Chapter 25 FUEL-OIL SYSTEM

MANUFACTURER/DISTRIBUTOR:

Wolseley Canada Inc
A/S M. Lacasse
4200 Hickmore
Saint-Laurent, Qc
Email: Mario.Lacasse@wolseleyinc.ca
Tel:(514) 344 9378
Fax:(514) 344 9341

25.1 FUEL PUMPS VIKING DUPLEX SYSTEM SG-0510X-DUP-O

See RFI 4 for justification on the use of this pump. Viking Pump does not offer a pump of 10GPH as specified in the tender. Will be used to full the day tank.

FP-1 / FP-2

VIKING PUMP CANADA

Viking Duplex Fuel Oil Pump Package - Quotation

Company:	Sifec North Inc.	Project:	Igloolik Improvement of Water Supply System
Address:	595 boulevard de l'Aéroparc		
City & Province:	Lachute, Québec	Quote #:	160876
Postal Code:	J8H 3R8	Date:	June 16, 2016
Contact:	Samuel Charbonneau	**FCA:**	Viking Pump, Windsor, Ontario
Phone:	(855) 437-4001	**Terms:**	1%10 days, net 30 days O.A.C.
Fax:		**Delivery:**	4 - 6 weeks after receipt of a purchase order
Email address:	scharbonneau@sifec.ca	**Validation:**	Quote is valid for 60 days

Required Conditions	Capacity			Pressure			Liquid	Viscosity	Temperature	
	2.4	144.0	9.0	9.2	25.0	0.63	No. 2 Fuel Oil	38	76	24
	USGPM	USGPH	L/min	PSIG	Feet	Bar	SG 0.85	SSU	°F	°C

We are pleased to offer the following:

Viking Duplex Fuel Oil Pump Package:

Quantity: **1**

Consisting of:

Quantity: **1** Viking DFO part number: SG-0510X-DUP-O

Quantity : **2** Motors Part Number: 350E.50-60-113TC

0.5 hp 1 ph 60 Hz 120 Volt 1150 rpm 56C Frame size

• Motors shall be Totally Enclosed Fan Cooled, C-Faced, NEMA Frame, CSA, fractional motor

Control Panel for Viking Duplex Fuel Oil Pump Package

Quantity **1**

Viking Control Panel part number: CPA05-160876

Best Regards,

Jerome Bouchard
Applications Engineering
519-259-4259

SHOP DRAWING

Reviewed by: Samuel Charbonneau
Date: 07 juillet 2016

Reviewed [X]
Reviewed as noted [ ]
Resubmit [ ]

Out for approval

SIFEC NORTH INC.

SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M.
Date: 8 July 2016

Reviewed [X]
Reviewed as noted [ ]
Resubmit [ ]

CHIARELLI ENGINEERING LTD.

VIKING PUMP CANADA

Specifications
Viking Duplex Fuel Oil Pump Package

The Duplex Fuel Oil Pump Set shall be Viking # **SG-0510X-DUP-O** complete with the following equipment.

• (2) SG-0510X Spur Gear Pump in cast iron construction, UL-Listed, heat treated steel gears, case-hardened shafts, carbon graphite bushings, lip seal, plain head, 1/2" NPT ports.

• (2) M-drive adaptor to mount the pump on the motor

Pump 1 P/N: Pump 2 P/N: Bracket P/N: **6-05-755-51-0006**

The pumps shall deliver:

Capacity	*Liquid*	*Differential Pressure*	*Viscosity/Sp. Gr.*
2.4 USGPM	No. 2 Fuel Oil	9.2 PSIG	38 SSU
144.0 USGPH		25.0 Feet	3 cPs
9.0 L/min		0.63 Bar	0.85 Sp. Gravity

• Motors shall be Totally Enclosed Fan Cooled, C-Faced, NEMA Frame, CSA, fractional motor

0.5 hp 1 ph 60 Hz 120 Volt 1150 rpm 56C Frame

Motor P/N: **350E.50-60-113TC**

• **Common Base** shall be made of heavy gauge steel plate with 1 1/2" high drip-lip and 1/2" NPT drain.

• **Suction Line Equipment** shall consist of the following components in 1" Header Size

- (2) Lid-Ease Basket Strainers w/40 mesh
- (2) Ball valve, 1" NPT, 600 PSI pressure rated, full port, two piece brass body, PTFE seat, UL-Listed
- (2) 30"Hg-0-30 PSI, Compound gauges, 2.5" face, brass internals, liquid filled
- (2) Gage Valve - Ball valves, 1/4" NPT, 600 PSI, full port, two piece brass body, PTFE seat, UL-Listed
- Sch. 40 cbn stl piping and nipples,150 PSI malleable iron scrd fittings; Class 125/150 Flanges where applicable. N/American fittings std.

• **Discharge Line Equipment** shall consist of the following components in 1/2" Header Size

- (3) Spring Check Valve, 1/2" NPT, 400 PSI pressure rated, bronze body, PTFE poppet
- (2) Ball valve, 1/2" NPT, 600 PSI pressure rated, full port, two piece brass body, PTFE seat, UL-Listed
- (2) In-Line Relief Valve - continuous bypass type, cast iron body, stainless steel spring
- (2) Pressure Gauge, 2.5" dial, brass internals, liquid filled, 0-160 Range
- (2) Gage Valve - Ball valves, 1/4" NPT, 600 PSI, full port, two piece brass body, PTFE seat, UL-Listed
- Sch. 40 cbn stl piping and nipples,150 PSI malleable iron scrd fittings; Class 125/150 Flanges where applicable. N/American fittings std.
- Pump Set to be leak tested with 100 PSI air and soapy water.
- Unit to be coated with Vinyl Toluene Alkyd, Quick Dry Enamel
- Magnetic Float Switch with Alarm for Drip Tray Leak Detection
- Pressure Switch - Dual Stage - High and Low, 6-200 PSI (41.4 to 1379.3 kPa) in EEMAC1 enclosure, installed

Note: Specifications subject to change, consult factory

VIKING PUMP CANADA

Specifications
Control Panel for Viking Duplex Fuel Oil Pump Package

The Control Panel for the Viking Duplex Fuel Oil Pump Set shall be Viking part number: **CPA05-160876**

Duplex Control Panel 0.5 HP, 1/60/120V:

- NEMA 1 enclosure
- Individual disconnect switches, motor protectors and transformer c/w through the door operation and control circuit fuse (1 phase - 120 Volt)
- Magnetic motor starters (2)
- Hand-Off-Auto selector switches (2)
- Power on pilot light (white) (1)
- Run pilot lights (green) (2)
- Terminal Strip
- Provision to connect 3 float switches (normally closed)
- Control circuit fuse
- P1 - Auto - P2 alternating selector switch
- Lead pump failure pilot light & manual reset, lag pump start (automatic transfer to non operating pump in case of motor overload or short circuit)
- High pressure cut out - red pilot light & manual reset
- Low pressure cut out - red pilot light & override timers (2) (manual reset)
- High pressure alarm signal
- Low pressure alarm signal
- Low level alarm signal & red pilot light
- High level alarm signal & red pilot light
- Critical High Level Alarm Signal & red pilot light
- Provision to connect valve (each)
- Redundant Contactors (Back-up to Primary Contactors)
- Drip tray leak detection alarm signal & red pilot light
- Type ADB - 2 float switches, signal from generator & high level red light
- Buzzer and silence push button

SHOP DRAWING

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Reviewed By: M.M.

Date: 8 July 2016

Reviewed [X]
Reviewed as noted [ ]
Resubmit [ ]

CHIARELLI ENGINEERING LTD.

Important Notes: When quoting an electrical control panel for the DFO set, please check any Federal, State, or Local requirements under the electrical code. Consult our Applications Engineering Department at 1-888-VIK-PUMP for options not listed above

Disclaimer: Any on-site modification needed to meet Federal, State, or Local electrical codes not specified on the order will be the responsibility of the Distributor or End-User and not Viking Pump, Inc. or Viking Pump of Canada Inc.

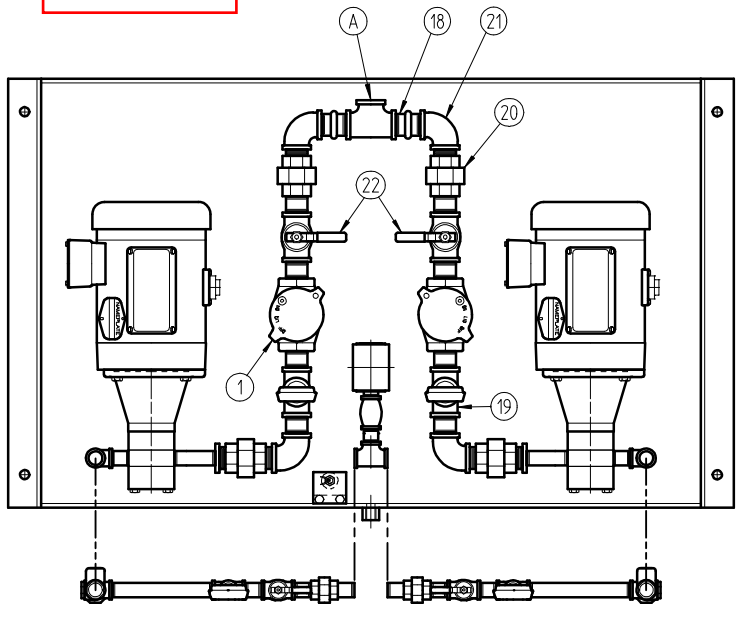
DIMENSIONAL DRAWING SG0510X-DUP-O DUPLEX UNIT

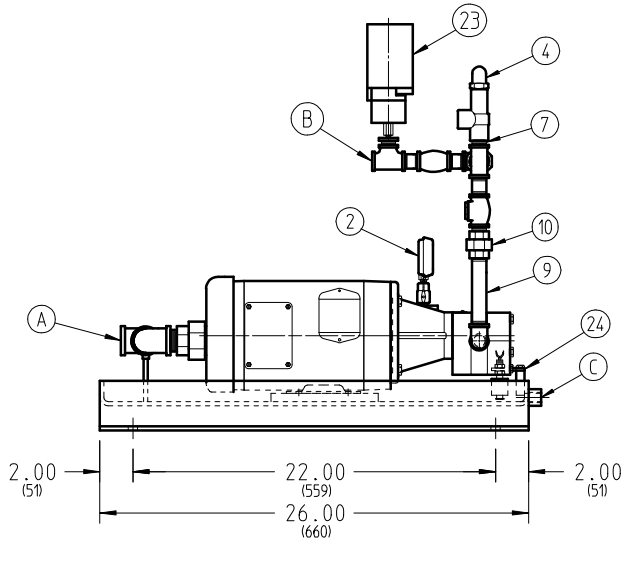
FP-1 / FP-2

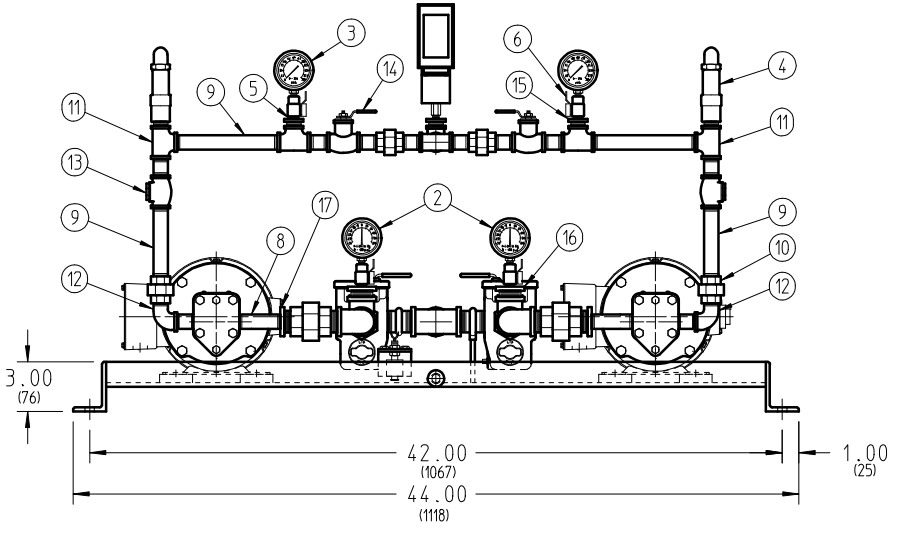
ITEM	DESCRIPTION
1	F1010 1.0" NPT LID EASE SIMPLEX BASKET STRAINER c/w 40 MESH S.S. BASKET
2	COMPOUND GUAGE 30"-0-30 PSI LIQUID FILLED 2.5" FACE X .25" NPT
3	PRESSURE GUAGE 0-100 PSI LIQUID FILLED 2.5" FACE X .25" NPT
4	FULFLO R.V. .50" NPT c/w GREEN-WS SPRING 30 - 100 PSI
5	.25" NPT X 1.5" PIPE NIPPLE
6	.25" NPT BALL VALVE
7	.50" NPT X 1.5" PIPE NIPPLE TBE
8	.50" NPT X 3.0" LONG NIPPLE
9	.50" NPT X 6.0" LONG NIPPLE
10	.50" NPT UNION
11	.50" NPT TEE
12	.50" NPT 90 DEG STREET ELBOW
13	.50" NPT CHECK VALVE
14	.50" NPT BALL VALVE
15	.50" MALE X .25" FEMALE NPT HEX REDUCING BUSHING
16	1.0" MALE X .25" FEMALE NPT HEX REDUCING BUSHING
17	1.0" MALE X .50" FEMALE NPT HEX REDUCING BUSHING
18	1.0" NPT X 2" PIPE NIPPLE
19	1.0" NPT TEE
20	1.0" NPT UNION
21	1.0" NPT 90 DEG STREET ELBOW
22	1.0" NPT BALL VALVE
23	PRESSURE SWITCH - DUAL STAGE
24	MAGNETIC FLOAT SWITCH

A	1.0" NPT COMMON SUCTION
B	.50" NPT COMMON DISCHARGE
C	.50" NPT DRAIN CONNECTION
D	9/16" DIA. 4-HOLES

NOTES
1) PIPES AND NIPPLES ARE CARBON STEEL SCH.40
2) ALL MALLEABLE IRON FITTINGS AND STEEL PIPING ARE MANUFACTURED IN USA/CANADA
3) PUMP SET IS LEAK TESTED WITH 100 PSI AIR AND SOAPY WATER







DIMENSIONAL DRAWING FOR VIKING DUPLEX FUEL OIL PACKAGE MODEL SG-0510X-DUP-O WITH SG-0510X PUMPS AND M DRIVE BRACKETS TO SUIT 56C FRAME MOTORS.

VIKING PUMP

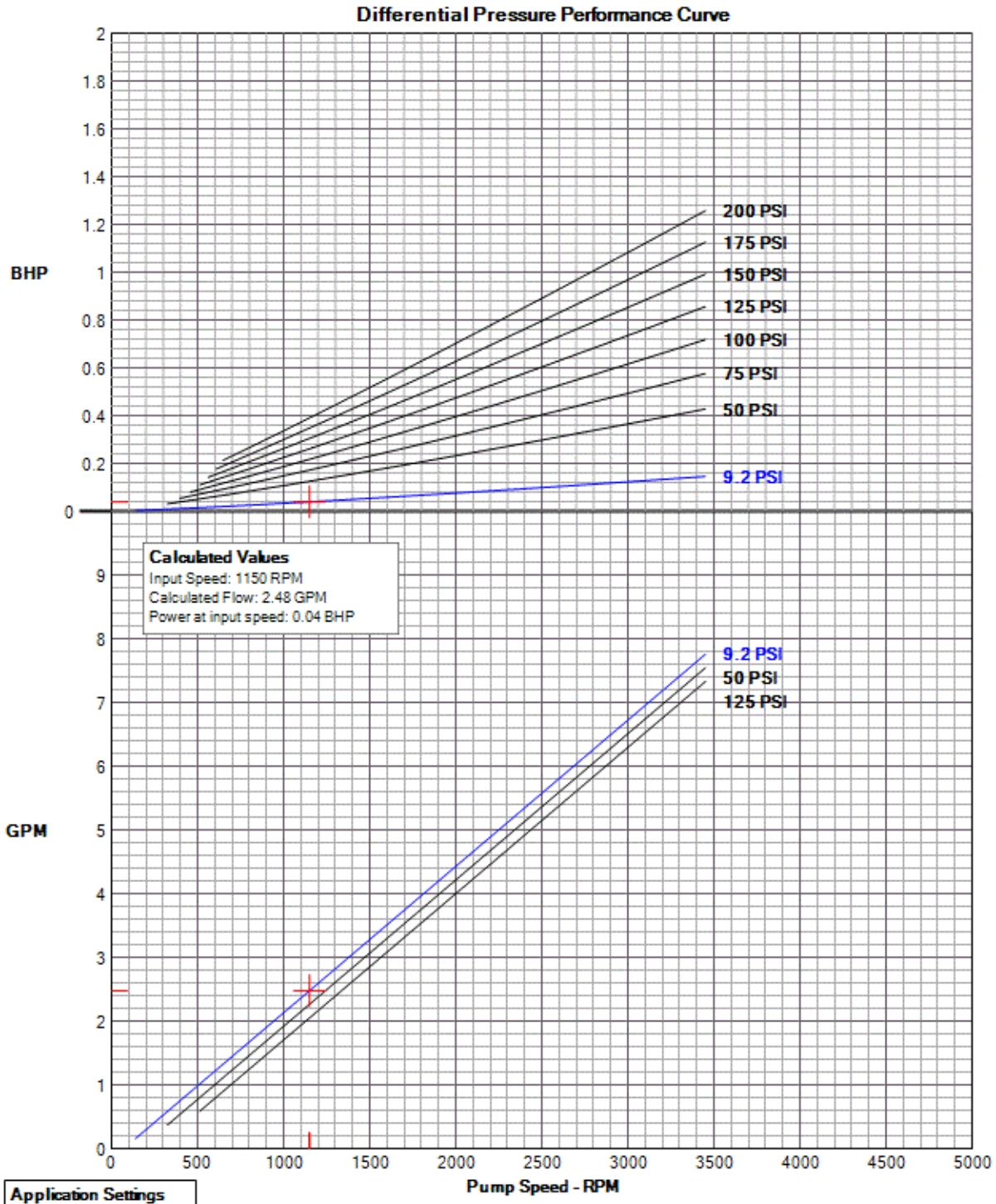
VIKING PUMP OF CANADA INC.
A Unit of IDEX Corporation
Windsor, Ontario N9A 6M3
CANADA

ARR. DRAWING

DRG. SIZE B

DRAWING NUMBER 800-SG-0510X-DUPLEX-O

FP-1 / FP-2



Application Settings
Model: SG-0510
Viscosity: 38 SSU
Diff. Pressure: 9.2 PSI
Temperature: 70 F
Specific Gravity: 0.85

Viking Pump, A Unit of IDEX Corporation, 406 State Street, Cedar Falls, Iowa, USA, 50613,

VIKING PUMP

A Unit of IDEX Corporation

Viking® Duplex Fuel Oil Systems and Control Panels

Factory Built and Tested Solutions for Simple Installation Startup and Operation

DFO

SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M.
Date: 20 June 2016

Reviewed ☐
Reviewed as noted ☒
Resubmit ☐

CHIARELLI ENGINEERING LTD.

- **25 Years experience**
- **Single source responsibility**
- **Compact integrated system**
- **Mounting flexibility**
- **Ease of Selection**
- **Factory-Built / Local Support**

SHOP DRAWING

Reviewed by: Samuel Charbonneau
Date: 14 Juin, 2016

Reviewed [X]
Reviewed as noted [ ]
Resubmit [ ]

Out for approval

SIFEC NORTH INC.

Capacity to 284 LPM (75 GPM)
Pressure to 3,448 kPa (500 PSI)
Viscosity 1 to 500 cSt (38 to 2,500 SSU)
Temperature -20°C to +82°C (-4°F to +180°F)

Shop Drawings
Contractor Approval
Approved by: M.A.G., G. F.
Date: Mar 03, 2015
SIFEC NORTH INC

IDEX CORPORATION

Duplex Fuel Oil Systems Applications

The Viking Advantages

Viking Duplex Fuel Oil systems:

Factory engineered and built to order Duplex Fuel Oil systems and control panels for oil transfer applications like:

- Fueling diesel generators for backup electrical power generation
- Boosting low pressure fuel oil on oil-fired boilers and oil-fired furnaces
- Oil filtration/recirculation to ensure clean and / or water-free oil
- Fuel oil transfer from storage to day tank.

Viking Advantages

- Experience – Viking Pump have been worldwide leaders of PD pumping solutions since 1911 and have over 25 years of engineering and manufacturing DFO systems.
- One Source-One Responsibility – With a Viking DFO set we pre-engineer, pre-plumb, and with available pre-wiring give you a complete “plug-n-play” system so you don’t have to worry about sourcing and assembling the components.
- Compact – The Viking DFO set provides you with a compact integrated system that allows you mounting flexibility.
- Ease of Selection – With Viking’s easy select software, you can design, specify, and order standard and custom DFO systems to suit your application.
- Factory-Built / Local Support – With Viking’s extensive Distributor network we can provide you with local support and start-up assistance for you Viking DFO set.

Customer Benefits:

- Reliable fuel delivery with plumbed-and-wired standby pump
- Alternate pumps automatically minimize run time on any one pump
- Proven, factory manufactured sets built custom to your order
- UL-CSA electrical control panels
- Available with standard or UL rated pumps
- Quick access comparison sheets, specification sheets and illustration drawings
- Easily requested CAD submittal drawings
- Over 25 years experience engineering and manufacturing duplex fuel oil systems
- Easy sizing with 8-Step Selection Program
  (CD available, through your local authorized Viking Distributor)

Typical Applications:

Emergency Generators

Turbine Generators

Boilers

Standard Equipment - Pump Sets

Standard Equipment

Viking Heavy Duty Positive Displacement Rotary Gear or Spur Gear Pumps (2)

Flexible couplings with Orange Peel OSHA guards (2)

Motors - Totally Enclosed Fan Cooled, foot mounted, NEMA, UL, CSA (2)

Common steel baseplate shall be made of heavy gauge steel plate with 1 1/2" high drip-lip and 1/2" NPT drain (1)

Suction Line Equipment

- Viking Lid-Ease Basket Strainers, cast iron body, 40 mesh stainless steel basket (2)
- Ball valves, 600 PSI pressure rated, full port, two piece bronze body, PTFE seat (2)
- Compound Gauges, 30" Hg-0-30 PSI 2.5" dial, bronze internals, stainless steel case, liquid filled (2)
- Gauge Valves - bronze ball valves, 600 PSI rated (2)

Discharge Line Equipment

- Spring Check Valves, 400 PSI pressure rated, bronze body, PTFE poppet (3)
- Ball valves, 600 PSI pressure rated, full port, two piece bronze body, PTFE seat (2)
- Relief Valves - continuous bypass type, cast iron body, stainless steel spring (2)
- Pressure Gauges, 0-200 PSI, 2.5" dial, bronze internals, stainless steel case, liquid filled (2)
- Gauge Valves - bronze ball valves, 600 PSI rated (2)

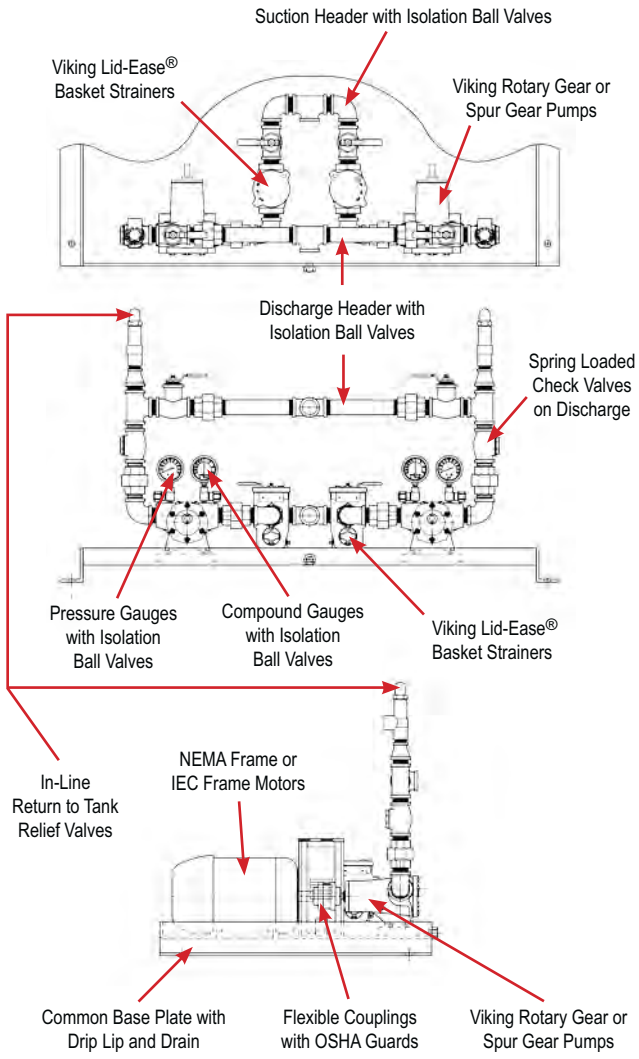
Suction and Discharge Piping

- Schedule 40 carbon steel piping and nipples, 150 PSI malleable iron screwed fittings

Unit to be coated with Vinyl Toluene Alkyd, quick dry enamel.

Duplex pump set to be leak tested with 100 PSI air and soap water.

Typical Standard Equipment Example



Suction Strainers

Viking Lid-Ease® Simplex Basket Strainer (2)
Duplex Basket Strainer (1)
Y-Strainers (2)
UL-Listed Simplex Basket Strainer (2)
UL-Listed Duplex Basket Strainer (1)

Standard equipment is Viking Lid-Ease Strainer w/40 mesh.
All strainers offerred in 20, 40 or 60 mesh.

Phase-Cycle-Voltage

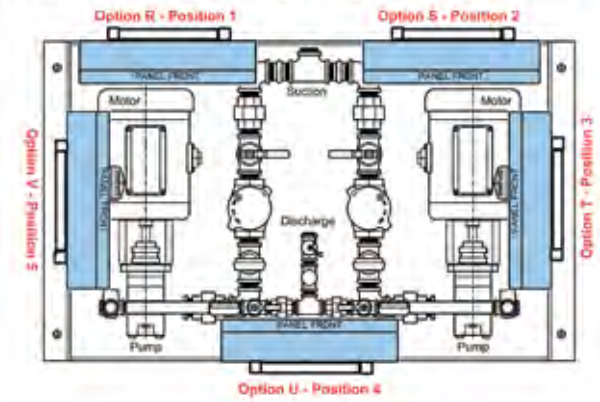
1 ph 60 Hz 115 Volt
1 ph 60 Hz 230-240 Volt
3 ph 60 Hz 208-230-460 Volt
3 ph 60 Hz 575 Volt
3 ph 50 Hz 380-415 Volt

Optional Equipment - Pump Sets

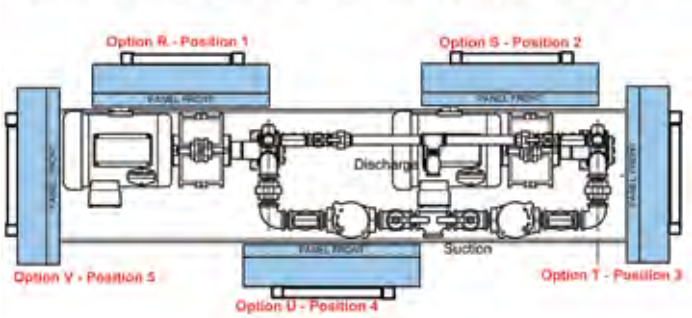
"A" or "B"	A	Pressure Switch - Single Stage, 20-200 PSI (41.4 to 1379.3 kPa) in EEMAC1 enclosure, installed
	B	Pressure Switch - Dual Stage - High and Low, 6-200 PSI (41.4 to 1379.3 kPa) in EEMAC1 enclosure, installed
	C	Pressure Control Valve Bronze body, Buna-N diaphragm, 0 to 75 PSI (0 to 517.2 kPa) c/w two shut off and one by-pass valve, installed
"D" or "E"	D	Flow Switch - Low Pressure to 100 PSI , NEMA 1, brass housing, SS vane, with junction box, c/w 120VAC, SPDT switch, installed
	E	Flow Switch - High Pressure to 1450 PSI , NEMA 7, brass housing, SS vane, less junction box, c/w 120VAC, SPDT switch, installed
"F" or "G"	F	Thermometer, industrial , bi-metal type, 3" round dial, 1/2"NPT mount -5° to 115°C (20° to 240°F), installed
	G	Thermometer, 91T100 industrial , 9" long Valox case with glass lens, 3/4"NPT mount, 0° to 115°C (30° to 240°F), installed
	H	Flexible Connectors: (1) suction header, (1) discharge header, (1) return-to-tank Relief Valve, SS hose, steel nipples, supplied loose
	J	Water Removal Filter, spin-on type cartridge filter, 200 PSI, c/w disposable 10 micron element and visual indicator, installed
	K	Galvanized Base Plate
	L	4" Dial Guages - (2) Compound 30"Hg-0-30PSI & (2) Pressure 0-200 PSI
"M" or "N"	M	UL-Listed Ball Valves, Strainer(s), and Relief Valves
	N	Stainless Steel Ball Valves and Check Valves (instead of standard bronze)
	O	Turbine Flow Meter - installed
	P	Viton® Seals in Pumps (instead of Buna-N)
	Q	High Efficiency Motors (Available for 3 phase 1 HP and larger)
"R" or "S" or "T" or "U" or "V"	R	Control Panel Mounted & Wired on Pump Set - Position 1
	S	Control Panel Mounted & Wired on Pump Set - Position 2
	T	Control Panel Mounted & Wired on Pump Set - Position 3
	U	Control Panel Mounted & Wired on Pump Set - Position 4
	V	Control Panel Mounted & Wired on Pump Set - Position 5
	W	Hand Priming Pump - Piped c/w isolation valves
	X	Magnetic Float Switch w/Alarm for Drip Tray Leak Detection
	Y	Header for Return-to-Tank Relief Valves

UL Listed Pumps
Cast Steel Pumps (4193 Series)
Consult factory for other options not listed

Control Panel Mounting and Wiring to Pump Set - (Side-by-Side Units)



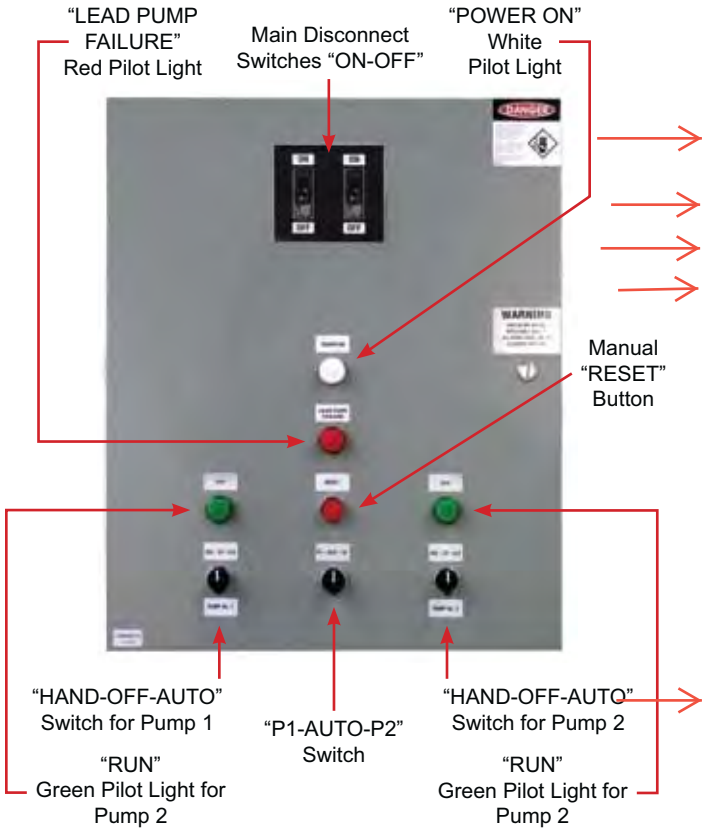
Control Panel Mounting and Wiring to Pump Set - (F & FH In-Line Units Only)



Standard Equipment - Control Panels

Standard Equipment:

- NEMA/CSA 1 enclosure
- Single pole circuit breaker (2) c/w through the door operation (120 volt) or individual disconnect switches, motor protectors and transformer (208-575 volt)
- Magnetic motor starters (2)
- Hand-Off-Auto selector switches (2)
- Power on pilot light (white)
- Run pilot light (green) (2)
- Terminal Strip
- Provision to connect 3 float switches (normally closed)
- Control circuit fuse
- Lead pump failure pilot light & manual reset, lag pump start
- P1 - Auto - P2 alternating selector switch



Standard control panel for Duplex Fuel Oil Pump Set is NEMA1 enclosure / CSA Listed. For USA customers, the panel is standard with UL508 Listing (see option Q in optional equipment)

Customized Packages to Your Specifications

Consult our Factory Applications Engineers to help us build the fuel oil system to meet your applications needs, with specific brands or specifications of:

• Motors	• Special Painting	• Filtration
• Valves	• Custom Nameplates	• Gauges
• Piping and Fittings	• Solenoid Valves	• Controls

Optional Equipment: Control Panel Chart

A	Motor run signal NO/NC - 1 per pump
B	Motor tripped red lights (2)
C	Motor tripped NO/NC signals (2)
D	High pressure cut out - red pilot light and manual reset
E	Low pressure cut out - red pilot light and override timers (2) (manual reset)
F	High pressure alarm signal
G	Low pressure alarm signal
H	Type ADB - 2 float switches, signal from generator and high level red light
I	Buzzer and silence push button
J	NEMA / CSA 2 enclosure - drip proof
K	NEMA / CSA 12 enclosure - oil & dust tight
L	NEMA / CSA 4 enclosure - water tight
M	Low flow signal to start lag pump c/w timers (2), red pilot lights and reset push button
N	Low level alarm signal and red pilot light
O	High level alarm signal and red pilot light
P	Low flow alarm signals (2)
Q	UL508 Listed Panel (Standard on USA Panel - Optional for Canadian panel)
R	Stop pump level main tank alarm signal and red pilot light
S	Low-level alarm signal and red pilot light (specify function)
T	High-level alarm signal and red pilot light (specify function)
U	Momentary test button
V	Key lock
W	Provision to connect valve (each)
X	Main disconnect for single phase controller
Y	Overload reset push-button (or handle)
Z	No alternator
1	NEMA 3R double door enclosure
2	Emergency push button shut-off switch
3	Time delay on Magnetrol contact (each, specify contact)
4	Main disconnect for three phase controller in lieu of pump disconnect

Consult Factory for other control panel options.

FP-1/FP-2

VIKING PUMP
A Unit of IDEX Corporation

Worldwide Leader Since 1911 for Positive Displacement Pumping Solutions for Industrial, OEM, and Sanitary Applications.

Innovation and Experience

Viking Pump has been a pump industry leader and innovator since its founding in 1911. We continue to build on our ever growing experience delivering innovative new pumping solutions, including custom designs, to many thousands of customers who use millions of Viking® pumps in some of the world's toughest applications.

Broad Performance Range

Capacity:
0.5 to 360 M³/Hr (0.1 to 1600 GPM)
Pressure:
0 to 172 Bar (0 to 2500 PSI)
Temperature:
-40°C to 370°C (-40°F to 700°F)
Viscosity:
0.5 to 1,000,000 cSt (28 to 4,500,000 SSU)

Ultimate in Sealing Solutions

Viking's offering of packing, component mechanical seals, cartridge seals, and sealless Mag Drive technology provides the best choices for sealing flexibility needed to provide your application a customized sealing solution every time - saving you money, time, and unplanned downtime.

Material Options Matched to Application

Viking's dedicated iron and alloys foundries provide pump construction materials from cast iron to Alloy C. Application-specific materials of construction extend pump life significantly, while reducing maintenance and unplanned downtime, which enables increased production and a better bottom line.

Liquid Integrity Protection

Viking has developed multiple positive displacement pump principles to protect shear-sensitive liquids, and low-shear options to prevent damage to fibers, polymers, and solids. Full-jacketing options provide precise temperature control throughout the pump. The Viking Mag Drive® and other seal options prevent fluid contact with air, assuring liquid integrity.

Local Applications and Engineering Support

Over 245 Authorized Viking Pump Distributors in 68 countries provide local application support and service, backed by Viking Application Engineers and Viking Region Managers strategically located around the world.

Quality Manufacturing

Viking uses ISO9001-2000, ISO14001, Six-Sigma, and Lean/Kaizen in its worldwide manufacturing and assembly processes to remove waste, reduce development costs, and deliver superior products on schedule. Dedicated Viking foundries and manufacturing facilities utilize state-of-the-art CNC equipment to assure unmatched quality is built into every pump.

Custom Designed Solutions

Viking has provided custom designed pumps to end-users and OEMs since its first pump in 1911, when Viking invented the gear-within-a-gear pumping principle to remove water from a rock quarry. Today, enabled by Viking's engineering staff, extensive applications experience, and in-house foundries, more than 20% of Viking's sales are new Viking designs, or pumps designs derived from more than 1000 Viking catalog pumps with more than 40,000 active configurations. So, whether you are an end-user or an OEM, Viking can provide custom designed pumping solutions to meet your specific needs.

IDEX CORPORATION

For more information, contact your local authorized Viking Pump Distributor or contact Viking at:

VIKING PUMP, INC.
A Unit of IDEX Corporation
406 State Street
Cedar Falls, Iowa 50613-0008 U.S.A.
Telephone: (319) 266-1741
Fax: (319) 273-8157
Email: info.viking@idexcorp.com
Web site: www.vikingpump.com

VIKING PUMP OF CANADA INC.
A Unit of IDEX Corporation
P.O. Box 398
Windsor, Ontario N9A 6M3 Canada
Telephone: (888) 845-7867
Fax: (519) 256-5070
E-mail: cinfo@idexcorp.com
Web site: www.vikingpumpcanada.com

SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M.
Date: 20 June 2016

Reviewed ☐
Reviewed as noted ☒
Resubmit ☐

CHIARELLI ENGINEERING LTD.

LATIN AMERICA
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FD-1/FD-2

VIKING PUMP CANADA

Specifications
Viking Duplex Fuel Oil Pump Package

The Duplex Fuel Oil Pump Set shall be Viking # **SG-0510X-DUP-O** complete with the following equipment.

• (2) SG-0510X Spur Gear Pump in cast iron construction, UL-Listed, heat treated steel gears, case-hardened shafts, carbon graphite bushings, lip seal, plain head, 1/2" NPT ports.

• (2) M-drive adaptor to mount the pump on the motor

Pump 1 P/N: Pump 2 P/N: Bracket P/N: **6-05-755-51-0006**

The pumps shall deliver:

10 usgpm @ 25'

Capacity	*Liquid*	*Differential Pressure*	*Viscosity/Sp. Gr.*
2.5 USGPM	No. 2 Fuel Oil	10.0 PSIG	38 SSU
9.5 l/min		0.68 Bar	3 cPs
0.15 l/sec		68.9 kPa	0.85 Sp. Gravity

• Motors shall be Totally Enclosed Fan Cooled, C-Faced, NEMA Frame, CSA, fractional motor

0.5 hp 1 ph 60 Hz 115 Volt 1150 rpm 56C Frame

Motor P/N: **350E.50-60-113TC**

• **Common Base** shall be made of heavy gauge steel plate with 1 1/2" high drip-lip and 1/2" NPT drain.

• **Suction Line Equipment** shall consist of the following components in 1" Header Size

- (2) Lid-Ease Basket Strainers w/40 mesh
- (2) Ball valve, 1" NPT, 600 PSI pressure rated, full port, two piece brass body, PTFE seat, UL-Listed
- (2) 30"Hg-0-30 PSI, Compound gauges, 2.5" face, brass internals, liquid filled
- (2) Gage Valve - Ball valves, 1/4" NPT, 600 PSI, full port, two piece brass body, PTFE seat, UL-Listed
- Sch. 40 cbn stl piping and nipples,150 PSI malleable iron scrd fittings; Class 125/150 Flanges where applicable. N/American fittings std.

• **Discharge Line Equipment** shall consist of the following components in 1/2" Header Size

- (3) Spring Check Valve, 1/2" NPT, 400 PSI pressure rated, bronze body, PTFE poppet
- (2) Ball valve, 1/2" NPT, 600 PSI pressure rated, full port, two piece brass body, PTFE seat, UL-Listed
- (2) In-Line Relief Valve - continuous bypass type, cast iron body, stainless steel spring
- (2) Pressure Gauge, 2.5" dial, brass internals, liquid filled, 0-160 Range
- (2) Gage Valve - Ball valves, 1/4" NPT, 600 PSI, full port, two piece brass body, PTFE seat, UL-Listed
- Sch. 40 cbn stl piping and nipples,150 PSI malleable iron scrd fittings; Class 125/150 Flanges where applicable. N/American fittings std.
- Pump Set to be leak tested with 100 PSI air and soapy water.
- Unit to be coated with Vinyl Toluene Alkyd, Quick Dry Enamel
- Magnetic Float Switch with Alarm for Drip Tray Leak Detection
- Pressure Switch - Dual Stage - High and Low, 6-200 PSI (41.4 to 1379.3 kPa) in EEMAC1 enclosure, installed

FD-1/FD-2

VIKING PUMP CANADA

Specifications
Control Panel for Viking Duplex Fuel Oil Pump Package

The Control Panel for the Viking Duplex Fuel Oil Pump Set shall be Viking part number: **CPA05-DUP-STD**

Duplex Control Panel 0.5 HP, 1/60/115V:

- NEMA 1 enclosure
- Individual disconnect switches, motor protectors and transformer c/w through the door operation and control circuit fuse (1 phase - 115 Volt)
- Magnetic motor starters (2)
- Hand-Off-Auto selector switches (2)
- Power on pilot light (white) (1)
- Run pilot lights (green) (2)
- Terminal Strip
- Provision to connect 4 float switches and 1 redundant float switch (normally closed)
- Control circuit fuse
- P1 - Auto - P2 alternating selector switch
- Lead pump failure pilot light & manual reset, lag pump start (automatic transfer to non operating pump in case of motor overload or short circuit)
- High pressure cut out - red pilot light & manual reset
- Low pressure cut out - red pilot light & override timers (2) (manual reset)
- High pressure alarm signal
- Low pressure alarm signal
- Low level alarm signal & red pilot light
- High level alarm signal & red pilot light
- Critical High Level Alarm Signal & red pilot light
- Provision to connect valve (each)
- Redundant Contactors (Back-up to Primary Contactors)
- Drip tray leak detection alarm signal & red pilot light

SHOP DRAWING

This review is solely for the verification of general design quality and does not alleviate the responsibility of the contractor for insuring that all specification, space and installation requirements are met.

Reviewed By: M.M.

Date: 20 June 2016

Reviewed ☐
Reviewed as noted ☒
Resubmit ☐

CHIARELLI ENGINEERING LTD.

INSTALLATION, START UP, TROUBLESHOOTING, PREVENTIVE MAINTENANCE, DO'S & DON'TS SERIES SG-04, SG-05 & SG-07 SPUR GEAR PUMPS

CONTENTS

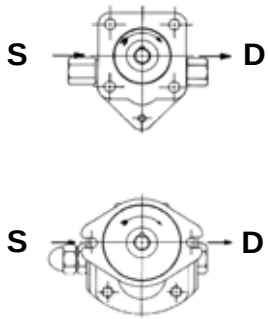


FIGURE 1

INSTALLATION

General

The following items must be considered prior to pump installation:

1. Location - locate the pump as close as possible to the liquid supply. If possible locate the pump below the liquid supply. Viking pumps are self-priming; but the better the suction conditions, the better the pump will perform.
2. Accessibility – the pump must be accessible for inspection, maintenance and repair.
3. Suction/Discharge - SG Series pumps are designed for clockwise rotation as standard (viewed from end of shaft). Refer to Figure 1.
4. Pressure Relief Valve - the SG Series is a positive displacement pump and requires some form of over pressure protection. Without pressure protection, if the discharge line is blocked or becomes closed, pressure will build up until the motor stalls, drive equipment fails, a pump part breaks, or the piping and/or other equipment in the system bursts. To prevent the possibility of any one or more of the above from occurring, the use of a pressure relief valve is recommended.
5. Storage - drain the pump and apply a light coat of non-detergent SAE 30 weight oil to all internal pump parts. Apply grease to the pump shaft extension. Viking suggests rotating the pump shaft by hand one complete revolution every 30 days to circulate the oil.

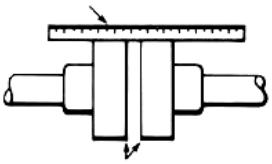
MOUNTING

1. Surfaces to which the pump mounts must be clean and flat.
2. Use SAE Grade 5 or better capscrews to mount pump.
3. The 4 mounting capscrews for the SG-04 and SG-05 pumps must have a minimum of ½ inch thread engagement, and must be torqued evenly to 12-15 ft-lbs.
4. The 2 mounting capscrews for the SG-07 pumps must have a minimum of ½ inch thread engagement, and be evenly torqued to 50-55 ft-lbs.
5. Standard SG Series pumps are designed to be used with jaw type couplings that do not induce axial thrust on the pump shaft. If an improper type of coupling is used, internal damage may result.
6. Do not strike or press the pump drive coupling to install. Internal pump damage will result. If the coupling does not slide onto the shaft, inspect the coupling, shaft and key for nicks or burrs and remove.
7. If the pump is to be belt or gear driven, the overhung load option must be specified.
8. Once the pump has been mounted and the coupling installed, it is recommended to put lube oil into the suction port and turn the pump by hand to make sure it turns freely.

Alignment

Check alignment after mounting.

1. If the unit has a flexible coupling, remove any coupling guards or covers and check alignment of coupling halves. A straight edge (piece of key stock will work) across the coupling must rest evenly on both rims at the top, bottom and sides. See Figure 3.
2. Make a final check on alignment after the piping is hooked up.



CHECK WIDTH BETWEEN THESE SURFACES WITH INSIDE CALIPERS OR FEELER GAUGE TO BE CERTAIN THE FACES ARE EQUAL DISTANCE APART AND PARALLEL.

FIGURE 3

Piping/Hose

The cause of many pumping problems can be traced to the suction piping. It should always be as large in diameter and as short in length as possible.

Before starting the layout and installation of your piping system, consider the following points:

1. Never use piping smaller than the pump port connections. Piping larger in diameter than the port connection is sometimes required to reduce friction losses.

2. Be sure the inside of the pipe is clean before installing.

3. When approaching an obstacle to the suction line, go around instead of over it. Going over an obstacle can create an air pocket. Where practical, slope the piping so no air or liquid pockets will be formed. Air pockets in the suction line make it hard for the pump to prime.

4. A strainer on the suction side of the pump should always be considered in any pumping system. The strainer will keep foreign matter from entering the pump. The strainer mesh or perforation size should be large enough so that it does not cause excessive pressure drop, but fine enough to protect the pump. Use of a strainer is particularly important at start up to help clean the system of weld beads, pipe scale and other foreign objects.

5. A pressure relief valve is required in the discharge line. See Pressure Relief Valves, General page 1 item 4.

6. The pump must not be used to support the piping. Hangers, supports, stands, etc. must carry the weight of the pipes.

7. When fastening piping to the pump do not impose any strain on the pump casing. “Springing” or “drawing” the piping up to the pump will cause distortion, possible misalignment and probable rapid wear of the pump. Do not use the pump to correct errors in piping layout or assembly.

8. All joints of piping system must be tight; liquid thread sealant will help assure leak free threaded joints. Loose joints result in liquid leaks or suction side leaks. Air leaks make the pump noisy and reduce flow. **CAUTION:** Be careful not to over tighten fittings as this can cause cracked joints. Do not use PTFE tape. Reduced friction makes over tightening very easy and will result in cracked ports. Leaks in the suction line can permit air to be drawn in, and will cause a noisy pump and reduction in capacity.

9. Drive alignment must be checked after piping is hooked up.

10. Provide a pressure relief device in any part of a pump and piping system that can be valved off and, thus, completely isolated. A rise in temperature will cause a liquid to expand. If there is no provision for pressure relief in the closed off section, there is a chance that the pump or piping will rupture.

Danger !

Before starting pump, be sure all drive equipment guards are in place. Failure to properly mount guards may result in serious injury or death.

START UP

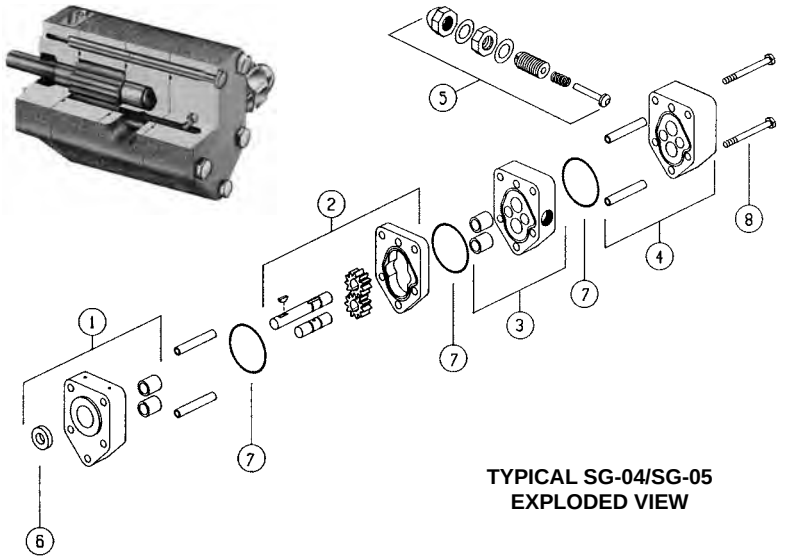
Before pushing “start” button, check the following:

1. Are vacuum and pressure gauges (liquid filled) mounted on or near the pump? Gauges are the quickest and most accurate way of finding out what is happening in the pump.

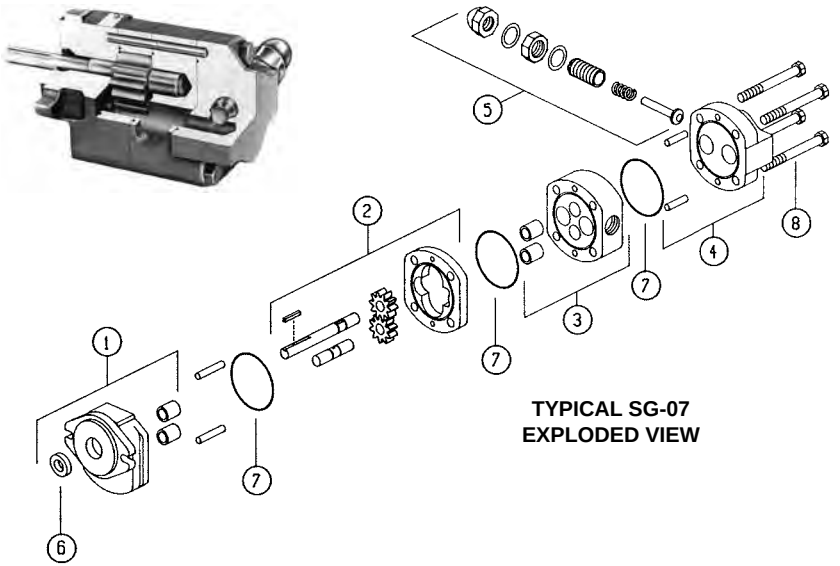
2. Is the pump is correctly aligned with the drive equipment?

3. Make sure there is no pipe strain on the pump ports.

4. Rotate the pump shaft by hand to be sure it turns freely.



TYPICAL SG-04/SG-05
EXPLODED VIEW



TYPICAL SG-07
EXPLODED VIEW

ITEM	DESCRIPTION	ITEM	DESCRIPTION
1.	Bracket, lipseal & bearing section	**5.**	Relief valve kit
2.	Match ground casing & (2) gears, driver & driven shafts	**6.**	Lipseal
3.	Separation plate & bearing assy.	**7.**	O-ring
4.	Head and alignment sleeve assy.	**8.**	Assembly capscrews

5. Before connecting to the motor, jog it to be sure it is running in the correct direction. Refer to **"General"** on page 1.

6. Is the pressure relief valve installed properly?

7. Make sure suction piping is properly connected and sealed, and valves are open.

8. Make sure the discharge piping is properly connected and sealed, valves are open, and there is a place for the liquid to go.

9. Make sure all guards are in place.

10. The above checklist is a general guideline to be used prior to starting the pump. Since Viking Pump cannot foresee every application for our product and possible system design, the final responsibility is with the user. The pump must be utilized within the catalog specifications and the pump system must be designed to provide safe working conditions.

The "start" button may now be pushed.

The pump should begin to deliver liquid within 15 seconds! If not, push the stop button. Do not run the pump without liquid flow longer than 30 seconds or the pump may be ruined.

Review **Startup** steps 1 through 10. Consider what the suction and discharge gauges may indicate. If everything appears in order, re-prime pump. Refer to **Mounting,** page 2, item 8.

Push the "start" button. If nothing is flowing within 30 seconds, stop the pump. The pump is not a compressor, it will not build up much air pressure. It may be necessary to vent discharge line until liquid begins to flow.

If pump still does not deliver, consider one or more of the following:

1. The suction line has air leaks.

2. The end of the suction pipe is not submerged deeply enough in the liquid.

3. The suction lift is too great or the suction piping is too small.

4. Liquid is vaporizing in the suction line before it gets to the pump.

If after consideration of these points, the pump still does not deliver liquid, review all points given under **START UP** and read through the **TROUBLESHOOTING** guide and try again. If pump still will not deliver liquid, contact your Viking Pump supplier.

TROUBLESHOOTING

A Viking pump that is properly installed and maintained will give long satisfactory performance.

If trouble does develop, one of the first steps toward finding the difficulty is to install a vacuum gauge in the suction line and a pressure gauge in the discharge line. Readings on these gauges often give a clue on where to start looking for trouble.

DANGER !

Before opening any Viking pump liquid chamber (pumping chamber, reservoir, relief valve adjusting cap fitting etc.) be sure:

1. **That any pressure in chamber has been completely vented through the suction or discharge lines or other appropriate openings or connections.**

2. **That the driving means (motor, turbine, engine, etc.) has been "locked out" or made non-operational so that it cannot be started while work is being done on the pump.**

3. **That you know what liquid the pump has been handling and the precautions necessary to safely handle the liquid. Obtain a material safety data sheet (MSDS) for the liquid to be sure these precautions are understood.**

Failure to follow the above listed precautionary measures may result in serious injury or death.

Vacuum Gauge - Suction Port

High vacuum reading would indicate:

1. The suction line is blocked, valve closed, a strainer is plugged or a pinched suction line.
2. The suction line is too small.
3. The liquid is too viscous to flow through the piping.
4. The lift required is too high.

Low reading would indicate:

1. There may be an air leak in the suction line.
2. The end of the pipe is not in the liquid.
3. The pump is worn.
4. The pump is dry and should be primed.

Fluttery, jumping or erratic reading would indicate:

1. The liquid is vaporizing.
2. Liquid is coming in to the pump in slugs, possibly an air leak or insufficient liquid above the end of the suction pipe.
3. Vibration from cavitation, misalignment, or damaged parts.

Pressure Gauge - Discharge Port

High reading would indicate:

1. High viscosity and small diameter and/or lengthy discharge line.
2. The strainer or filter is plugged.
3. The pressure relief valve is set too high.
4. Valve in the discharge line partially closed.
5. Line partially plugged from build up on inside of pump, solidified product or foreign object.
6. Liquid in the pipe not up to temperature.

Low reading would indicate:

1. Pressure relief valve set too low.
2. Pressure relief valve poppet not seating properly.
3. Pump mounting capscrews into torqued to specifications (GP-04 and GP-05 Series 12-15 ft.-lbs.).
4. Pump assembly bolts not torqued into specifications (GP-07 Series 50-55 ft.- lbs.).
5. The bypass around pump partially open.
6. Pump is damaged or worn.
7. The pump has too much internal clearance.

Fluttery, jumping or erratic reading would indicate:

1. Cavitation.
2. Liquid is coming to the pump in slugs.
3. Air leak in the suction line.
4. Vibrating from misalignment or mechanical problems.

MISCELLANEOUS

Pump does not pump:

1. The pump has lost its prime from air leak or low level in tank.
2. The suction lift is too high.
3. Rotating in the wrong direction.
4. The motor does not come up to speed.
5. The strainer is clogged.
6. The bypass valve is open, pressure relief valve set too low or pressure relief valve poppet stuck open.
7. The pump is worn out.
8. Any changes in liquid, system or operation that would help explain the trouble, e.g. new liquid, additional lines or process changes.

Pump starts, then looses its prime:

1. The supply tank is empty.
2. The liquid is vaporizing in the suction line.
3. There is an air leak or air pockets in the suction line.
4. The pump is worn out.

Pump is noisy:

1. The pump is cavitating (liquid vaporizing in suction line) or being starved (heavy liquid cannot get to pump fast enough). Increase the suction pipe size and/or reduce the length, or decrease the pump speed. If the pump is above the liquid, raise the liquid level closer to the center line of the inlet port. If the liquid is above the pump, increase the head of the liquid.
2. Check alignment.
3. Anchor the base or piping to eliminate vibration.

Pump not delivering up to capacity:

1. The pump is starving or cavitating – see **Pump is noisy**, item 1.
2. The strainer partially clogged.
3. Air leak somewhere in the suction line.
4. Running too slow. Is the motor the correct speed and wired up correctly?
5. Pressure relief valve is set too low, stuck open or has damaged poppet seat.
6. The bypass line around the pump partially opened.
7. The pump is worn out.

Pump takes too much power (stalls motor):

1. The pump sequence valve set too high.
2. Liquid is more viscous than the is unit sized to handle.
3. The system pressure relief valve set too high.
4. The pump is misaligned.

DO'S AND DON'TS

Do's and Don'ts for installation, operation and maintenance of Viking pumps to assure safe, long, trouble free operation.

Installation:

1. **DO** install the pump as close to supply tank as possible.
2. **DO** leave working space around the pumping unit.
3. **DO** use large, short and straight suction port.
4. **DO** install a strainer in the suction line.
5. **DO** a double check of alignment after unit is mounted and piping is hooked up.
6. **DO** provide pressure relief valve for discharge side of pump.
7. **DO** check for proper rotation.
8. **DO** use a return line filter.
9. **DO** use an industrial grade hydraulic oil.
10. **DO** use piping, hose and fittings rated for maximum system pressure.

Operation

1. **DON'T** run the pump at speeds faster than 3600 RPM.
2. **DON'T** allow the pump to develop pressure higher than those shown in catalog at that size.
3. **DON'T** operate pumps at temperatures above or below limits shown in catalog for model.
4. **DON'T** operate unit without all guards in place.
5. **DON'T** operate pump without pressure relief valve in discharge piping; be sure valve is mounted and set correctly.
6. **DON'T** stick fingers in ports of pump!!! Fingers may be pinched between gears.
7. **DON'T** work on the pump unless driver has been "locked out" so it cannot be started while work is being done on the pump.

Maintenance:

1. **DO** record pump model number and serial number and file for further use.
2. **DO** have spare parts, pump or stand by units available, particularly if pump is essential part of key operation process.
3. **DO** obtain, read and keep all maintenance instructions furnished with pump.
4. **DO** make sure any pump that has residual system pressure in it or that has handled high vapor pressure liquids, has been vented through the suction or discharge lines or other openings provided for this purpose.
5. **DO** make sure that if the pump is still hooked to the driver while maintenance is being performed that the driver has been "locked out" so that it cannot be inadvertently started while work is being done on the pump.
6. **DO** make sure any pump that has handled a corrosive, flammable, hot or toxic liquid has been drained, flushed, vented and/or cooled before it is disassembled.

INSTALLATION, START UP, TROUBLESHOOTING, PREVENTIVE MAINTENANCE, DO'S & DON'TS
SERIES SG-04, SG-05 & SG-07 SPUR GEAR PUMPS

VIKING PUMP

IDEX CORPORATION

WARRANTY

Viking warrants all products manufactured by it to be free from defects in workmanship or material for a period of one (1) year from date of startup, provided that in no event shall this warranty extend more than eighteen (18) months from the date of shipment from Viking. The warranty period for Universal Seal series pumps ONLY (Universal Seal models listed below) is three (3) years from date of startup, provided that in no event shall this warranty extend more than forty-two (42) months from the date of shipment from Viking.

UNDER NO CIRCUMSTANCES SHALL VIKING BE LIABLE UNDER THIS WARRANTY OR OTHERWISE FOR SPECIAL, INCIDENTAL, INDIRECT, CONSEQUENTIAL OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING, BUT NOT LIMITED TO, LOST OR UNREALIZED SALES, REVENUES, PROFITS, INCOME, COST SAVINGS OR BUSINESS, LOST OR UNREALIZED CONTRACTS, LOSS OF GOODWILL, DAMAGE TO REPUTATION, LOSS OF PROPERTY, LOSS OF INFORMATION OR DATA, LOSS OF PRODUCTION, DOWNTIME, OR INCREASED COSTS, IN CONNECTION WITH ANY PRODUCT, EVEN IF VIKING HAS BEEN ADVISED OR PLACED ON NOTICE OF THE POSSIBILITY OF SUCH DAMAGES AND NOTWITHSTANDING THE FAILURE OF ANY ESSENTIAL PURPOSE OF ANY PRODUCT.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND SHALL BE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT ALL OF WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED.

See complete warranty at www.vikingpump.com.