coupling (dogbone). When in position, shut-off the engine.

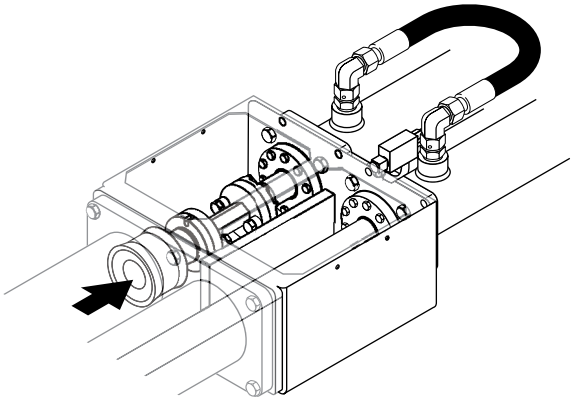


Figure 18
Retract spacer coupling (dogbone) into the waterbox

5. Using the 50-mm open-end wrench and 24–30 mm box-end wrench provided with the unit, place the 55-mm wrench on the spacer coupling to hold the assembly from turning. Use the 24–30 mm box-end wrench to unscrew the four M20 bolts that hold the assembly together (Figure 19).

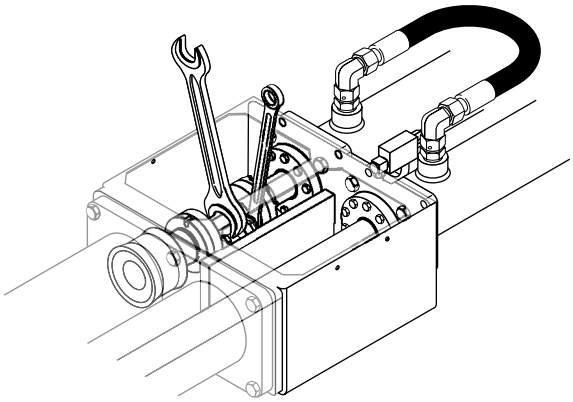


Figure 19
Removing the spacing coupler

6. Restart the engine and clear the E-stops. With the concrete pump forward or reverse button and Ram Change Mode button pressed, finish retracting the lefthand side rod into the waterbox. The spacer coupling will fall out. Release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine.

7. Remove the spacer coupling from the waterbox (Figure 20).

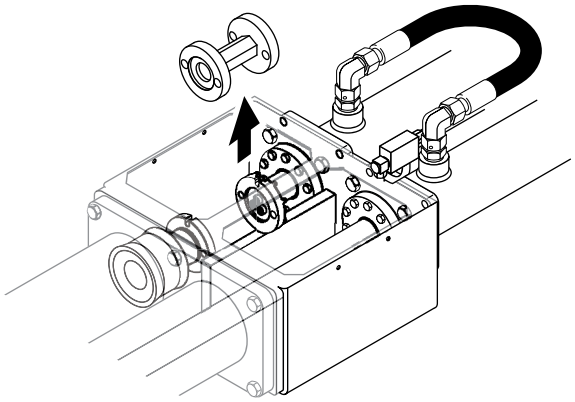


Figure 20
Remove spacer coupling

8. Restart the engine and clear the E-stops. Press the concrete pump forward or reverse button and Ram Change Mode button simultaneously to slowly extend the cylinder rod until it just contacts the rubber ram flange (Figure 21). Release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine.

Be careful not to drive the rubber ram into the material cylinder. If you accidentally knock the ram into the material cylinder so far that you can't reach it, you will have to remove it by knocking it out from the Rock Valve end of the unit. Call Schwing America's Service Center.

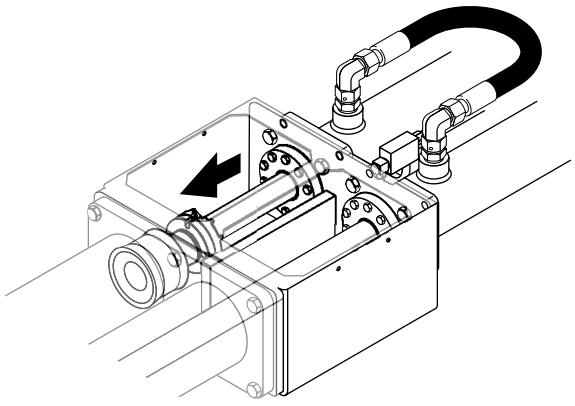


Figure 21
Extend cylinder to ram

9. There is a groove in the ram flange that will line up with a groove in the cylinder flange. The M12 x 45 bolt with nut will drop into this groove and allow you to pull the ram out. The fit should be snug, but there is no need to tighten the nut with tools (Figure 22). The ram flange and cylinder flange are shown outside of the waterbox for clarity of the illustration.

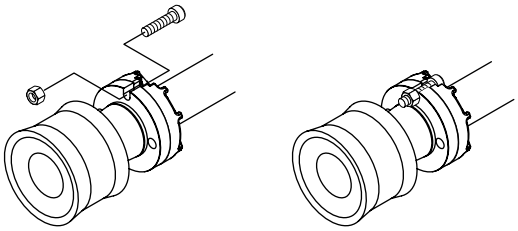


Figure 22
Bolt ram to differential cylinder rod

10. Restart the engine and clear the E-stops. Press the concrete pump forward or reverse button and Ram Change Mode button simultaneously to slowly retract the cylinder rod until the ram is clear of the material cylinder (Figure 23). Release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine.

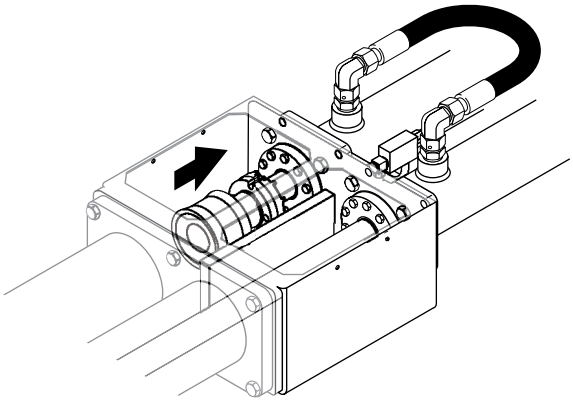


Figure 23
Retract ram into waterbox

11. Remove the nut and bolt, and the ram will be free to come out of the waterbox (Figure 24).

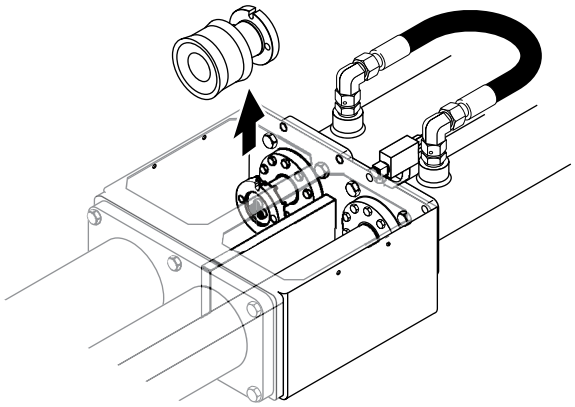


Figure 24
Remove ram from waterbox

12. Clean and inspect the bolts and bushings, the spacer coupling, and the cylinder flange. Replace any damaged or worn parts with new ones.

Install the new rams

1. Apply Loctite primer (or equivalent) to the M20 bolts. Allow the primer to dry.

2. While the primer is drying, apply a liberal coat of clean grease to the new rams. It is impossible to use too much grease in this procedure, because the excess will be wiped off by the material cylinders during installation.

3. Hold the new ram up to the cylinder flange. Line up the grooves, and drop your nut and bolt into place to hold the assembly together. Again, you should tighten the nut only finger-tight.

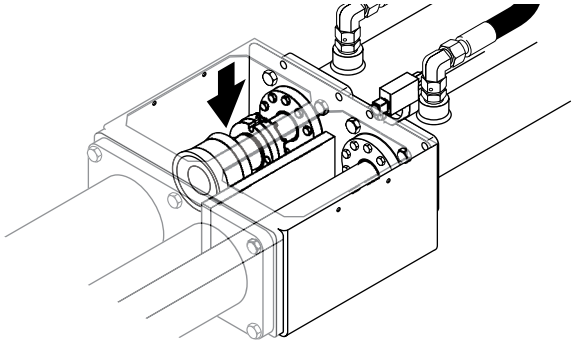


Figure 25
Install new ram

4. Restart the engine and clear the E-stops. Press the concrete pump forward or reverse button and Ram Change Mode button simultaneously. Slowly extend the cylinder until the ram is installed in the material cylinder, but the mounting flange is still exposed enough to remove the nut and bolt (Figure 26). When in position, release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine. Remove the nut and bolt.

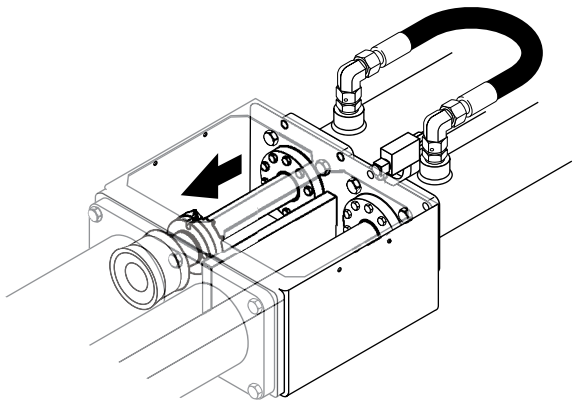


Figure 26
Push ram into material cylinder

5. Restart the engine and clear the E-stops. Press the concrete pump forward or reverse button and Ram Change Mode button simultaneously. Slowly retract the rod again (Figure 27), until there is room to install the spacer coupling.

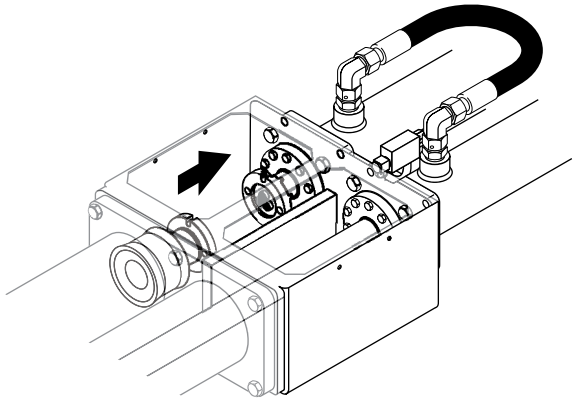


Figure 27
Retract cylinder away from ram

6. Release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine. Apply Loctite 242 or equivalent to 2 of the M20 bolts. Place the spacer coupling up against the flange of the new ram. Install two of the M20 bolts (with Loctite) and bushing, finger-tighten only.

It is important to install the spacer flange against the new ram first, not the cylinder flange. This gives you an extra 6 – 8 inches of safety margin when you extend the cylinder to meet the spacer flange. If you attach to the cylinder flange first, chances are good that you will accidentally knock the new ram into the material cylinder so far that you won't be able to reach it.

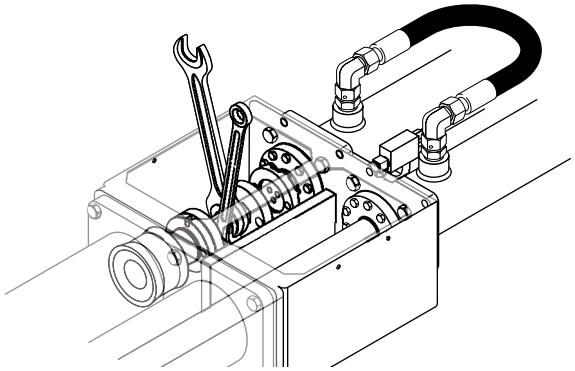


Figure 28
Attach spacer coupling to ram

7. Restart the engine and clear the E-stops. Press the concrete pump forward or reverse button and Ram Change Mode button simultaneously. Slowly move the cylinder down to where its flange butts up to the spacer coupling. Be careful not to go too far (Figure 29).

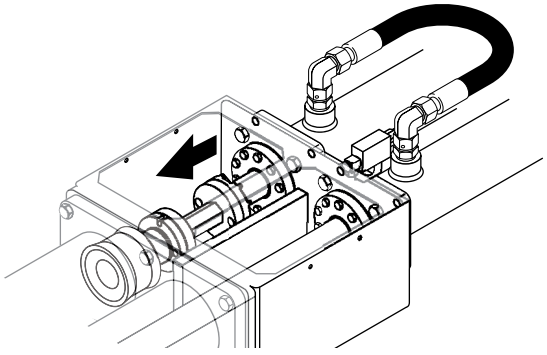


Figure 29
Move cylinder to spacer coupling

8. Release the concrete pump forward/reverse or Ram Change button to stop the differential cylinders. Shut off the engine. You may have to slightly rotate the spacer coupling to align the bolt holes with the cylinder flange. When aligned, coat the remaining two M20 bolts with Loctite and install, including the bushings. Once all four bolts are started, you may tighten the bolts to the torque spec for M20 10.9 bolts (420 ft/lbs).

9. Repeat all steps in the "Remove the old rams procedure" and "Install the new rams procedure" for the righthand side ram.

10. Open the shutoff valve (Figure 30). The unit will not stroke with this valve closed.

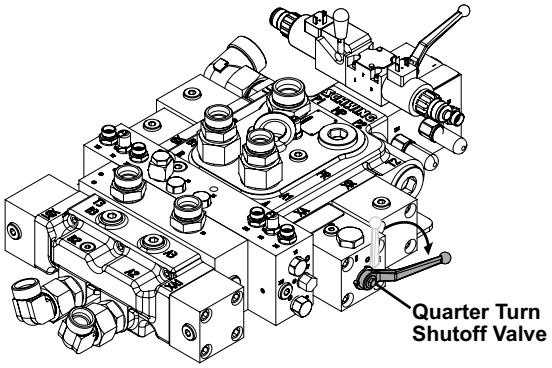


Figure 30
Open the quarter turn shut-off valve

Changing the Material Cylinders

The material cylinders eventually wear out. They are considered worn out when the chrome starts to wear off the barrel. Normally, the end attached to the Rock Valve wears out first, because it sees the most concrete. The waterbox end may be in like-new condition, because that end never experiences concrete. For this reason, the material cylinders were designed to be able to flip end for end. That way, you can move the worn out part to the waterbox, and the like-new part to the concrete valve for double the life. If you are going to do this, you have to catch the wear on the material cylinders before they get too thin or break through in one or more spots. Once that happens, you cannot flip them, because they will be structurally too weak to hold the pressure forces at the waterbox end.

The procedure for changing and aligning the material cylinders is the subject of Service Bulletin G-102/88. Contact Schwing America's Service Center.

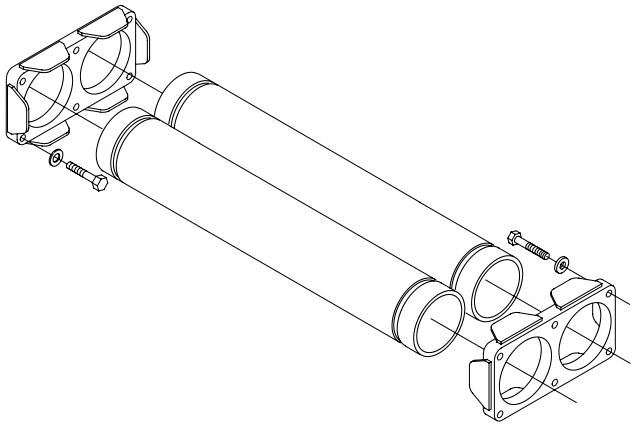


Figure 31
Material cylinder assembly

Accumulator Charging Procedure

Check the accumulator gas charge quarterly or 500 hours. Read all of the instructions before beginning the job. Accumulators must be charged only with dry nitrogen. Never use compressed air or oxygen, as the oxygen molecules will combine with the hydraulic oil and lower the flash point of the oil to below room temperature. You will create a major explosion by using compressed air or oxygen to charge accumulators. People have died using compressed air or oxygen to charge accumulators. Use dry nitrogen, not liquid nitrogen.

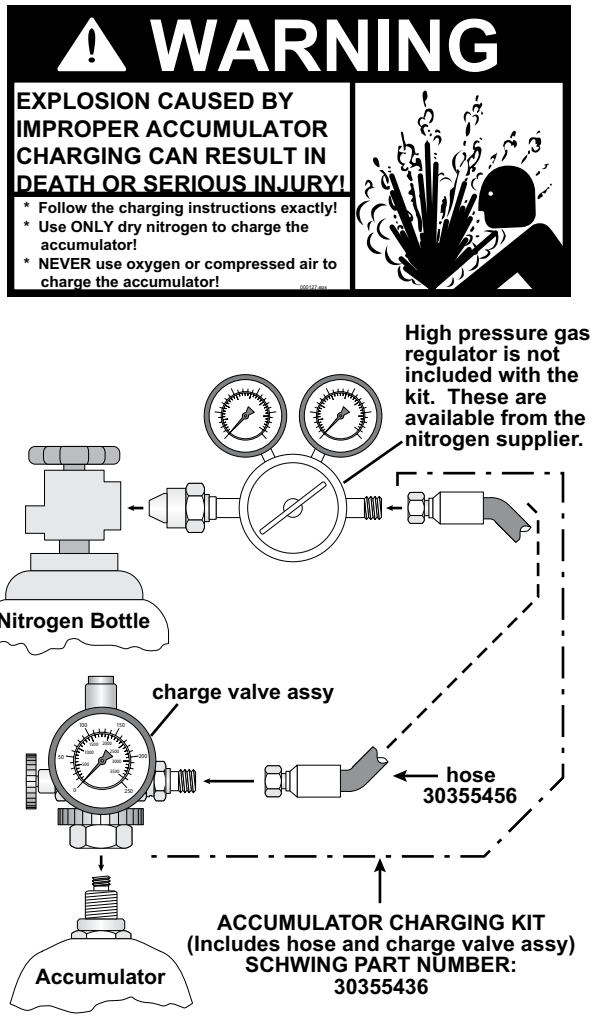


Figure 32
Accumulator charging kit

The following steps are required for checking and charging the accumulator:

1. Before you begin, you will need a charging kit (Figure 32). Do not attempt to charge the accumulators without one. Order the charge valve kit assembly from Schwing America using part number 30355436.

2. You must use a high-pressure regulator with the nitrogen bottle. If it was not supplied with the bottle, order one before proceeding with this job.

3. Before beginning the charging procedure, stop the engine, remove the key, and put a “Do Not Operate” tag over the key switch. Put the key in your pocket, so no one can start the engine.

4. Remove the valve protection cap and the valve seal cap from the accumulator that you will charge first (Figure 33).

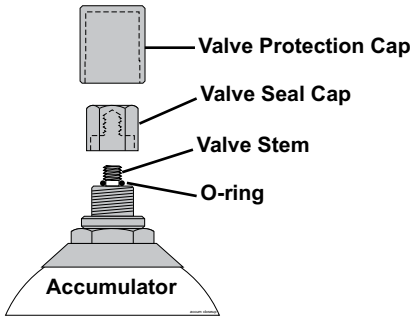


Figure 33
Accumulator protection cap

5. On the charge valve assembly (Figure 34), close the bleed valve (turn it clockwise all the way in). If a hose is connected to the charge valve stem, disconnect the hose from the charge valve stem. This step closes the charge valve stem to prevent the gas pressure from escaping out of the hose. It ensures that the initial pressure reading is accurate.

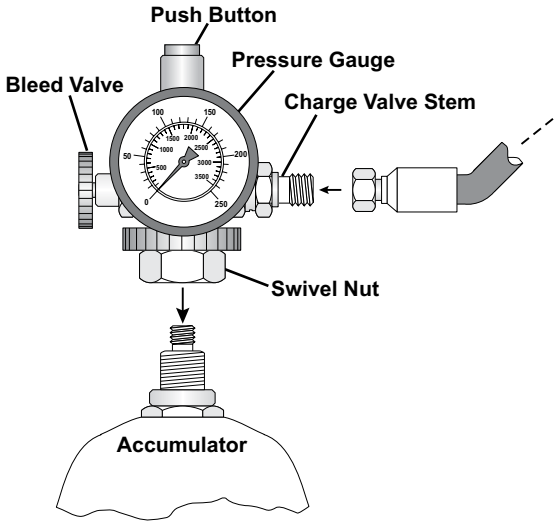


Figure 34
Charge valve assembly

6. Find the swivel nut on the charge valve assembly (Figure 34). Screw the swivel nut onto the accumulator gas valve. Tighten to 10–15 in./lb.

7. After the swivel nut is attached, depress the push button on the top of the charge valve assembly (Figure 34). This presses a pin into the accumulator gas valve and opens it. Read the pressure on the charge valve assembly pressure gauge. The pressure should read 103 bar (1500 PSI).

   - If pressure must be added, proceed to Step 8.
   - If pressure is too high, skip to Step 12.
   - If no adjustment is necessary, skip to Step 15.

8. Be sure that the nitrogen bottle supply valve is firmly closed. Attach the high-pressure regulator to the nitrogen bottle, then attach the hose to the high-pressure regulator. Finally, attach the other end of the hose to the charge valve stem on the charge valve assembly (Figure 35).

9. Do not open the nitrogen bottle supply valve yet. Turn the regulator adjustment handle on the high-pressure regulator (Figure 35) counter clockwise to its minimum setting (closed).

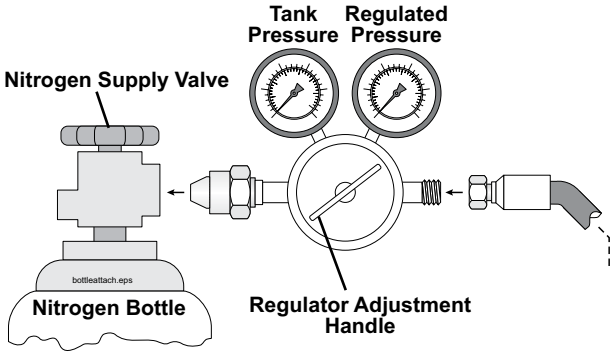


Figure 35
Nitrogen bottle and regulator

10. Slowly open the nitrogen bottle supply valve (Figure 35). You will get a reading on the tank pressure gauge side of the regulator. If there is enough pressure in the nitrogen bottle to do the job, proceed to the next step.

If there is not at least 1500PSI in the nitrogen bottle (as shown on the regulator gauge at this time), you will not be able to charge the accumulator nitrogen to the 1500 PSI specification. If that is the case, you will need a new bottle of nitrogen before proceeding.

11. Adjust the regulator adjustment handle clockwise, raising the regulated pressure. The accumulator will begin to fill. Continue filling until the charge valve assembly pressure gauge (Figure 35) reads the desired pressure of 1500 PSI. Close the nitrogen bottle supply valve.

12. If you overcharge the nitrogen pressure, proceed as follows:

    - Close the nitrogen bottle supply valve.
    - Depress the push button on the top of the charge valve assembly.
    - Slowly open the bleed valve on the charge kit. Close the bleed valve when the correct pressure is reached on the charge valve pressure gauge.

Never let nitrogen out of the accumulator by pressing the gas valve pin with a foreign object. The high pressure may rupture the valve seal!

13. Let the nitrogen sit in the accumulator for 20 to 30 minutes. This allows the gas temperature to stabilize. Depress the push button on top of the charge valve assembly. Recheck the pressure on the charge valve assembly pressure gauge.

14. Add or release nitrogen until the pressure is correct. Be sure that the bleed valve is closed before adding pressure and that the nitrogen bottle supply valve is closed before releasing pressure.

15. When the correct pressure is reached, proceed as follows:

    - Close the nitrogen bottle supply valve.
    - Open the charge valve assembly bleed valve. This releases the pressure in the hose, charge valve assembly, and regulator.
    - While holding the charge valve assembly on the accumulator, unscrew the charge valve swivel nut.
    - Remove the charge valve assembly.
    - If you are finished with the charge valve assembly, remove the hose and regulator.

16. Make a bubbly mixture from soap and water. Spread the mixture around the accumulator gas valve to check for gas leaks. Gas leaks will push the bubbles away from the area of the leak. If you find a leak, replace the accumulator or have it repaired by qualified personnel. Never repair an accumulator yourself.

17. Replace the gas valve seal cap (tighten to 22 ft/lb), and hand-tighten the valve protection cap (Figure 36).

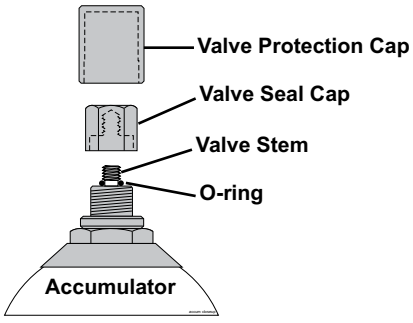


Figure 36
Accumulator protection cap

Setting main relief / Pressure cut off

Pressure settings must be made with the oil at normal operating temperatures (40°– 60°C).

Main system adjustments are preset at the factory. The following procedure begins with adjustment of the main relief cartridge and pressure cutoff. If proper pressures can not be obtained through these steps, contact the Schwing Service Department.

It is vital that each adjustment screw be properly identified prior to making any adjustment. All screw adjustments for the system relief must be made with the pumpkit in the neutral position, and adjustments for pressure cutoff must be made with the engine shut off.

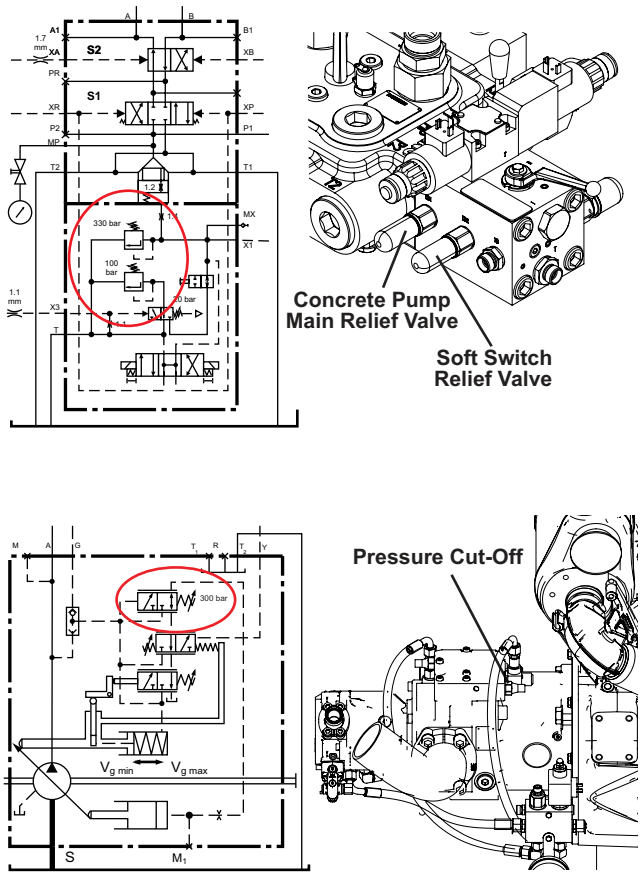


Figure 37
Relief cartridges and pressure cut-off screw

1. With the engine running and E-Stops cleared, increase the throttle to maximum RPM. Close the quarter turn and soft switch valve (Figure 38).

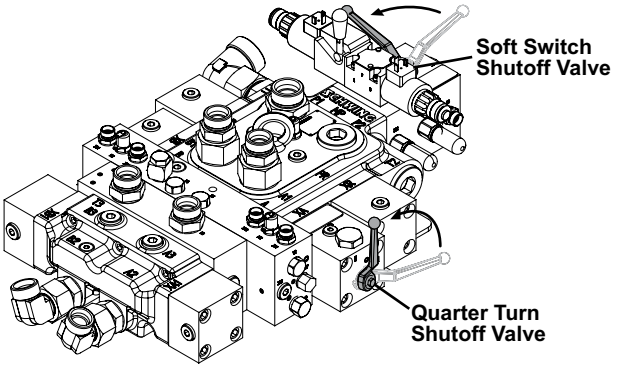


Figure 38
Close the Soft Switch and quarter turn valve

2. At the rear operator panel, select “local” control with the “local/remote” button. Press and hold the stroke limiter (+) button until the stroke limiter is at maximum output (Figure 39).

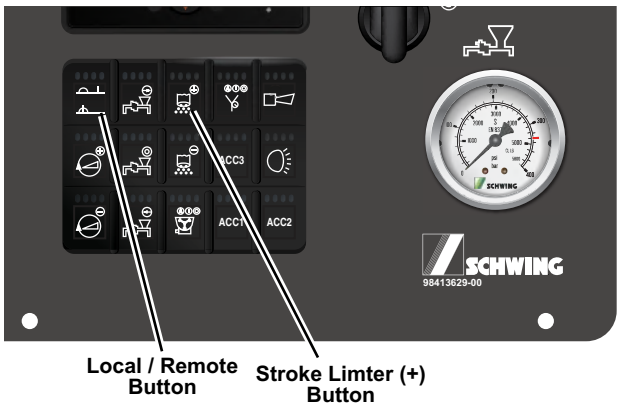


Figure 39
Rear control panel, stroke limiter and pressure gauges

3. The main system control block pressure must be set first to properly set the pressure cutoff on the pump.

4. Go to the pressure cutoff screw on the hydraulic pump, and back off the jam nut with a 13mm wrench. Turn the adjustment screw *in* (clockwise) one quarter turn with a 4mm allen wrench then tighten the jam nut. This should raise pressure cut-off above the main relief valve pressure setting. Restart the engine and place the concrete

pump into forward using the Concrete Pump Forward button. The system will pressure out, with the oil going over the main relief valve. The pressure showing on the Concrete Pump Pressure gauge will be the main relief valve setting.

5. To increase the main relief valve setting, stop the concrete pump with the Concrete Pump Stop button. On the main relief valve cartridge use a 9/16" wrench to loosen the jam nut and a 5/32" allen wrench to turn the adjustment screw *in* (clockwise). When increasing the pressure, the adjustments should be made in quarter turn increments. Your target pressure will be found on the hydraulic schematic.

6. When the proper main relief pressure is achieved, pressure cut-off can be set. Stop the engine and follow "Lock Out - Tag Out procedure" on page 92.

7. Return the pressure cut-off screw to it's original position by turning the pressure cut-off screw *out* (counterclockwise) one quarter turn and locking the jam nut.

8. Start the engine, clear the E-Stops and increase the throttle to maximum RPM. Place the concrete pump into forward using the Concrete Pump Forward button. The pressure showing on the Concrete Pump Pressure gauge will show the pressure cut-off setting.

9. Go to the pressure cutoff screw on the hydraulic pump and back off the jam nut with a 13mm wrench. With a 4mm allen wrench turn the pressure cutoff screw *in* (clockwise) or *out* (counterclockwise to achieve the target pressure shown on the hydraulic schematic.

After pressure cutoff is set, return the pump to neutral, bring engine RPM to idle, open the soft switch quarter turn valve, and either proceed to other pressure settings or shutoff the engine.

Setting the soft switch relief pressure

First, open the soft switch quarter turn valve that you closed in the previous procedure. The rest of the unit should still be set up as if you were going to check the main relief valve pressure; concrete pump shutoff valve still closed (Figure 40).

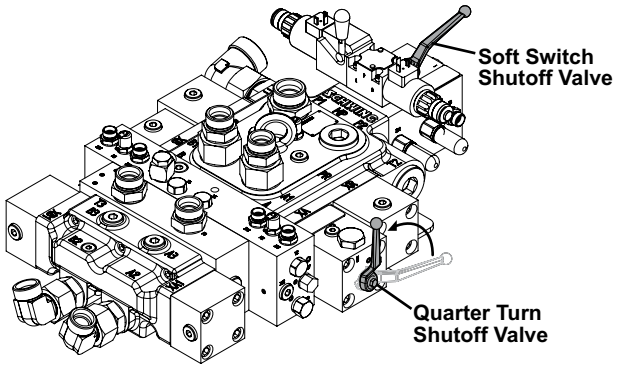


Figure 40
Close the quarter turn shut-off valve

When you put the pump in forward now, the main concrete pump pressure gauge should read 100 bar (1450 PSI). If adjustment is needed, loosen soft switch relief valve jam nut (Figure 41) with a 9/16 open end wrench, and use a 5/32 allen key to adjust the pressure. Turn the adjustment screw *in* (clockwise) to raise the pressure or *out* (counter clockwise) to lower the pressure. When you attain the required pressure, tighten the jam nut while holding the allen key to keep the pressure from rising. Be sure to open the quarter turn shutoff valve when you are finished. The unit will not stroke with this valve closed.

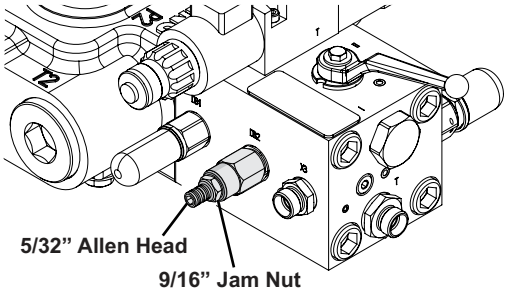


Figure 41
Soft switch relief valve

Set accumulator pressure cut-off

Read the pressure on the accumulator circuit pressure gauge. The pressure should read 200 bar (2900 PSI). If pressure adjustment is needed, follow these steps:

1. Stop the engine and follow “Lock Out - Tag Out procedure” on page 92.

2. Loosen the jam nut on the pressure regulator of the accumulator hydraulic pump (Figure 42). Turn the screw *in* (clockwise) to increase the pressure or *out* (counterclockwise) to decrease pressure. Lock the jam nut when the pressure is correct.

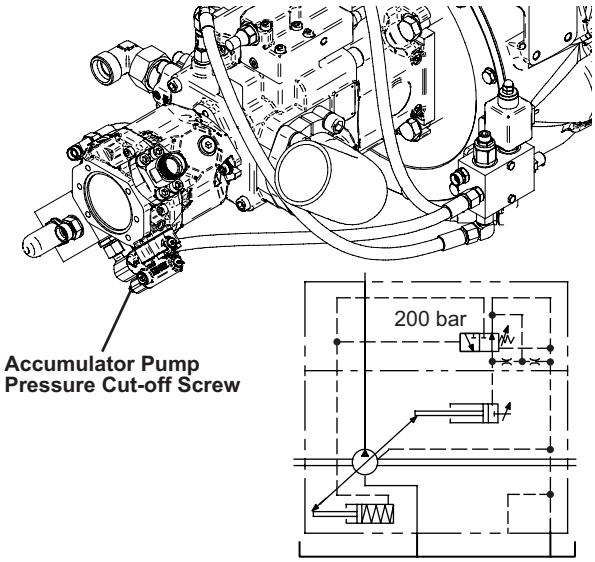


Figure 42
Accumulator pressure cut-off screw

3. Read the pressure on the accumulator gauge. It should read the proper accumulator system pressure.

Set the agitator pressure.

The agitator circuit relief valve is on the hydraulic tank and is factory set to 200 bar (1812 PSI).

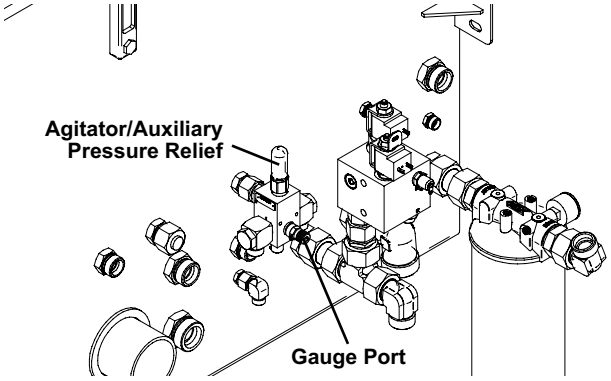


Figure 43
Agitator valve pressure relief

To adjust the agitator relief valve:

1. Stop the engine and follow “Lock Out - Tag Out procedure” on page 92.

2. Install a 0–600 bar gauge in the agitator valve relief test port. Make sure the whip hose connection is tight. Cap off the agitator (Figure 44).

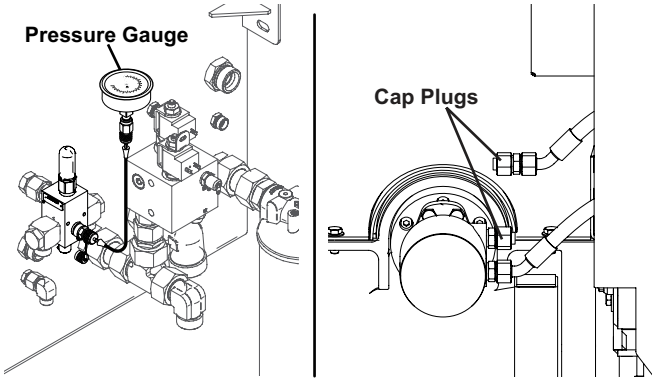


Figure 44
Install pressure gauge in agitator circuit

3. Start the engine, clear the E-stops and increase the throttle to maximum RPM.

4. Move the agitator handlever into the forward position (Figure 45). The oil will be forced over the relief valve.

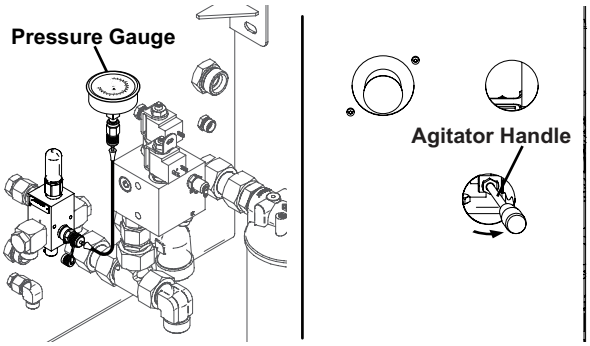


Figure 45
Activate the agitator handvalve - forward

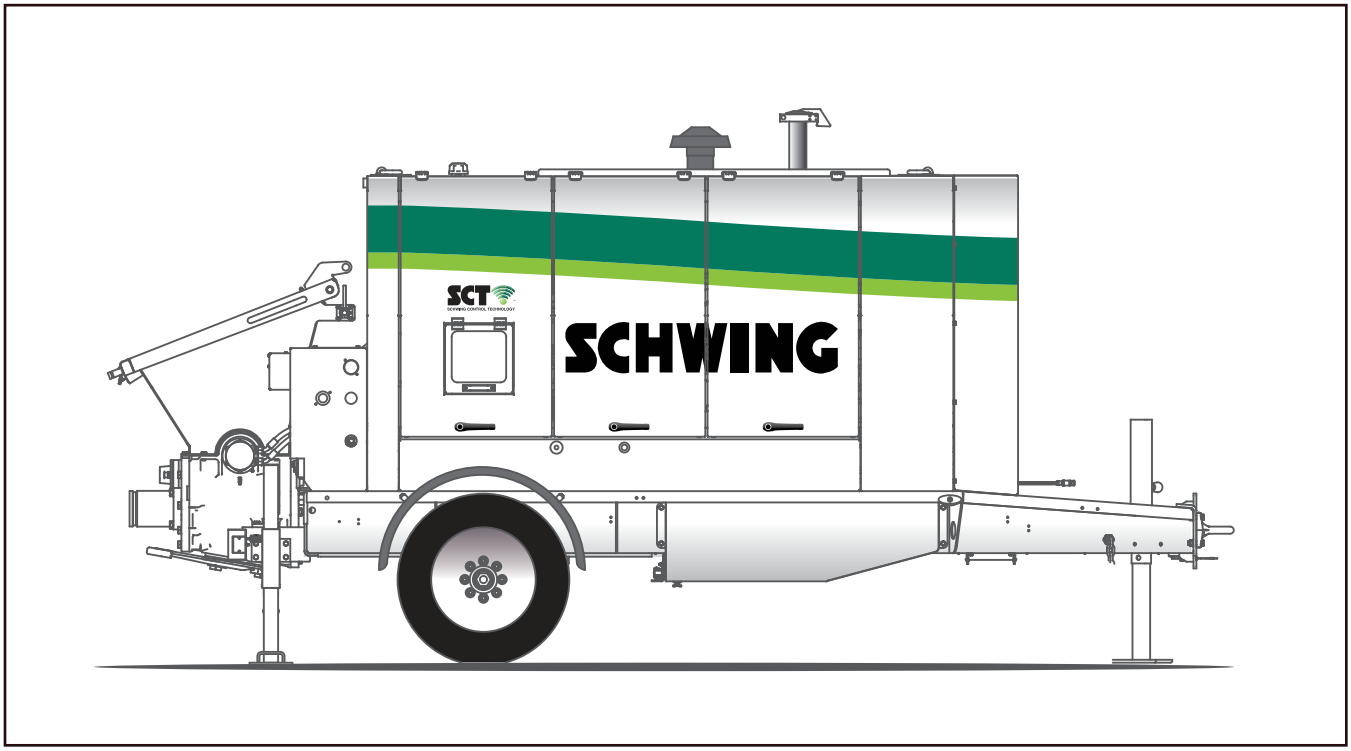
5. The gauge should read 200 bar (1812 PSI).

6. To adjust the pressure, loosen the jam nut and turn the allen head screw *in* (clockwise) to increase pressure, or *out* (counterclockwise) to decrease pressure until 125 bar is showing the pressure gauge.

7. Return the agitator handle to the neutral position.

1. Stop the engine and follow “Lock Out - Tag Out procedure” on page 92.

2. Remove the pressure gauge and cap fitting from the agitator circuit.



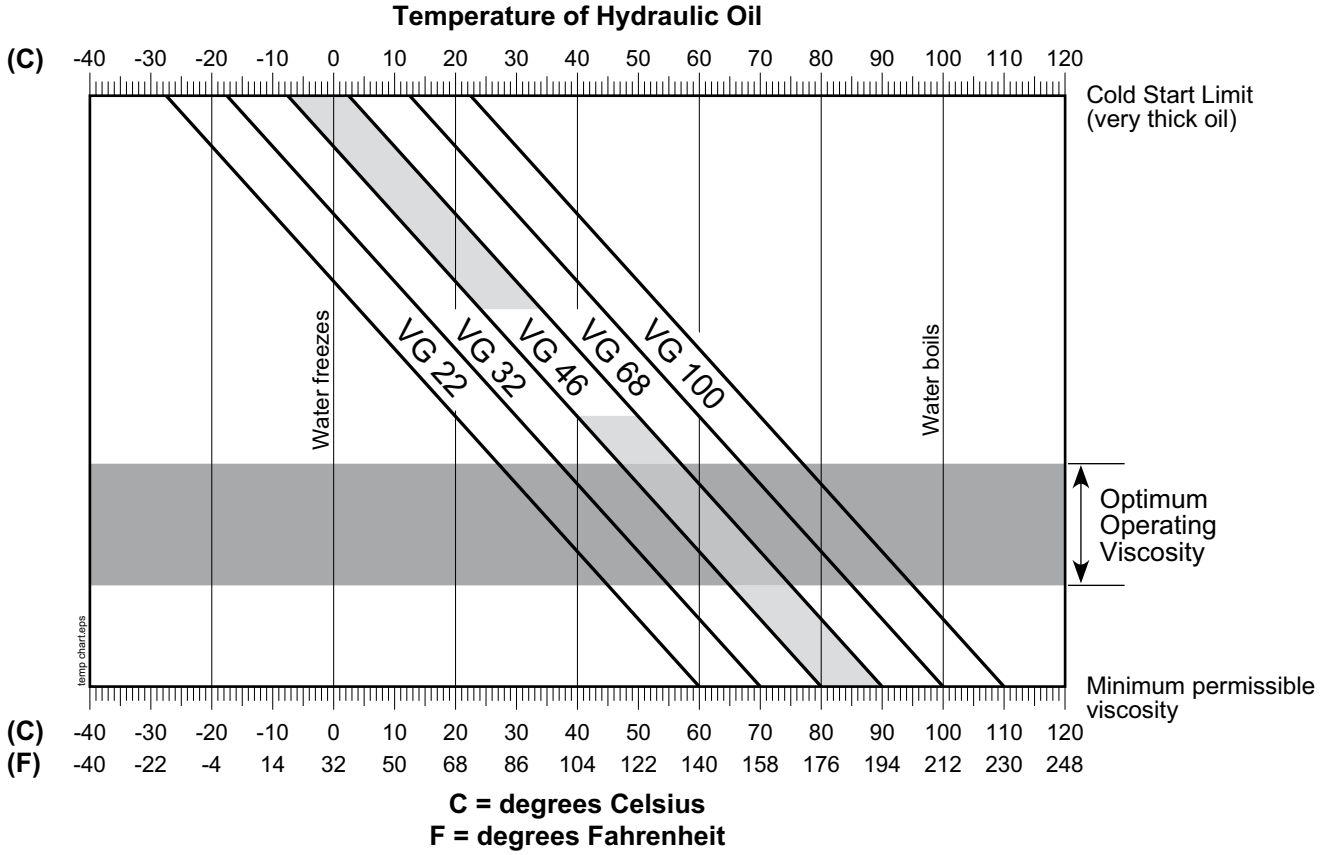
Appendix

Hydraulic Oil Viscosity Chart

The illustration below shows the relationship between the oil temperature and its viscosity. As you can see, the oil gets thicker when the temperature is low and thinner as the temperature rises.

Your Schwing concrete pump was delivered with Mobil Univis N46 hydraulic oil. This multi viscosity works for any temperature between -20˚ F and 100˚ F. If you have chosen to change to a regular viscosity oil, pay close attention to the following.

- The cold start limit represents the coldest temperature at which the oil is thin enough to flow into the hydraulic pumps. If it were any colder, the pumps would not be able to suck in the oil (cavitation).
- The minimum permissible viscosity represents the warmest temperasture at which the oil will still be thick enough to provide lubrication and sealing. If it were warmer, the components would have metal-to-metal contact (thermal breakdown).
- The optimum operating viscosity is the range of oil thickness at which the oil works best (thin enough to flow easily, yet thick enough to protect the system components).
- An example of how to read a chart for VG-46 oil is given in the chart below. The chart shows the cold start limit as –8°C (18°F) and the minimum permissible viscosity as 90°C (194°F). The optimum range is 50°– 76°C.



Torque Specifications for Metric Bolts

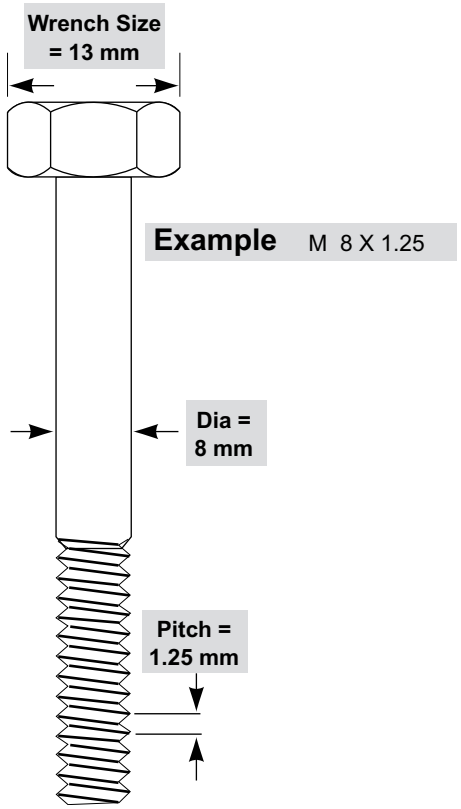
The following charts show the tightening torques specified for the bolts used on Schwing equipment.

A torque wrench must be calibrated to within 1% of its indicated value throughout its range. Bolts must be torqued to within 4% of the requirement if the wrench has a dial scale. If no dial scale is present, the bolts must be torqued to within 6% of the requirement.

For example, a bolt to be torqued to a 200 pound requirement must be within the range of 208–192 foot pounds for a dial scale torque wrench.

Schwing equipment uses two different types of bolts; one has a black or silver finish and the other has a Dacromet/Geomet finish.

Torque specifications are very important for proper machine function. For more information on this subject, refer to the section on bolt tightening in the Maintenance section of this manual.



The torque specifications on the following pages refer to wrench size, bolt size and thread pitch. Above is an example showing what those numbers refer to.

Torque Chart

Dacromet/Geomet 500 Coating

1. Nuts and Bolts as per DIN 912 – 931 – 933 – 934 – 6914 - 6915

Applicable to: **1. Dacromet/Geomet 500 coating.**

2. Black and silver-chromated nuts and bolts fitted with mounting paste such as Cu or MOS_2.

These are the torque values as of January 09.

Bolt torqueDACROGEOMET.eps

Coarse-Pitch Thread

Wrench Size (mm)	Bolt Size Thread Designation	* Fitting Tightening Torque (Nm, ft lb) Property Class 8,8 N m	8,8 ft lb	10,9 N m	10,9 ft lb	12,9 N m	12,9 ft lb
7	M 4 X 0.7	2,2	1,6	3,2	2,4	3,8	2,8
8	M 5 X 0.8	4,3	3,2	6,4	4,7	7,5	5,5
10	M 6 X 1	7,5	5,5	10,8	8	12,6	9,3
13	M 8 X 1.25	18	13	27	20	31	23
17	M 10 X 1.5	36	27	53	39	62	46
19	M 12 X 1.75	62	46	90	66	108	80
22	M 14 X 2	100	74	140	103	170	125
24	M 16 X 2	150	111	225	166	260	192
27	M 18 X 2.5	220	162	310	228	365	269
30	M 20 X 2.5	300	221	440	324	510	376
32	M 22 X 2.5	420	310	590	435	700	516
36	M 24 X 3	530	391	750	553	880	649
41	M 27 X 3	780	575	1120	826	1300	958
46	M 30 X 3.5	1080	796	1530	1128	1750	1290
55	M 36 X 4	-	-	**2000	**1475	-	-

Fine-Pitch Thread

Wrench Size (mm)	Thread Designation	* Fitting Tightening Torque (Nm, ft lb) Property Class 8,8 N m	8,8 ft lb	10,9 N m	10,9 ft lb	12,9 N m	12,9 ft lb
13	M 8 X 1	20	15	28	21	33	24
17	M 10 X 1	40	29	57	42	68	50
17	M 10 X 1.25	37	27	55	41	64	47
19	M 12 X 1.25	67	49	100	74	115	85
19	M 12 X 1.5	65	48	95	70	110	81
22	M 14 X 1.5	105	77	155	114	180	133
24	M 16 X 1.5	160	118	235	173	280	206
27	M 18 X 1.5	240	177	345	254	400	295
30	M 20 X 1.5	335	247	475	350	590	413
32	M 22 X 1.5	460	339	650	479	750	553
36	M 24 X 2	560	413	810	597	940	693
41	M 27 X 2	820	604	1170	862	1390	1025
46	M 30 X 2	1170	862	1660	1224	1930	1423

* The fitting tightening torque corresponds to the axial force in the bolt at which the limit of elasticity of the latter is utilised 90 % by tension and torsion.

** Octagonal Mast

a. DACROMET/GEOMET 500 means coated with Teflon and silver colored.
b. Conversion: 1 Nm = .738 ft-lb.

Torque Chart

Black and Silver Chromated

2. Nuts and Bolts as per DIN 912 – 931 – 933 – 934 – 6914 - 6915

Applicable to: **Black and silver chromated nuts and bolts.**

These are the torque values as of January 09.

Coarse-Pitch Thread

Wrench Size (mm)	Bolt Size: Thread Designation	* Fitting Tightening Torque (Nm, ft lb)					
		Property Class					
		8,8		10,9		12,9	
		N m	ft lb	N m	ft lb	N m	ft lb
7	M 4 X 0.7	2,7	2	4	3	4,6	3
8	M 5 X 0.8	5,3	4	7,8	6	9	7
10	M 6 X 1	8	6	13,5	10	16,2	12
13	M 8 X 1.25	22	16	32	24	38	28
17	M 10 X 1.5	44	32	64	47	75	55
19	M 12 X 1.75	76	56	112	83	130	96
22	M 14 X 2	120	89	180	133	210	155
24	M 16 X 2	185	136	275	203	325	240
27	M 18 X 2.5	270	199	385	284	450	332
30	M 20 X 2.5	380	280	550	406	640	472
32	M 22 X 2.5	520	384	740	546	870	642
36	M 24 X 3	650	479	940	693	1095	808
41	M 27 X 3	990	730	1390	1025	1620	1195
46	M 30 X 3.5	1300	959	1890	1394	2200	1623
55	M 36 X 4	-	-	**2000	**1475	-	-

Fine-Pitch Thread

Wrench Size (mm)	Thread Designation	* Fitting Tightening Torque (Nm, ft lb)					
		Property Class					
		8,8		10,9		12,9	
		N m	ft lb	N m	ft lb	N m	ft lb
13	M 8 X 1	24	18	35	26	41	30
17	M 10 X 1	50	37	70	52	85	63
17	M 10 X 1.25	46	34	65	48	80	59
19	M 12 X 1.25	83	61	120	89	145	107
19	M 12 X 1.5	80	59	115	85	140	103
22	M 14 X 1.5	130	96	190	140	230	170
24	M 16 X 1.5	200	148	295	218	350	258
27	M 18 X 1.5	300	221	435	321	510	376
30	M 20 X 1.5	425	313	610	450	710	524
32	M 22 X 1.5	580	428	825	608	940	693
36	M 24 X 2	720	531	1030	760	1210	892
41	M 27 X 2	1030	760	1480	1092	1750	1291
46	M 30 X 2	1480	1092	2110	1556	2470	1822

* The fitting tightening torque corresponds to the axial force in the bolt at which the limit of elasticity of the latter is utilised 90 % by tension and torsion.

** Octagonal Mast

a. DACROMET/GEOMET 500 means coated with Teflon and silver colored.
b. Conversion: 1 Nm = .738 ft-lb.

Recommended Emergency Hose Kit

Schwing recommends that you carry one of each of the following hoses on the unit in case you blow a hose on the job. Each size listed represents the longest hose of each diameter that is installed on the unit at the factory. Keep the insides of the hoses clean until they are needed by capping the ends and using tape to hold the cap in place. Dirt introduced into your hydraulic system through the installation of a hose that was not kept clean will cause a variety of problems in the operation of the unit.

Diameter	Length	Part Number
8	6400mm	30314105
13	6400mm	30314106
16	1350mm	10049948
20	1000mm	10049959
25	2100mm	30347677
32	1100mm	10000230

Fitting Wrench Sizes

This chart is provided as an aid to selecting the proper wrench to hold or tighten the hydraulic fittings on Schwing equipment. Sizes may change, so use this chart only as a guide.

Straight fittings

Fitting or Tube Size (mm)	Metric Wrench Sizes		Nearest American Wrench Sizes	
	Cap Nut (mm)	Coupling Body (mm)	Cap Nut (in.)	Coupling Body (in.)
8	17	17	11/16	11/16
12	22	19	7/8	3/4
16	30	27	1 3/16	1 1/16
20	36	32	1 7/16	1 1/4
25	46	41	1 13/16	1 5/8
30	50	46	2	1 13/16
38	60	55	1 3/8	1 13/16

Banjo fittings

End Cap Separate from Stem

Fitting or Tube Size	Metric Wrench Sizes			Nearest American Wrench Sizes		
	Cap Nut (mm)	Coupling Body (mm)	End Cap (mm)	Cap Nut (mm)	Coupling Body (in.)	End Cap (in.)
8 mm	17	22	19	11/16	7/8	3/4
12 / R 1/4 in.	22	22	19	7/8	7/8	3/4
12 / R 3/8 in.	22	27	22	7/8	1 1/16	7/8
12 / R 1/2 in.	22	30	24	7/8	1 3/16	15/16
16 mm	30	32	27	1 3/16	1 1/4	1 1/16
20 mm	36	41	32	1 7/16	1 5/8	1 1/4
25 mm	46	50	41	1 13/16	2	1 5/8
30 mm	50	60	50	2	2 3/8	2
38 mm	60	70	55	2 3/8	2 13/16	2 3/16

End Cap Part of Stem

12 / R 3/8 in.	22	24	22	7/8	15/16	7/8
16 mm	30	30	27	1 3/16	1 3/16	1 1/16
25 mm	46	46	41	1 13/16	1 13/16	1 5/8
38 mm	60	65	55	2 3/8	2 9/16	2 3/16

Weld-on Ends / Coupling Comparison

Shown is a comparison among commonly used ends/couplings. No two ends shown can be joined without the use of an adapter pipe or a special adapter clamp. Clamps and pipe strength must also be considered when determining proper system requirements. The ratios shown in the text below represent the safety factor from burst : working pressures.

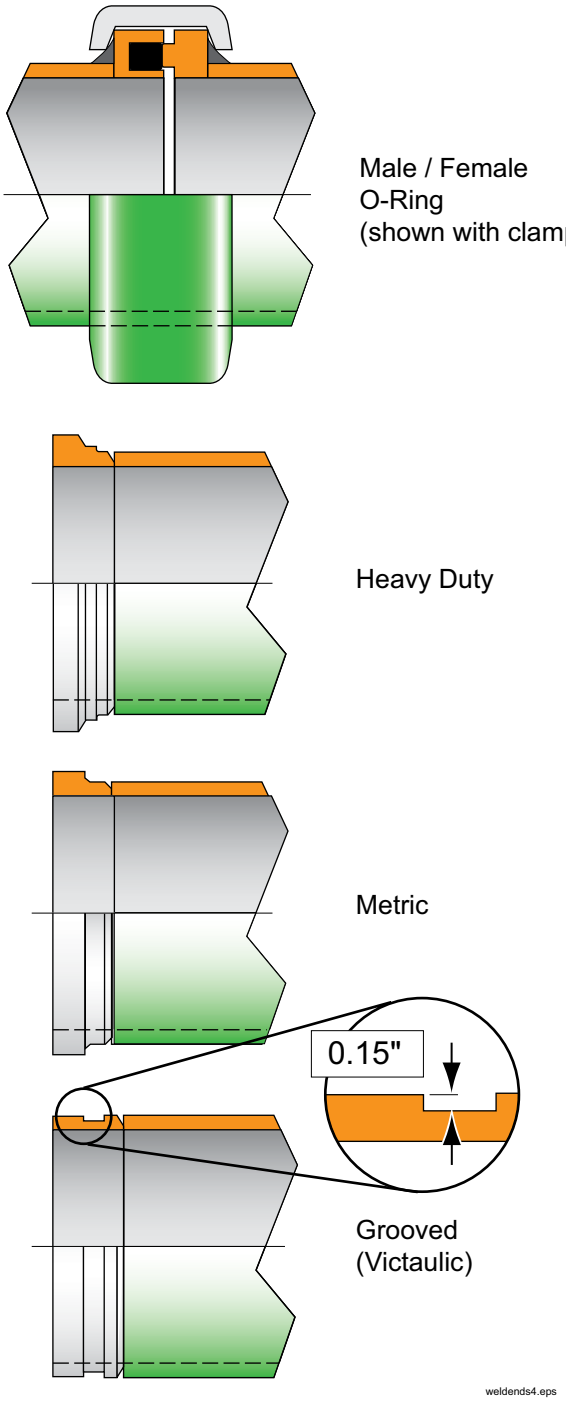
1. Male / female o-ring style couplings have the highest pressure rating of the ends commonly used for concrete pumping. They can withstand 4350 PSI @ a 2:1 safety factor. They are self aligning and waterproof when used with o-rings in good condi- tion. They are typically not used on booms because of their weight. Pipes equipped with this style cou- pling cannot be swapped end-for-end.

2. Heavy-Duty couplings are designed for pressures up to 2250 PSI @ 2:1. They have 20% more contact area than metric couplings and a tapered face that draws the pipe sections together during assembly. Both the ends and clamps weigh more than metric style and, therefore, should not be used on booms without consulting the manufacturer.

3. Metric couplings are designed for pressures up to 1400 PSI @ 2:1. They have 85% more contact area than grooved couplings. The face is flat and will not draw pipe together. Although they have a raised edge, they are not compatible with Heavy Duty cou- plings unless a special clamp or an adapter pipe is used to change from one style to the other. Metric connections are standard equipment on booms because of the weight savings compared with other styles.

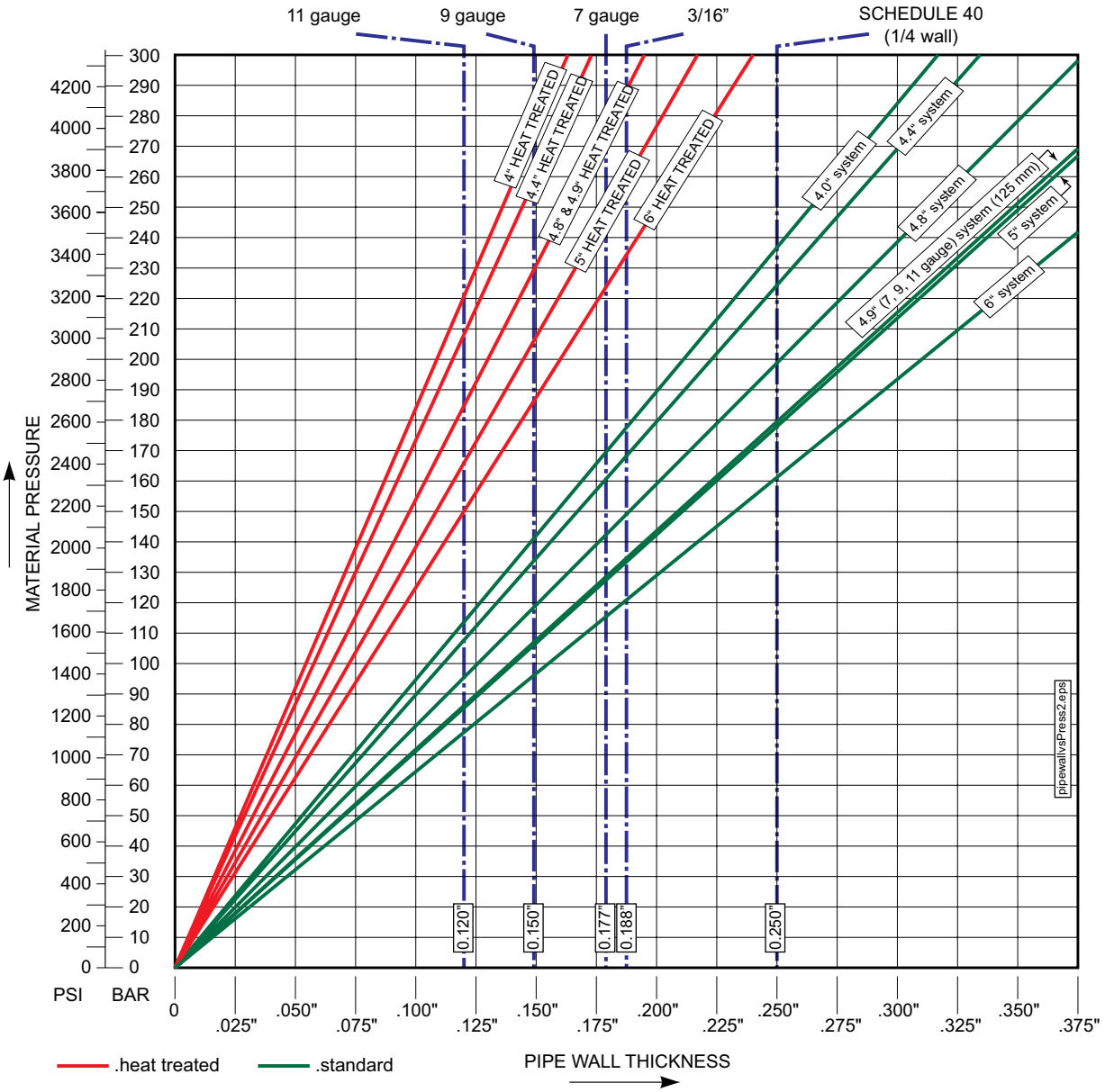
4. Grooved couplings (lip height of 0.15” or less) are designed for pressures only up to 750 PSI @ 2:1. The recessed groove is hard to clean when changing pipe on a job. The weld-on end fails before the pipe because the groove is cut into the pipe thickness, making it the weakest spot. Grooved couplings are not recommended for concrete pumping applications.

All pressure ratings listed refer to 5-inch (125mm) diameters in like-new condition. Other pressures would apply to other sizes.



Minimum Pipe Wall Thickness

Single Wall



1. This chart assumes a safety factor of 2:1. Higher safety factors may be required in some circumstances.
2. Wear reduces wall thickness. Thickness must be checked on a regular basis.
3. Pressures may be limited even more by clamp style or pipe end used.
4. The chart is based on 62,000 PSI tensile strength. Heat-treated calculations are based on 120,000 PSI tensile strength.
5. The chart is for pressure calculations ONLY. There is no allowance for mechanical forces other than pressure, and thicker walls may be needed for mechanical strength because of support or restraint considerations.
6. The chart does not take into account metal fatigue caused by pressure cycles.
7. The chart does not apply to the system at the back end of the pump. The outlet pipe, tapered bend, 6 inch elbow, and 6 to 5 reducer have a minimum wall thickness of 2mm or .079 inches, and must be able to handle the maximum material pressure of the pumpkit.

Note! This chart is intended as a guide for concrete pumping applications and is subject to the notes, assumptions, and conditions listed above. Any other use of this chart is not recommended.

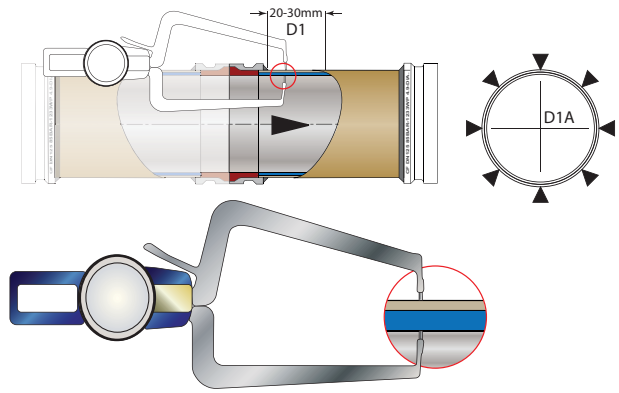
This chart does not apply to double-wall pipe. Double wall pipe can be checked by inspecting the inside of the pipe. If the insert is intact, the pipe is okay. If the insert is worn through, the pipe must be replaced. Contact your pipe supplier for the pressure capacity of your double-wall pipe.

Minimum Pipe Wall Thickness

Twin Wall

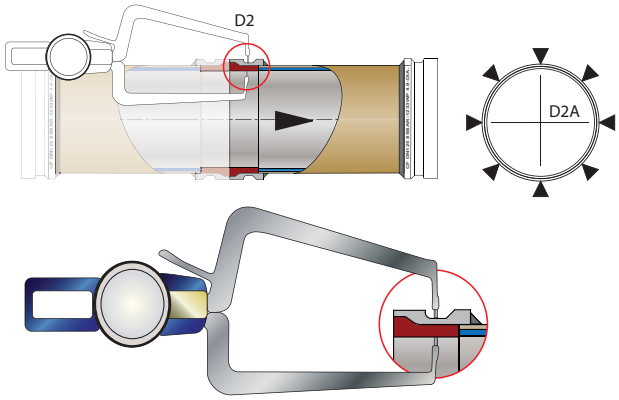
Measuring points on pipe wall:

Measure multiple points circumferential, approx. 20-30 mm behind the weld zone as illustrated in (D1)and (D1A). Measurements should be done on both ends of the pipe.



Measuring points on Weld end:

Measure multiple points circumferential in the weld end groove as illustrated in (D2) and (D2A). Measurements should be done on both ends of the pipe.



S2000

Size	Overall Wall Thinkness (New)	D1 in./mm	D2 in./mm
DN125/4.8	.180 / 4.572	.110 / 2.794	.230 / 5.842

S3000

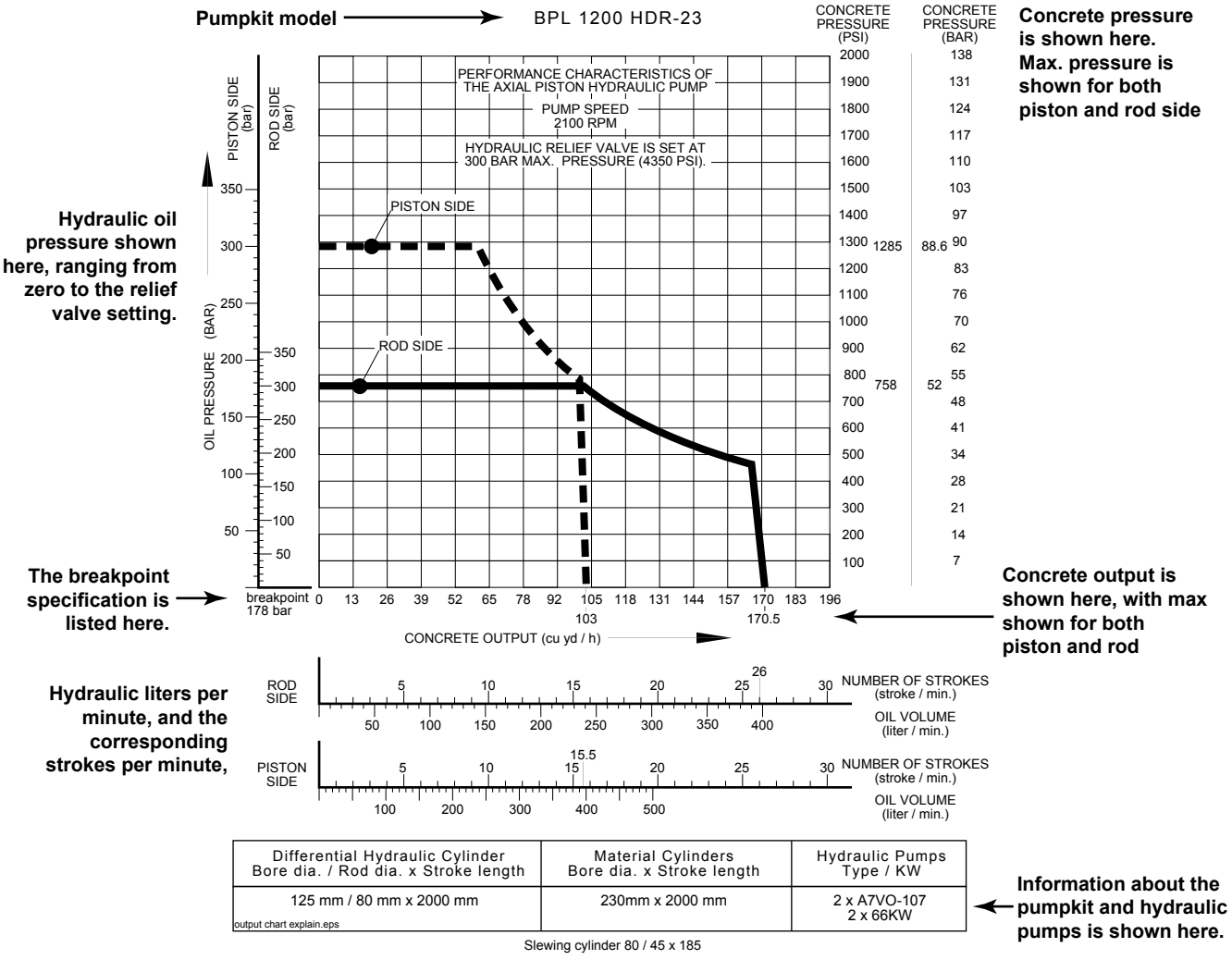
Size	Overall Wall Thinkness (New)	D1 in./mm	D2 in./mm
DN125/4.8	.188 / 4.775	.090 / 2.286	.230 / 5.842

Output Charts

The hydraulic pumps that drive your concrete pump are horsepower controlled. That means that when pressure rises past a certain point (known as the breakpoint), the pumps change their displacement per revolution, resulting in less flow and fewer strokes per minute. The reason for this is so the pumps will not stall your engine by drawing too much horsepower. Output charts show the horsepower curve (in kilowatts, or Kw) of the concrete pump hydraulic circuit. From them, you can determine the:

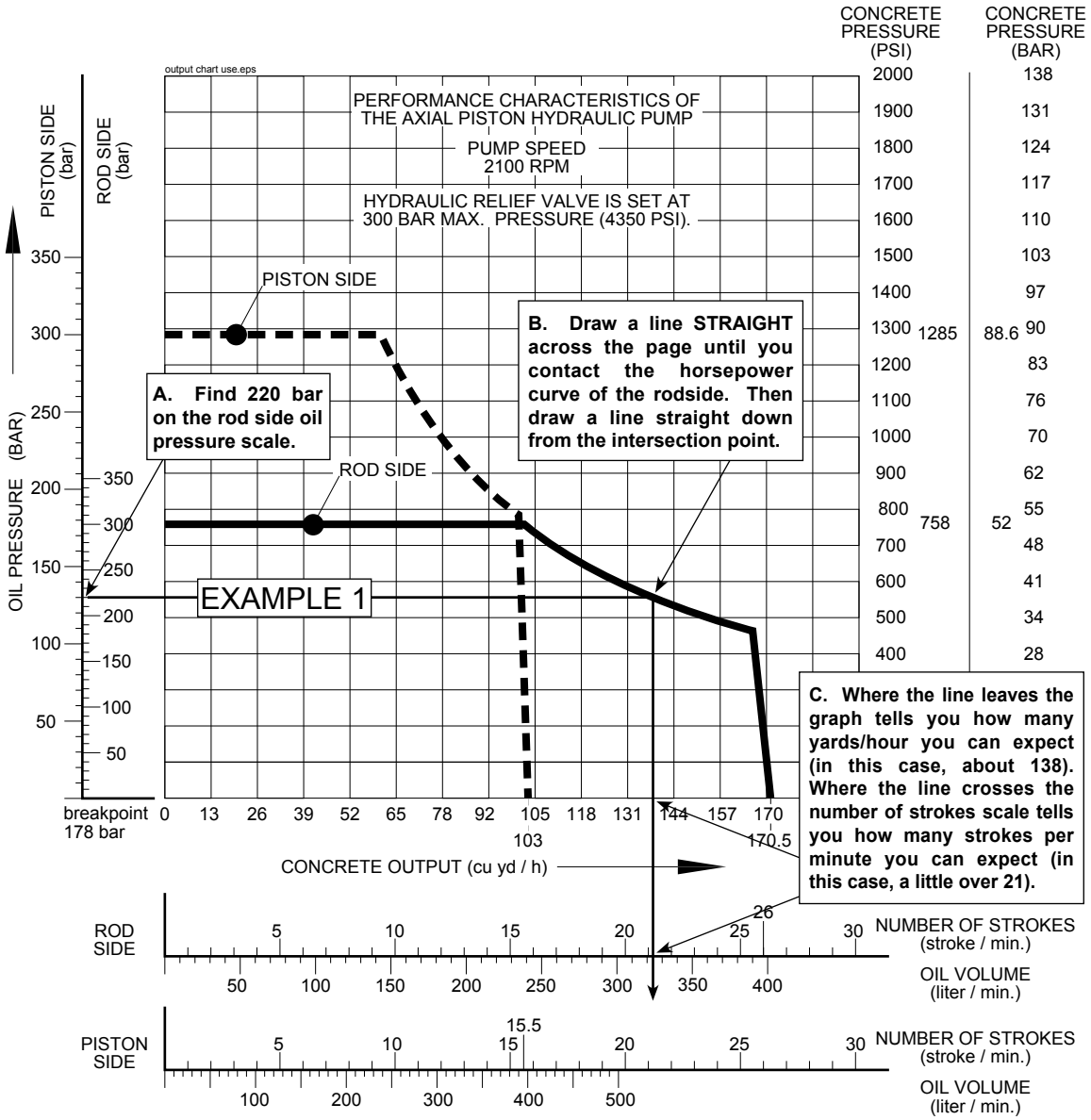
- Maximum concrete pressure of the pumpkit.
- Maximum output (in cubic yards per hour) of the pumpkit.
- Maximum strokes per minute of your pumpkit.
- Maximum output (in liters per minute, L/min) of your hydraulic pumps,
- Output at various pumping pressures.
- Condition of your hydraulic pumps when used in conjunction with a flowmeter.
- Breakpoint of your hydraulic system.

An explanation of an output chart is shown on the following pages, followed by some examples of chart usage. The output chart of the pumpkit shipped with this manual is shown later.



Example 1—Checking flow at a given pressure

Your unit is configured on the rod side (standard from the factory). You notice that your machine is not getting as many strokes per minute as you are used to seeing. You count the strokes and see that you are getting about 21-1/2 per minute. You check your pressure gauge and see that the hydraulic oil pressure is at 220 bar. To determine whether your unit is acting normally: Locate the 220 bar oil pressure marking on the rod side scale (Item A in the example below). Draw a line straight across the page until you intersect with the horsepower curve (Item B). Next, draw a straight line down from the intersection point until you pass through the rod side number of strokes scale, and read the strokes per minute. At 220 bar you should be getting a little more than 21 strokes per minute. Your unit is fine.



Example 2—Checking your hydraulic pumps

To determine whether your pumps are still in good working condition, use the output chart and a flow meter. Test one pump at a time, multiply the readings by 2, and chart the result. You must multiply the readings because the chart is based on the output of two pumps, but we are only testing one at a time.

Breakpoint specification		1st Pump Liters/min (read on meter)		Total (for plotting)		2nd Pump Liters/min (read on meter)		Total (for plotting)
	0 bar	_____	x 2	_____		_____	x 2	_____
	100 bar	_____	x 2	_____		_____	x 2	_____
_____	breakpoint	_____	x 2	_____	_____	_____	x 2	_____
☐ 150 or ☐ 200 bar		_____	x 2	_____	breakpoint	_____	x 2	_____
	250 bar	_____	x 2	_____		_____	x 2	_____
	300 bar	_____	x 2	_____		_____	x 2	_____

Check output form-R82

To test your pumps:

- Be sure you are using the chart that applies to your unit.
- Select the proper gear for pumping (found on the information plate mounted in the cab).
- Set the pump speed (input drive shaft) RPM. Pump speed information is found on line 16 of the Delivery Inspection Report, which arrived with your unit when it was new. A difference of even a few RPM will give you a bad reading. Check the RPM of the drive shaft with a digital tachometer if one is available.
- Know how to use your flowmeter. Read the instructions that came with it, and remember that a flowmeter must be calibrated periodically.
- Make two copies of the output chart so you don't ruin your original. You need one chart for each pump tested.

Read the flow at 0 bar, 100 bar, 150 or 200 bar, 250 bar, and 300 bar. Also, document the breakpoint. The breakpoint is where the flow drops off rapidly. You will be able to notice it on the flowmeter. If you think it would be helpful, copy the chart below. Check which reading you used (150 or 200 bar). The breakpoint will be very close to either 150 or 200 bar, so it is not necessary to take both readings. The breakpoint specification is shown on each output chart.

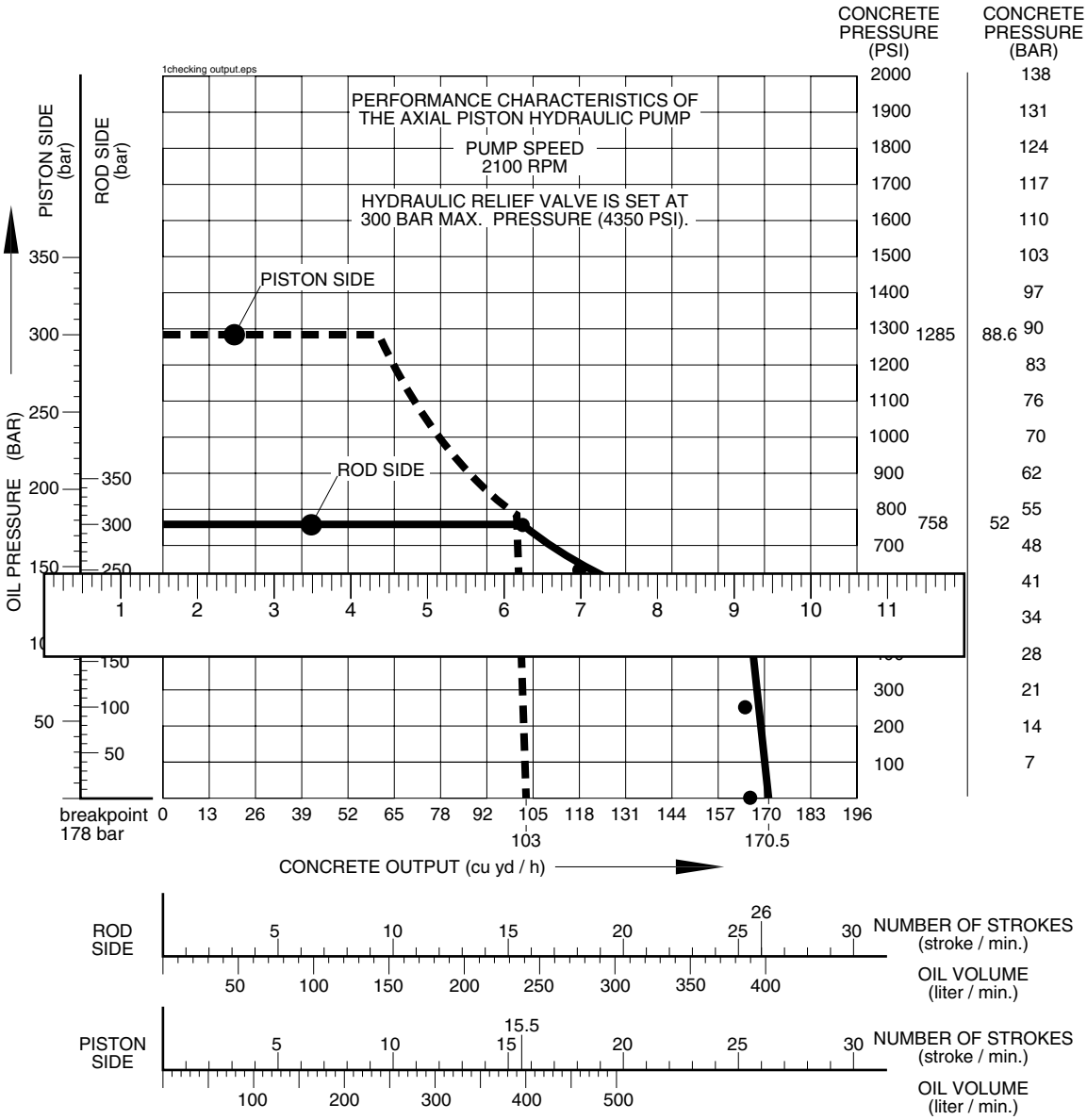
As an example, we'll assume that we have just taken the following readings:

Breakpoint specification		1st Pump Liters/min (read on meter)		Total (for plotting)		2nd Pump Liters/min (read on meter)		Total (for plotting)
178	0 bar	199	x 2	398		_____	x 2	_____
	100 bar	196	x 2	392		_____	x 2	_____
178	breakpoint	194	x 2	388	_____	_____	x 2	_____
☐ 150 or ☑ 200 bar		169	x 2	338	breakpoint	_____	x 2	_____
	250 bar	138	x 2	276		_____	x 2	_____
	300 bar	117	x 2	234		_____	x 2	_____

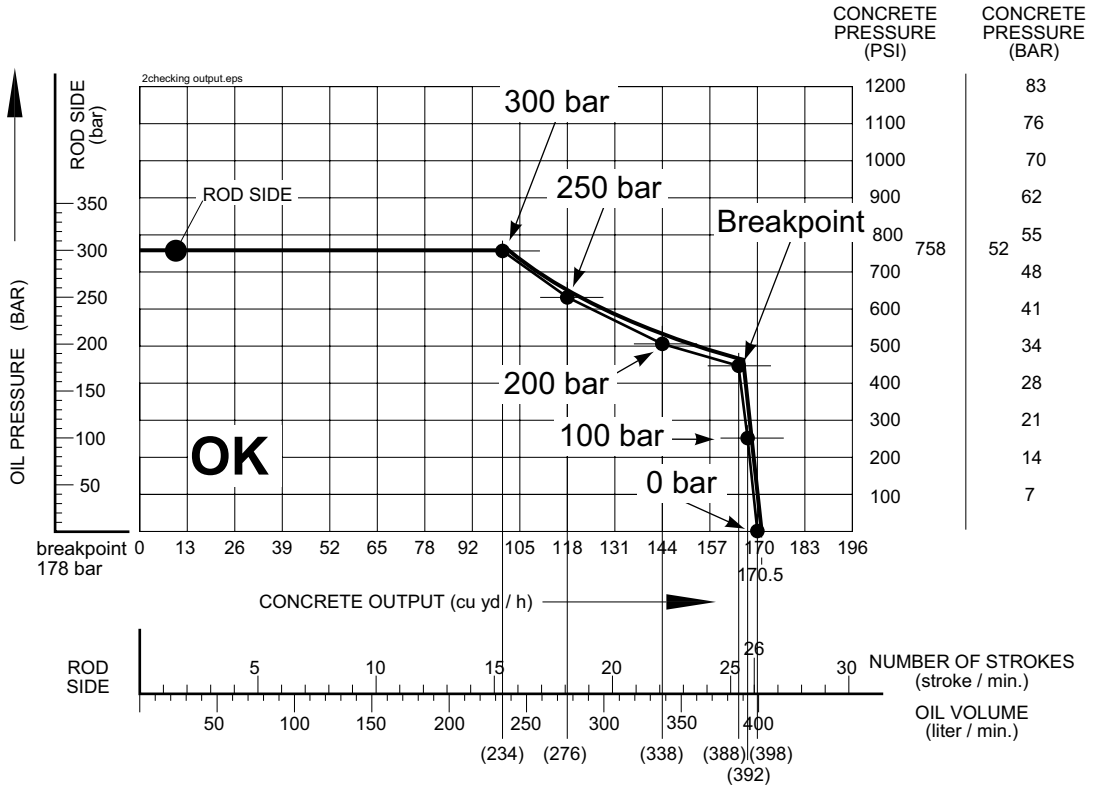
Check output form-R82

- Lay a straight edge horizontally across the page at the pressure point you are plotting. Draw a light line across the chart. In the example below, we use the rod side scales and curve (you could use the piston side scale and curve instead if you were configured on the piston side). The ruler is shown ready to draw a line at 250 bar hydraulic pressure.
- Turn the ruler sideways, and draw a light line up the page from the liters/minute reading you took at that pressure (remember to multiply the reading by 2). In our example, we measured 276 liters at 250 bar.
- Put a dot at the point where the two lines intersect.

Do the same thing with each pressure reading. You should end up with six dots.



- Connect the dots. If your plotted line reasonably matches the specification plot on the chart, the pump is fine. If your line is to the lower left of the specification plot, the pump is getting weak. If your line is to the upper right, you have done the test incorrectly, or you are using the wrong chart. In our example, the pump is okay. (See the plot that follows.)



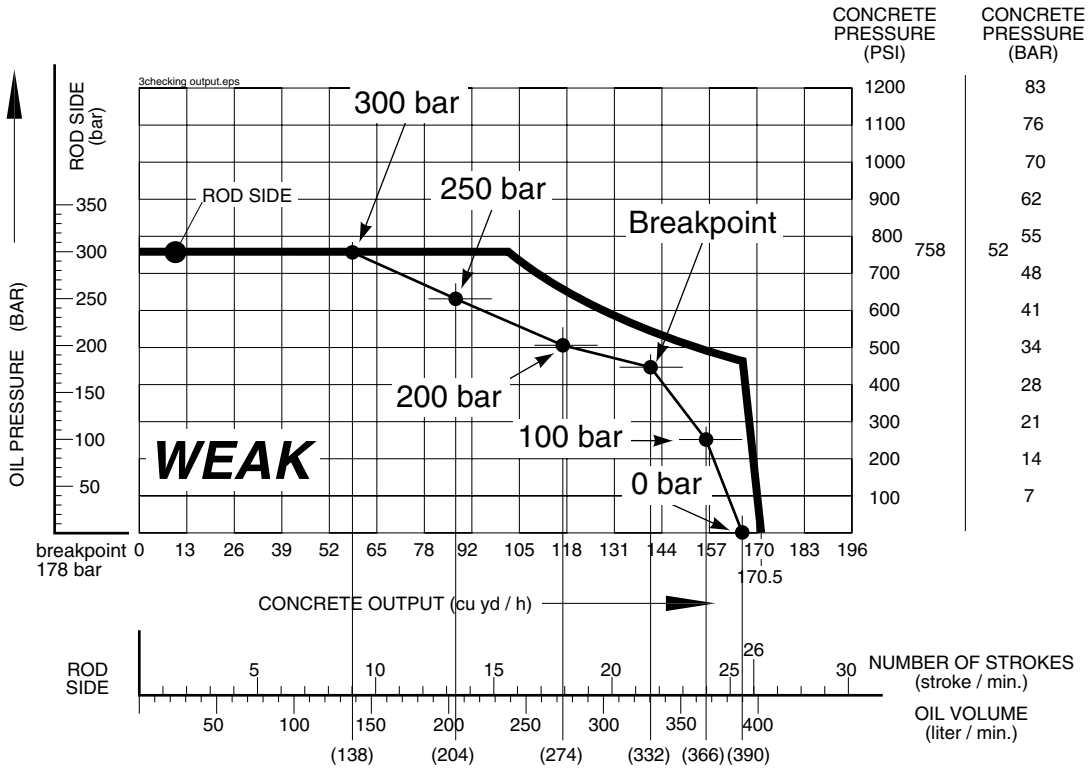
(Piston side scales have been removed for clarity.)

Check the second pump. Hook up the flowmeter just as when you checked the first pump. Again, be sure that you have the correct speed, gear, chart, and so on. This time our example will have worse results.

Breakpoint specification		1st Pump Liters/min (read on meter)		Total (for plotting)		2nd Pump Liters/min (read on meter)		Total (for plotting)
178	0 bar	199	x 2	398		195	x 2	390
	100 bar	196	x 2	392		183	x 2	366
178	breakpoint	194	x 2	388	178 breakpoint	166	x 2	332
☐ 150 or ☑	200 bar	169	x 2	338		137	x 2	274
	250 bar	138	x 2	276		102	x 2	204
	300 bar	117	x 2	234		69	x 2	138

Check output form-682

Again, plot the results on a clean copy of the flowchart. As we plot this pump, we can see that the dots are moving quite a bit to the inside of the flow specification (see below).



Note: Piston side scales have been removed for clarity.

When you connect the dots, the line is completely below the specifications. This pump is very weak and will completely stop pumping oil soon. You may notice high heat with this unit if you are pumping at high oil pressures.

Never try to make up for this weak pump by increasing the speed of the engine. If the pump turns faster than specification, it will not be able to draw oil as fast as it is turning ("cavitation"), and immediate failure could result.

If the plotted curve matches the specification plot for a while but the breakpoint is too high or too low, it is possible to make an adjustment. Contact Schwing America's Service Center for the procedure.

There are many different possible pump kits and power settings for this unit. If you accidentally destroy your original output chart, please have your serial number handy when you call to get a replacement. Also, please advise us if you have changed differential cylinders, material cylinders, or hydraulic pumps, because you may need a different output chart than the one that was originally shipped with the unit.

Using a Nomograph

Concrete pumps are limited in what jobs they can do by three factors:

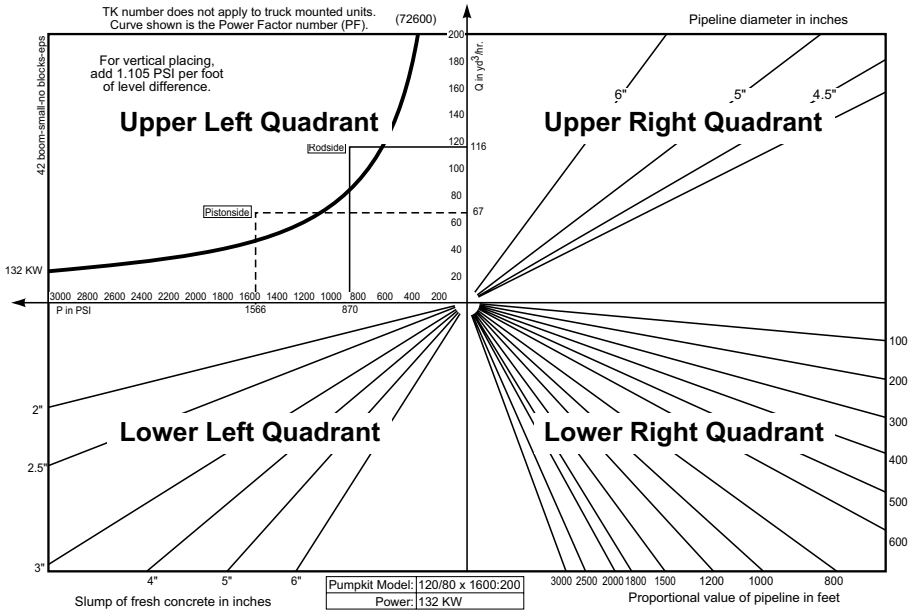
1. the amount of power available,
2. the maximum concrete output available, and
3. the maximum concrete pressure available.

To estimate the power a pump requires to complete a particular job and to determine which pump is appropriate, a nomograph is used.

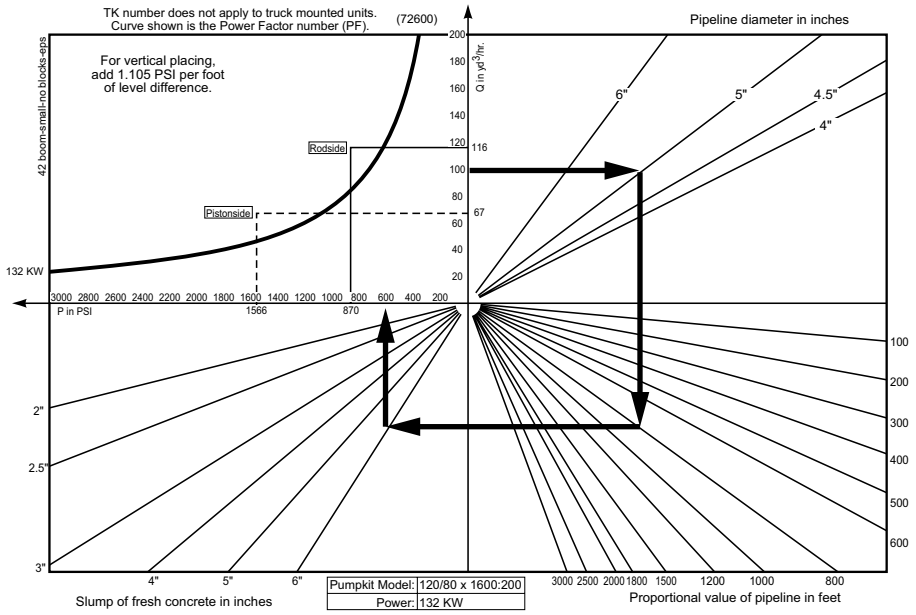
With a concrete pump that is driven by its own prime mover, such as a trailer-mounted concrete pump or a truck-mounted pump with a separate drive engine, the power rating (in Kw) is shown for the engine or electric motor. With a truck-mounted pump that uses a PTO from the truck engine, the power rating reflects the power output of the hydraulic pumps only. (All the power from the truck engine is normally not available to the concrete pump and should not be used for power calculations.) If you know the required output for the job, the nomograph will help you calculate the required pressure. If you know the output and pressure, you can calculate the power requirement.

The nomograph was developed by extensive trial-and-error testing and has proven to be accurate to ±10% in nearly all pumping applications. The original nomographs used “spread measure” of fresh concrete instead of slump, and the two are not directly interchangeable. Some approximations are used in translating the charts from spread measure to slump, but the ±10% accuracy still applies. In all cases, it is assumed that you will receive fresh, high-quality concrete on your job and that the concrete will be plastic enough to flow into the material cylinders. If you know that the concrete will be hard to feed into the cylinders, you should adjust the output requirement to compensate for incomplete filling. For example, if you will need 50 cubic yards per hour into the form but the concrete is so stiff that it will fill the cylinders only 80%, you should multiply the required output by 1.25 (1 ÷ 80%).

The nomograph is divided into four quadrants.The upper left quadrant is the beginning and end point of the graph, and it shows maximum output, pressure, and power for a specific machine. The upper right quadrant accounts for the relationship between concrete output and pipeline diameters. The lower right quadrant accounts for the resistance to flow of the entire pipeline system. The lower left quadrant accounts for the pumpability of the concrete.



To use the nomograph, begin at output required and move clockwise until you encounter the lines that represent your job situation. Each time you meet the line that applies, make a 90° turn until you come to a point on the bottom of the upper left quadrant that shows pressure required.



To illustrate the use of a nomograph, we will use a hypothetical job situation with the following specifications:

1. We will need an average output of 75 cubic yards per hour, but we will be pumping only 75% of the time. The rest of the time will be spent moving hose, removing pipe lengths, waiting for concrete trucks, and taking care of miscellaneous jobs. This means that when we are actually pumping, we will need an output rate of 75 ÷ 75 = 100 yd3/hr.

2. We will use 5-in.-diameter pipeline.

3. We will need the following pipeline lengths: Separately laid pipeline:

- 40 ft of 5-in. rubber hose
- 150 ft of 5-in. horizontal steel pipe

Boom pipe, elbows, and deck system:

- 13 ft. of 5-in. rubber hose
- 144 ft. of 5-in. steel pipe (on the boom and pump deck)
- 5.25 ft. of 6–to–5-in. reducer (on the pump)
- four 5-in. 45° elbows, radius 250 mm
- eleven 5-in. 90° elbows, radius 250 mm
- two 6-in. 90° elbows, radius 250 mm

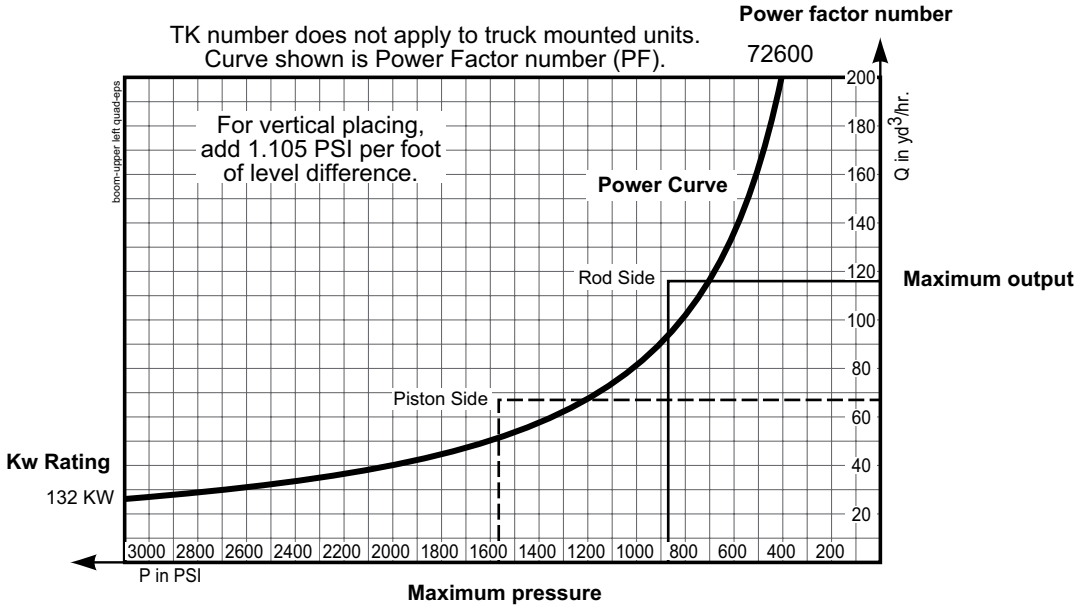
4. We will specify a slump of 5-6 in. and use the 5-in. line on the chart.

5. In addition, when we add the pressure for the vertical run, we will have to add 1.1 times 70 ft = 77 PSI.

All of these criteria will be explained in detail as we go through the individual quadrants.

The quadrants

1. The upper left quadrant describes the power curve of a given hydraulic pump Kw rating and the maximum output and maximum pressure of a particular model of concrete pump.



Any concrete pump selected for a job must meet three technical parameters:

- the power factor number of the pump must be equal to or greater than the power factor number of the job,
- the maximum output required by the job must be available from the pump, and
- the maximum pressure required by the job must be available from the pump.

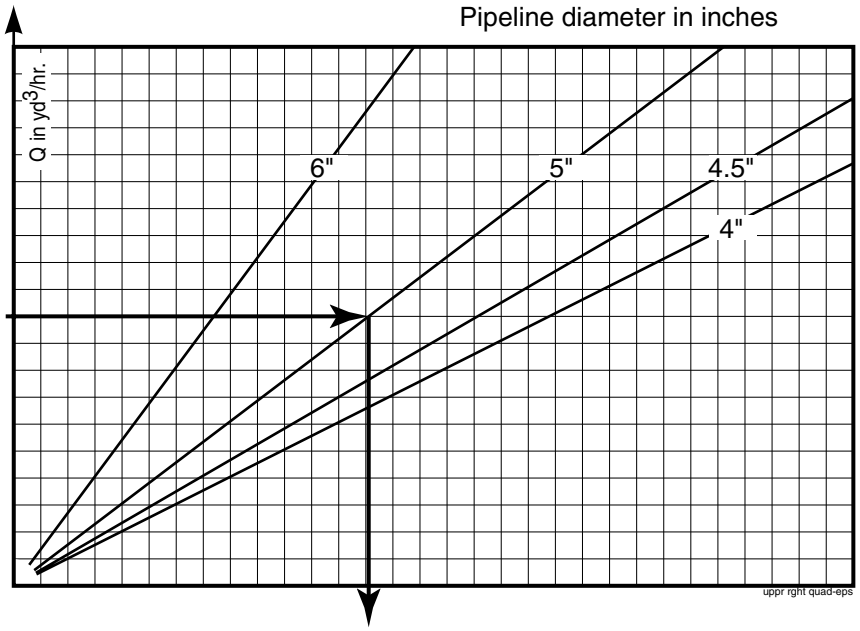
It is important to notice the pump maximum pressure and maximum output, even if the power factor number of the pump is larger than the job requires. These parameters are decided during the design stage of the unit and cannot be adjusted on the job. If the unit is able to go from rod side to piston side, maximum pressure and output can be exchanged—that is, you can decrease one while increasing the other the same amount.

The power factor number (PF) replaces the TK number on a truck-mounted unit. It is the Kw multiplied by a constant (550) that has several efficiency factors figured in. When using an Americanized nomograph (pressure in PSI and flow in cubic yards per hour), the pressure multiplied by the output must always be less than or equal to the PF. For example, if you needed 50 cubic yards per hour and determined that this will require 750 PSI, you can multiply 50 by 750, which equals 37,500. Any pump you select must have a PF of 37,500 or greater. If you are using a nomograph that has been converted to metric units of measure (pressure in bar and output in cubic meters per hour), you can still multiply the pressure by the output, but you must multiply the answer by the conversion factor between metric and English units of measure to get the PF. The conversion factor for cubic yards to cubic meters and for bar to PSI is 18.966. For all practical purposes, you can use 19. For example, if you need 50 cubic meters per hour and determine that your job setup will require 65 bar, you can multiply 50 by 65, which equals 3250. Multiply this by 19, and you find that your PF requirement is 61,750. Again, any pump you select for the job in this example should have a PF of 61,750 or greater.

The **maximum output** (abbreviated as max Q) is determined by the size of the hydraulic pumps, the number of strokes per minute, and the size of the differential and material cylinders. The unit is usually designed so maximum output can be achieved only at less than maximum pressure.

Maximum pressure (abbreviated as max P) is determined by the size of the differential and material cylinders and the setting of the main relief valve. To be sure that the unit will handle the job, be careful to notice max P and max Q. Here is an example of why that is important: You contract to pump a job that requires only 20 yards per hour, but you calculate that you will need 2100 PSI pressure. The PF of this job is 42,000 (20 x 2100). The pump shown in Figure 224 has a TK of 72,600, so there is enough power available. However, the maximum pressure available from the pump is only 1570 PSI. This pump would not do the job.

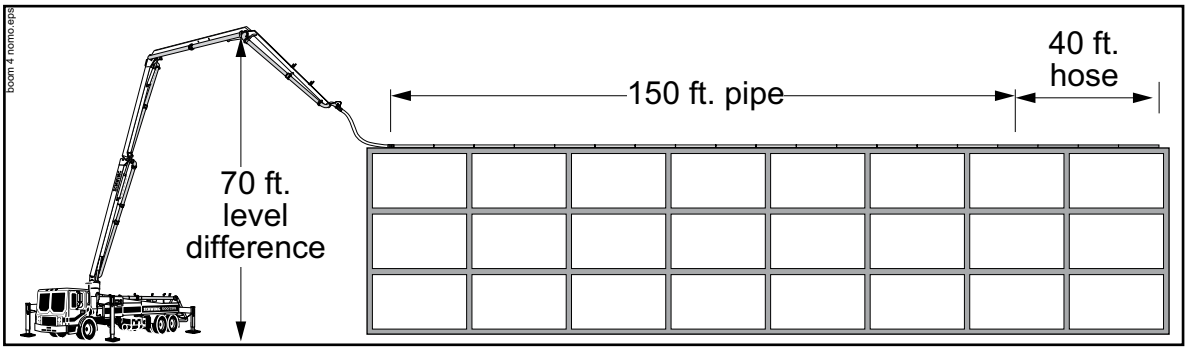
2. Follow the chart in a straight line from required output into the upper right quadrant until you come to the size of the pipeline that you will use. A good rule of thumb for sizing pipeline is to use the largest diameter pipeline that you can. It takes less force to move concrete through a 6-inch pipeline than, for example, a 4-inch pipeline. When pressure is exerted on concrete in a pipeline, a paste of water and cement fines coats the inside of the pipeline and forms a slippery layer on which the bulk of the concrete slides. While it is true that a 6-inch pipeline has 49 percent more surface area to coat than a 4-inch pipeline, the volume of concrete that can move on the layer is increased by 125 percent, which results in lower velocity of the concrete (in feet per second), lower friction, and, therefore, lower pressure. A pump that may not be capable of completing a difficult job through 4- or 5-inch pipe may be able to do it easily through 6-inch pipe. Experience has taught us that 5-inch is the optimum pipeline size for lengthy vertical runs, such as those found on high-rise buildings. It is large enough for most aggregate but small enough that you minimize the amount of concrete that slides back into the hopper when the concrete valve cycles, which we call backwash. You must also consider the people at the point of placement. Very few hose handlers, if any, can move 6-inch hose on a slab all day. There is no provision in the nomograph for mixing pipeline sizes. For example, if you will be reducing from 5-inch to 4-inch pipe, you should calculate the chart as if you were using 4-inch pipe for the entire distance. This will not be completely accurate, but you will be safe in your pressure calculation. In our example, we use 5-inch pipeline.



When the output line intersects the pipeline diameter that corresponds to your job, draw a line straight down into the lower right quadrant, as shown in Figure 225.

3. The lower right quadrant refers to the proportional value of your pipeline. It is a way of taking into account not only the length of the pipeline, but also the number of bends, the increased resistance of flow in rubber hose, and other factors. It is more a measure of the resistance to flow than a measure of length. In calculating the proportional value of your pipeline, always apply the following criteria:

- each 90° bend with a radius of 250 mm (boom elbow) = 3.5 feet
- each 90° bend with a radius of 1 meter (long sweep) = 10 feet
- each 30° or 45° bend with a radius of 1 meter or 250 mm = 3 feet
- each section of rubber hose causes three times as much resistance as the same length of steel pipe (e.g., 12 ft. of rubber hose has the same resistance as 36 ft. of pipeline)
- Figure all horizontal and vertical distances equally. The increased pressure required to push concrete vertically is accounted for by adding pressure, not distance. An example pipeline is shown below.



elbow - 90°, r = 250 mm...3.5 feet
elbow - 90°, r = 1 meter...10 feet
elbow - 30° or 45°, r = 250mm or 1 meter...3 feet

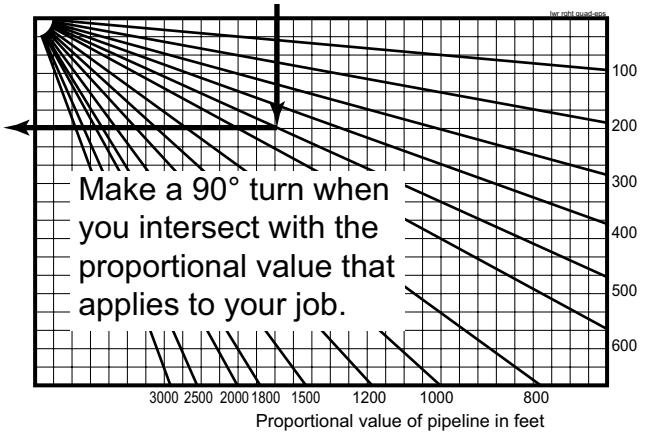
Example: You must go 150 feet out through the deck and boom pipe, including the tip hose, then through 40 feet of rubber hose. Calculate the proportional value as follows:

all boom system = 260.0 feet (includes a 12-ft long, 5-in. tip hose)
15 10-foot pipe sections = 150.0 feet
40 x 3 = 120.0 feet (for the rubber hose)
Total = 530.0 feet

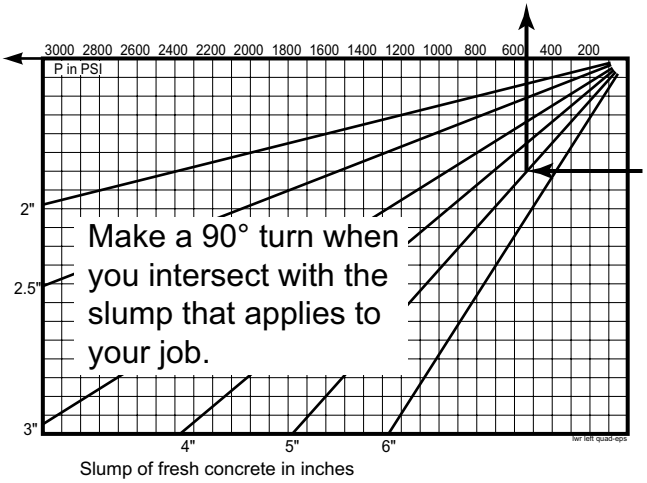
Round down to 500 feet to make it easy to use the chart.

NOTE:
Proportional value of the 41 meter boom and deck pipe system is 260 feet. This value includes elbows, reducer, and tip hose.

Once you have calculated the proportional value of your pipeline, extend your line down from the upper right quadrant until it intersects with the line that represents your pipeline. When you reach the intersection, make a 90° turn clockwise into the lower left quadrant. As noted previously, we are using 500 feet as our proportional value.



4. The lower left quadrant refers to the pumpability of the concrete. If the concrete specifications allow a range in slump (for example 5–6 in.), always use the lower end to be safe. In our example, we use 5- inch slump. Extend the line from the lower right quadrant until it intersects with the 5-inch slump line, and then make a 90° turn clockwise. This will lead you back into the upper left quadrant through the pressure scale.



As you can see we are re-entering the upper left quadrant through the pressure scale at about 550 PSI. Remember, we now have to add the head pressure for our vertical rise. At 1.1 PSI per foot of level difference and our 70-foot vertical run, we must now add 1.1 x 70 = **77 PSI** to the 550 PSI from the chart.

550 PSI + 77 PSI = 627 PSI

When calculating the head pressure from vertical runs, it doesn't matter if the pipeline runs straight up and down or if it runs uphill at an angle. Only the level difference (in feet) is needed for the pressure calculation. If the pipeline is running downhill, the operator will need special knowledge, but you don't need to add any head pressure to the nomograph.

The nomograph is now complete. The PF of our job can be calculated like this:

PF = PSI x yd3/hr

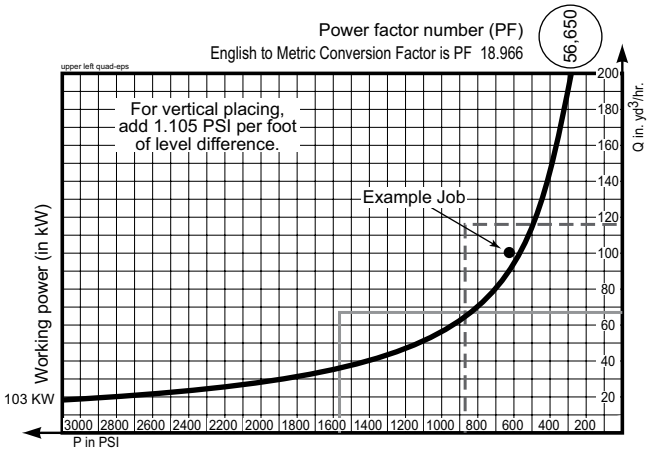
We need a unit that is capable of 627 PSI and 100 yd^3/hr. The PF of this job is:

PF = (627 x 100)

PF = 62,700

The unit must have a PF over 62,700, and it must be able to pump 100 yd3/hr and 627 PSI simultaneously. Look at the pump shown in our sample nomograph.

- Can the unit pump at 627 PSI? **Yes**
- Can the unit pump 100 yd3/hr? **Yes**
- Can the unit pump both simultaneously? **No! This unit will not do the job.**



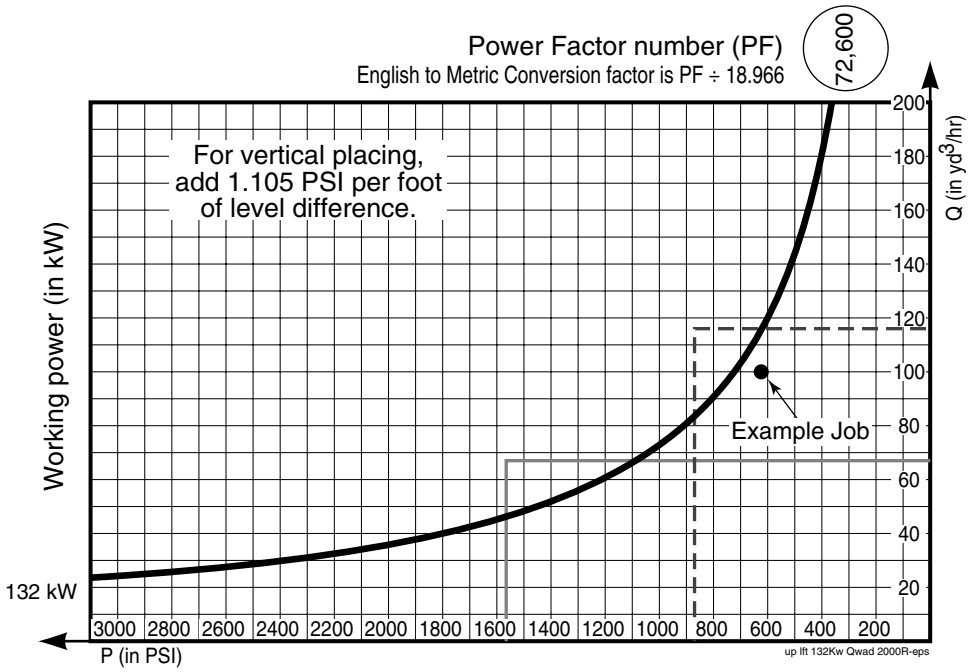
The engine is a little too small. The intersection of 100

yards3/hr and 627 PSI has been plotted for visual representation, but you can see immediately that the PF of the job (62,700) is bigger than the PF of the unit (56,650). The curved black line represents the PF of the unit. If the unit is going to be able to handle the job, the intersection of pressure and yd3/hr will be to the right and down from the curved line. Anything to the left or above the line is beyond the power of the hydraulic pumps. If we could order this same unit with the pumps set to a higher Kw, the PF of the higher Kw unit would be 72,600, which would be sufficient.

Plotting the intersection of our hypothetical job again, you can see that it falls within the power zone of the hydraulic pumps of the higher KW unit.

Bearing in mind that the nomograph should only be considered accurate to within ±10 percent, you should always calculate conservatively, and allow for the graph tolerance. In the case of our example, we should still be safe even if the pressure required were 10% greater (690 PSI).What if you already own the pump shown in our example? Is there anything that can be done to the job specifications to make the unit with the less powerful pumps work? You could use the smaller PF unit or if you can get permission to do any of the following things:

- Pump the top of the building at 85 yd3/hr instead of 100 yd3/hr.
- Pump the top of the building at a 6-inch slump instead of 5-inch. (This would still be within specifications.)
- Remove some of the rubber hose at the end of the horizontal run. Normally, with job circumstances that did not require a substantial vertical run, you could also use 6-inch instead of 5-inch-diameter pipeline. But in our example, the entire vertical run was made with the boom. The boom can never support 6-inch pipeline.



Glossary of Terms

Accumulator

A hydraulic device that stores fluid power energy in much the same way that a capacitor stores electrical energy. Because an accumulator stores energy, it must be drained and depressurized before work begins on an actuator or hydraulic system equipped with an accumulator.

Agitator

A device set in the concrete hopper to keep concrete moving, which prevents it from setting. It is typically a rotating shaft to which several paddles have been mounted. See also: Hopper Grate

AWS D1.1

The code for structural welding with steel, as defined by the American Welding Society. Sections 3, 5, and paragraph 9.25 of section 9 apply. See also: Certified Welder and EN 287-1

Blanking Plate

Also known as a blanking plug or end cap. Its purpose is to prevent material from falling out of the delivery system (typically the end hose) when moving a full boom over personnel or property.

Blockage

If the pump is pushing and concrete fails to come out at the point of discharge, a blockage is the cause. The causes of blockages are detailed in section 6.18 of this manual. Blockages can create dangerous situations by causing high concrete pressure combined with the sometimes uncoordinated efforts of untrained workers to remedy the problem.

Bulk Density

The mass of a substance per volume. For example, 1 cubic foot of air weighs much less than 1 cubic foot of water. One cubic foot of lightweight concrete weighs less than 1 cubic foot of steel-entrained concrete. We could say that steel-entrained concrete has a higher bulk density than lightweight concrete. All calculations for the operation manuals and specifications of concrete pumps are based upon 150 pounds per cubic foot, which is the approximate mass of hard rock (normal) concrete.

Certified Operator

An operator who has been issued a certification card by the American Concrete Pumping Association. There are several classes of certification, each relating to a different category of pump. For an operator to become certified, he or she must pass tests regarding operation, setup, and cleanout for each category of pump. They must also pass the safety rules test common to all certification categories, meet the experience requirements set forth for each category, and maintain a safe and clean driving record. Certified operators are considered qualified operators in their categories. See also: Expert, Qualified Operator

Certified Welder

As it relates to concrete pumping and this safety manual, a Certified Welder is a person who has applied for, taken, and passed the American Welding Society (AWS) or the European Normal (EN) test for structural steel welding. Anyone welding on a concrete pump placing boom, outrigger, tower, or other device must be certified to AWS D1.1 sections 3, 5, and paragraph 9.25 of section 9 and/or EN287-1/PREN288-3.

Concrete Pressure

The force per square area that is exerted on the concrete. The concrete pressure is always a ratio in direct proportion to the hydraulic oil pressure on the concrete pump circuit. See also: Maximum Pressure

Conductors

Materials that conduct electricity. Copper, silver, aluminum, gold, steel, and water are considered good conductors of electricity. Air, fiberglass, rubber, ceramics, and glass are considered poor conductors. All of these conductors have a resistance to the flow of electricity, which is measured in terms of ohms per linear foot. As voltage increases, more current flows through the same resistance. With high-voltage electric wires—8000 volts, for example—even poor conductors carry enough current through your body to ground to kill you. (As little as 35 milliamps can cause cardiac arrest.) Some conductors, such as air, resist electricity verywell, but if the voltage gets high enough, current will flow. (Lightning is a good example of this.) See also: Electrocution

Decibels

A measurement of volume equal to one tenth of a bel, abbreviated dB. As it applies to concrete pumps, it is a measurement of the sound pressure level one meter away from a noise source. Because constant exposure to loud sound can cause permanent hearing loss, OSHA has developed guidelines for time limits on exposure to sound at different volumes. The chart is in section 6.13 of the Safety Manual.

Drive Engine

The primary source of power for a hydraulic system. Typically, the word engine denotes an internal combustion device, whereas the word motor denotes an electrical device. See also: Prime Mover

Electrocution

Made by combining the words “electric” + “execution.” It means “death by electricity.” See also: Conductors

EN 287-1 / PREN 288-3

The code for structural welding with steel as defined by the European Norm. See also: Certified Welder

Expert

As used in this Safety Manual, an expert is defined as a person who, on the basis of specialized training and experience, has developed a high degree of knowledge and skill in the areas of concrete pumps, concrete pumping, cleanout procedures, generally accepted engineering norms, and safety regulations to the extent of being able to evaluate equipment and processes as they relate to job safety. Experts demonstrate their knowledge and abilities by passing the certification testing and experience requirements of the American Concrete Pumping Association. Other experts may include master mechanics and after-sales service technicians of the manufacturer. See also: Certified Operator

Fast Switch

A secondary hydraulic circuit added to single- circuit machines to disable the stroke limiter during the switch of the Rock Valve cylinder, thereby making the Rock Valve switch quickly. This circuit is not needed or available on twin- circuit machines.

Foreign Material

Material that was never intended to be pumped but ends up in the concrete hopper. Examples of foreign material include small animals, hammers, ready-mix truck fins, unmixed clumps of cement, hardened concrete that breaks away from ready- mix truck fins, and soft drink cans. Many of these items can create a blockage if they are pumped through the system.

Go Devil

A plug made from a rubber composite, usually with several fins that expand to seal when pressure is applied. Go devils are intended to be inserted in a steel delivery pipeline and pushed with water or compressed air for the purpose of cleaning the pipe. Not to be used with rubber hose or short sections of pipe. See also: Sponge Ball

Guide

An assistant brought in to help with backing up a truck or trailer or with other circumstances in which the driver cannot see enough to ensure safety. See also: Spotter

High Voltage

For the purposes of this manual, any current over 120 volts AC is considered high voltage. In the United States, electrically driven concrete pumps normally operate the motors at 480 volts AC (high voltage) and the controls at 24 volt DC (low voltage). With electric wires in residential or industrial areas, the voltage is approximately 8000 volts to ground or 13,800 volts from phase to phase (distribution voltage). When dealing with electric wires that are mounted high above the ground on steel towers, the voltage ranges from 100,000 to 1,000,000 volts (transmission voltage).

Hopper Grate

A meshwork typically made from steel bars and placed over the concrete hopper. It serves to keep human body parts away from the agitator (when left in its proper position) and to keep large foreign objects from falling into the hopper, which could cause blockages if they were pumped. The hopper grate must be secured in position in order to be effective.

Jacking the Outriggers

Adjustment of the outriggers in the vertical direction. With boom-mounted concrete pumps, you should strive to make the adjustments so that the unit sits within 3° of level.

Licensed Electrician

A qualified electrician licensed by the state, county, or municipality where the connections are to be made. In some locations, electricians are not required to be

licensed, but the work should still be completed by a competent professional. Under no circumstances should high-voltage connections be made by a concrete pump operator or related personnel.

Maintenance

All procedures for servicing, inspection, and repair of concrete pumps and related equipment and devices. Maintenance and inspection are methods of maintaining the desired state of the equipment. Repair is the method of restoring the desired state of the equipment.

Maximum Pressure

When talking about a hydraulic system, maximum pressure refers to the highest pressure that can be achieved with the settings of the circuit relief valves. When discussing concrete output, maximum pressure refers to the pressure that will be developed if the hydraulic system pressure reaches the relief valve setting. Concrete pressure is always the force at which the differential cylinders are moving, divided by the cross-sectional area of the concrete cylinder. Maximum concrete pressure, then, is developed when the differential cylinders are moving with maximum force, which is determined by the hydraulic system relief valve setting. During normal pumping, the resistance of moving the concrete through the pipe or boom creates the pressure needed by the pump and is well under the maximum pressure. See Also: Concrete Pressure

Minimum Safety Distance

In this manual, the term “minimum safety distance” refers to the closest distance that you are allowed to approach an object or electrical wires while leaving room for errors in human judgment or machine malfunction. The distance from electrical wires in the United States is 20 feet, as recommended by the American Concrete Pumping Association. This distance may have other values in different countries.

Murphy’s Law

An old adage that says: “Anything that can go wrong, will go wrong, and at the worst possible moment.”

Operational Area

The area around a working piece of equipment or point of discharge where dangers can be encountered because of the nature of the machinery or process in use. For safety reasons, do not allow unauthorized presence in the operational area.

OSHA

Occupational Safety and Health Administration. A branch of the U. S. federal government that deals with job safety. It establishes and enforces safety regulations for industry and business. One of the areas over which it has authority is construction job sites and workshops.

Personal Protective Apparel

Things you can wear to protect yourself from potential dangers in a concrete placing environment. Examples are:

- snug-fitting work clothes
- steel-toed work boots
- lime-resistant gloves
- safety glasses
- ear muffs or ear plugs
- rubber boots - standing in concrete
- hard hat

Point of Discharge

The location on the machine from which concrete is expelled from a delivery system. This can be the point of placement (the actual form that is being filled with concrete) or the cleanout area after completion of a job.

Pour

Used by the concrete pumping industry and in this manual as a noun. It is the specific job for the pump during any given time period, e.g. “We’ll grab lunch right after the pour.”

Prime Mover

The primary power source for a hydraulic system. The term “prime mover” denotes neither an internal combustion engine nor an electric motor.

PTO (Power Take Off)

A switchable output from the transmission or an intermediate gearcase. On a concrete pump, the PTO is used to divert the power from the engine and drive train to turn the hydraulic pumps.

Qualified Operator

An individual who meets all the following qualifications:

- reached the age of 18
- is physically and mentally capable
- has been trained in the proper operation and maintenance of the pump and placing boom, if applicable
- has demonstrated his or her capabilities to the hiring company with respect to the operation and maintenance of the pump and placing boom
- can be expected to perform assigned duties in a reliable manner

Qualified Personnel

A generic term used to describe people who are qualified to do work in their area of application. For example, having your boom repairs inspected by “qualified personnel” before use refers to inspection by a certified welder or certified welding inspector. Having repairs to your hydraulic system done by “qualified personnel” would refer to repairs made by qualified workshop personnel.

Qualified Workshop Personnel

An individual who meets all of the following qualifications:

- has reached the age of 18 years
- is physically and mentally capable
- has been trained in proper repair, mainte- nance, and inspection procedures plus the pertinent safety rules for concrete pumps and related equipment
- has demonstrated their capabilities to their company with regard to the procedures and rules discussed above
- can be expected to perform assigned duties in a reliable manner

Rock Jam

A specific type of blockage caused when the cement and fines of the concrete are not present in sufficient quantity to fully coat the larger aggregates and the walls of the delivery system. In these cases, the rock (larger aggregates of the mix) form a wedge inside the pipe. Resistance to movement then becomes overpowering and the concrete stops. Increasing pressure to try to remove the wedge only results in forcing more of the finest particles past the rocks, compounding the problem. In some cases, the wedge can be broken up by alternately pumping in forward and then reverse. See also: Blockage

Separate Pipeline

A pipeline, other than the placing boom pipeline, that is laid between the concrete pump and the point of discharge.

Shutoff Valve

In hydraulics: a valve with the ability to stop the flow or pressure of hydraulic oil. Must be able to withstand the maximum pressure of the hydraulic circuit that it controls. In concrete: A manually or hydraulically operated valve that prevents the flow of concrete in either direction. Some concrete shutoff valves also have the ability to divert the flow of concrete to a different pipeline (for example, to a discharge point for cleanout). The shutoff valve must be able to withstand the maximum pressure on the concrete of which the pump is capable.

Soft Switch

A secondary hydraulic circuit added to twin- circuit machines to account for the oil coming from the main hydraulic pumps while the Rock Valve is being switched by the oil from the accumulator.

Soil Pressure

The force per square area that is exerted on the ground by the outrigger legs. The amount of pressure that the soil will support varies with the composition and compaction of the soil. To determine the stability of the soil, see the chart in section 5.16 of this manual.

Sponge Ball

A medium to hard, spherical sponge used to clean the inside of delivery pipelines. See Also: Go Devil

Spotter

A spotter is a person who stands at a vantage point where he or she can see both the point of discharge and the pump operator. The spotter uses two-way radios or hand signals to direct the operator to operate the unit as required by the job circumstances. A spotter can be anyone who is familiar with the safety rules for the pump and workers and is equipped with a radio or knows the appropriate hand signals. A spotter is needed whenever the operator cannot safely see the point of placement or the distance between the unit and an unsafe area. See Also: Guide

Sucking Back

The act of putting the concrete pump into the reverse mode for any of several reasons. Some examples of reasons to suck back:

- to relieve pressure in the delivery system before opening when a blockage has occurred
- to clean the boom with a sponge ball upon completion of the pour
- to remove concrete from the boom for the purpose of folding the boom for moving

Thrust Block

Also known as a “dead man.” This is a large block of poured concrete, usually with one or more sweep elbows cast inside, placed at the bottom of a vertical run for the purpose of supporting the weight of the vertical run and for lateral stabilization of the pipeline. It stabilizes and supports the vertical run by virtue of its enormous mass (normally one cubic yard or larger).

Transport Position

“Transport Position” refers to the position of the boom during transport. For transport, the boom is completely folded and lowered into the rests, and the boom straps are secured. When stowing in the traveling position because of a thunderstorm, however, the boom straps need not be secured if no travel is imminent.

Twin Circuit

The plumbing method used for the pumpkit in which the differential cylinders are moved by the main hydraulic pumps but the Rock Valve is moved by the oil stored in an accumulator.

Unauthorized

Without authority, without permission. Examples: Unauthorized operation of the boom could be operation by a passing teenager. Unauthorized repairs to the boom could be repairs made without the manufacturer’s permission.

Unintentional Movement

Movement of the pump, boom, or related equipment without a specific, intentional command by the operator. An example of an unintentional movement is if an operator fell while walking with the remote control box and accidentally hit a joystick, which caused a boom movement. Unintentional movement can be avoided by disabling the hydraulic system with the emergency stop devices when the unit is not in immediate use.

Vertical Run

Sections of concrete delivery pipeline that run in an up and down direction. Vertical runs have very specific procedures and rules for installation, support, cleaning, and inspection. Concrete pumping personnel should, therefore, have specific training in these procedures and rules before attempting to use them in a job setting.

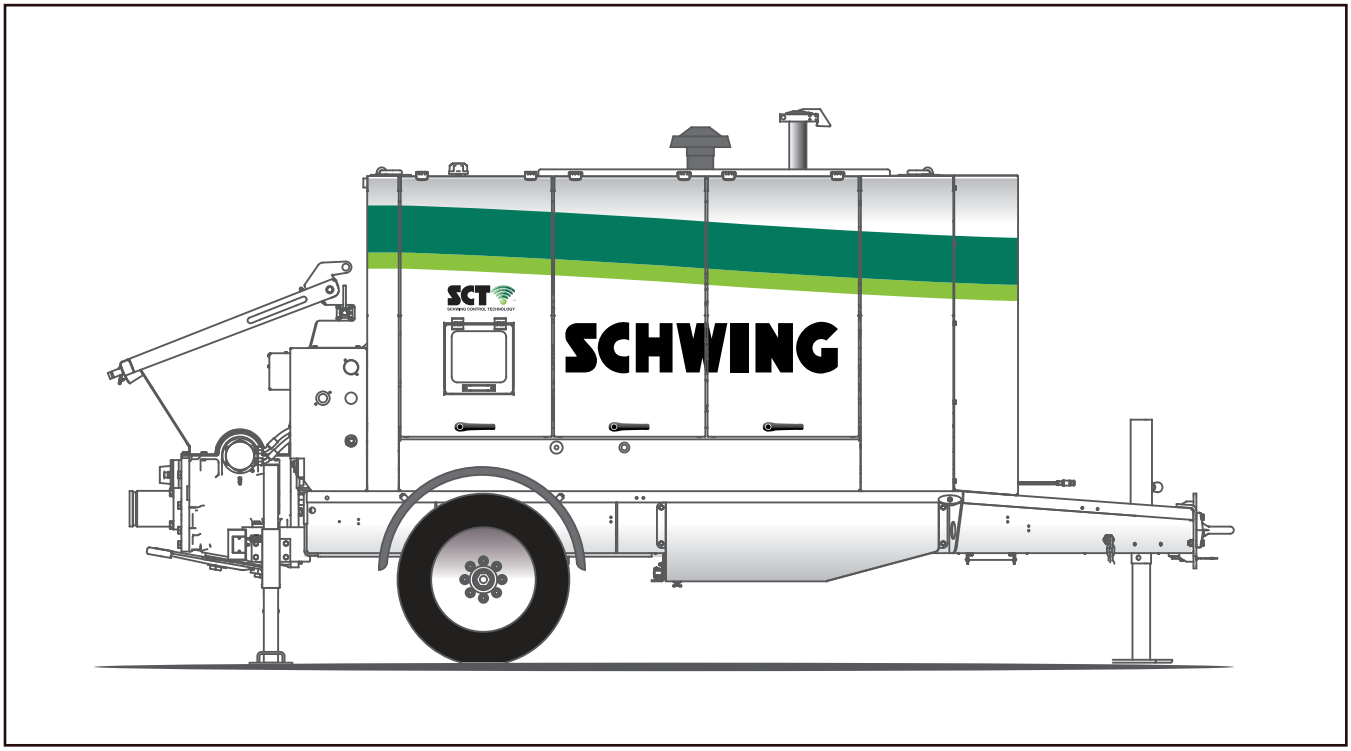
Water Jet

The stream of water that comes out the end of a water hose or pressure washer. The water jet is the only part of the water system that needs to go into the hopper, concrete valve, or waterbox for cleaning.

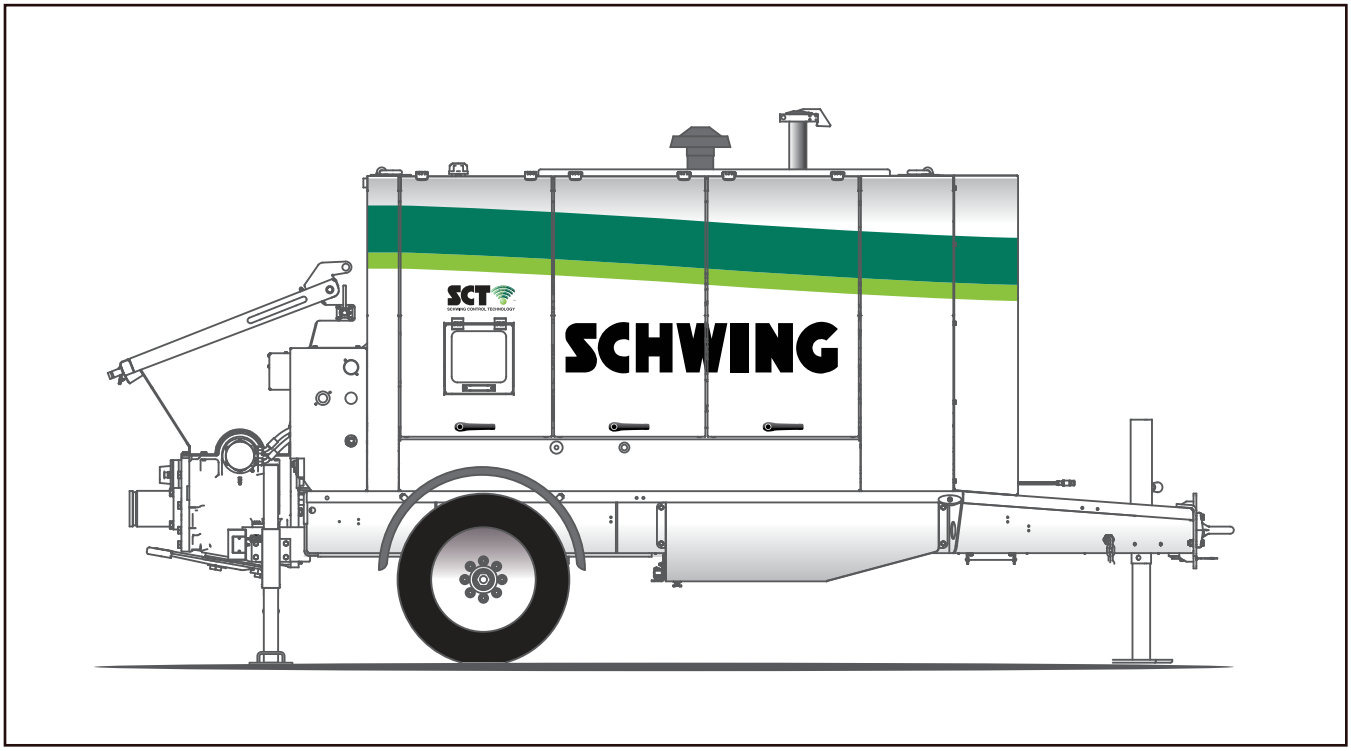
Additional Reading Material

This is a partial list of the books that have been written on the subject of concrete pumping. Omission of any relevant books was done so unintentionally.

- Pumping Concrete and Concrete Pumps. Karl Ernst v. Eckardstein. F. W. Schwing GmbH, 1983.
- Pumping Concrete—Techniques and Applications. Robert Allen Crepas. Aberdeen Group, 1991.



Alphabetical Index



Short Instructions

Preparation

The Short Instruction section of this manual are for quick reference only. Operator's need to read through and understand the entire manual.

Before using the Stationary Pump, please review the following topics;

- Safety Manual - page 25
- Machine Overview - page 38
- Safety Equipment - page 34
- Personal Protection - page 63
- Unit Setup - page 67
- Machine Preparation - page 68

Figure 1
Protective clothing

Starting the Machine

- Be sure all safety guards are in place.
- From the Rear Operator Panel, turn ignition switch to the RUN position. The SCT controller will initialize, the Schwing logo will appear on the screen. When the system has finished initializing, the Engine Status screen will be displayed. When the glow plug indicator icon disappears, turn and hold the key switch in (III) START position; when the engine starts - release. You can't start the engine until the SCT controller has initialized.
- After starting, the engine may be held at low speed for a duration between 1 to 25 seconds to allow engine systems to stabilize. The duration will depend on the ambient temperature, time since last run and other factors.

NOTE In ambient temperatures from 32 to 140°F (0 to 60°C), the warm-up time is approximately 3 minutes. In temperatures below 32°F (0°) additional warm-up time may be required.

Start-Up Screen | Engine Status Screen

Figure 2
Start up and Engine Status screen

- With the engine properly warmed-up, press the Horn button, to clear the E-Stops.
- Use the Throttle Up button to increase engine RPM's. Press and hold this button until the engine is at maximum RPM.

Checking the machine

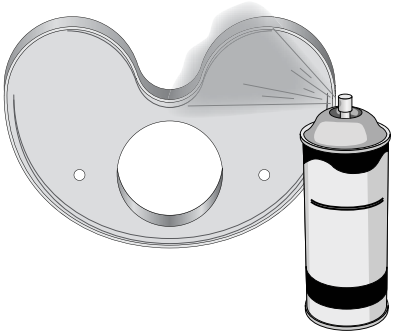
- Raise the hopper cover and secure with locking pin.

⚠WARNING Crushing hazard. Always secure the hopper cover with the locking pin.

- Press the agitator enable button. Place the agitator handvalve in either the forward or reverse position. Carefully lift the hopper grate cover. Ensure the agitator stops when lifted. If the agitator continues to move, shut down the machine and check the hopper grate switch.

⚠WARNING Do not operator the machine, if the hopper grate switch is malfunctioning.

- Check your hydraulic pressures. See “Check hydraulic pressures” on page 99.
- Lubricate the outlet wear plate with water or WD40. Spray inside the outlet pipe and in front of the Rock Valve. DO NOT put your hand inside the outlet pipe, spray from the outside only. Never operate the Rock Valve without first lubricating the outlet wear plate. Moving the kidney seal against a dry plate will cause excessive wear and premature failure.



- Fill the waterbox if you haven’t done so already.
- With the outlet wear plate lubricated and the waterbox filled, stroke the machine a couple of times by putting the concrete pump in the forward position.
- If the machine is stroking properly, you can either shutdown the machine or begin pumping the job, see “Pumping the Job” on page 77 to continue.

Shutting the Machine Down

NOTE Stopping the engine immediately after the engine has been working under load, can result in overheating and accelerated wear of engine components.

Avoid accelerating the engine prior to shutting down the engine.

Avoiding hot engine shutdowns will maximize turbocharger shaft bearing life.

To shut the machine down, put all functions in the neutral or OFF position. Reduce engine RPM to a low idle, allow the engine to idle for 5 minutes in order to cool.

When the engine has cooled, turn the ignition keyswitch to the OFF position.

After key-off, the DEF pump will circulate the DEF fluid for a given time, in order to cool the DEF injector. The DEF pump will also purge the DEF system of fluid to protect the lines from freezing in cold conditions. The SCT screen will remain ON during this process. When finished the SCT system will shut off and the screen will go blank.

Disconnecting the battery power too soon may prevent purging of the DEF fluid lines after the engine has shutdown. Do not disconnect the battery until “Wait to Disconnect” symbol is no longer displayed on the SCT screen (Figure 23).

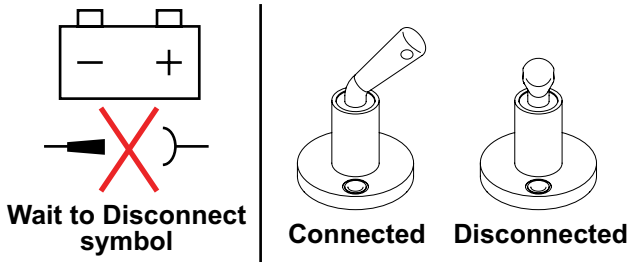
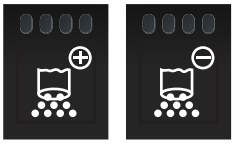


Figure 3
Wait to Disconnect symbol / Battery switch

Controlling the Concrete Pump

Stroke Limiter



The stroke limiter is a hydraulic device that can be electrically adjusted with the stroke limiter (+) and (-) buttons, located at the rear operators station or cable remote. Its function is to raise and lower the output of the hydraulic pumps that operate the concrete pumpkit. This has the advantage of allowing the engine to remain at higher RPM, where horsepower is at the maximum.

The stroke limiter has an adjustment range of 95 percent. That means it can go from as low as 2 strokes per minute to maximum strokes per minute. The stroke limiter only adjusts the output of the hydraulic pumps while the differential cylinders are moving. That means that when the differential cylinders are stopped at the end of the stroke and the Rock Valve is moving, the pumps don't return to maximum output until the Rock Valve cylinder has completed its travel.

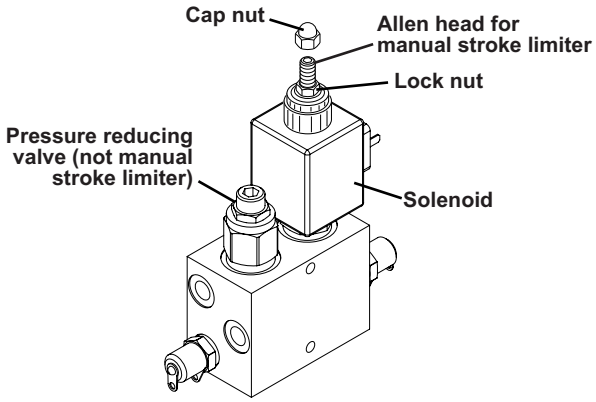


Figure 4
Stroke limiter control block

If electrical control of the stroke limiter is lost, it can be adjusted manually by removing the cap nut located on the top of the solenoid assembly and loosening the lock nut with a 1/2 inch wrench. The adjustment is then accomplished with a 5/32 inch allen wrench by turning the screw in (clockwise) to decrease strokes or out (counter clockwise) to increase strokes. Always return the manual stroke limiter to maximum strokes (full counter clockwise out position) when electrical power is restored.

Cable Remote

To use the cable remote, remove the dummy plug from the rear socket and replace it with the cable remote plug. At the operator control panel, put the Local/Remote button in the remote position. Clear the E-stop by releasing the E-stop button on the Cable remote and pressing the horn button.

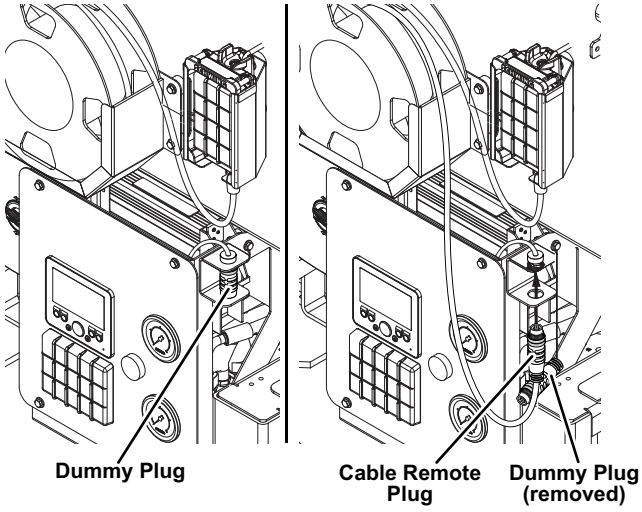
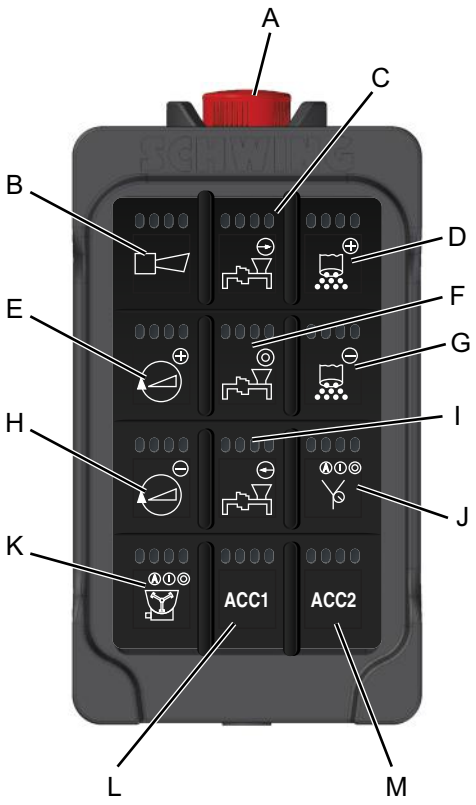


Figure 5
Connecting the radio remote

Cable Remote Functions

The cable remote includes the following buttons:

A. E-Stop Button
B. Horn
C. Concrete Pump Forward
D. Stroke Limiter (+)
E. Throttle (+)
F. Concrete Pump - Off
G. Stroke Limiter (-)
H. Throttle (-)
I. Concrete Pump - Reverse
J. Vibrator Auto/Manual - On/Off
K. Agitator - On/Off
L. Optional Accessories 1 - On/Off
M. Optional Accessories 2 - On/Off



Radio Remote (Optional)

To use the wireless remote, remove the dummy or cable remote plug from the socket and install the receiver plug. At the operator control panel, put the Local/Remote button in the remote position. On the wireless remote, unlock the E-stop button by turning it clockwise. Press the Power ON button and then press the horn button. If the transmitter's signal light does not flash, check the battery orientation.

To turn off the transmitter, press the Power OFF button or the E-Stop button.

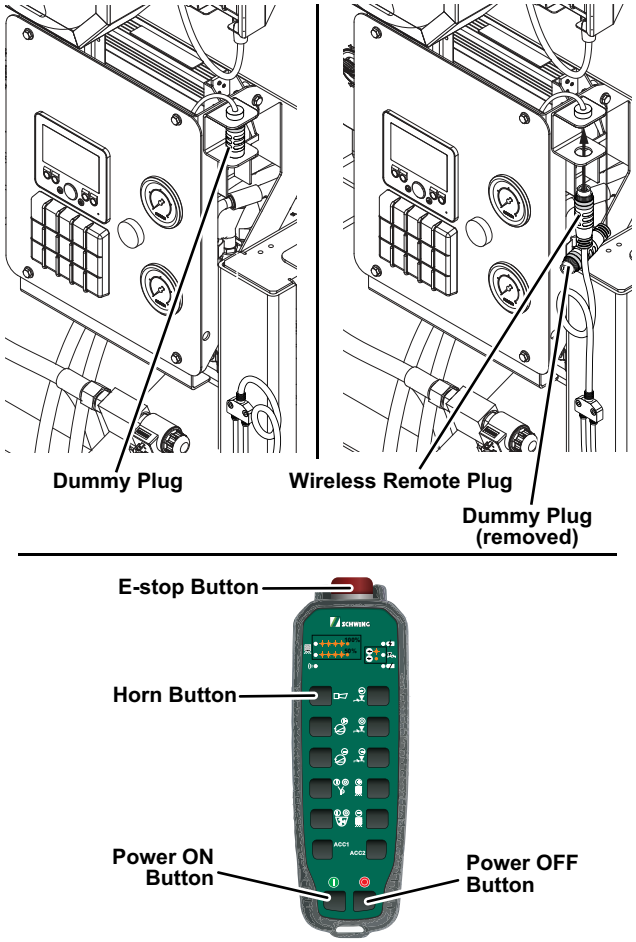
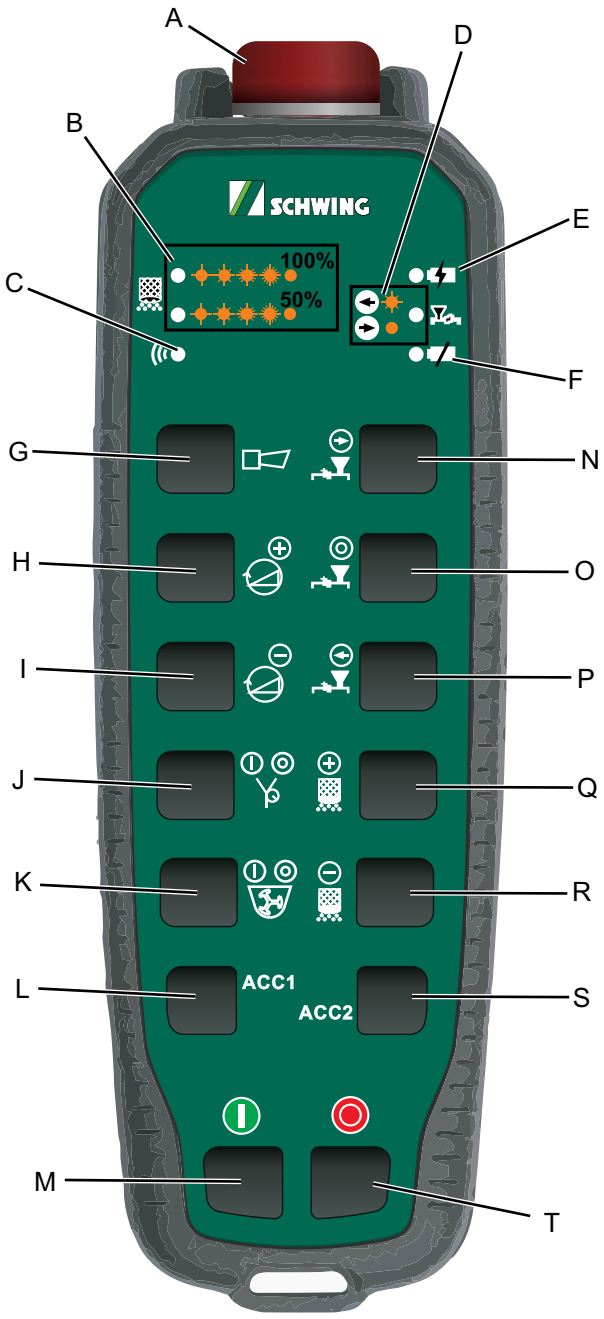


Figure 6
Connecting the wireless remote

Radio Remote Functions

The radio remote includes the following lights and buttons:

A. E-Stop Button
B. Stroke Limiter Indicator Lights
C. Link Active Light
D. Concrete Pump Fwd/Rev Indicator Light
E. Battery Charging Light
F. Battery Low Warning Light
G. Horn
H. Throttle (+)
I. Throttle (-)
J. Vibrator Auto - On/Off
K. Agitator - On/Off
L. Optional Accessories 1
M. Remote - On
N. Concrete Pump Forward
O. Concrete Pump - Off
P. Concrete Pump - Reverse
Q. Stroke Limiter (+)
R. Stroke Limiter (-)
S. Optional Accessories 2
T. Remote - Off



Emergency Procedures

Electrical power loss

If there is an electrical malfunction, the E-stop circuit dump valves will open, disabling the hydraulic circuit. To continue use, remove the cable connector from the E-Stop harness and replace it with the Emergency Power Cable Plug. This will restore power to the dump valves and allow the system to build hydraulic pressure. Hydraulic functions can now be controlled by the override handles.

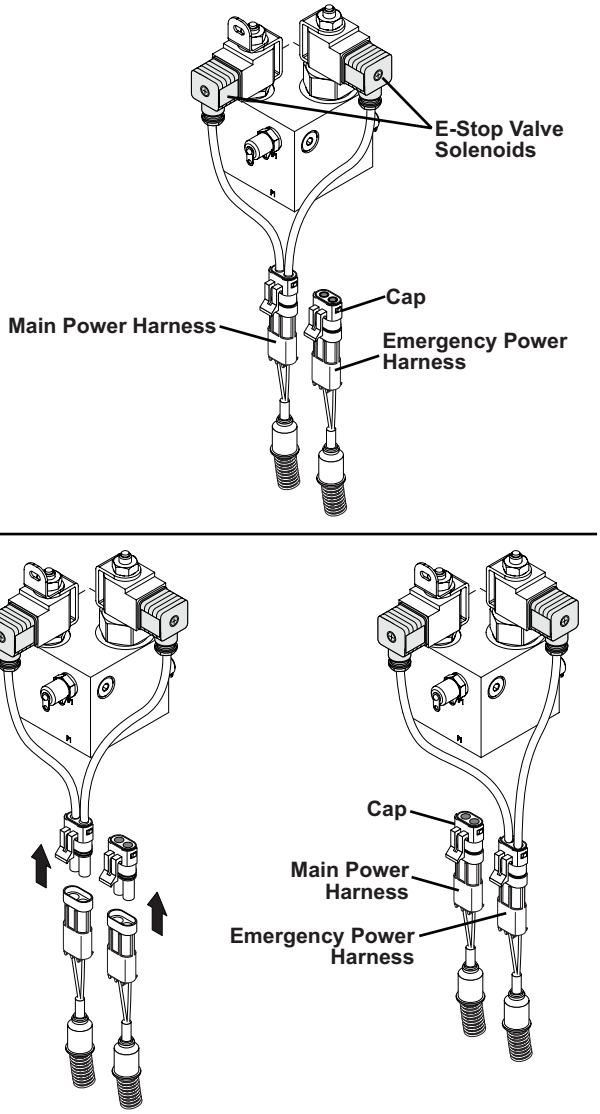


Figure 7
Connecting the Emergency Power Harness

Emergency Override Button

If you cannot correct the electrical power loss problem, try activating the dump valves by pushing the two override buttons on the E-stop while another person activates the concrete pump forward/reverse handle, on the S1/S2 Control Block. Activating the three valves will close the dump valves allowing the accumulator to shift the concrete valve and the pump to be cleaned out.

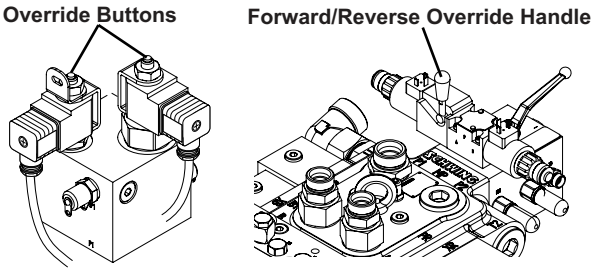


Figure 8
E-stop override buttons / Concrete Pump forward/reverse override handle

For information on where to look and what to do if you lose electricity on the unit, contact the Schwing Service Center at (888) 292-0262.

Loss of Radio/Cable remote

The Radio/Cable Remote is considered the primary control source for the stationary pump. If you lose the remote control for any reason, you can still operate the stationary pump from the rear operator panel.

If your Radio Remote stops functioning and the battery LED is off, the battery is probably dead. Remove the battery from the Radio Remote, and replace it with a fully charged battery. The dead battery should then be placed in the charger.

Disposal of spent batteries

NiCd and NiMH batteries are recyclable. You can help preserve our environment by returning your unwanted batteries to the nearest collection point for recycling or proper disposal. Call 1-800-822-8837 toll free for infomation about spent battery collection.

NOTE Do not dispose of nickel cadmium or nickel metal hydride batteries in household or business trash.