FINAL DRAWINGS

CONTRACT: Bid Opportunity 571-2005
City of Winnipeg
Branch #1 Booster Pumps

SUBMISSION DATE: April 4, 2007

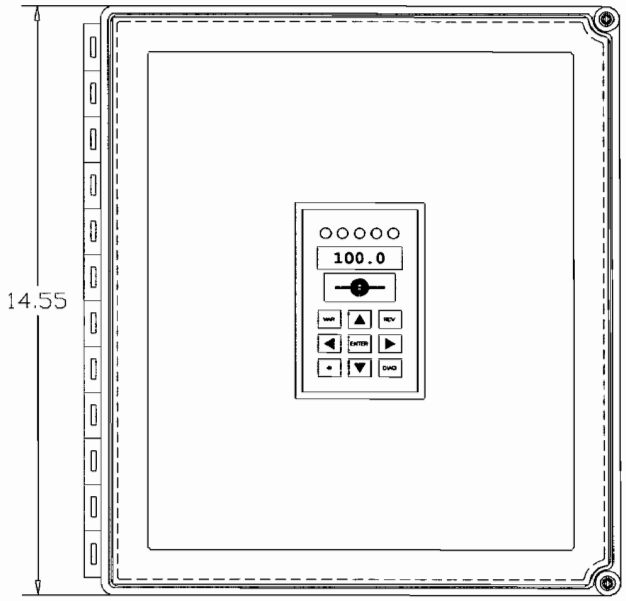
Drawings & Data

Table of Contents

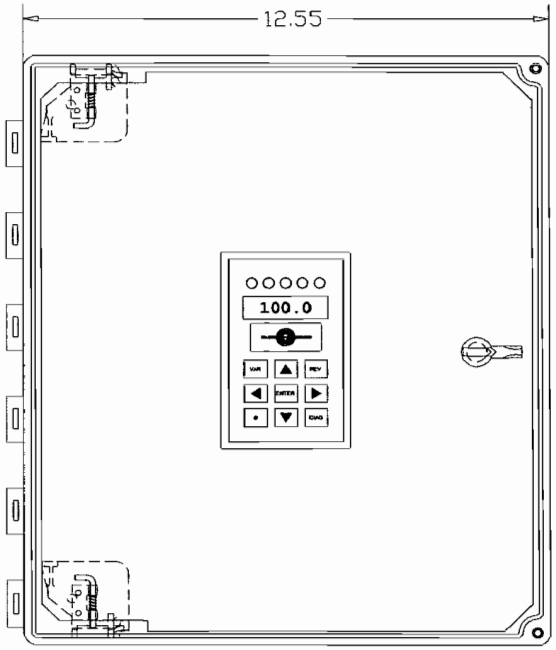
Booster Pumps S.N. S004025/26

CUSTOMER	City of Winnipeg	Power & Mine	**Power & Mine Supply Co. Ltd.** **4-75 Meridian Drive** **Winnipeg, Manitoba**	DRAWING (REV.)	TR400_BOX
PROJECT OR ENGINEER	Earthtech			DATE	Jan 26, 2007
PO #	Bid Opp 515-2005			CERTIFIED BY	D. Shamlock
TAG NUMBER(S)	n/a	DO NOT SCALE	UNITS IN INCHES	MOUNTED PART	TR400 tachometer

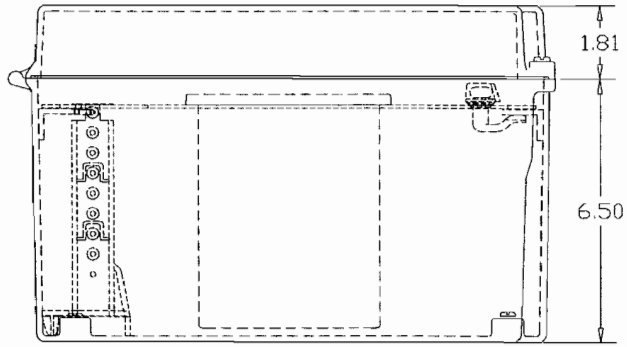
Top view with cover c/w
TR400 digital ratemeter mounted



Top view with cover removed c/w
TR400 digital ratemeter mounted
in swing-out panel



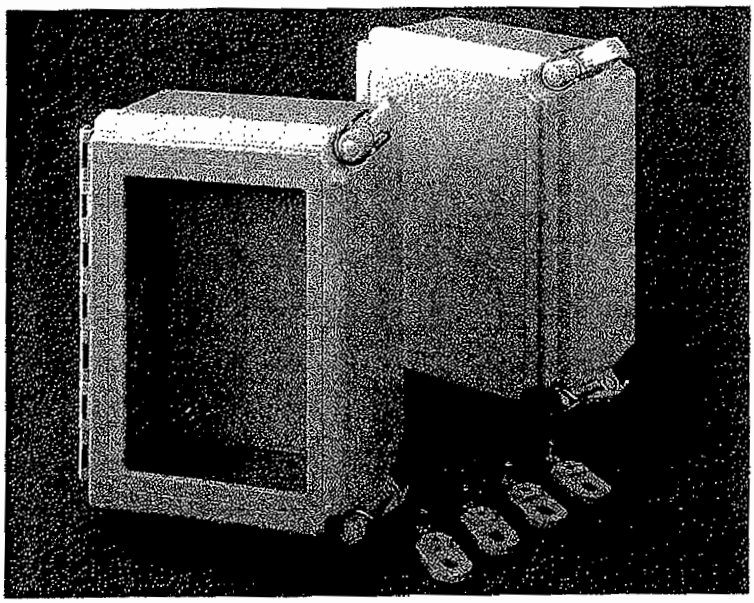
End view with cover c/w
TR400 digital ratemeter/tachometer
mounted in swing-out panel



Hoffman model A14128CHSCFGW
fiberglass hinged cover with window
NEMA 4X enclosure complete with
A14SPK12C swing-out panel kit

Hoffman
A Pentair Company

Fiberglass Hinged Cover Type 4X Enclosures



Application

Designed for use as a junction box or instrument housing in both indoor and outdoor settings. The enclosure is used in highly corrosive environments typically found in oil refineries, chemical processing plants, waste water treatment, marine installations, pulp and paper processing, and electroplating plants. The efficient design and simple construction create a low-cost, durable, and aesthetic enclosure.

Construction

- Molded fiberglass polyester has outstanding chemical and temperature resistance qualities and exhibits excellent weatherability and physical properties
- Fiberglass is easily punched, drilled, filed, or sawed
- Seamless foam-in-place gasket assures watertight and dust-tight seal
- Polyester mounting brackets and stainless steel attachment screws are provided with each enclosure
- Scratch-resistant GE Lexan Margard® windows are permanently bonded in place
- Molded-in-place threaded brass inserts and plated steel screws are provided for mounting optional panels and terminal block kits
- Removable hinged cover attached to body with Type 316 stainless steel hinge pin
- Screw cover enclosures are secured with two captivated Type 316 stainless steel slotted cross point cover screws
- Enclosures with patented quick-release latches have corrosion-resistant polyester latches located in corners that provide unobstructed access to enclosure
- Hinge pin and bail are corrosion-resistant Type 316 stainless steel
- Knockout padlock provisions included in each latch

U.S. Patent 4,917,421

Finish/Color

Optional steel panels are white. Optional stainless steel, aluminum, and composite panels are unpainted. Fiberglass material is light gray inside and out.

Industry Standards

UL 508A, 508 File No. E61997: Type 4, Type 4X, Type 12, and Type 13
NEMA/EEMAC Type 4, Type 4X, Type 12, and Type 13
Enclosure flammability rating per UL 508
Window flammability rating per UL 508
CSA File No. LR42186: Type 4, Type 4X, Type 12, and Type 13
IEC 60529, IP66

Accessories

See Chapter 12, General Accessories.

Panels (see table)
Threaded Panel Extenders
Quick-Release Latch Kit
Swing-Out Panel Kit
Terminal Block Kit Assembly
Ventilators

Modification Services Program

You can customize this product to your unique requirements by specifying from these options:

- Colors
- Holes and cutouts in body, doors, subpanels
- Doors
- Subpanels
- Standard accessories

For details, see Modification Services at hoffmanonline.com.
To order, contact your local Hoffman sales representative.

NOTE: For information about modifications outside the scope of the Modification Services program, contact your Hoffman sales representative.

Standard Sizes Fiberglass Hinged Solid Cover Type 4X Enclosures

Catalog Number Screw Cover	Catalog Number Quick-Release	Enclosure Size A x B x C	* Panel Catalog Number	Panel Size D x E	Mounting G x H	Overall L x W	F	J	K	O	P	Q	R	T	U
A664CHSCFG	A664CHQRFG	6.00 x 6.00 x 4.00 (152 x 152 x 102)	A6P6	4.88 x 4.88 (124 x 124)	6.94 x 4.00 (176 x 102)	6.50 x 6.50 (165 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	4.25 (108)	5.64 (143)	5.12 (130)	0.12 (3)	5.64 (143)
A864CHSCFG	A864CHQRFG	8.00 x 6.00 x 4.00 (203 x 152 x 102)	A8P6	6.75 x 4.88 (171 x 124)	8.94 x 4.00 (227 x 102)	8.50 x 6.50 (216 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	6.25 (159)	7.64 (194)	7.12 (181)	0.12 (3)	5.64 (143)
A1086CHSCFG	A1086CHQRFG	10.00 x 8.00 x 6.00 (254 x 203 x 152)	A10P8	8.75 x 6.88 (222 x 175)	10.94 x 6.00 (278 x 152)	10.50 x 8.50 (267 x 216)	5.45 (138)	4.94 (125)	1.31 (33)	6.25 (159)	8.25 (210)	9.61 (244)	9.12 (232)	0.12 (3)	7.61 (193)
A12106CHSCFG	A12106CHQRFG	12.00 x 10.00 x 6.00 (305 x 254 x 152)	A12P10	10.75 x 8.88 (273 x 226)	12.94 x 8.00 (329 x 203)	12.50 x 10.50 (318 x 267)	5.45 (138)	4.69 (119)	1.56 (40)	8.25 (210)	10.25 (260)	11.58 (294)	11.12 (282)	0.12 (3)	9.58 (243)
A14128CHSCFG	A14128CHQRFG	14.00 x 12.00 x 8.00 (356 x 305 x 203)	A14P12	12.75 x 10.88 (324 x 276)	14.94 x 10.00 (379 x 254)	14.55 x 12.55 (370 x 319)	7.45 (189)	6.50 (165)	1.81 (46)	10.25 (260)	12.25 (311)	13.59 (345)	13.12 (333)	0.15 (4)	11.59 (294)
A16148CHSCFG	A16148CHQRFG	16.00 x 14.00 x 8.00 (406 x 356 x 203)	A16P14	14.75 x 12.88 (375 x 327)	16.94 x 12.00 (430 x 305)	16.55 x 14.55 (420 x 370)	7.45 (189)	6.23 (158)	2.08 (53)	12.25 (311)	14.25 (362)	15.56 (395)	15.12 (384)	0.15 (4)	13.56 (344)
A181610CHSCFG	A181610CHQRFG	18.00 x 16.00 x 10.00 (457 x 406 x 254)	A18P16	16.75 x 14.88 (425 x 378)	18.94 x 14.00 (481 x 356)	18.58 x 16.58 (472 x 421)	9.45 (240)	7.66 (195)	2.66 (68)	14.25 (362)	16.25 (413)	17.53 (445)	17.12 (435)	0.16 (4)	15.53 (394)

Standard Sizes Fiberglass Hinged Window Cover Type 4X Enclosures

Catalog Number Screw Cover	Catalog Number Quick-Release	Enclosure Size A x B x C	* Panel Catalog Number	Panel Size D x E	Mounting G x H	Overall L x W	F	J	K	M	N	O	P	Q	R	T	U
A664CHSCFGW	A664CHQRFGW	6.00 x 6.00 x 4.00 (152 x 152 x 102)	A6P6	4.88 x 4.88 (124 x 124)	6.94 x 4.00 (176 x 102)	6.50 x 6.50 (165 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	4.25 (108)	4.25 (108)	4.25 (108)	4.25 (108)	5.64 (143)	5.12 (130)	0.12 (3)	5.64 (143)
A864CHSCFGW	A864CHQRFGW	8.00 x 6.00 x 4.00 (203 x 152 x 102)	A8P6	6.75 x 4.88 (171 x 124)	8.94 x 4.00 (227 x 102)	8.50 x 6.50 (216 x 165)	3.45 (88)	3.25 (83)	1.00 (25)	6.25 (159)	4.25 (108)	4.25 (108)	6.25 (159)	7.64 (194)	7.12 (181)	0.12 (3)	5.64 (143)
A1086CHSCFGW	A1086CHQRFGW	10.00 x 8.00 x 6.00 (254 x 203 x 152)	A10P8	8.75 x 6.88 (222 x 175)	10.94 x 6.00 (278 x 152)	10.50 x 8.50 (267 x 216)	5.45 (138)	4.94 (125)	1.31 (33)	8.25 (210)	6.25 (159)	6.25 (159)	8.25 (210)	9.61 (244)	9.12 (232)	0.12 (3)	7.61 (193)
A12106CHSCFGW	A12106CHQRFGW	12.00 x 10.00 x 6.00 (305 x 254 x 152)	A12P10	10.75 x 8.88 (273 x 226)	12.94 x 8.00 (329 x 203)	12.50 x 10.50 (318 x 267)	5.45 (138)	4.69 (119)	1.56 (40)	10.25 (260)	8.25 (210)	8.25 (210)	10.25 (260)	11.58 (294)	11.12 (282)	0.12 (3)	9.58 (243)
A14128CHSCFGW	A14128CHQRFGW	14.00 x 12.00 x 8.00 (356 x 305 x 203)	A14P12	12.75 x 10.88 (324 x 276)	14.94 x 10.00 (379 x 254)	14.55 x 12.55 (370 x 319)	7.45 (189)	6.50 (165)	1.81 (46)	12.25 (311)	10.25 (260)	10.25 (260)	12.25 (311)	13.59 (345)	13.12 (333)	0.15 (4)	11.59 (294)
A16148CHSCFGW	A16148CHQRFGW	16.00 x 14.00 x 8.00 (406 x 356 x 203)	A16P14	14.75 x 12.88 (375 x 327)	16.94 x 12.00 (430 x 305)	16.55 x 14.55 (420 x 370)	7.45 (189)	6.23 (158)	2.08 (53)	14.25 (362)	12.25 (311)	12.25 (311)	14.25 (362)	15.56 (395)	15.12 (384)	0.15 (4)	13.56 (344)
A181610CHSCFGW	A181610CHQRFGW	18.00 x 16.00 x 10.00 (457 x 406 x 254)	A18P16	16.75 x 14.88 (425 x 378)	18.94 x 14.00 (481 x 356)	18.58 x 16.58 (472 x 421)	9.45 (240)	7.66 (195)	2.66 (68)	16.25 (413)	14.25 (362)	14.25 (362)	16.25 (413)	17.53 (445)	17.12 (435)	0.16 (4)	15.53 (394)

Millimeter dimensions ( ) are for reference only; do not convert metric dimensions to inch.
Panels must be ordered separately. Optional stainless steel, aluminum, and composite material panels are also available for most sizes. See General Accessories.

Modification Services Program

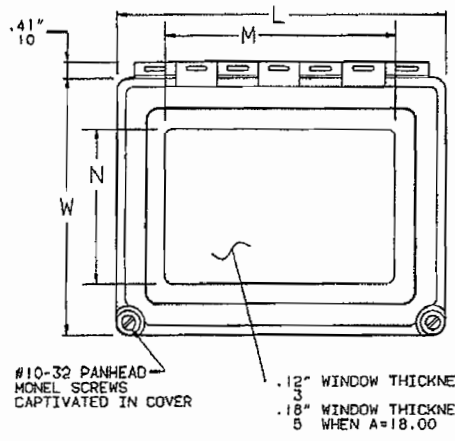
You can customize this product to your unique requirements by specifying from these options:

- Colors
- Holes and cutouts in body, doors, subpanels
- Doors
- Subpanels
- Standard accessories

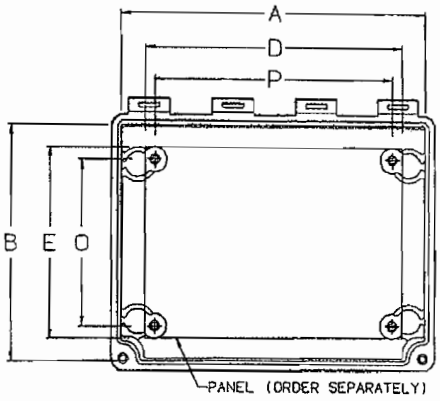
For details, see Modification Services at hoffmanonline.com.
To order, contact your local Hoffman sales representative.

NOTE: For information about modifications outside the scope of the Modification Services program, contact your Hoffman sales representative.

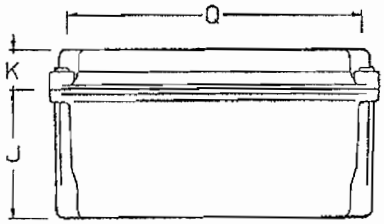
Fiberglass Hinged Cover Type 4X Enclosures



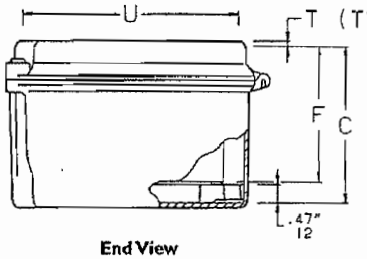
Top View



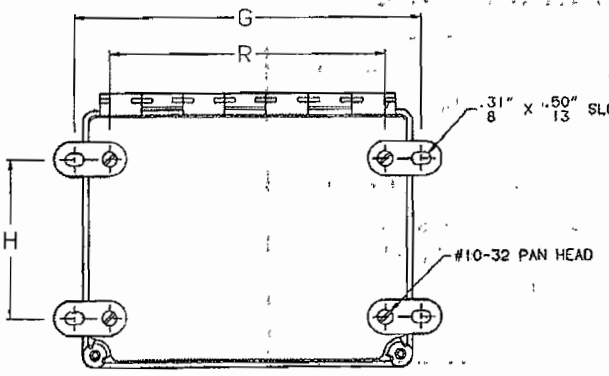
Top View with Cover Removed



Side View

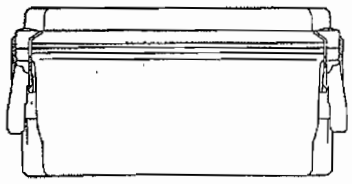


End View



Bottom View

NOTES: 1. Panel screws are #10-32 pan head.
2. Mounting brackets are .16 in. (4mm) thick.

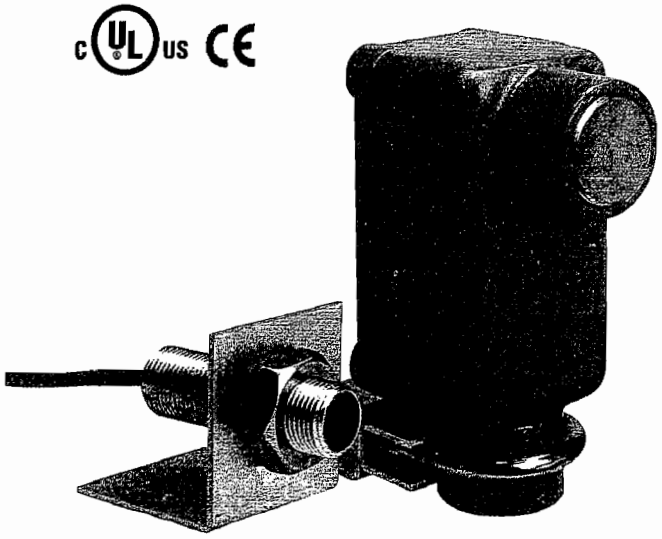


Side View
Quick-Release Cover Enclosure

C2567

ELECTRO•SENSORS

Superior • Systems • Solutions



Hall Effect Sensors

Models 906 and 907 Explosionproof

Quadrature Models 906B and 907B Explosionproof

- Large gap non-contact sensing
- NPN Open collector output
- Signal transmission up to 1,500 feet
- Compatible with PLC digital I/Os
- Easy to install - no maintenance
- Rugged and reliable
- 907 Series UL and CSA approved to applicable standards
- 5 Year Limited Warranty on all products*

* Excludes motor controllers and MKS products

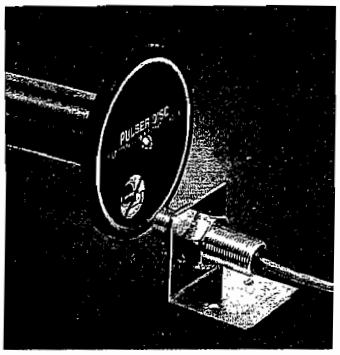
Product Information

Description

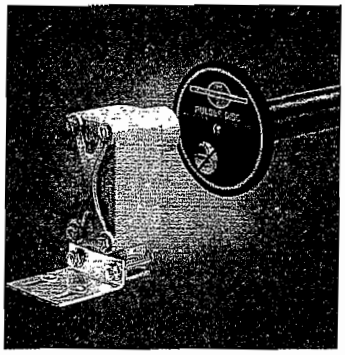
Electro-Sensors' Model 906/906B* and 907/907B* Hall Effect sensors are designed for use with pulse generators that provide magnetic targets, such as Electro-Sensors' Pulser Discs and Split Collar Pulser Wraps. 906 series sensors have a 3/4" threaded aluminum body, are supplied with a mounting bracket and jam nuts, and are recommended for use with Pulser Discs and Split Collar Pulser Wraps. 907 series explosionproof sensors are mounted in a rugged cast aluminum enclosure, which is CSA approved and UL rated for Class I, Group D; Class II, Groups E, F, and G, and Class III environments. 907 series sensors are also supplied with a mounting bracket and are recommended for use with Pulser Discs and Split Collar Pulser Wraps. 906 and 907 sensors come with 10 feet of 3-wire shielded cable as standard, and 906B and 907B sensors come with 10 feet of 4-wire shielded cable as standard. Both the 906 and 907 series of sensors can be mounted up to 1,500 feet from the control unit (i.e. speed switch or tachometer).

906 and 907 series sensors are powered by 6-24 Vdc, and provide an NPN open collector output. Hall Effect sensors switch high and low in the presence of alternating magnetic fields, and generate a square wave (digital) signal with a 50/50 duty cycle when used with Electro-Sensors' pulse generators, which have evenly spaced magnets of alternating polarity. 906 and 907 series sensors allow for a large gap distance of 3/8" ± 1/8" between the sensing surface and the pulse generator's target magnets. The signal produced by the 906 and 907 series sensors is compatible with all Electro-Sensors' products, most PLC digital I/O cards, and with other products requiring an NPN type digital pulse input signal. Electro-Sensors' products bring efficiency and safety to your operations by preventing machine damage, product waste, and costly downtime.

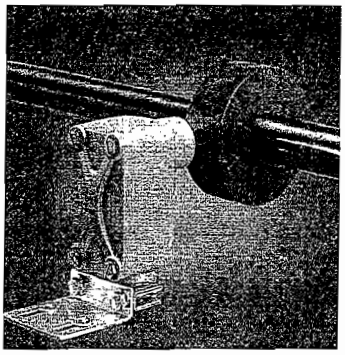
** The 906B and 907B sensors are used where directional sensing is required.*



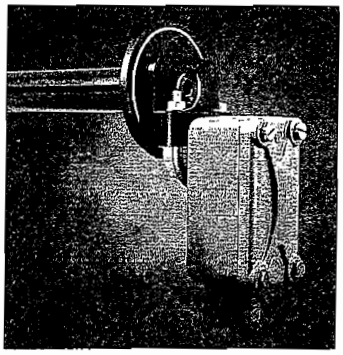
906 Series Sensor and Pulser Disc



907 Series Sensor and Pulser Disc



907 Series Sensor and Pulser Wrap



Optional EZ100 Bracket for use with 907 Series Sensors

6111 Blue Circle Drive
Minnetonka, MN 55343
Phone: 952-930-0100
Fax: 952-930-0130
ISO 9001:2000 Certified

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Sensors and Pulse Generators

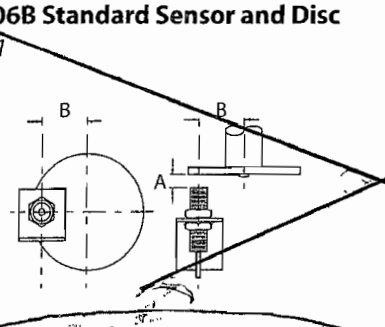
The standard sensor is supplied with a mounting bracket and two jam nuts, and is easily adjustable to achieve the proper gap distance. The optional explosionproof sensor is supplied with a slotted mounting bracket, also easily adjustable. Sensors should be installed allowing the center of the magnets to pass in front of the center of the sensing head during rotation. The gap distance between the sensor and disc or wrap (Dimension A in Figures 1-4) is 3/8" ± 1/8". When using a standard 4" Pulser Disc, the center of the magnetized area of the disc (Dimension B in Figures 1 and 3) is 1-3/4" from the center hole of the disc.

Available Options

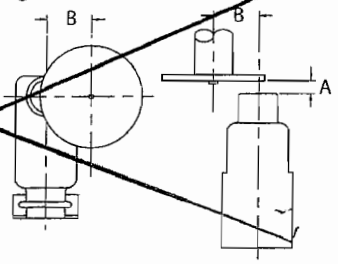
- EZ100 Easy Mount Bracket Assembly for use with 907 Series explosionproof sensors (Figure 5 below).
- 906 series sensors available in stainless steel.
- Stainless Steel Disc-Guard for 907 Series explosionproof sensors.

(Consult factory for further options.)

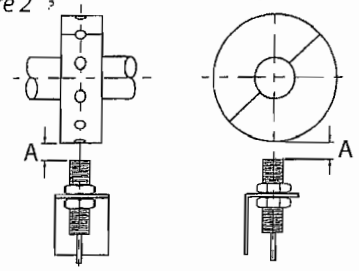
906/906B Standard Sensor and Disc
Figure 1



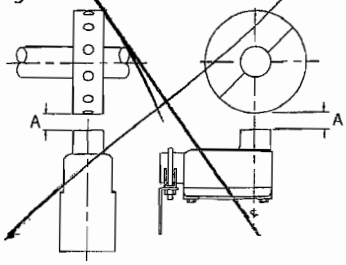
907/907B Sensor and Disc
Figure 3



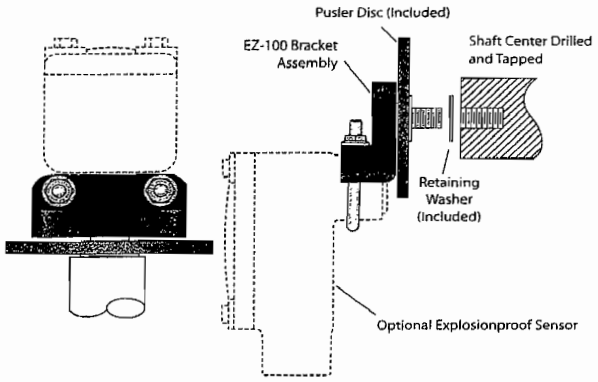
906/906B Standard Sensor and Wrap
Figure 2



907/907B Sensor and Wrap
Figure 4



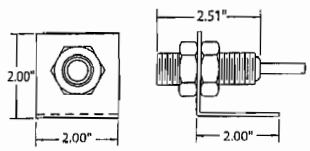
Optional EZ-100 Easy Mount Bracket
Figure 5



Dimensional Drawings - Hall Effect Sensors 906 • 907 • 906B • 907B

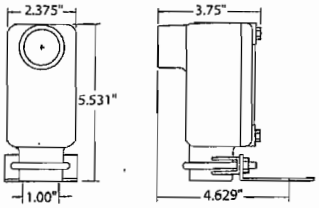
906 Series Digital Sensing Head

Stock No. 775-000500 (906)
775-000504 (906B)

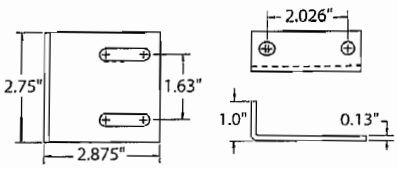


907 Series Explosionproof Sensor

Stock No. 775-000600 (907)
775-006100 (907BV)
775-006101 (907BH)



907 Series Mounting Bracket



Specifications - Hall Effect Sensors 906 • 907 • 906B • 907B

Supply	6 – 24 Vdc @ 10 mA
Output Type	NPN Open Collector
Operating Frequency	0 Hz to 20 KHz
Current Sink	25 mA maximum
Operating temperature	-40°C to +60°C*
Gap Distance	3/8" ± 1/8"
Distance to input device	1,500 feet maximum
Cable	906/907: 3-conductor shielded, 22 AWG
	906B/907B: 4-conductor shielded, 22 AWG
Standard Cable Length	10 feet

Wiring code	906/907: Red = Supply
	Clear = Common
	Black = Signal
	906B/907B: Red = Supply
	White = Common
	Black = Signal A
	Green = Signal B
Material	906 Series: Aluminum, 3/4"–16 UNF threads
	907 Series: Cast Aluminum Housing CSA approved. Meets UL Class I, Group D; Class II, Groups E, F, and G; Class III

**Contact factory for higher temperature ranges.*
Specifications subject to change without notice.

ES-116 Rev.H

6111 Blue Circle Drive
Minnetonka, MN 55343
Phone: 952-930-0100
Fax: 952-930-0130
ISO 9001:2000 Certified

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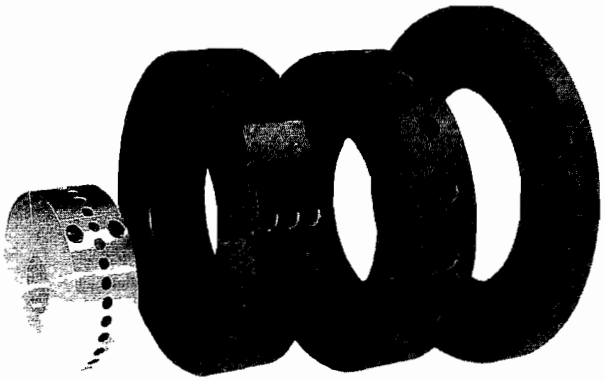


Split Collar Pulser Wraps

Custom made for your application, built to your specifications

- No machinery tear-down required for mounting
- Five types of wraps fit most applications
- Custom number of pulses per revolution
- PVC, aluminum, or stainless steel
- High temperature wraps available

Product Information

Description

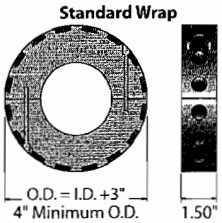
Pulser Wraps are PVC, aluminum, or stainless steel split collars with magnets mounted on the outside circumference. The magnets serve as targets for Hall-Effect and Magnetoresistive sensors that switch when exposed to magnetic fields. All wraps are custom machined to the diameter of the monitored shaft and are split into halves. This splitting process allows the wrap to clamp tightly onto the shaft without tearing down any equipment to install them. The halves are secured around the shaft with recessed Allen-head socket screws supplied. Pulser Wraps provide magnetic targets that are strong enough to allow large gap distances (up to 1/2-inch) between the wrap and the sensor. The wrap and sensor system forgives slight misalignment of the sensor, machinery vibration, dirty, wet, or greasy environments, and shaft end-play.

Special Wraps

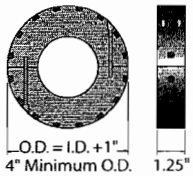
Wraps purchased for use with standard Electro-Sensors systems are typically provided with 16 magnets of alternating polarity. Using a standard Hall-Effect sensing system, this provides 8 pulses per revolution from the sensor. Special wraps can be provided to suit particular application requirements. This often includes adding magnets to the wraps to increase the number of pulses per revolution generated by the sensing system. Adding magnets will usually require an increase in the outside diameter of the wrap. Standard and miniature wraps are typically selected when more magnets are required because the magnets may be added without large increases in the ouside diameter, particularly if the 1/4" diameter magnets are used. Wraps can be manufactured from PVC, aluminum, or stainless steel, and have the option of a keyway where required. **Steel inserts can be substituted for magnets when using proximity or mag sensors.** An Electro-Sensors Application Specialist can assist in the design of wraps to meet specific or special needs.

Dimensional Drawings

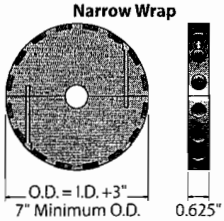
Standard Wrap



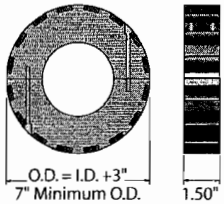
Miniature Wrap



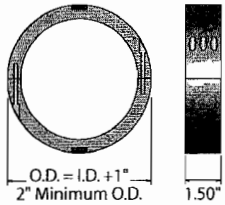
Narrow Wrap



Slotted Wrap



High Speed Wrap



6111 Blue Circle Drive
Minnetonka, MN 55343
Phone: 952-930-0100
Fax: 952-930-0130
ISO 9001:2000 Certified

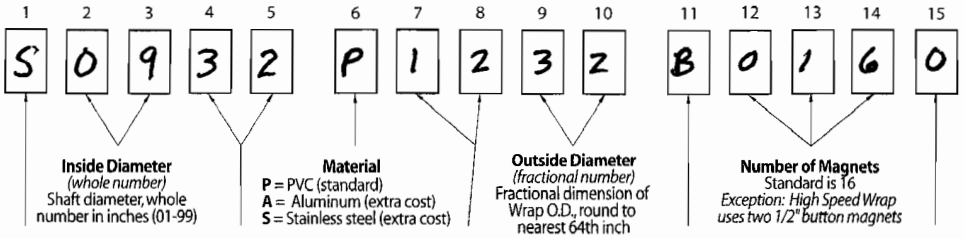
ELECTRO•SENSORS
Superior · Systems · Solutions

Free Catalog and Application Assistance
1-800-328-6170
Visit us online
www.electro-sensors.com

Installation

Pulser Wraps are custom manufactured to fit the shaft they will be mounted on. When the wrap is shipped, four Allen-head cap screws hold the two halves of the wrap together. These screws must be removed so that the wrap is in two halves. Place the halves around the shaft, reinsert the screws and torque them evenly to 5 foot pounds. After installation, a small gap between the two halves is normal.

Use the following chart to create a part number for any wrap. Please state the exact shaft diameter and maximum RPM when ordering.



Examples

1. Standard PVC Wrap for 3-1/2"shaft, 1,750 RPM, with 16 magnets	Part No.	**S0332**	**P0632**	**B0160**
2. Narrow Aluminum Wrap for 1-5/8"shaft, 1,200 RPM, 1/4" keyway, with 16 magnets	Part No.	**N0140**	**A0700**	**B0164**
3. High Speed Aluminum Wrap for 6-1/4" shaft, 6,000 RPM, with 2 magnets	Part No.	**S0616**	**A0716**	**B0020**
4. Miniature PVC Wrap for 1-1/8" shaft, 3,000 RPM, with max. no. of 1/4" magnets	Part No.	**M0108**	**P0400**	**40310**

The formulas below show the maximum number of magnets that can be mounted on the Standard or Miniature Wraps with respect to magnet diameter and the outside diameter of the Wrap.

1/2" Magnets

$$\frac{(\text{Wrap Outside Diameter} - 1/2") \times 3.14}{0.65}$$

1/4" Magnets

$$\frac{(\text{Wrap Outside Diameter} - 1/2") \times 3.14}{0.35}$$

Specifications • Split Collar Pulser Wraps

All Wraps - Temperature Range

PVC Material ..... -40°C to +60°C
Aluminum Material ..... -40°C to +150°C
Stainless Steel ..... -40°C to +150°C

Consult factory for higher temperature ranges.

Wrap Types

Standard - Under 3,000 rpm
Width ..... 1-1/2"
Inside diameter ..... Custom to shaft size
Outside diameter ..... I.D. + 3"
Min. outside diameter ..... 4"
Material ..... PVC std., aluminum optional
Standard magnet size ..... 1/2" diameter
Standard no. of magnets ..... 16 (8 or 16 pulses/revolution)

Miniature - Under 3,000 rpm
Width ..... 1-1/4"
Inside diameter ..... Custom to shaft size
Outside diameter ..... I.D. + 1"
Minimum outside diameter .... 4"
Material ..... PVC std., aluminum optional
Standard magnet size ..... 1/4" diameter
Standard no. of magnets ..... 16 (8 or 16 pulses/revolution)

Narrow - Under 3,000 rpm
Width ..... 5/8"
Inside diameter ..... Custom to shaft size
Outside diameter ..... I.D. + 3"
Minimum outside diameter .... 7"
Material ..... PVC std., aluminum optional
Standard magnet size ..... 1/2" diameter
Standard no. of magnets ..... 16 (8 or 16 pulses/revolution)

Slotted - Under 3,000 rpm
Width ..... 1-1/2"
Inside diameter ..... Custom to shaft size
Outside diameter ..... I.D. + 3"
Minimum outside diameter .... 7"
Material ..... PVC std., aluminum optional
Standard magnet size ..... 1/2" x 1-1/2" bar
Standard no. of magnets ..... 16 (8 or 16 pulses/revolution)

High Speed - Over 3,000 rpm
Width ..... 1-1/2"
Inside diameter ..... Custom to shaft size
Outside diameter ..... I.D. + 1"
Minimum outside diameter .... 2"
Material ..... Aluminum
Standard magnet size ..... 1/2" diameter
Standard no. of magnets ..... 2 (1 or 2 pulses/revolution)

Specifications subject to change without notice.

6111 Blue Circle Drive
Minnetonka, MN 55343
Phone: 952-930-0100
Fax: 952-930-0130
ISO 9001:2000 Certified

SECTION II

MOTOR DATA
S.N. 20048605S0100

EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
8100 WEST FLORISSANT AVE.
P.O. BOX 3946 * BLDG. K * ST. LOUIS, MO 63136
FAX (314) 553-1101

DATE: 3/26/2007

P.O. NO.: 4832OD/70411
USEM
Order/Line NO.: 20048605 SO 100

TO: EMERSON ELECTRIC-Canada Fluid
9999 MARKHAM ROAD
ATTN: Nick Kinsella
MARKHAM, ON, L3P3J3, CANADA
ATTN: POWER MINEP/O70411

Model Number: NA
Catalog Number: NA
Submittals
CONF,LLC,SUBMITTALS

REVISIONS:
B)CHANGED LOCATION OF VIBRATION DETECTOR.
REVISED DIM. PRINT

ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY US ELECTRICAL MOTORS.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Accessories:

Direct Connected To Load
Corro-Duty Paint Job
Clockwise Rotation FODE/ CCW
Ground Lug In Conduit Box
Grounding Pad On Frame
Insulated Bearing - Short End
Sleeve Bearings
115 Volt Space Heaters
Bearing RTD-100 Ohm,3 Lead
Both Bearings
Winding RTD's-100 Ohm,3 Lead
Conduit Box Information: ~ Size 3 Conduit Box-Cast Iron
Conduit Opening Size (AA) .. 3.5" NPT
2 Conduit Openings ~ Bottom Of Conduit Box
Q-1 Accessory Outlet Box ~ Opposite Side of Main O/B
1" NPT Conduit Opening
One Box with Terminal Board
Air Filters - Std. Zinc Media
Special Features Plate Info:
WINDING TEMPERATURE
ALARM = 160C
SHUT DOWN = 165C
Starting Duty Nameplate
Starts in Succession w/ motor initially @ Amb Temp (1) 002
Starts in Succession w/ motor initially @ Rated Temp (2) 001
Subsequent Starts after (1) limited to XX Hour(s) Apart 01
Subsequent Starts after (2) limited to XX Hour(s) Apart 02

EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
8100 WEST FLORISSANT AVE.
P.O. BOX 3946 * BLDG. K * ST. LOUIS, MO 63136
FAX (314) 553-1101

DATE: 4/21/2006

P.O. NO.: 4832OD/70411
USEM Order/Line NO.: 20048605 SO 100

TO: EMERSON ELECTRIC Fluid
9999 MARKHAM ROAD
ATTN: Nick Kinsella
MARKHAM, ON, L3P3J3, CANADA
ATTN: POWER MINEP/O70411

Model Number: NA
Catalog Number: NA
Submittals
CONF,LLC,SUBMITTALS

REVISIONS:
A)CHANGE TO F2.ADD
METRIC DIMEN.
NEW PACKAGE

ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY US ELECTRICAL MOTORS.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Accessories:

FC
Direct Connected To Load
Corro-Duty Paint Job
Clockwise Rotation FODE
Ground Lug In Conduit Box
Grounding Pad On Frame
Insulated Bearing - Short End
Sleeve Bearings
115 Volt Space Heaters
Bearing RTD-100 Ohm,3 Lead
Both Bearings
Winding RTD's-100 Ohm,3 Lead
Conduit Box Information: ~ Size 3 Conduit Box-Cast Iron
Conduit Opening Size (AA) .. 3.5" NPT
2 Conduit Openings ~ Bottom Of Conduit Box
Q-1 Accessory Outlet Box ~ Same Side As Main O/B
1" NPT Conduit Opening
One Box with Terminal Board
Air Filters - Std. Zinc Media
Special Features Plate Info:
WINDING TEMPERATURE
ALARM = 160C
SHUT DOWN = 165C
PMC/Beta 162 VTS Vib. Transmit
Q-1 Upper/Short End Bracket
Std. Mounting Position
No Vib Detect On Lower/PE Brk
Test Requirements:
Short Commer. Test - Unwit
Vibration Test-Unwit. (IPS)

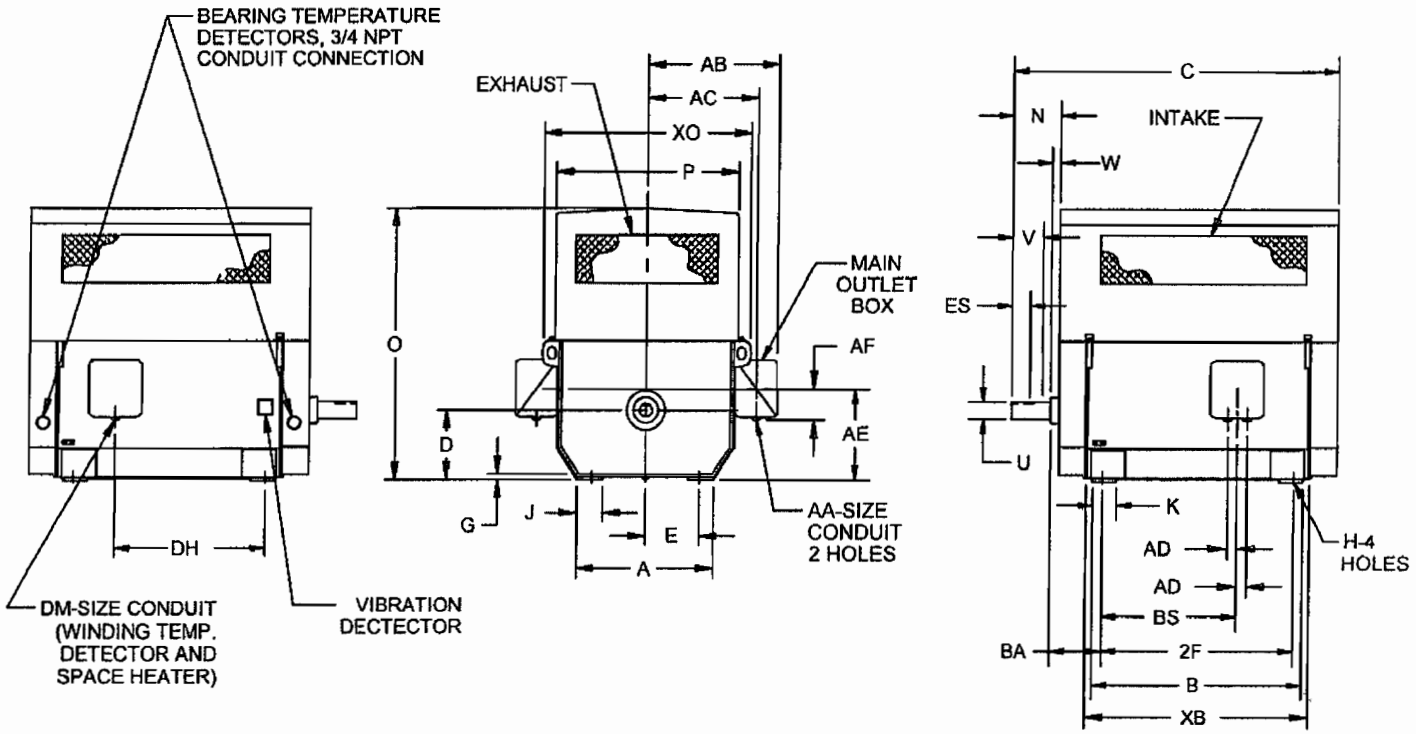
USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	450
Pole(s)	18
Voltage(s)	4160
Frame Size	8008S
Shaft U Diameter	5.375

Outlet Box AF	10.94
Outlet Box AA	3.5
Accessory Outlet Box DM	1

EFFECTIVE: 20-APR-06	HORIZONTAL MOTORS WEATHER PROTECTED TYPE 2 FRAME: 8005 THRU 9610 TYPE: RS	PRINT: 07-1882-13
SUPERSEDES: NEW		SHEET: 2 OF 2

F2 ASSEMBLY



ALL DIMENSIONS ARE IN MILLIMETERS

	BASIC FRAME	N	U -.03	V MIN	W	ES MIN	SQ KEY
4	~~8000SS~~	~~216~~	~~98.4~~	~~101~~	~~10~~	~~143~~	~~25.4~~
	8000S	292	136.5	267	19	219	31.8
	~~9608S~~	~~318~~	~~149.2~~	~~292~~	~~19~~	~~292~~	~~38.1~~

BASIC FRAME	A	D -.06	E	G	H +.05	J	K	O	P
8000	1054	508	406	48	41	203	178	2346	1378
~~9600~~	~~1270~~	~~610~~	~~483~~	~~57~~	~~41~~	~~254~~	~~229~~	~~2775~~	~~1092~~

AA
~~3 NPT~~
3-1/2 NPT
~~4 NPT~~

BASIC FRAME	QTY-OF CONDUIT	AB	AC	AD	AE	AF	BA	XO
8000	3-1/2 NPT	1099	880	76	668	278	343	1575
~~9600~~	~~3-1/2 NPT~~	~~1226~~	~~1007~~	~~76~~	~~828~~	~~278~~	~~406~~	~~1880~~

DM
~~3/4 NPT~~
1 NPT
~~1-1/2 NPT~~

FRAME	B	C	2F ±.03	BS	XB	DH
8005S	978	1762	813	413	1067	413
8006S	1080	1864	914	514	1168	514
8007S	1181	1965	1016	616	1270	616
8008S	1308	2092	1143	743	1397	743
8009S	1435	2219	1270	870	1524	870
8010S	1598	2372	1422	1022	1676	1022
8011S	1765	2550	1600	1200	1854	1200
9603S	108	1915	813	476	1194	476

FRAME	B	C	2F ±.03	BS	XB	DH
9604S	1181	2016	914	578	1295	578
9605S	1283	2118	1016	679	1397	679
9606S	1410	2243	1143	806	1524	806
9607S	1537	2372	1270	933	1651	933
9608S	1689	2524	1422	1086	1803	1086
9609S	1867	2702	1600	1264	1981	1264
9610S	2070	2905	1803	1467	2184	1467

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2: MAIN CONDUIT BOX MAY BE ROTATED IN STEPS OF 90 DEGREES. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
3: "XB" IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.
4: SS SHAFT IS FOR 2 POLE ONLY.

NAMEPLATE DATA

CATALOG NUMBER:				NAMEPLATE PART #:	422706-006		
MODEL		FR	8008S	TYPE	RSE	ENCL	WPII
SHAFT END BRG	-			OPP END BRG	-		
PH	3	MAX AMB	40 C	ID#	(ref: Order#: 20048605, Type: SO, Line#: 100)		
INSUL CLASS	F	Asm. Pos.	F2	DUTY	CONT		

HP	450	RPM	393	HP		RPM	
VOLTS	4160			VOLTS			
FL AMPS	75.0			FL AMPS			
SF AMPS	84.0			SF AMPS			
SF	1.15	DESIGN	#	CODE	G	SF		DESIGN		CODE	
NEMA NOM EFFICIENCY	92.4	NOM PF	66.9	KiloWatt	335.7	NEMA NOM EFFICIENCY		NOM PF			
GUARANTEED EFFICIENCY	91.0	MAX KVAR	265.2	HZ	60	GUARANTEED EFFICIENCY		MAX KVAR		HZ	

UL DATA (IF APPLICABLE):

DIVISION		CLASS I		GROUP I	
TEMP CODE		CLASS II		GROUP II	

VFD DATA (IF APPLICABLE):

VOLTS			
AMPS			
TORQUE 1		TORQUE 2	
VFD LOAD TYPE 1		VFD LOAD TYPE 2	
VFD HERTZ RANGE 1		VFD HERTZ RANGE 2	
VFD SPEED RANGE 1		VFD SPEED RANGE 2	
SERVICE FACTOR		FL SLIP	
NO. POLES		MAGNETIZING AMPS	
VECTOR MAX RPM		Encoder PPR	
Radians / Seconds		Encoder Volts	

TEAO DATA (IF APPLICABLE):

HP (AIR OVER)		HP (AIR OVER M/S)		RPM (AIR OVER)		RPM (AIR OVER M/S)	
FPM AIR VELOCITY		FPM AIR VELOCITY M/S		FPM AIR VELOCITY SEC			

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise		OPP/Upper Oil Cap	8 QT/7.6 L
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	8 QT/7.6 L
Altitude			
EPACT Note		EPACT Compliance	
COS		Marine Duty	
Balance		Arctic Duty	
3/4 Load Eff.	92.4	Inrush Limit	
Motor Weight	12000	Direction of Rotation	
Sound Level		Special Note 1	WINDING TEMPERATURE
Vertical Thrust		Special Note 2	ALARM = 160C
Thrust Percentage		Special Note 3	SHUT DOWN = 165C
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	SH VOLTS=115V
380V 50 Hz Max Amps		SH Watts	SH WATTS=700W
NEMA Inertia		Load Inertia	1827 LBS-FT2 LB-FT2
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1	BEARING SET POINTS	Special Accessory Note 16	
Special Accessory Note 2	ALARM= 90C	Special Accessory Note 17	AFFIX N/P 915591
Special Accessory Note 3	SHUTDOWN= 100C	Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	

EMERSON.
Motor Technologies

EMERSON MOTOR COMPANY
ST. LOUIS, MO

MOTORS

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED

MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
NA	NA	3	RSE	8008S

ORDER NO.	20048605	LINE NO.	100

MPI:	95769
HP:	450
POLES:	18
VOLTS:	4160
HZ:	60
SERVICE FACTOR:	1.15
EFFICIENCY (%):	
S.F.	92.2
FULL	92.4
3/4	92.4
1/2	91.1
1/4	85.7
POWER FACTOR (%):	
S.F.	69.2
FULL	66.9
3/4	60.6
1/2	49.1
1/4	30.1
NO LOAD	2.4
LOCKED ROTOR	20.3
AMPS:	
S.F.	84
FULL	75
3/4	62
1/2	52
1/4	45
NO LOAD	43.3
LOCKED ROTOR	392
NEMA CODE LETTER	G
NEMA DESIGN LETTER	#
FULL LOAD RPM	393
NEMA NOMINAL EFFICIENCY (%)	92.4
GUARANTEED EFFICIENCY (%)	91
MAX KVAR	265.2
AMBIENT (°C)	40
ALTITUDE (FASL)	3300
SAFE STALL TIME-HOT (SEC)	30
SOUND PRESSURE (DBA @ 1M)	80
TORQUES:	
BREAKDOWN{% F.L.}	175
LOCKED ROTOR{% F.L.}	60
FULL LOAD{LB-FT}	6006.7

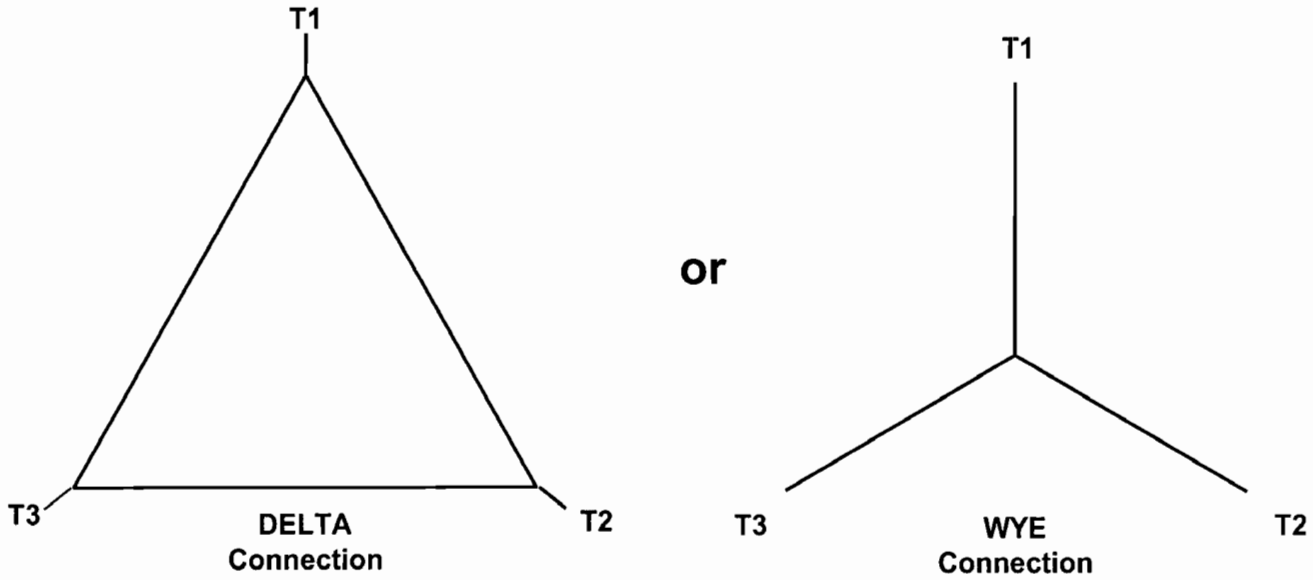
The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

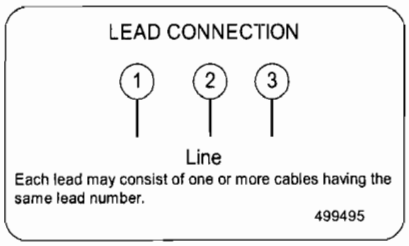
EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
ST. LOUIS, MO

499495

Motor Wiring Diagram





To reverse direction of rotation interchange connections L1 and L2.

Each lead may be comprised of one or more cables.
Each cable will be marked with the appropriate lead number.

EFFECTIVE: 2/27/96
SUPERCEDES: X736618, 96441, 179879, 284138
Connection Plate: 499495
Connection Decal: 912113

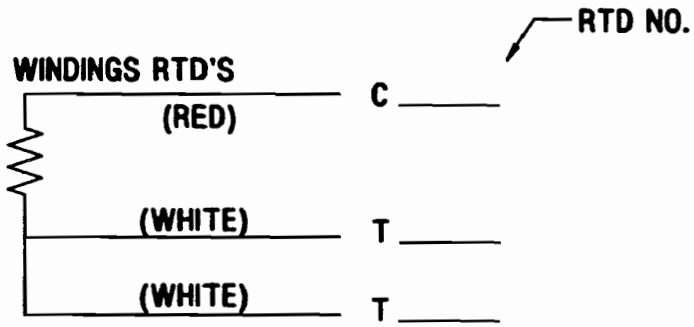
ALT.		
A	833989	A

WINDING RTD'S

1. THERE ARE QTY-6 RESISTANCE TYPE TEMPERATURE DETECTORS (RTD) INSTALLED IN THE STATOR WINDING, 2 PER PHASE. REFER TO NAMEPLATE ATTACHED TO THE MOTOR ADJACENT TO ACCESSORY OUTLET BOX FOR RATING THE RTD'S.

2. DETECTORS ARE INSTALLED IN PHASES AS SHOWN.

PHASE	A	B	C
RTD NO.	1, 11	2, 22	3, 33



ACCESSORY LISTING
QTY-6 3 LEAD RTD'S

ALT LET	CHANGE NOTICE NO.	DESCRIPTION OF CHANGE
-	-	REDRAWN ON CAD 8-10-89
A	MOD	6-JUN-00 UPDATED

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
ST. LOUIS, MISSOURI

TITLE: CUSTOMER CONNECTION DIAGRAM

SCALE: NONE | UNITS: IN

DRWN 9-MAY-79, HEB
RVSD 6-JUN-00, RWK
APPD 6-JUN-00, REP

MATERIAL: - - -

PART#: - - - | FRAME: - - -

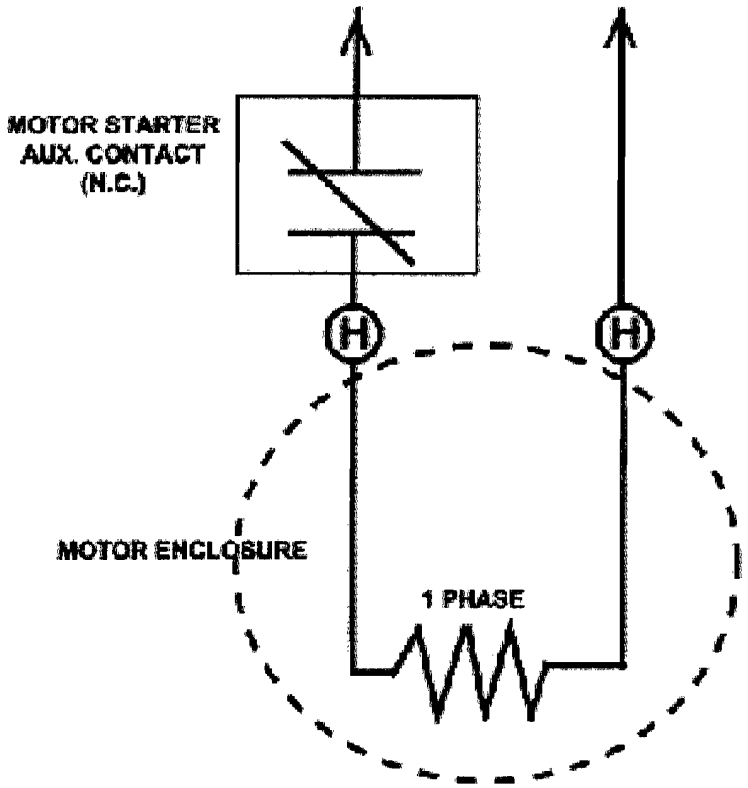
CSTG#: - - - | TYPE: - - -

SHEET 1 OF 1 | PREFIX: CDG

ALT.		
A	833989	A

SPACE HEATER CONNECTION DIAGRAM

SPACE HEATER LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX



THIS EQUIPMENT IS SUPPLIED WITH ANTI-CONDENSATION HEATERS. HEATERS SHOULD BE ENERGIZED WHEN EQUIPMENT IS NOT OPERATING TO PROTECT UNIT BY PREVENTING INTERNAL CONDENSATION. CONNECT THE "H" OR HEATER LEADS TO	
115V VOLTS	**700W** WATTS RATING

SPACE HEATER NAMEPLATE (ON MOTOR)

SILICONE RUBBER SPACE HEATERS

Electric motors frequently have space heaters installed to prevent moisture condensation in the motor during times the motor is not running.

Many motor manufacturers use metallic or ceramic cartridge heaters for this purpose. Because such heaters are small they must operate at a high surface watt density and consequently high temperature. The high temperature causes rapid heater failure, often within the first year.

To combat this high failure rate, many smart users specify that space heaters are to be operated at one-half their rated voltage. This lowers the surface watt density to one-fourth the value with rated voltage, and increases the heater life more than proportionally.

U. S. Electrical Motors has another, better, solution to heater failure rate - the use of silicone rubber space heaters. The heaters are manufactured by sandwiching a resistance wire network between two pieces of high-temperature silicone rubber and bonding the silicone rubber pieces together. The silicone rubber heaters are designed for low surface watt density by providing a large surface area (a heater measuring 45" X 2.5" is rated at 169 watts, or 1.5 watts per square inch). The life of these heaters typically exceeds the life of the motor.

Silicone rubber heaters enjoy another advantage over metallic or ceramic heaters. Because they are applied directly to the winding end turns, it is usually possible to achieve the required condensation prevention with a lower power consumption.

These silicone rubber heaters are used, when specified, on all U. S. Electrical Motors motors. It is not necessary for the user to specify operation at one-half rated voltage to get the long heater life that is desired.

* Space heaters must be operated at +/- 10% rated voltage to be effective.

DR# 587-9358
H.E. Barr
1/8/81
*Revision: 3/11/03
Mike Cullen

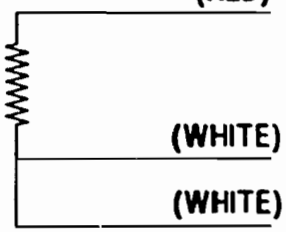
ALT.		
A	338312	A

BEARING RTD'S

1. THERE ARE QTY-1 OR 2 (3 LEAD) BEARING RTD'S INSTALLED, ONE PER BEARING.

   A = UPPER/ODE (OPPOSITE DRIVE END)
   B = LOWER/DE (DRIVE END)

BEARING RTD'S



	UPPER/ODE	LOWER/DE
(RED)	A1	B1
(WHITE)	A2	B2
(WHITE)	A2	B2

ACCESSORY LISTING

QTY 1 OR 2 BEARING RTD'S (3 LEAD)

ALT LET	CHANGE NOTICE NO.	DESCRIPTION OF CHANGE
-	MOD	12-APR-00
A	MOD	11-JUL-00

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
ST. LOUIS, MISSOURI

TITLE: CUSTOMER CONNECTION DIAGRAM

SCALE: NONE | UNITS: IN

DRWN 12-APR-00, RAW
RVSD 11-JUL-00, RWK
APPD 11-JUL-00, REP

PART#: - - - | FRAME: - - -

CSTG#: - - - | TYPE: - - -

MATERIAL: - - -

SHEET 1 OF 1 | PREFIX: CDG

ALT.		
A	338312	A

MOTOR DATA
S.N. 20045177S0100

EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
8100 WEST FLORISSANT AVE.
P.O. BOX 3946 * BLDG. K * ST. LOUIS, MO 63136
FAX (314) 553-1101

DATE: 3/26/2007

P.O. NO.: 4767OD/70411
USEM
Order/Line NO.: 20045177 SO 100

TO: EMERSON ELECTRIC-Canada Fluid
9999 MARKHAM ROAD
ATTN: Nick Kinsella
MARKHAM, ON, L3P3J3, CANADA
ATTN: POWER MINEP/O70411

Model Number: NA
Catalog Number: NA
Submittals
CONF,LLC,SUBMITTALS

REVISIONS:
B)CHANGED LOCATION OF VIBRATION DETECTOR.
REVISED DIM. PRINT

ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY US ELECTRICAL MOTORS.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Accessories:

Direct Connected To Load
Corro-Duty Paint Job
Counter CW Rotation FODE/ CW ROTATION
Ground Lug In Conduit Box
Grounding Pad On Frame
Insulated Bearing - Short End
Sleeve Bearings
115 Volt Space Heaters
Bearing RTD-100 Ohm,3 Lead
Both Bearings
Winding RTD's-100 Ohm,3 Lead
Conduit Box Information: ~ Size 3 Conduit Box-Cast Iron
Conduit Opening Size (AA) .. 3.5" NPT
2 Conduit Openings ~ Bottom Of Conduit Box
Q-1 Accessory Outlet Box ~ Same Side As Main O/B
1" NPT Conduit Opening
One Box with Terminal Board
Air Filters - Std. Zinc Media
Special Features Plate Info:
WINDING TEMPERATURE
ALARM = 160C
SHUT DOWN = 165C
Starting Duty Nameplate
Starts in Succession w/ motor initially @ Amb Temp (1) 002
Starts in Succession w/ motor initially @ Rated Temp (2) 001
Subsequent Starts after (1) limited to XX Hour(s) Apart 01
Subsequent Starts after (2) limited to XX Hour(s) Apart 02

EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
8100 WEST FLORISSANT AVE.
P.O. BOX 3946 * BLDG. K * ST. LOUIS, MO 63136
FAX (314) 553-1101

DATE: 4/21/2006

P.O. NO.: 4767OD/70411
USEM Order/Line NO.: 20045177 SO 100

TO: EMERSON ELECTRIC Fluid
9999 MARKHAM ROAD
ATTN: Nick Kinsella
MARKHAM, ON, L3P3J3, CANADA
ATTN: POWER MINEP/O70411

Model Number: NA
Catalog Number: NA
Submittals
CONF,LLC,SUBMITTALS

REVISIONS:
A)CHANGED TO F2.ADD
METRIC DIMEN.
NEW PACKAGE

ALL DOCUMENTS HEREIN ARE CONSIDERED CERTIFIED BY US ELECTRICAL MOTORS.
THANK YOU FOR YOUR ORDER AND THE OPPORTUNITY TO SERVE YOU.

Accessories:

FC
Direct Connected To Load
Corro-Duty Paint Job
Counter CW Rotation FODE
Ground Lug In Conduit Box
Grounding Pad On Frame
Insulated Bearing - Short End
Sleeve Bearings
115 Volt Space Heaters
Bearing RTD-100 Ohm,3 Lead
Both Bearings
Winding RTD's-100 Ohm,3 Lead
Conduit Box Information: ~ Size 3 Conduit Box-Cast Iron
Conduit Opening Size (AA) .. 3.5" NPT
2 Conduit Openings ~ Bottom Of Conduit Box
Q-1 Accessory Outlet Box ~ Same Side As Main O/B
1" NPT Conduit Opening
One Box with Terminal Board
Air Filters - Std. Zinc Media
Special Features Plate Info:
WINDING TEMPERATURE
ALARM = 160C
SHUT DOWN = 165C
PMC/Beta 162 VTS Vib. Transmit
Q-1 Upper/Short End Bracket
Std. Mounting Position
No Vib Detect On Lower/PE Brk
Test Requirements:
Short Commer. Test - Unwit
Vibration Test-Unwit. (IPS)

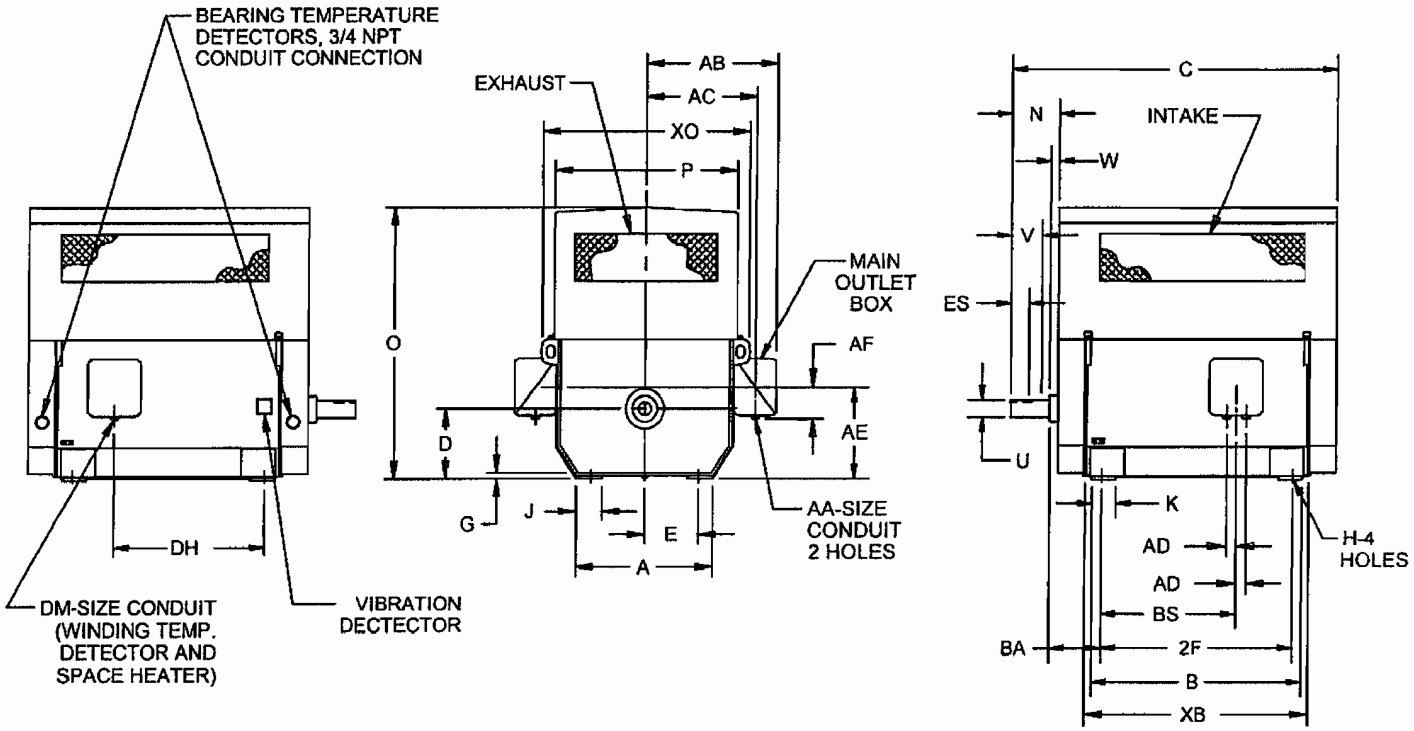
USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	450
Pole(s)	18
Voltage(s)	4160
Frame Size	8008S
Shaft U Diameter	5.375

Outlet Box AF	10.94
Outlet Box AA	3.5
Accessory Outlet Box DM	1

EFFECTIVE: 20-APR-06	HORIZONTAL MOTORS WEATHER PROTECTED TYPE 2 FRAME: 8005 THRU 9610 TYPE: RS	PRINT: 07-1882-13
SUPERSEDES: NEW		SHEET: 2 OF 2

F2 ASSEMBLY



ALL DIMENSIONS ARE IN MILLIMETERS

	BASIC FRAME	N	U -.03	V MIN	W	ES MIN	SQ KEY
4	~~8000SS~~	~~216~~	~~98.4~~	~~101~~	~~19~~	~~143~~	~~25.4~~
	8000S	292	136.5	267	19	219	31.8
	~~9600S~~	~~318~~	~~149.2~~	~~292~~	~~19~~	~~232~~	~~38.1~~

BASIC FRAME	A	D -.06	E	G	H +.05	J	K	O	P
8000	1054	508	406	48	41	203	178	2346	1378
~~9600~~	~~1270~~	~~610~~	~~483~~	~~57~~	~~41~~	~~254~~	~~229~~	~~2779~~	~~1632~~

AA
~~3 NPT~~
3-1/2 NPT
~~4 NPT~~

BASIC FRAME	QTY-OF CONDUIT	AB	AC	AD	AE	AF	BA	XO
8000	3-1/2 NPT	1099	880	76	668	278	343	1575
~~9600~~	~~3-1/2 NPT~~	~~1226~~	~~1007~~	~~76~~	~~926~~	~~278~~	~~406~~	~~1886~~

DM
~~3/4 NPT~~
1 NPT
~~1-1/2 NPT~~

FRAME	B	C	2F ±.03	BS	XB	DH
8005S	978	1762	813	413	1067	413
8006S	1080	1864	914	514	1168	514
8007S	1181	1965	1016	616	1270	616
8008S	1308	2092	1143	743	1397	743
8009S	1435	2219	1270	870	1524	870
8010S	1588	2372	1422	1022	1676	1022
8011S	1765	2550	1600	1200	1854	1200
9603S	108	1915	813	476	1194	476

FRAME	B	C	2F ±.03	BS	XB	DH
9604S	1181	2016	914	578	1295	578
9605S	1283	2118	1016	679	1397	679
9606S	1410	2243	1143	806	1524	806
9607S	1537	2372	1270	933	1651	933
9608S	1689	2524	1422	1086	1803	1086
9609S	1867	2702	1600	1264	1981	1264
9610S	2070	2905	1803	1467	2184	1467

1: ALL ROUGH DIMENSIONS MAY VARY BY .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
2: MAIN CONDUIT BOX MAY BE ROTATED IN STEPS OF 90 DEGREES. STANDARD AS SHOWN WITH CONDUIT OPENING DOWN.
3: "XB" IS THE DISTANCE BETWEEN SURFACES THAT MAY BE USED FOR HORIZONTAL JACKING.
4: SS SHAFT IS FOR 2 POLE ONLY.

EMERSON. Motor Technologies

MOTORS

NAMEPLATE DATA

CATALOG NUMBER:				NAMEPLATE PART #:	422706-006		
MODEL		FR	8008S	TYPE	RSE	ENCL	WPII
SHAFT END BRG	-			OPP END BRG	-		
PH	3	MAX AMB	40 C	ID#	(ref: Order#: 20045177, Type: SO, Line#: 100)		
INSUL CLASS	F	Asm. Pos.	F2	DUTY	CONT		

HP	450		RPM	393		HP		RPM	
VOLTS	4160					VOLTS			
FL AMPS	75.0					FL AMPS			
SF AMPS	84.0					SF AMPS			
SF	1.15	DESIGN	#	CODE	G	SF		DESIGN	CODE
NEMA NOM EFFICIENCY	92.4	NOM PF	66.9	KiloWatt	335.7	NEMA NOM EFFICIENCY		NOM PF	
GUARANTEED EFFICIENCY	91.0	MAX KVAR	265.2	HZ	60	GUARANTEED EFFICIENCY		MAX KVAR	HZ

UL DATA (IF APPLICABLE):

DIVISION		CLASS I	GROUP I
TEMP CODE		CLASS II	GROUP II

VFD DATA (IF APPLICABLE):

VOLTS			
AMPS			
TORQUE 1		TORQUE 2	
VFD LOAD TYPE 1		VFD LOAD TYPE 2	
VFD HERTZ RANGE 1		VFD HERTZ RANGE 2	
VFD SPEED RANGE 1		VFD SPEED RANGE 2	
SERVICE FACTOR		FL SLIP	
NO. POLES		MAGNETIZING AMPS	
VECTOR MAX RPM		Encoder PPR	
Radians / Seconds		Encoder Volts	

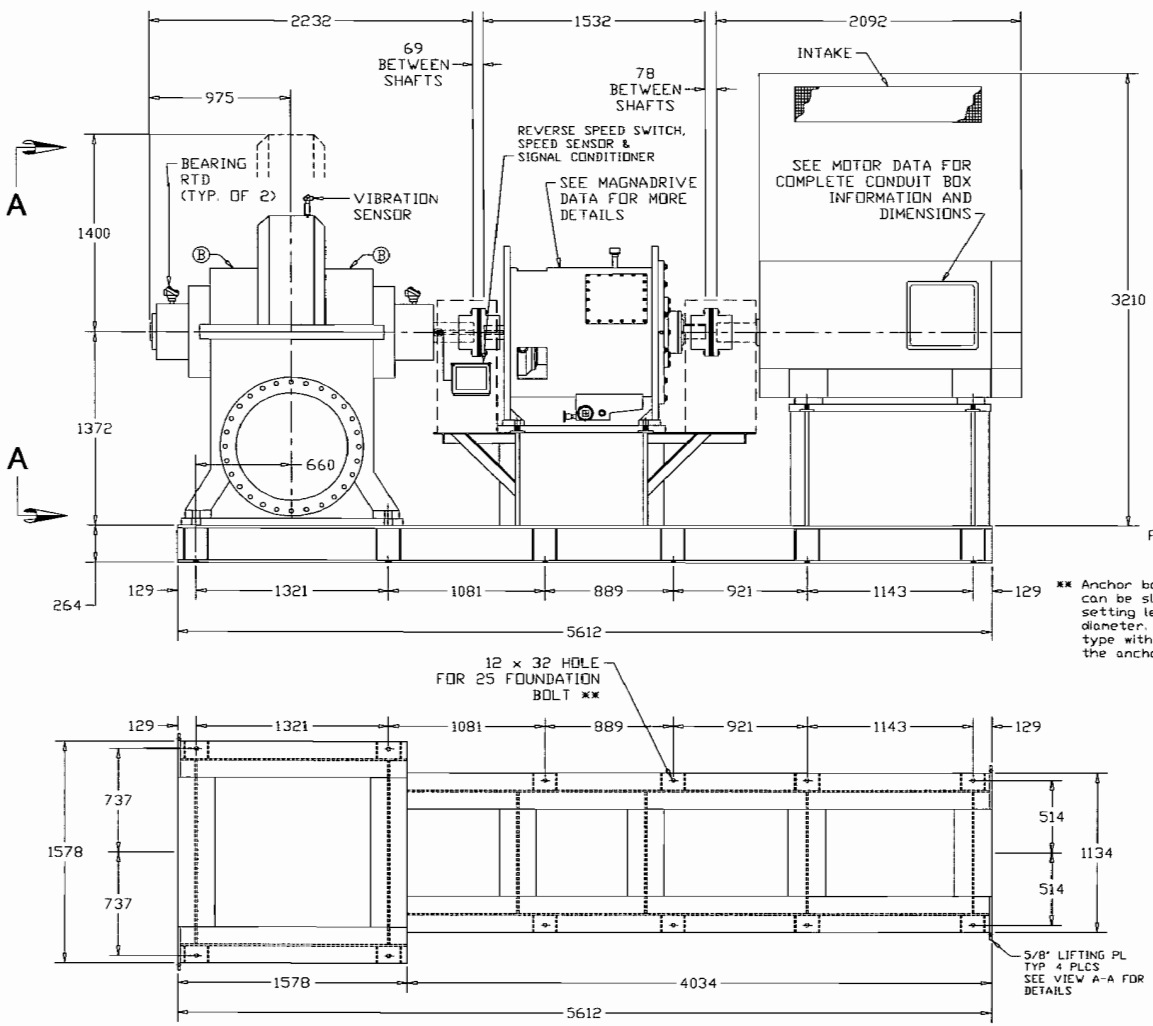
TEAO DATA (IF APPLICABLE):

HP (AIR OVER)		HP (AIR OVER M/S)		RPM (AIR OVER)		RPM (AIR OVER M/S)	
FPM AIR VELOCITY		FPM AIR VELOCITY M/S		FPM AIR VELOCITY SEC			

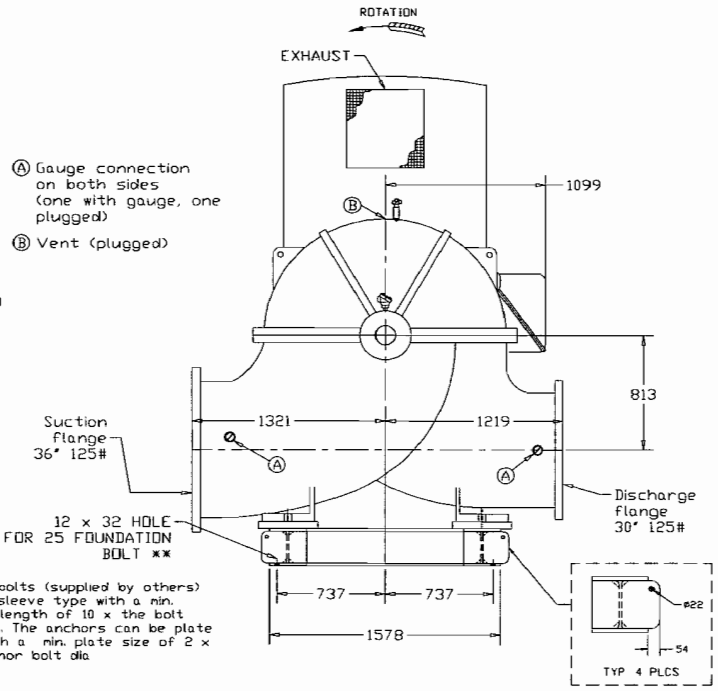
SECTION I

CUSTOMER	City of Winnipeg	**Power & Mine Supply Co. Ltd.**		DRAWING (REV.)	750LNE1050-8008S (5)
PROJECT OR ENGINEER	Earthtech / UMA	**4-75 Meridian Drive**		DATE	November 15, 2006
PO #	Bid Opp. 571-2005	**Winnipeg, Manitoba**		CERTIFIED BY	D. Shamlock
TAG NUMBER(S)	Deacon booster pumps	DO NOT SCALE	UNITS IN mm	PUMP	750-LNE-1050
			Tolerance ±5 mm on all dimensions		

IMPORTANT
See detailed Magnadrive VSD and USEM motor drawings for locations of cooling ports, RTDs, and other sensors and details.



View A-A



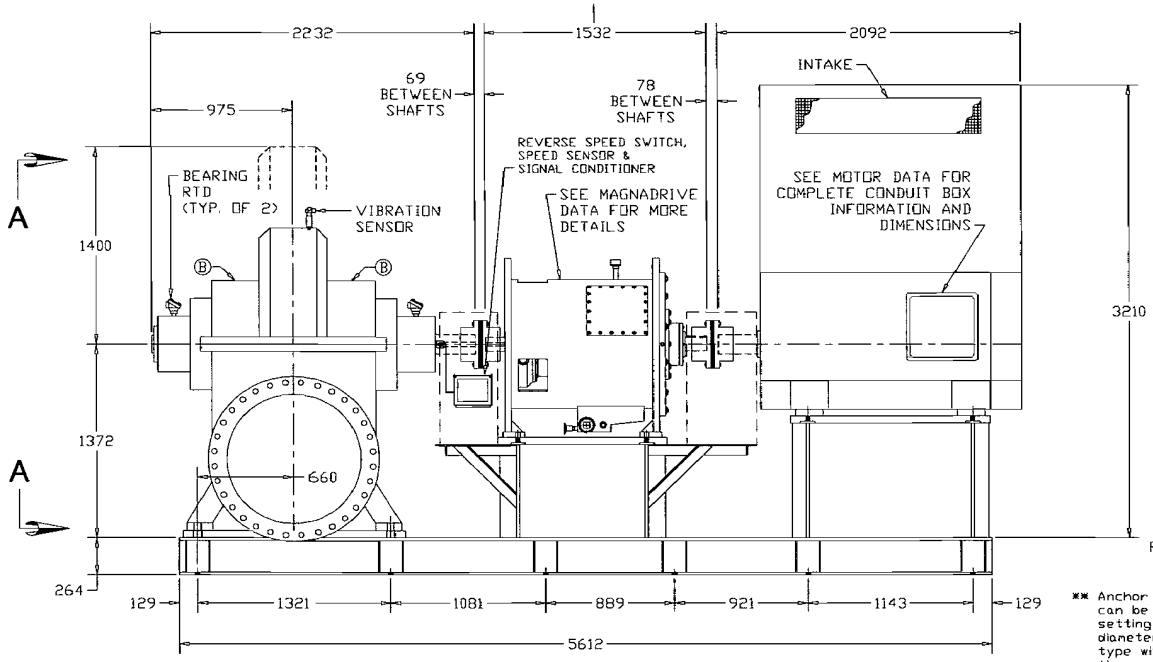
** Anchor bolts (supplied by others) can be sleeve type with a min. setting length of 10 x the bolt diameter. The anchors can be plate type with a min. plate size of 2 x the anchor bolt dia

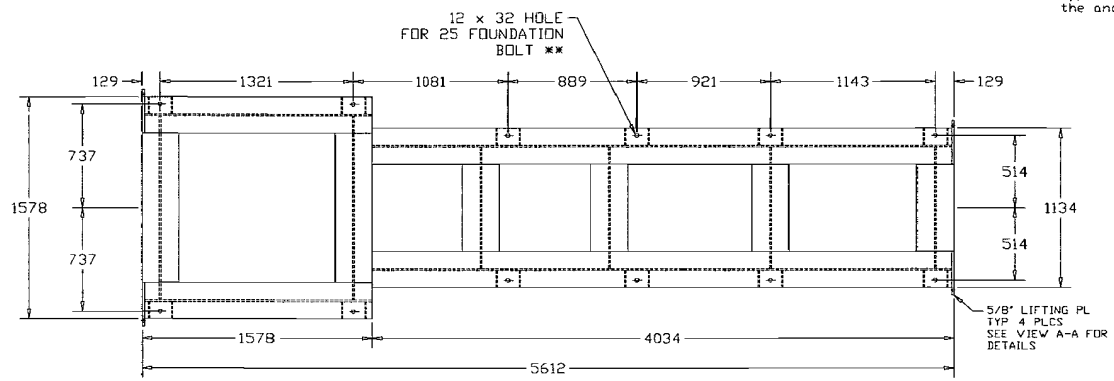
Revisions	
0	Original - June 5, 2006
1	Moved main conduit box to opposite side. Added speed and vibration sensor, added bearing RTDs, added gauges (April 18, 2006)
2	Pump ℄ to opposite shaft end dim change (June 5, 2006)
3	Engineering changes to base design - footprint change (Sept 28, 2006)
4	Remove lifting lug extensions from ends of base. Add comments regarding anchor bolts. Added 4 lifting plates flush with beam ends (Nov 15, 2006)
5	Magnadrive mirrored - no displayed dimensional changes. Anchor bolt comment revised. (March 20, 2007)

FLANGE & ROTATION DATA		**VARIABLE SPEED DRIVE**		**ELECTRIC MOTOR DATA**			
SUCTION FLANGE	36" 125#	MANUFACTURER	MagnaDrive	MANUFACTURER	USEM	VOLTAGE	4160
DISCHARGE FLG.	30" 125#	TYPE	Horizontal	FRAME / ENCL.	8008S	PHASE	3
		MODEL	WH 2500	HP	450	FUTURE FR/HP	n/a
ROTATION	CW from motor end	COUPLINGS	Woods 50 HSH	RPM	400	ACCESSORIES	n/a

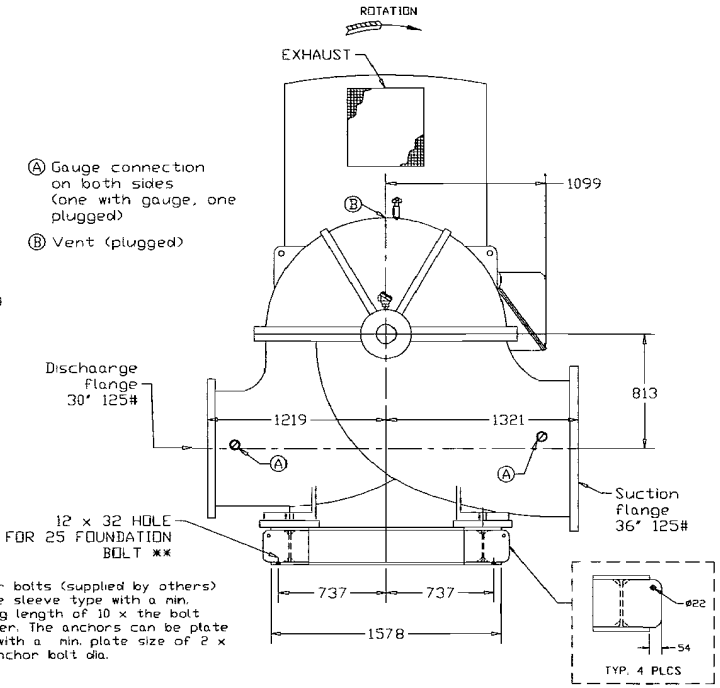
CUSTOMER	City of Winnipeg	**Power & Mine Supply Co. Ltd.**		DRAWING (REV.)	750LNE1050-8008S CCW (5)
PROJECT OR ENGINEER	Earthtech / UMA	**4-75 Meridian Drive**		DATE	November 15, 2006
PO #	Bid Opp. 571-2005	**Winnipeg, Manitoba**		CERTIFIED BY	D. Shamlock
TAG NUMBER(S)	Deacon booster pumps	DO NOT SCALE	UNITS IN mm	PUMP	750-LNE-1050
			Tolerance ±5 mm on all dimensions		

IMPORTANT
See detailed Magnadrive VSD and USEM motor drawings for locations of cooling ports, RTDs, and other sensors and details.





View A-A



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FLANGE & ROTATION DATA		**VARIABLE SPEED DRIVE**		**ELECTRIC MOTOR DATA**			
SUCTION FLANGE	36" 125#	MANUFACTURER	MagnaDrive	MANUFACTURER	USEM	VOLTAGE	4160
DISCHARGE FLG.	30" 125#	TYPE	Horizontal	FRAME / ENCL.	8008S	PHASE	3
		MODEL	WH 2500	HP	450	FUTURE FR/HP	n/a
ROTATION	CCW from motor end	COUPLINGS	Woods 50 HSH	RPM	400	ACCESSORIES	n/a

S004025

FOUNDATION BOLTS AND CONNECTING PIPING MUST NOT BE FIXED RIGIDLY UNTIL MACHINE IS IN PLACE.

WHEN EXPANSION JOINTS ARE USED IN THE DISCHARGE AND/OR SUCTION PIPING SUITABLY SIZED PIPE ANCHORS OR TIE RODS MUST BE INSTALLED BETWEEN THE EXPANSION JOINT AND THE PUMP PROPER. THESE MEASURES ARE REQUIRED TO PREVENT THE TRANSMISSION OF EXCESSIVE HYDRAULIC FORCES TO THE PUMP.

CLOCKWISE ROTATION - PER HYDRAULIC INSTITUTE
VIEWED FROM COUPLING END OF PUMP

APPROX WEIGHTS=KGs	
PUMP (DRY)	8500

PUMP NOZZLE LOADINGS

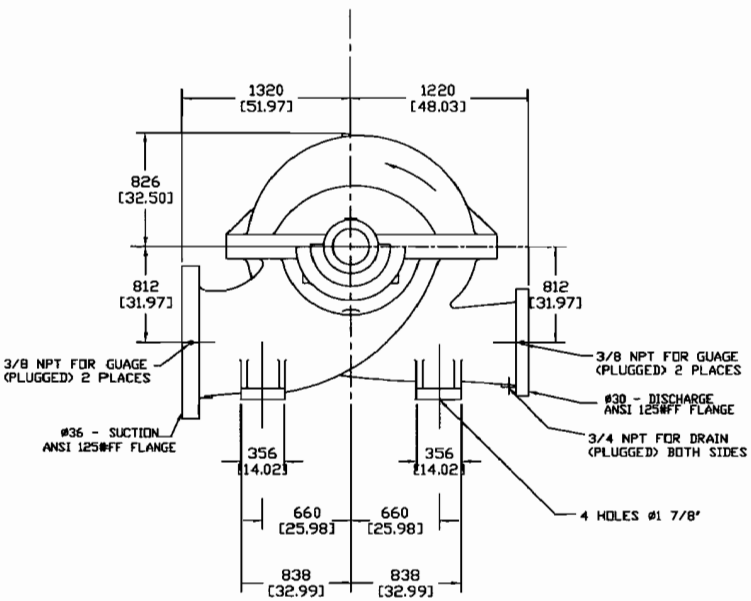
The Loads and Torques on the flanges do not exceed the values specified in the following list

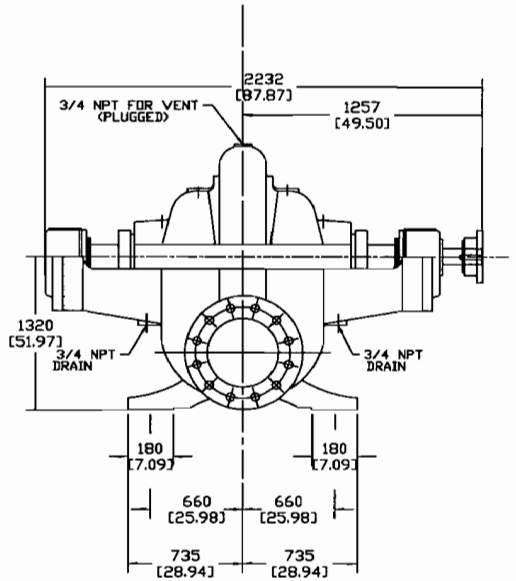
	Fx	Fy	Fz	Mx	My	Mz
	kN			kNm		
SUCTION	40.03	40.03	40.03	10.17	10.17	10.17
DISCHARGE	40.03	40.03	40.03	10.17	10.17	10.17

PUMP FLANGE DETAILS

SUCTION
ANSI B16.1 125#FF
1168.4 [46.00]
1085.8 [42.75]
60.3 [2.37]
32 holes ø41
36°

DISCHARGE
ANSI B16.1 125#FF
984.2 [38.74]
914.4 [36.00]
54 [2.13]
28 holes ø35
30°





CUSTOMER'S ORDER REFERENCE 70380
CUSTOMER POWER & MINE SUPPLY
DISTRICT OFFICE ORDER 727-0Q050 WORKS ORDER S004025
CERTIFIED BY JIM KURTZ DATE 04/18/06

DIMENSIONS ARE FROM DRAWINGS, CASTINGS MAY VARY SLIGHTLY. FOUNDATION BOLTS MUST NOT BE FIXED RIGIDLY UNTIL MACHINE IS IN PLACE. THIS PRINT IS LOANED SUBJECT TO RETURN ON DEMAND AND UNDER CONDITION THAT IT IS NOT TO BE USED IN ANY WAY DETRIMENTAL TO OUR INTERESTS. DO NOT SCALE; ADDITIONAL DIMENSIONS WILL BE FURNISHED UPON REQUEST.

ALL DIMENSIONS ARE IN MM
TOLERANCE ± 5 MM ON ALL DIMENSIONS

B | CORRECTED DIMENTIONS AND VIEWS

BOOSTER PUMP

CAD DWG.-NO MANUAL CHANGES PERMITTED

750LNE1050
ELEVATION

TANEYTOWN, MARYLAND FLOWSERVE
ORDER S004025 DATE 04/18/06 SCALE N. T. S.

DRAWN	CHECKED	APPROVED		
FRC	JK		GS004025	B

A	B	C	D	E	F	G	H	J	K

S004026

FOUNDATION BOLTS AND CONNECTING PIPING MUST NOT BE FIXED RIGIDLY UNTIL MACHINE IS IN PLACE.

WHEN EXPANSION JOINTS ARE USED IN THE DISCHARGE AND/OR SUCTION PIPING SUITABLY SIZED PIPE ANCHORS OR TIE RODS MUST BE INSTALLED BETWEEN THE EXPANSION JOINT AND THE PUMP PROPER. THESE MEASURES ARE REQUIRED TO PREVENT THE TRANSMISSION OF EXCESSIVE HYDRAULIC FORCES TO THE PUMP.

COUNTER CLOCKWISE ROTATION - PER HYDRAULIC INSTITUTE VIEWED FROM COUPLING END OF PUMP

APPROX WEIGHTS=KGs	
PUMP (DRY)	8500

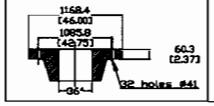
PUMP NOZZLE LOADINGS

The Loads and Torques on the flanges do not exceed the values specified in the following list

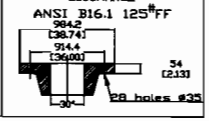
	Fx	Fy	Fz	Mx	My	Mz
	kN			kNm		
SUCTION	40.03	40.03	40.03	10.17	10.17	10.17
DISCHARGE	40.03	40.03	40.03	10.17	10.17	10.17

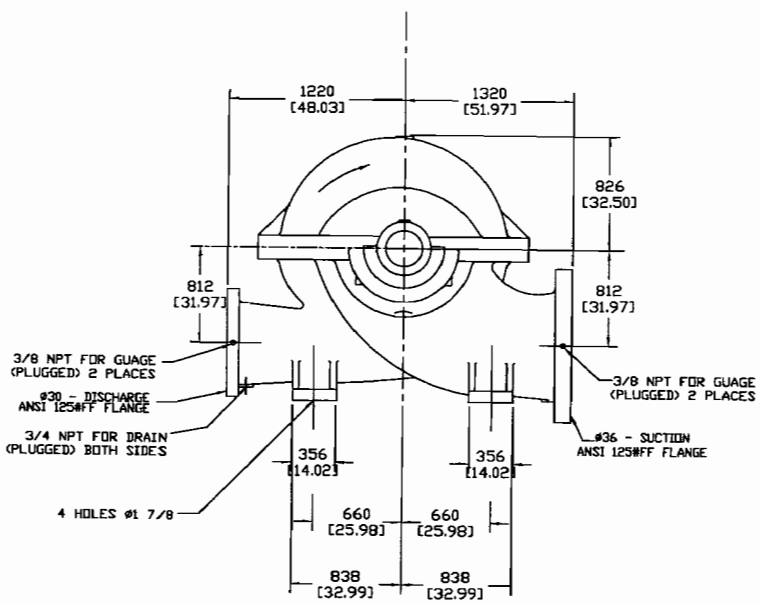
PUMP FLANGE DETAILS

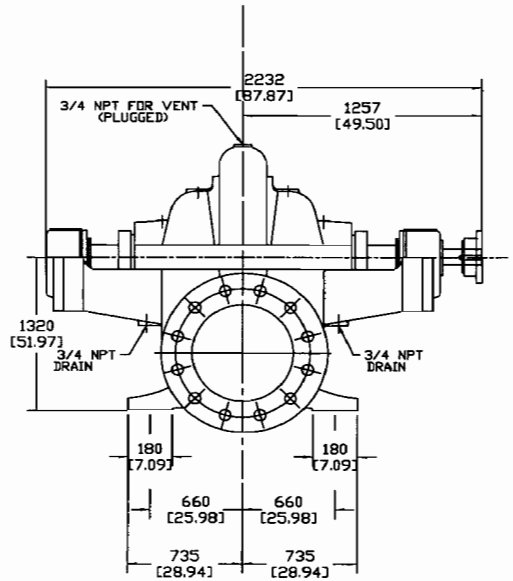
SUCTION
ANSI B16.1 125#FF



DISCHARGE
ANSI B16.1 125#FF







CUSTOMER'S ORDER REFERENCE: 70380
CUSTOMER: POWER & MINE SUPPLY
DISTRICT OFFICE ORDER: 727-00050 WORKS ORDER: S004026
CERTIFIED BY: JIM KURTZ DATE: 04/18/06

DIMENSIONS ARE FROM DRAWINGS, CASINGS MAY VARY SLIGHTLY. FOUNDATION BOLTS MUST NOT BE FIXED RIGIDLY UNTIL MACHINE IS IN PLACE. THIS PRINT IS LOANED SUBJECT TO RETURN ON DEMAND AND UNDER CONDITION THAT IT IS NOT TO BE USED IN ANY WAY DETRIMENTAL TO OUR INTERESTS. DO NOT SCALE; ADDITIONAL DIMENSIONS WILL BE FURNISHED UPON REQUEST.

ALL DIMENSIONS ARE IN MM
TOLERANCE ± 5 MM ON ALL DIMENSIONS

B	CORRECTED DIMENTIONS AND VIEWS

BOOSTER PUMP

CAD DWG.-NO MANUAL CHANGES PERMITTED

750LNE1050
ELEVATION

TANEYTOWN, MARYLAND FLOWSERVE

ORDER S004206 DATE 04/18/06 SCALE N. T. S.

DRAWN	CHECKED	APPROVED		
FRC	JK		GS004026	B

FLOWSERVE

Pump Division
Flowserve Pumps
IDP Pumps

February 27, 2007

Pump Efficiency

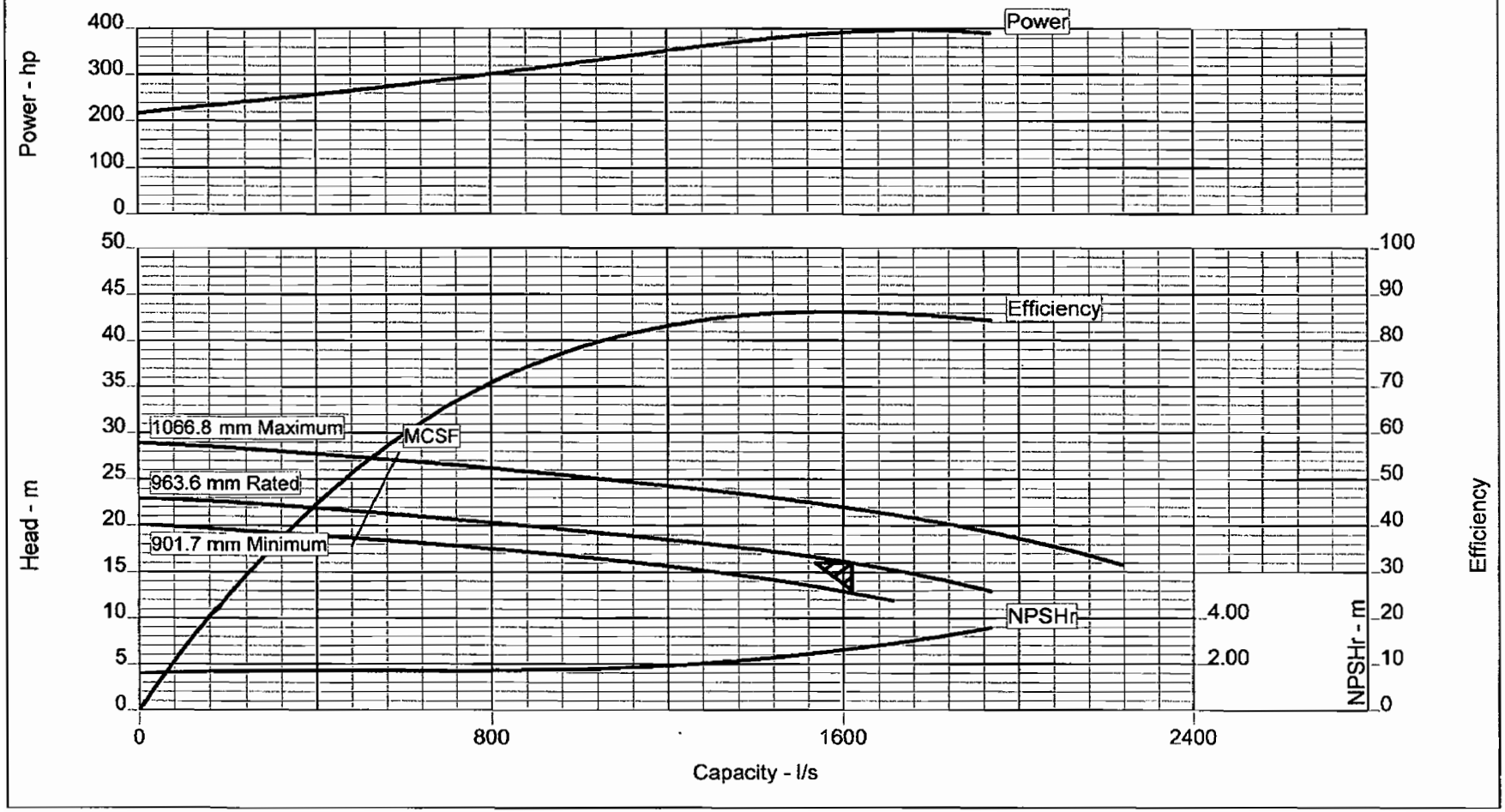
Customer:	Power & Mine Supply Co.	Tag:	Booster Pumps 1 & 2
Project:	WINNIPEG WTP	Shop Order:	S004025/6
Service:	Deacon Booster Pumps	S/N:	XXXXXXXXX
P.O.:	70380	Rev:	D

Flowserve Guarantees the following:

1150 l/s @ 7m at 256 rpm	85%	(minimum)
1470 l/s @ 13m at 342 rpm	86%	(Normal)
1620 l/s @ 16m at 379 rpm	86%	(maximum)

Customer	: **Power & Mine**	**FLOWSERVE** Pump Division			Pump size & type : **30-LN-41**
Item number	: **1 TTN Option**				Based on curve no. : **ER-4047**
Service	:				Number of stages : 1
Vendor reference	: **1819-50042**	Capacity	: **1620.0 l/s**	Specific gravity	: **1.000**
Date	: June 8, 2006	Head	: **16.00 m**	Pump speed	: **379 rpm**

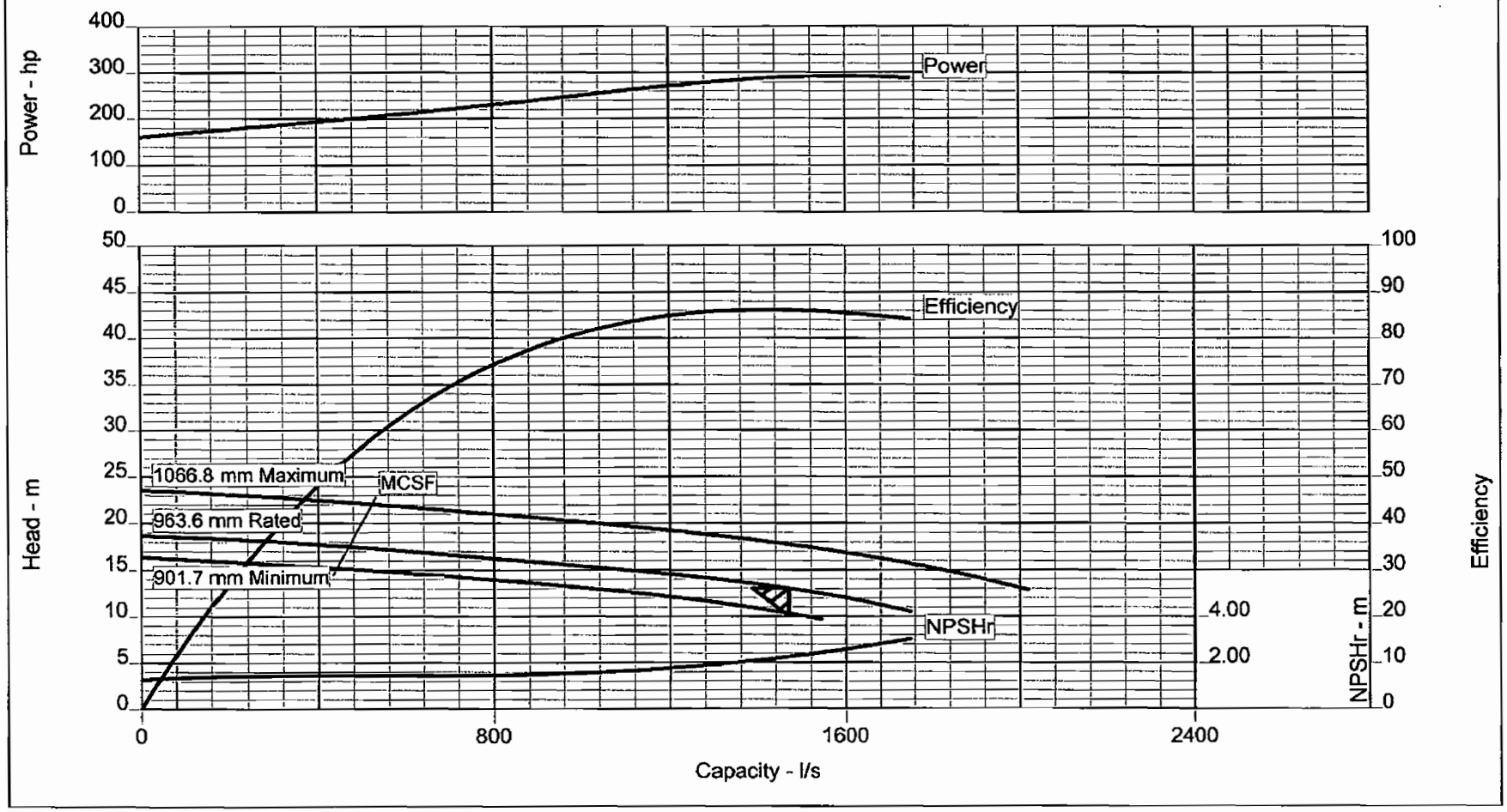
CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY.



WinPROS+ V3.2.3

Customer	: **Power & Mine**	**FLOWSERVE** Pump Division			Pump size & type : **30-LN-41**
Item number	: **1 TTN Option**				Based on curve no. : **ER-4047**
Service	:				Number of stages : **1**
Vendor reference	: **1819-50042**	Capacity	: **1470.0 l/s**	Specific gravity	: **1.000**
Date	: June 8, 2006	Head	: **13.00 m**	Pump speed	: **342 rpm**

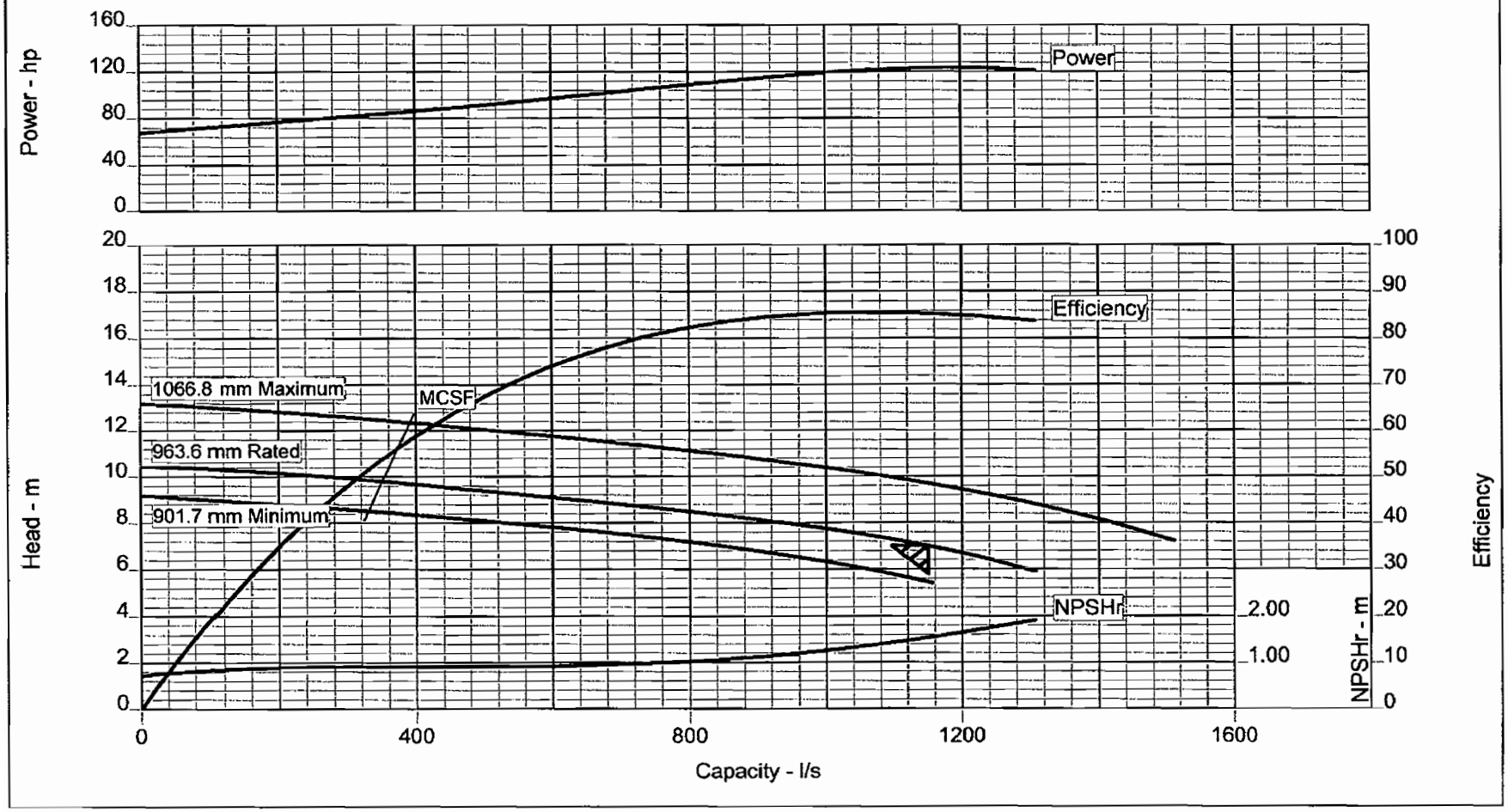
CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY.



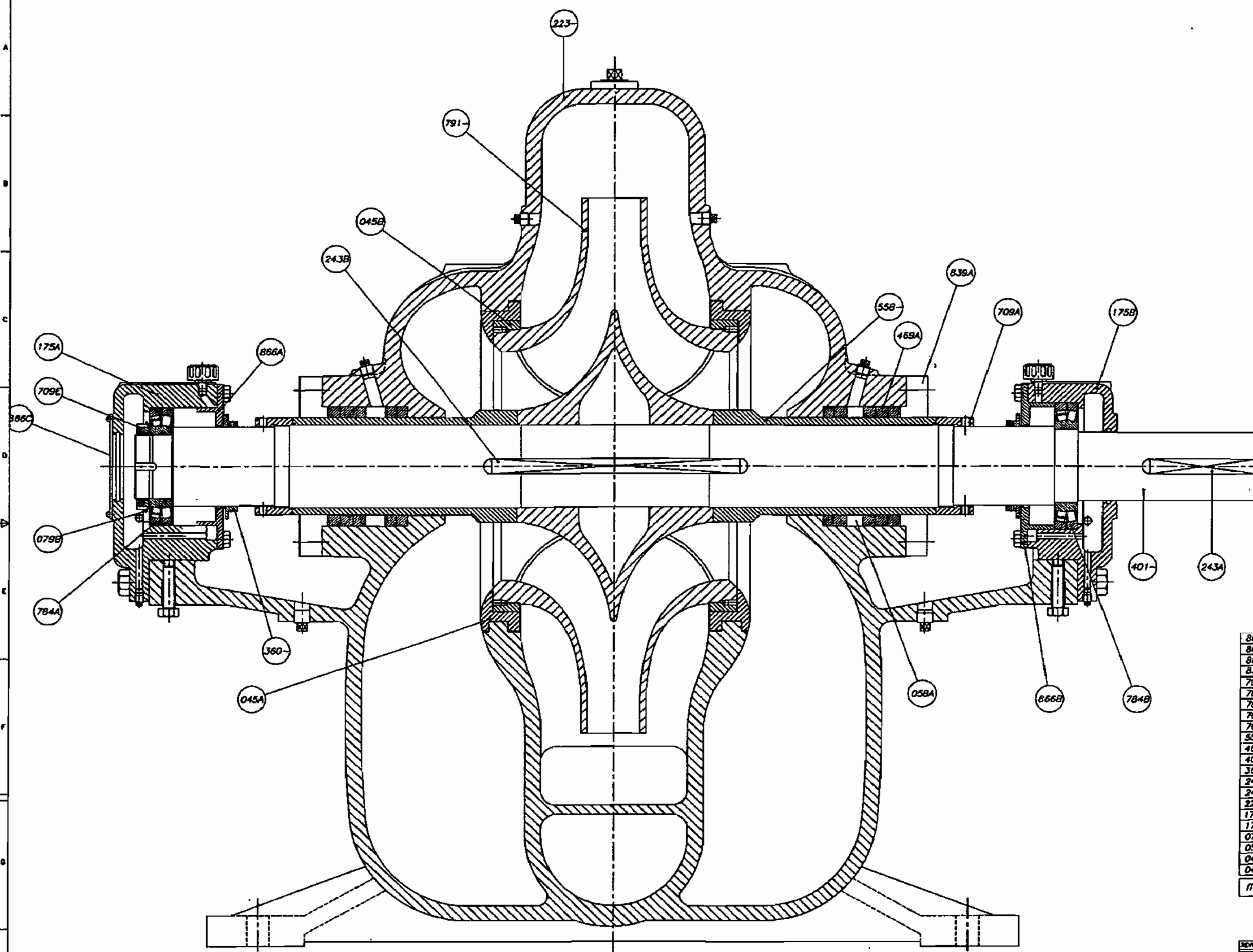
WinPROS+ V3.2.3

Customer	: **Power & Mine**	**FLOWSERVE** Pump Division			Pump size & type : **30-LN-41**
Item number	: **1 TTN Option**				Based on curve no. : **ER-4047**
Service	:	Capacity	: **1150.0 l/s**	Specific gravity	: **1.000**	Number of stages : **1**
Vendor reference	: **1819-50042**	Head	: **7.00 m**	Pump speed	: **256 rpm**	
Date	: June 8, 2006				

CURVES ARE APPROXIMATE, PUMP IS GUARANTEED FOR ONE SET OF CONDITIONS, CAPACITY, HEAD, AND EFFICIENCY.



WinPROS+ V3.2.3



ITEM	QT	DESCRIPTION	MATERIAL ASTM
866C	01	BEARING END COVER AND LABEL	STEEL/SST
866B	01	LINE BEARING HOUSING COVER	A48 CL.35
866A	01	THRUST BEARING HOUSING COVER	A48 CL.35
839A	04	GLAND HALF	B584 C83600
791-	01	IMPELLER	B148 C95800
784B	01	LINE BEARING	STEEL
784A	01	THRUST BEARING	STEEL
709E	01	BEARING LOCKING NUT	COMERCIAL COMPONENT
709A	02	SHAFT NUT	B584-505-271
558-	02	SHAFT SLEEVE	A479 UNS S31603 type 316L
459A	10	PACKING RING	PTFE
401-	01	PUMP SHAFT	A276 type 410
360-	02	DEFLECTOR	B584-505-271
243B	01	IMPELLER KEY	A108
243A	01	COUPLING KEY (LINE HOUSING)	A108
223-	01	CASING	A48 CL 35
175B	01	LINE HOUSING	A48 CL.35
175A	01	THRUST HOUSING	A48 CL.35
079B	01	BEARING LOCKING WASHER	COMERCIAL COMPONENT
058A	04	LANTERN RING HALF	B584-505-271
045B	02	IMPELLER WEAR RING	A487 Gr CA-15
045A	02	CASING WEAR RING	A743 Gr CA-40

CUSTOMER/PROJECT: POWER & MINE

CUSTOMER'S REFERENCES: PO 76380

FLOWSERVE Pump Division

TITLE: SECTIONAL DRAWING WITH PARTS LIST

DRAWING NR.: CS004025

SHEET: 1/1

FLOWSERVE

Pump Division
Flowserve Pumps
IDP Pumps

April 18, 2006

Spare Parts List

Customer:	Power and Mine Supply Co.	Tag:	Booster Pumps 1 & 2
Project:	WINNIPEG WTP	Shop Order:	S004025/6
Service:	Deacon Booster Pumps	S/N:	XXXXXXXXXX
P.O.:	70380	Rev:	A

The following spare parts will be provided for the pumps specified above: Quantities listed are the totals for 2 pumps.

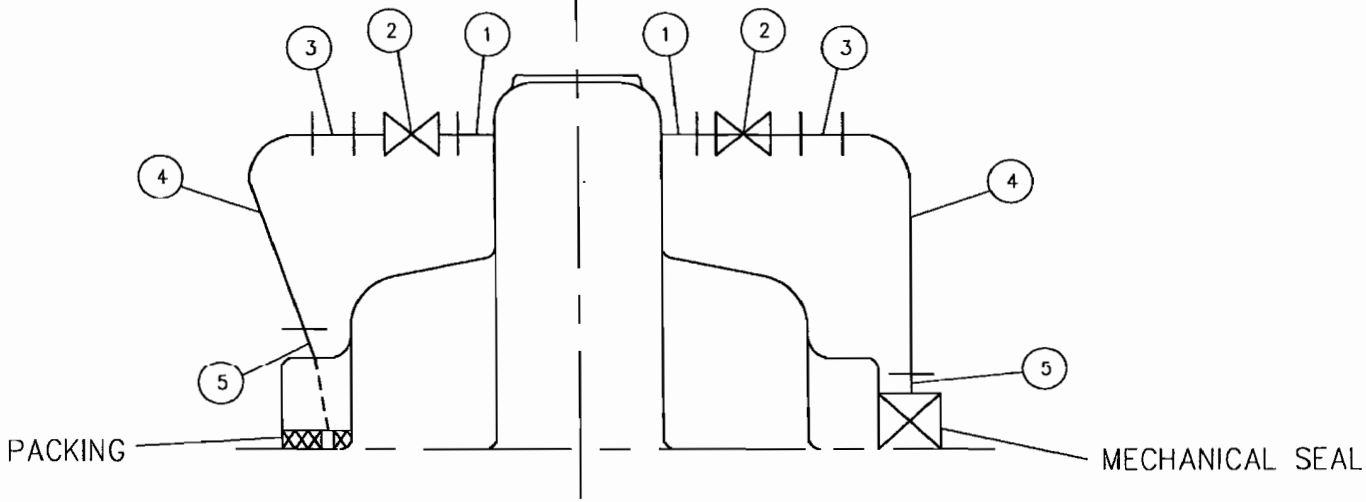
Qty.	Name of Part
2	Sets of wear rings
4	Sets of gasket wear rings
2	Sets of Stuffing Box Packing
2	Sets of pump bearings
2	Sets of shaft sleeves
2	Pump shafts
2	Impeller (HI-CW)
2	Impeller (HI-CCW)

User: JKURTZ

ITEM NO.	DESCRIPTION	MATERIAL
1	PIPE NIPPLE	316 S.ST.
2	GATE VALVE	BRONZE
3	MALE CONNECTOR	316 S.ST.
4	TUBING	316 S.ST.
5	MALE CONNECTOR	316 S.ST.

ARRANGEMENT FOR PACKING

ARRANGEMENT FOR MECHANICAL SEAL



DATE	SYM	REVISION	DIM. WAS	AUTH	DRN	EDC#

MACHINING TOLERANCES-DEC. INCH UNLESS OTHERWISE SPECIFIED

DECIMAL PLACES	TOL'S	DISP. CLASS
ONE X.X	± .1	MINOR
TWO X.XX	± .02	MINOR
THREE X.XXX	± .005	BASIC MINOR
SPECIFIED	.001 TO .003 TOTAL	BASIC MAJOR
SPECIFIED	.0029 TOTAL	CRITICAL

OTHER	
REMOVE BURRS & SHARP CORNERS	
ANGLES	±0° - 30'
WELD BEVELS AND CHAMFERS	±2° - 30'
THREADS	UN-2A, 2B
FILLETS & RADII	.048 MAX.
BREAK CORNERS	45° X .02-.04
TORCH CUT	± .06

GEOMETRIC TOLERANCES UNLESS OTHERWISE SPECIFIED

FLATNESS	.002 PER FT.
STRAIGHTNESS	.002 PER FT.
ROUNDNESS	.010
PARALLELISM	.002 PER IN.
PERPENDICULARITY	.002 PER IN.
ANGULARITY	± 1/2 DEGREE
RUNOUT	.010
TOTAL RUNOUT	.010
TRUE POSITION	Ø .060
CONCENTRICITY	Ø .03
SYMMETRY	SPECIFY
CYLINDRICITY	.010

THIRD ANGLE PROJECTION

AUTOCAD DRAWING NO MANUAL CHANGES PERMITTED

DRAWN SER

CHECKED ACM

ESTIMATED WEIGHT (LBS.)

DATE 11-24-99

MATERIAL SPEC. N/A

Ingersoll-Dresser Pumps

TITLE

SEAL PIPING FOR WORTHINGTON

DWG. NO.	DWG. TYPE	REV.
87025276	ASSY	A

SCALE	PROD. FAM.	NOUN CODE	PAGE
NONE	060		1 OF 1

FLOWSERVE

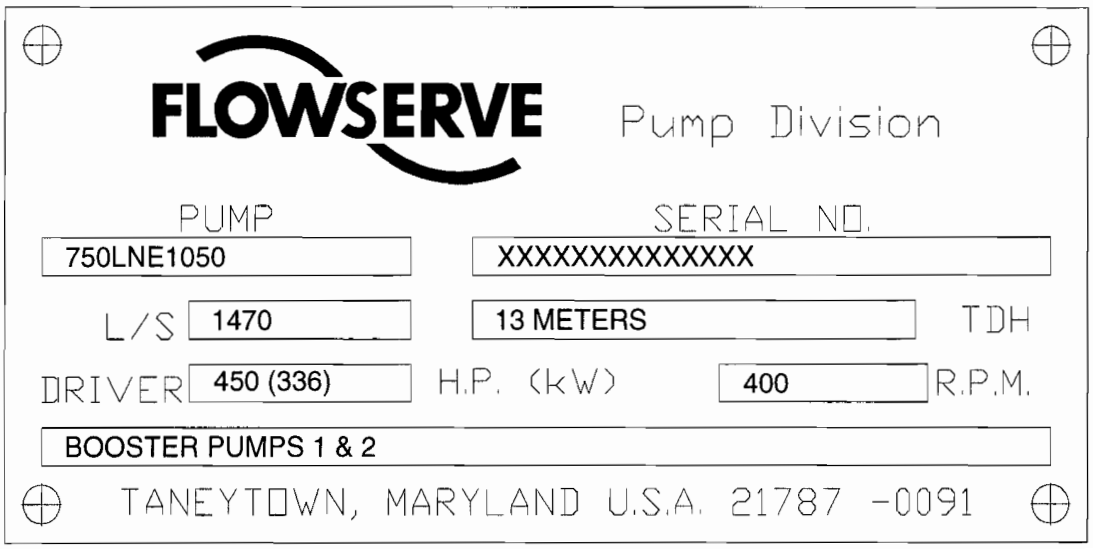
Pump Division
Flowserve Pumps
IDP Pumps

August 15, 2006

Nameplate

Customer:	**Power & Mine Supply Co.**	**Tag:**	**Booster Pumps 1 & 2**
Project:	**WINNIPEG WTP**	**Shop Order:**	**S004025/6**
Service:	**Deacon Booster Pumps**	**S/N:**	**XXXXXXXXXX**
P.O.:	**70380**	**Rev:**	**A**

Material: 316 Stainless Steel



FLOWSERVE

Pump Division
Flowserve Pumps
IDP Pumps

November 15, 2006

Pump Shop Coating Data

Customer:	Power & Mine Supply Co.	Tag:	Booster Pumps 1 & 2
Project:	WINNIPEG WTP	Shop Order:	S004025/6
Service:	Deacon Booster Pumps	S/N:	XXXXXXXXX
P.O.:	70380	Rev:	A

Coating Details

Interior:
Surface Preperatoin SSPC – SP10
Primer Coat: Belzona 1341NSF
Intermediate Coat: Belzona 1341NSF

Exterior:
Surface Preperatoin SSPC-SP10
Primer Coat: Tnemec 20
Intermediate Coat: Tnemec 20
Top Coat: Tnemec 20

Coating Data Sheets
Data sheets for the coatings specified above are following this page.

BELZONA® 1341
SUPERMETALGLIDE

The Cost Effective Approach to Preventing Erosion-Corrosion and Maintaining Fluid Flow

Energy losses due to the effects of viscous drag and surface roughness, accentuated by erosion-corrosion effects, can be reduced by the application of a protective coating to the surfaces of fluid handling equipment.

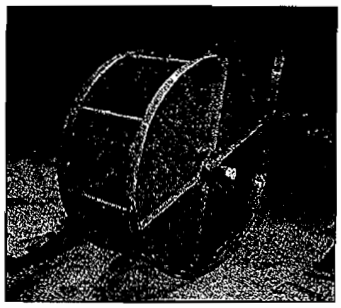
Conventional coatings, however, have severe limitations:

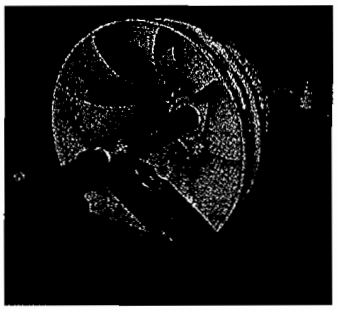
- Many fail to give a smooth surface.
- Poor rheology leads to excessive film thickness which will affect flow characteristics.
- Insufficient resistance to erosion-corrosion attack.

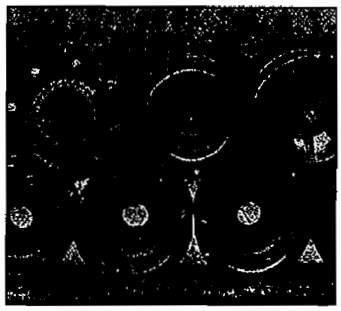
In contrast, the unique hydrophobic nature of the Belzona® 1341 system makes water simply roll off. Wear by abrasion is minimized by its encapsulated blend of lubricating and abrasion resistant fillers. When applied to fluid flow equipment, Belzona® 1341 can reduce power consumption, increase efficiency, lower maintenance costs, and improve hydrodynamic performance.

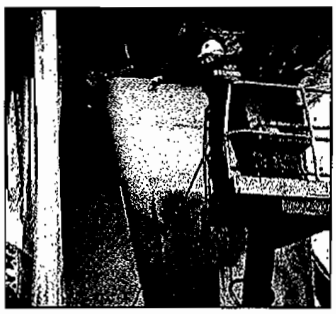
Belzona® 1341 is suitable for contact with potable water. It is certified to ANSI/NSF Standard 61, and satisfies the U.K. Drinking Water Inspectorate requirements.

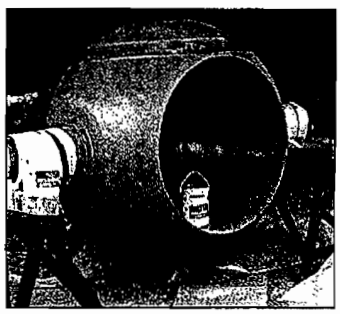

NEW PUMPS


FILTERS AND STRAINERS


TURBINE RUNNERS


MULTI-STAGE PUMPS


MARINE COMPONENTS


VALVES

The Unconventional Alternative.

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E-mail: Com@Belzona.co.uk

Belzona Inc. Miami, Florida 33172, USA
Fax: (305) 599-1140 • Tel: (305) 594-4994
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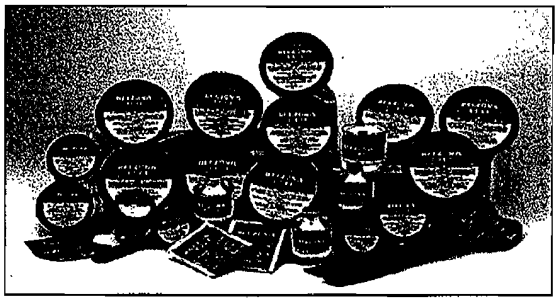
www.belzona.com

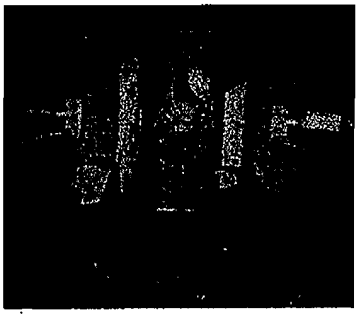
BELZONA®

BELZONA® 1341

SUPERMETALGLIDE



BELZONA® 1000 SERIES METALLIC POLYMERS



User Friendly Characteristics

- Can be brush or spray applied to give a perfectly smooth, high gloss finish.
- Long working life after mixing.
- Overcoating time of up to 24 hours (at 10°-30°C) after application.
- Color differentiated formulations plus computer designed product rheology allow two coats to be applied at correct film thickness-very important to ensure no change to fluid flow characteristics of equipment while still enhancing efficiency.

Cost Savings in Fluid Flow

- Independent tests show a typical 6.7% reduction in pump power consumption without changing pump characteristics.
- Increased output from hydro-electric turbine systems.

Improved Hydro-Dynamic Performance

- Achieved because controlled film thickness allows fluid velocity to be enhanced without inducing turbulence.

Reduced Maintenance Costs in Erosion-Corrosion Situations

- Tests show superior cavitation and entrainment resistance when compared with normal metal filled epoxies and glass flake linings.

Outstanding Adhesion to the Substrate

- Up to 3,500 psi (245kgs/cm²) on grit blasted mild steel.

Good Temperature Operating Range

- Can be brush or spray applied to give a perfectly smooth, high gloss finish.

Suitability for Contact with Potable Water

- Certified to ANSI/NSF Standard 61.
- Satisfies U.K. Drinking Water Inspectorate requirements with regard to Water Supply Regulation 25.

Suitability for Use on New or Existing Equipment

- Severely worn or pitted areas on fluid handling equipment previously in service can be restored to original profile using Belzona® 1111, a machinable ceramic steel filled repair compound, before being treated with Belzona® 1341.

BS EN ISO 9002 - 1994
Certificate No. Q/09335

NSF® Certified to ANSI/NSF Standard 61

WRAS APPROVED PRODUCT

Certificate No. 9S-HU9719-X

Printed in U.S.A. Publication No. F1341 (0601)

BELZONA® 1341 (SUPERMETALGLIDE)

INSTRUCTIONS FOR USE

1. TO ENSURE AN EFFECTIVE MOLECULAR WELD

i) **METALLIC SURFACES - APPLY ONLY TO BLAST CLEANED SURFACES**

a) Brush away loose contamination and degrease with a rag soaked in **Belzona® 9111** (Cleaner/Degreaser) or any other effective cleaner which does not leave a residue e.g. methyl ethyl ketone (MEK).

b) Select an abrasive to give the necessary standard of cleanliness and a minimum depth of profile of 3 mils (75 microns).

Use only an angular abrasive.

c) Blast clean the metal surface to achieve the following standard of cleanliness:

ISO 8501-1 Sa 2½ very thorough blast cleaning.
American Standard near white finish SSPC SP 10.
Swedish Standard Sa 2½ SIS 05 5900.

d) After blasting, metal surfaces should be coated before any oxidation of the surface takes place.

SALT CONTAMINATED SURFACES

Metal surfaces that have been immersed for any periods in salt solutions e.g. sea water, should be blasted to the required standard, left 24 hours to allow any ingrained salts to sweat to the surface and then washed prior to a further brush blast to remove these. This process may need to be repeated to ensure complete removal of salts.

ii) **SURFACES ALREADY REBUILT WITH BELZONA® 1111**

a) If overcoating takes place within 2 hours, no further surface preparation is required.

b) After this maximum overcoating time has elapsed roughen the **Belzona® 1111** preferably by brush blasting before applying **Belzona® 1341**.

2. COMBINING THE REACTIVE COMPONENTS

a) Stir the contents of the Base container thoroughly to reincorporate any settlement.

b) Transfer the entire contents of the Solidifier can into the Base module.

c) Mix thoroughly together to achieve a uniform material free of any streakiness.

NOTES:

1. MIXING LARGE UNITS

When mixing 5 kg. units of **Belzona® 1341**, use a mechanical mixer, ensuring that material on the side and at the corners of the container is fully incorporated. Avoid incorporation of excessive amounts of air into the mixed material.

2. MIXING AT LOW TEMPERATURES.

To ease mixing when the material temperature is below 50°F (10°C), warm the Base and Solidifier modules until the contents attain a temperature of 68-77°F (20-25°C).

3. WORKING LIFE

From the commencement of mixing, **Belzona® 1341** must be used within the times shown below.

Temperature	41°F (5°C)	59°F (15°C)	77°F (25°C)	86°F (30°C)
Use all material within	2 hours	1 hour	30 min.	20 min.

4. MIXING SMALL QUANTITIES

For mixing small quantities of **Belzona® 1341** use:
1 part Base to 1 part Solidifier by volume
100 parts Base to 70 parts Solidifier by weight.

5. VOLUME CAPACITY OF MIXED BELZONA® 1341

22 cu.in. (360 cm^3) per 500g unit
220 cu.in. (3.6 liters) per 5 kg unit.

3. APPLYING BELZONA® 1341

FOR BEST RESULTS
Do not apply when:

i) The temperature is below 50°F (10°C) or the relative humidity is above 90%.
ii) Rain, snow, fog or mist is present.
iii) There is moisture on the metal surface or is likely to be deposited by subsequent condensation.
iv) The working environment is likely to be contaminated by oil/grease from adjacent equipment or smoke from kerosene heaters or tobacco smoking.

a) **FIRST COAT**
Apply the **Belzona® 1341** directly on to the prepared surface with a stiff bristled brush or with the plastic applicator provided. To achieve the correct film thickness of 10 mils (250 microns), a practical coverage rate of 13.0 sq. ft (1.2 m²) per 500g unit or 130 sq.ft. (12 m²) per 5 kg unit should be obtained.

b) **SECOND COAT**
As soon as possible after application of the first coat, apply a further coat of **Belzona® 1341** as in (a) above. This time will be 4 - 6 hours at 68°F (20°C). The first coat must not be left longer than 24 hours before overcoating, irrespective of temperature. Should this occur, then the surface should be brush blasted or abraded before commencing application.

SPRAY APPLICATION
On suitable areas, **Belzona® 1341** may be applied by heated airless spray. Typical set up would be 63:1 airless spray unit with either in-line heater or trace heated lines capable of raising product temperature to at least 122°F (50°C). Solvent must **NOT** be added. Please contact Belzona direct for more specific information.

DIFFERENTIATION BETWEEN LAYERS
Belzona® 1341 is available in blue and gray, to facilitate application and to prevent misses. In service the colour of the applied product may change.

CLEANING
Mixing tools should be cleaned immediately after use with **Belzona® 9111** or any other effective solvent e.g. Methyl ethly ketone (MEK). Brushes, injection guns, spray equipment and any other application tools should be cleaned using a suitable solvent such as **Belzona® 9121**, MEK, acetone or cellulose thinners.

4. COMPLETION OF THE MOLECULAR REACTION

Allow **Belzona® 1341** to solidify as below subjecting it to the conditions indicated.

Temperature	Movement or use involving no loading or immersion	Light loading	Full mechanical/ thermal loading or water immersion	Chemical contact
50°F/10°C	24 hours	48 hours	14 days	21 days
59°F/15°C	12 hours	24 hours	7 days	10 days
68°F/20°C	8 hours	16 hours	3 days	7 days
77°F/25°C	7 hours	14 hours	2½ days	6 days
86°F/30°C	6 hours	12 hours	2 days	5 days

5. FINAL SOLIDIFICATION OF BELZONA® 1341

When time is important and equipment usage is pressing, then by installing forced air heaters and taking steps to contain this heat around the equipment being reclaimed, final solidification time can be as little as 24 hours. Application of heat should not be carried out until the **Belzona® 1341** has initially gelled (typically 4 hours at 68°F (20°C) and the material temperature should not exceed 122°F (50°C).

Due allowance must be made for "warming up".
If there is any doubt regarding final solidification then **BE SAFE - MAKE MORE TIME.**

HEALTH & SAFETY INFORMATION
Please read and make sure you understand the relevant Material Safety Data Sheets.

Printed in England Publication No. 06-9-02

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E-Mail: belzona@belzona.com

BS EN ISO 9002 : 1994
Certificate No. Q09335

BELZONA

www.belzona.com

BELZONA® World leaders in the conservation of man-made resources and the environment

PRODUCT SPECIFICATION SHEET
BELZONA® 1341NSF

1. PRODUCT NAME
Belzona® 1341NSF (Supermetalglide)
A drinking water approved coating system for improving the efficiency of fluid handling systems and protecting metals from the effects of erosion-corrosion.

NSF Certified to ANSI/NSF 61

2. MANUFACTURER
Belzona Polymerics Ltd.,
Claro Road, Harrogate,
HG1 4AY, England.

Belzona Inc.,
2000 N.W. 88 Court,
Miami, Florida 33172, U.S.A.

3. PRODUCT DESCRIPTION
A two component system specifically designed to improve the efficiency of fluid handling equipment and to protect all metals from the effects of erosion-corrosion.

Applications
Pumps
Heat exchangers
Water boxes
Valves
Water tanks
Pipes
Tube sheets

4. TECHNICAL DATA
Base component

Appearance	Thixotropic paste
Color	Gray or Blue
Density	1.58-1.63 g/cm³

Solidifier component

Appearance	Clear liquid
Color	Clear
Density	1.17-1.19 g/cm³

Mixed properties

Mixing ratio by weight	2 : 1
Mixing ratio by volume	3 : 2
Density	1.42-1.46 g/cm³

• *Limitations of Use*
Belzona® 1341NSF should not be used at temperatures below 50°F (10°C). Where material has been stored below this temperature, warm the Base and Solidifier units until they attain a temperature of 68-77°F (20-25°C).

• *Shelf life*
Separate Base and Solidifier components shall have a shelf life of at least 3 years when stored between 32°F (0°C) and 86°F (30°C).

• *Working life*
Will vary according to temperature:

Temperature	Working life
50°F (10°C)	70 minutes
59°F (15°C)	50 minutes
68°F (20°C)	35 minutes
77°F (25°C)	25 minutes
86°F (30°C)	16 minutes

• *Coverage rate*
To achieve the correct film thickness of 10 mils (250 microns), a practical coverage rate of 19.5 sq. ft (1.8 sq. m) per 750g unit should be obtained or 130 sq. ft (12 sq. m) per 5kg.

• *Volume capacity*
The volume capacity of mixed **Belzona® 1341NSF** is 31.73 in³ / 750g or 212 in.³ (3.475 litres) / 5kg.

• *Cure time*
At a thickness of approximately ¼ in. (6 mm) allow to cure for the times shown in the chart below before subjecting it to the conditions indicated.

5. PHYSICAL/MECHANICAL PROPERTIES
Determined after 7 days cure at 68°F (20°C).

• *Abrasion resistance*
Taber
The sliding abrasion resistance using Taber Abraser using H10/CS17 wheels and 1kg load is typically:

Wet	52 mm³
Dry	6 mm³

Loss per 1000 cycles.

• *Adhesion*
Tensile shear
When tested in accordance with ASTM D1002 using degreased strips, grit blasted to a 3-4mil (75 micron) profile, typical values obtained will be:

20°C cure

Mild steel	2,500 psi (175 kg/cm²)
Stainless steel	2,780 psi (195 kg/cm²)
Copper	2,230 psi (156 kg/cm²)
Aluminum	1,570 psi (110 kg/cm²)

100°C cure

Mild steel	3,250 psi (228 kg/cm²)

• *Cathodic disbondment*
When tested in accordance with ASTM G8 typical values obtained will be Class B.

• *Cavitation resistance*
When tested to a modified version of ASTM G32 using stationary specimens at 20KHz frequency and 50 microns amplitude a typical volume loss will be 12 mm³/hour.

• *Chemical resistance*
Once fully cured, the material will demonstrate excellent resistance to the following chemicals:
Water
Sea water
Inorganic salt solutions
10% sodium hydroxide

CURE TIMES

TEMPERATURE	50°F (10°C)	59°F (15°C)	68°F (20°C)	77°F (25°C)	86°F (30°C)
Movement or use involving no loading	24 hours	12 hours	8 hours	7 hours	6 hours
Movement or use involving light loading	48 hours	24 hours	16 hours	14 hours	12 hours
Full mechanical/thermal loading or water immersion	14 days	7 days	3 days	2½ days	2 days
Immersion in chemicals	21 days	10 days	7 days	6 days	5 days

• *Compressive yield strength*
When tested in accordance with ASTM D695 typical values obtained will be:
68°F (20°C) cure 6,900 psi (485 kg/cm²)
212°F (100°C) cure 8,500 psi (598 kg/cm²)

• *Flexural strength*
When tested in accordance with ASTM D790 typical values obtained will be:
68°F (20°C) cure 5,900 psi (415 kg/cm²)
212°F (100°C) cure 6,400 psi (450 kg/cm²)

• *Heat distortion temperature*
When tested in accordance with ASTM D648 typical values obtained will be:
68°F (20°C) cure 111°F (44°C)
212°F (100°C) cure 156°F (69°C)

• *Heat resistance*
For many typical applications, the product is thermally stable up to 450°F (200°C) dry and down to 140°F (60°C).

• *Impact strength*
When tested in accordance with ASTM D256 typical values obtained will be:
68°F (20°C) cure 1 ft.lb./in (54 J/m)
212°F (100°C) cure 1.15 ft.lb./in (62 J/m)

• *Potable Water Approval*
Belzona® 1341 bearing the **NSF** mark is approved for contact with drinking water subject to the following restrictions.
For use on distribution line pumps of >4 inch diameter with a minimum daily output of 4800 gallons/ft² of coated pump surface
For use on tanks of > 100,000 gallons

• *Pump Efficiency Enhancement*
The **Belzona® 1341NSF** system has been shown to be capable of bringing about an increase in pump efficiency of up to 7% in independent tests carried out by the National Engineering Laboratory, East Kilbride, Glasgow, Scotland, test number 0230 432/88 BEM/01 and the Aurora Pump Company, North Aurora, Illinois, test number 0789089/1089037.

• *Thermal expansion*
When tested in accordance with ASTM E228 typical values obtained will be:
74.7 ppm/°C

6. SURFACE PREPARATION AND APPLICATION PROCEDURES
For proper technique, refer to the Belzona Instructions For Use leaflet which is enclosed with each packaged product.

7. AVAILABILITY AND COST
Belzona® 1341NSF is available from a network of Belzona Distributors throughout the world for prompt delivery to the application site. For information, consult the Belzona Distributor in your area.

8. WARRANTY
Belzona guarantees this product will meet the performance claims stated herein when material is stored and used as instructed in the Belzona Instructions For Use leaflet. Belzona further guarantees that all its products are carefully manufactured to ensure the highest quality possible and tested strictly in accordance with universally recognized standards (ASTM, ANSI, BS, DIN, etc.). Since Belzona has no control over the use of the product described herein, no warranty for any application can be given.

9. TECHNICAL SERVICES
Complete technical assistance is available and includes fully trained Technical Consultants, technical service personnel and fully staffed research, development and quality control laboratories.

10. HEALTH AND SAFETY
Prior to using this material, please consult the Material Safety Data Sheet provided with each packaged product

11. APPROVALS/ACCEPTANCES
NSF
U.S.D.A.
INGERSOL RAND
SULZER PUMPS
SPP LTD.
SSW PUMP SERVICES
AURORA PUMPS

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BELZONA

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FLOWSERVE

Pump Division
Flowserve Pumps
IDP Pumps

April 18, 2006

Comments and Clarifications & Deviations

Spec. Section:

Customer: Power and Mine Supply Co.	Tag: Booster Pumps 1 & 2
Project: WINNIPEG WTP	Shop Order: S004025/6
Service: Deacon Booster Pumps	S/N: XXXXXXXXXX
P.O.: 70380	Rev: A

Flowserve Pump Division respectfully submits the following comments.

1. The specifications require the pump casing to be cast iron with a Belzona coating on the interior. Coating the interior of iron pumps will increase the galvanic corrosion where the coating becomes compromised in any manner as well as at the coating edges. The end result is graphitic corrosion in grey iron castings and deep pitting/general corrosion in ductile iron. Flowserve will apply coatings fully in accordance with manufacturers directions, but will not be responsible for corrosion that may develope at flaws that develope over time in the coating. Please find the attached page from the Pump Handbook, specifically the last paragraph before Stress Corrosion Cracking.

2. Also attached are the general proposal comments, clarifications, and coordination notes

Respectfully Submitted,

Jim Kurtz
Project Manager

anodic to the stainless steel and will protect it from localized corrosion when the pump is shut down and contains stagnant water. The area of Ni-Resist is considerably larger than that of stainless steel. The increased galvanic corrosion of the Ni-Resist is spread over a large area and is negligible.

The amount of corrosion that will occur in a galvanic couple also depends on the freely corroding potentials of the coupled metals. Less corrosion-resistant metals, such as zinc, cast iron, and steel will usually have more negative potentials when measured against a standard reference electrode. More corrosion-resistant metals, such as stainless steels, will have less negative potentials.

The corrosion potentials for many commonly used engineering alloys in slowly moving seawater are shown in Table 1. The alloys are listed in the order of the potential that they exhibit in flowing seawater. Certain alloys (indicated by solid colored boxes preceding the name of the alloy) in low-velocity or poorly aerated water and at shielded areas may become active and exhibit a potential near −0.5 volts. The extent of galvanic corrosion that will occur when two metals are electrically coupled will depend on the potential difference between the metals. The corrosion rate of zinc coupled to stainless steel will increase dramatically because of the large potential difference between these two metals. A nickel aluminum bronze coupled to austenitic stainless steel will experience little galvanic corrosion because the potentials of these two metals are close to one another. The pump designer needs to be aware of the corrosion potentials of dissimilar metals used in conductive fluids in order to avoid unanticipated galvanic corrosion problems.

The use of coatings can decisively alter the galvanic relationships in a pump. If the more anodic component, such as a steel casing, is coated, one can expect a high rate of corrosion at those locations where the coating eventually begins to fail. This will be caused by a very unfavorable area ratio, with a small area of exposed carbon steel coupled to a large area of some more noble metal, such as stainless steel or bronze. For this reason, coatings should be employed with caution in pumps handling conductive fluids that are constructed of dissimilar metals. It is generally advisable in these applications not to coat the anodic component. Figure 4 documents the galvanic corrosion on the interior diameter of a carbon steel flange connected to a stainless steel shroud. The accelerated corrosion is due to the unfavorable ratio of stainless steel to carbon steel in this component.

Stress Corrosion Cracking *Stress corrosion cracking* (SCC) is a particularly dangerous form of corrosion because it is not easily detected before it has progressed to such an extent that it can cause sudden catastrophic damage. Although relatively uncommon in pumps, it can occur in several classes of materials. The pump designer should be aware of the potential combinations of material and environment that can cause SCC.

Stress corrosion requires that several factors be present. These include tensile stress, which can be either residual or applied, a susceptible material, an environment capable of causing stress corrosion, and time.

The materials used in the pump industry that may experience SCC include austenitic and martensitic stainless steels, some copper base alloys, and, occasionally, Ni-Resist. The austenitic stainless steels are susceptible to stress corrosion in aqueous chlorides at temperatures above about 140°F (60°C). Cast alloys, which contain some fraction of ferrite in the microstructure, are significantly more resistant to stress corrosion than their wrought counterparts. The possibility of cracking is increased in situations where chlorides are concentrated, as by evaporation. High residual stress, often present in as-welded structures, also enhances the possibility of cracking. Increasing nickel content in austenitic stainless alloys enhances the resistance to SCC. The high nickel grade, commonly known as Alloy 20, is often used in chemical applications where the optimum resistance to stress corrosion is necessary. The SCC of austenitic stainless steels in pumps is relatively uncommon.

Martensitic stainless steels are susceptible to cracking in the presence of hydrogen sulfide and is often referred to as *sulfide stress corrosion cracking* (SSC). These steels, particularly CA-15 and CA-6NM, are commonly used in pumping applications in oil production and refining where hydrogen sulfide can be present. SCC can be avoided by giving these materials a special heat treatment intended to reduce hardness below a certain threshold level, below which cracking will not occur. This has also been correlated to the yield strength of a material. It is often seen in literature that ferrous materials used

PRODUCT PROFILE

GENERIC DESCRIPTION Polyamide Epoxy

COMMON USAGE Industry standard for potable water epoxy coatings for nearly 30 years. Known for its forgiving application characteristics in adverse and varied conditions, and for its benchmark performance.

COLORS 1211 Red, 1255 Beige, 11WH White, 15BL Tank White, 39BL Delft Blue.
Note: Epoxies chalk with extended exposure to sunlight. Lack of ventilation, incomplete mixing, miscatalyzation or the use of heaters that emit carbon dioxide and carbon monoxide during application and initial stages of curing may cause yellowing to occur.

SPECIAL QUALIFICATIONS Certified by **NSF International** in accordance with **ANSI/NSF Std. 61.** Ambient air cured Series 20 is qualified for use on the interior of potable water storage tanks and reservoirs of 1,000 gallons (3785 L) capacity or greater. Force-cured Series 20 is qualified for tanks of 100 gallons (378 L) or greater. Conforms to **AWWA D 102 Inside Systems No. 1 and No. 2.** Contact your Tnemec representative for approved systems and additional information on potential uses.

PERFORMANCE CRITERIA Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

PRIMERS Self-priming, FC20, N140, N140F, 91-H_2O. **Note:** 91-H_2O is ANSI/NSF Std. 61 certified by UL as a primer for Series 20. Refer to the 91-H_2O product data sheet for additional information.

TOPCOATS **Interior:** Series 20, FC20, N140, N140F, 264, 265
Exterior: Series 20, FC20, 66, N69, 73, N140, 161, 175, 700, 1074, 1075. **Note:** When topcoating with Series 700, an intermediate coat of Series 73 or 1075 is required.
Refer to COLORS on applicable topcoat data sheets for additional information.

Certified to ANSI/NSF 61

SURFACE PREPARATION

STEEL **Immersion Service:** SSPC-SP10/NACE 2 Near-White Blast Cleaning
Non-Immersion Service: SSPC-SP6/NACE 3 Commercial Blast Cleaning

PRIMED SURFACES **Immersion Service:** Scarify the Series 20 or FC20 prime coat by brush-blasting with fine abrasive before topcoating if it has been exterior exposed for 60 days or longer.

CAST/DUCTILE IRON Contact your Tnemec representative or Tnemec Technical Services.

CONCRETE Allow new concrete to cure for 28 days. Abrasive blast referencing SSPC-SP13/NACE 6 Surface Preparation of Concrete and Tnemec's Surface Preparation and Application Guide. Holes, pits, voids and cracks should be filled with 63-1500 Filler and Surfacer.

ALL SURFACES Must be clean, dry and free of oil, grease, chalk and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS* 57.0 ± 2.0% (mixed)

RECOMMENDED DFT 2.0 to 6.0 mils (50 to 150 microns) per coat. **Note: Number of coats and thickness requirements will vary with substrate, application method and exposure. Contact your Tnemec representative.**

CURING TIME

Temperature	To Handle	To Recoat	Immersion
75°F (24°C)	10 hours	12 hours	7 days

Curing time varies with surface temperature, air movement, humidity and film thickness.

Force Cure (Temperatures shown are for substrate.)

1st Coat	24 hours at 75°F (24°C)
2nd Coat	Flash 2 to 4 hours at 75°F (24°C), followed with 24 hours at 150°F (66°C), plus 24 hours at 75°F (24°C)

VOLATILE ORGANIC COMPOUNDS*

Unthinned	Thinned 10%
3.06 lbs/gallon (366 grams/litre)	3.41 lbs/gallon (408 grams/litre)

THEORETICAL COVERAGE* 898 mil sq ft/gal (22.0 m^2/L at 25 microns). See APPLICATION for coverage rates.

NUMBER OF COMPONENTS Two: Part A and Part B

PACKAGING 5 gallon (18.9L) pails and 1 gallon (3.79L) cans — Order in multiples of 2.

NET WEIGHT PER GALLON* 12.50 ± 0.25 lbs (5.7 ± .11 kg) (mixed)

STORAGE TEMPERATURE Minimum 20°F (-7°C) Maximum 110°F (43°C)

TEMPERATURE RESISTANCE (Dry) Continuous 250°F (121°C) Intermittent 275°F (135°C)

ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise		OPP/Upper Oil Cap	8 QT/7.6 L
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	8 QT/7.6 L
Altitude			
EPACT Note		EPACT Compliance	
COS		Marine Duty	
Balance		Arctic Duty	
3/4 Load Eff.	92.4	Inrush Limit	
Motor Weight	12000	Direction of Rotation	
Sound Level		Special Note 1	WINDING TEMPERATURE
Vertical Thrust		Special Note 2	ALARM = 160C
Thrust Percentage		Special Note 3	SHUT DOWN = 165C
Bearing Life		Special Note 4	
Starting Method		Special Note 5	
Number of Starts		Special Note 6	
200/208V 60Hz Max Amps		SH Max. Temp.	
190V 50 hz Max Amps		SH Voltage	SH VOLTS=115V
380V 50 Hz Max Amps		SH Watts	SH WATTS=700W
NEMA Inertia		Load Inertia	1827 LBS-FT2 LB-FT2
Sumpheater Voltage		Sumpheater Wattage	
Special Accessory Note 1	BEARING SET POINTS	Special Accessory Note 16	
Special Accessory Note 2	ALARM= 90C	Special Accessory Note 17	AFFIX N/P 915591
Special Accessory Note 3	SHUTDOWN= 100C	Special Accessory Note 18	
Special Accessory Note 4		Special Accessory Note 19	
Special Accessory Note 5		Special Accessory Note 20	
Special Accessory Note 6		Special Accessory Note 21	
Special Accessory Note 7		Special Accessory Note 22	
Special Accessory Note 8		Special Accessory Note 23	
Special Accessory Note 9		Special Accessory Note 24	
Special Accessory Note 10		Special Accessory Note 25	
Special Accessory Note 11		Special Accessory Note 26	
Special Accessory Note 12		Special Accessory Note 27	
Special Accessory Note 13		Special Accessory Note 28	
Special Accessory Note 14		Special Accessory Note 29	
Special Accessory Note 15		Special Accessory Note 30	

EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
ST. LOUIS, MO

MOTORS

TYPICAL NAMEPLATE DATA
ACTUAL MOTOR NAMEPLATE LAYOUT MAY VARY
SOME FIELDS MAY BE OMITTED

MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
NA	NA	3	RSE	8008S

ORDER NO.	20045177	LINE NO.	100

MPI:	95769
HP:	450
POLES:	18
VOLTS:	4160
HZ:	60
SERVICE FACTOR:	1.15
EFFICIENCY (%):	
S.F.	92.2
FULL	92.4
3/4	92.4
1/2	91.1
1/4	85.7
POWER FACTOR (%):	
S.F.	69.2
FULL	66.9
3/4	60.6
1/2	49.1
1/4	30.1
NO LOAD	2.4
LOCKED ROTOR	20.3
AMPS:	
S.F.	84
FULL	75
3/4	62
1/2	52
1/4	45
NO LOAD	43.3
LOCKED ROTOR	392
NEMA CODE LETTER	G
NEMA DESIGN LETTER	#
FULL LOAD RPM	393
NEMA NOMINAL EFFICIENCY (%)	92.4
GUARANTEED EFFICIENCY (%)	91
MAX KVAR	265.2
AMBIENT (°C)	40
ALTITUDE (FASL)	3300
SAFE STALL TIME-HOT (SEC)	30
SOUND PRESSURE (DBA @ 1M)	80
TORQUES:	
BREAKDOWN{% F.L.}	175
LOCKED ROTOR{% F.L.}	60
FULL LOAD{LB-FT}	6006.7

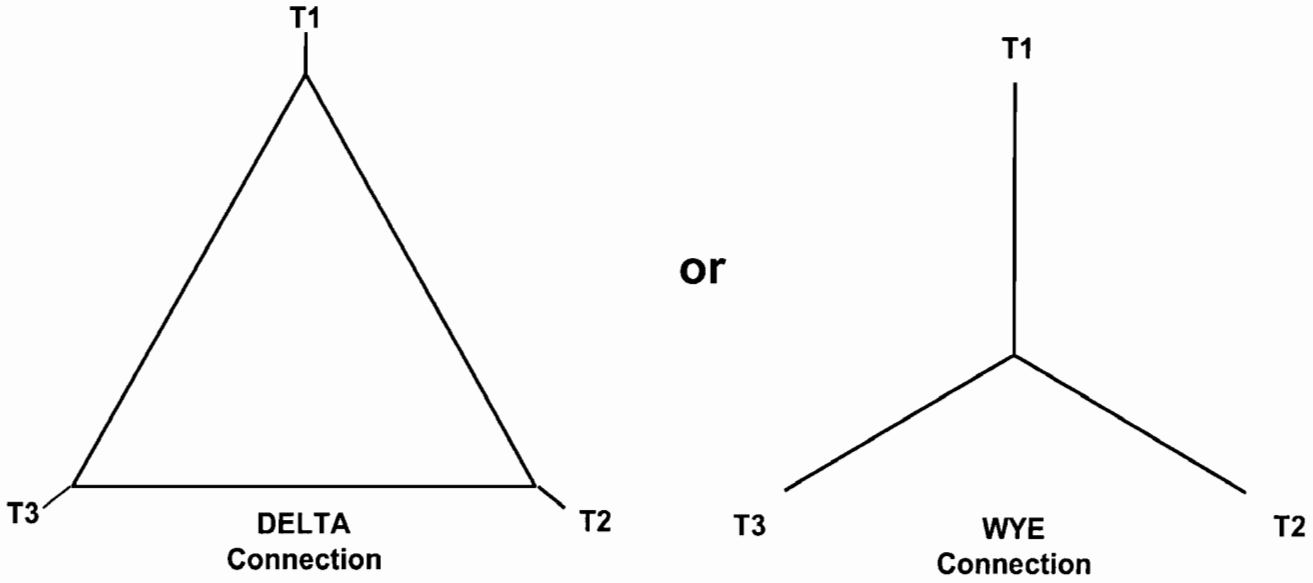
The Above Data Is Typical, Sinewave Power Unless Noted Otherwise

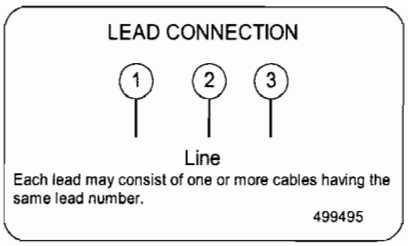
EMERSON
Motor Technologies

EMERSON MOTOR COMPANY
ST. LOUIS, MO

499495

Motor Wiring Diagram





To reverse direction of rotation interchange connections L1 and L2.

Each lead may be comprised of one or more cables.
Each cable will be marked with the appropriate lead number.

EFFECTIVE: 2/27/96
SUPERCEDES: X736618, 96441, 179879, 284138
Connection Plate: 499495
Connection Decal: 912113

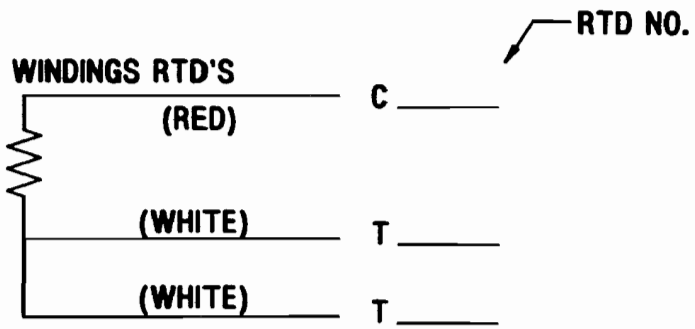
ALT.	A	833989	A

WINDING RTD'S

1. THERE ARE QTY-6 RESISTANCE TYPE TEMPERATURE DETECTORS (RTD) INSTALLED IN THE STATOR WINDING, 2 PER PHASE. REFER TO NAMEPLATE ATTACHED TO THE MOTOR ADJACENT TO ACCESSORY OUTLET BOX FOR RATING THE RTD'S.

2. DETECTORS ARE INSTALLED IN PHASES AS SHOWN.

PHASE	A	B	C
RTD NO.	1, 11	2, 22	3, 33



ACCESSORY LISTING
QTY-6 3 LEAD RTD'S

ALT LET	CHANGE NOTICE NO.	DESCRIPTION OF CHANGE
-	-	REDRAWN ON CAD 8-10-89
A	MOD	6-JUN-00 UPDATED

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
ST. LOUIS, MISSOURI

TITLE: CUSTOMER CONNECTION DIAGRAM

SCALE: NONE | UNITS: IN

DRWN 9-MAY-79, HEB
RVSD 6-JUN-00, RWK
APPD 6-JUN-00, REP

MATERIAL: - - -

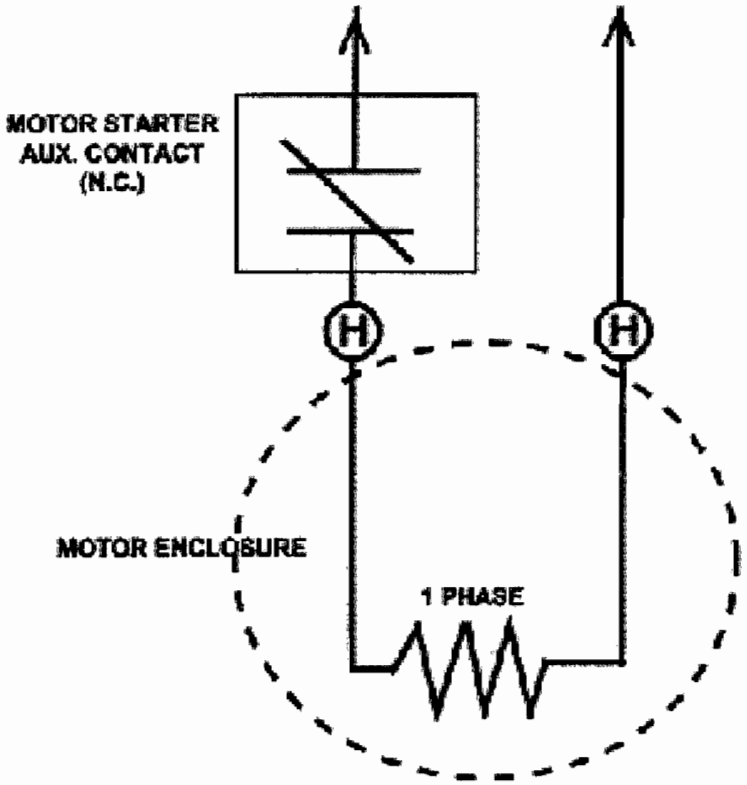
CSTG# - - - | PART# - - - | FRAME - - - | TYPE - - -

SHEET 1 of 1 | PREFIX CDG

ALT.	A	833989	A

SPACE HEATER CONNECTION DIAGRAM

SPACE HEATER LEADS MAY BE LOCATED IN EITHER THE MAIN OUTLET BOX OR IF SO EQUIPPED, AN AUXILIARY BOX



THIS EQUIPMENT IS SUPPLIED WITH ANTI-CONDENSATION HEATERS. HEATERS SHOULD BE ENERGIZED WHEN EQUIPMENT IS NOT OPERATING TO PROTECT UNIT BY PREVENTING INTERNAL CONDENSATION. CONNECT THE "H" OR HEATER LEADS TO	
115V VOLTS	**700W** WATTS RATING

SPACE HEATER NAMEPLATE (ON MOTOR)

SILICONE RUBBER SPACE HEATERS

Electric motors frequently have space heaters installed to prevent moisture condensation in the motor during times the motor is not running.

Many motor manufacturers use metallic or ceramic cartridge heaters for this purpose. Because such heaters are small they must operate at a high surface watt density and consequently high temperature. The high temperature causes rapid heater failure, often within the first year.

To combat this high failure rate, many smart users specify that space heaters are to be operated at one-half their rated voltage. This lowers the surface watt density to one-fourth the value with rated voltage, and increases the heater life more than proportionally.

U. S. Electrical Motors has another, better, solution to heater failure rate - the use of silicone rubber space heaters. The heaters are manufactured by sandwiching a resistance wire network between two pieces of high-temperature silicone rubber and bonding the silicone rubber pieces together. The silicone rubber heaters are designed for low surface watt density by providing a large surface area (a heater measuring 45" X 2.5" is rated at 169 watts, or 1.5 watts per square inch). The life of these heaters typically exceeds the life of the motor.

Silicone rubber heaters enjoy another advantage over metallic or ceramic heaters. Because they are applied directly to the winding end turns, it is usually possible to achieve the required condensation prevention with a lower power consumption.

These silicone rubber heaters are used, when specified, on all U. S. Electrical Motors motors. It is not necessary for the user to specify operation at one-half rated voltage to get the long heater life that is desired.

* Space heaters must be operated at +/- 10% rated voltage to be effective.

DR# 587-9358
H.E. Barr
1/8/81
*Revision: 3/11/03
Mike Cullen

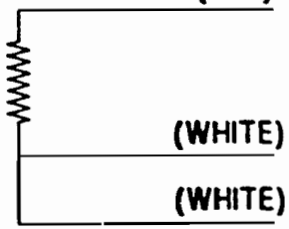
ALT.		
A	338312	A

BEARING RTD'S

1. THERE ARE QTY-1 OR 2 (3 LEAD) BEARING RTD'S INSTALLED, ONE PER BEARING.

   A = UPPER/ODE (OPPOSITE DRIVE END)
   B = LOWER/DE (DRIVE END)

BEARING RTD'S



	UPPER/ODE	LOWER/DE
(RED)	A1	B1
(WHITE)	A2	B2
(WHITE)	A2	B2

ACCESSORY LISTING

QTY 1 OR 2 BEARING RTD'S (3 LEAD)

ALT LET	CHANGE NOTICE NO.	DESCRIPTION OF CHANGE
-	MOD	12-APR-00
A	MOD	11-JUL-00

U.S. ELECTRICAL MOTORS
DIVISION OF EMERSON ELECTRIC CO.
ST. LOUIS, MISSOURI

TITLE: CUSTOMER CONNECTION DIAGRAM

SCALE: NONE	UNITS: IN	DRWN 12-APR-00, RAW RVSD 11-JUL-00, RWK APPD 11-JUL-00, REP	PART# --- FRAME ---
MATERIAL: ---			CSTG# --- TYPE ---
SHEET 1 OF 1	PREFIX CDG		ALT. A 338312 A

PMC/BETA How To Select

Compact-Size Transmitter

162VTC - A - B C D - E F

A - Full Scale

1	2	1	= 1.0 ips (25.4 mm/s), pk
1	2	3	= 2.0 ips (50.8 mm/s), pk
1	2	6	= 0.8 ips (20.3 mm/s), pk
1	3	4	= 1.97 ips (50.0 mm/s), pk
2	0	0	= 1.60 ips (40.6 mm/s), pk
2	0	1	= .32 ips (8.0 mm/s), pk
2	0	2	= .64 ips (16 mm/s), pk
2	0	3	= 1.26 ips (32.0 mm/s), pk
2	0	4	= 2.52 ips (64.0 mm/s), pk
2	0	5	= 3.2 ips (81.3 mm/s), pk
2	0	6	= 0.4 ips (10.2 mm/s), pk

B - Mounting

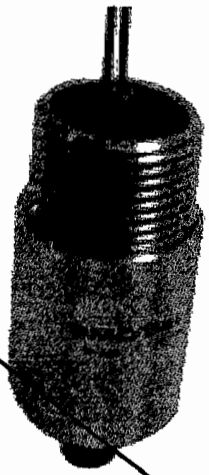
0	= Integral 1/4" NPT
1	= Integral 1/2" NPT
2	= 3/8 - 24 UNF X 1/2"
3	= 1/2 - 20 UNF X 1/2"
4	= M8X 1 - 12
5	= M10X 1.25 - 12

C - Hazardous Area Rating

1	= Non-hazardous & CSA/NRTL/C (for all connections) Class 1, Div 2, Grps A-D
2	= Class 1, Div 1, Grps B-D & Class 2, Div 1, Grps E-G (only avail. w/flying leads config)

E - HP Filter

0	= No filter (2Hz)
1	= 5 Hz
2	= 10 Hz
3	= 20 Hz
4	= 50 Hz
5	= 100 Hz
6	= 200 Hz



D - Connection

0	= 4-20 mA; Flying leads (C = 1 or 2)
1	= 4-20 mA & Dynamic Signal; Flying leads (C = 1 or 2)
2	= 4-20 mA; 2-pin terminal block (C = 1)
3	= 4-20 mA & Dynamic Signal; 4-pin terminal block (C = 1)
4	= 4-20 mA; 2-pin MS connector (C = 1)

F - LP Filter

0	= No filter (1500 Hz)
1	= 500 Hz
2	= 1000 Hz
3	= 2000 Hz

Slim-body Transmitter

162VTS - A - B C D - E F

162VTS - 2 0 6 - 2 4 5 - 0 0

A - Full Scale

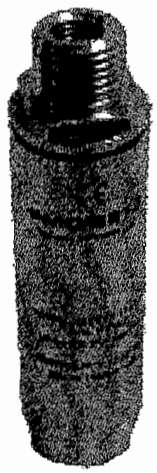
1	2	1	= 1.0 ips (25.4 mm/s), pk
1	2	3	= 2.0 ips (50.8 mm/s), pk
1	2	6	= 0.8 ips (20.3 mm/s), pk
1	3	4	= 1.97 ips (50.0 mm/s), pk
2	0	0	= 1.60 ips (40.6 mm/s), pk
2	0	1	= .32 ips (8.0 mm/s), pk
2	0	2	= .64 ips (16 mm/s), pk
2	0	3	= 1.26 ips (32.0 mm/s), pk
2	0	4	= 2.52 ips (64.0 mm/s), pk
2	0	5	= 3.2 ips (81.3 mm/s), pk
2	0	6	= 0.4 ips (10.2 mm/s), pk

B - Mounting

0	= Integral 1/4" NPT
1	= Integral 1/2" NPT
2	= 3/8 - 24 UNF X 1/2"
3	= 1/2 - 20 UNF X 1/2"
4	= M8X 1 - 12
5	= M10X 1.25 - 12
6	= 1/2" NPT + 1/4-20 tapped hole
7	= 1/2" NPT + 1/4-28 tapped hole
8	= 1/4"-20 UNC Stud

C - Hazardous Area Rating

3	= None
4	= Class 1, Div 1, Grps B-D and Class 2, Div 1, Grps C-G. Available on the 1/2" NPT Top only.



E - HP Filter

0	= No filter (2Hz)
1	= 5 Hz
2	= 10 Hz
3	= 20 Hz
4	= 50 Hz
5	= 100 Hz
6	= 200 Hz

F - LP Filter

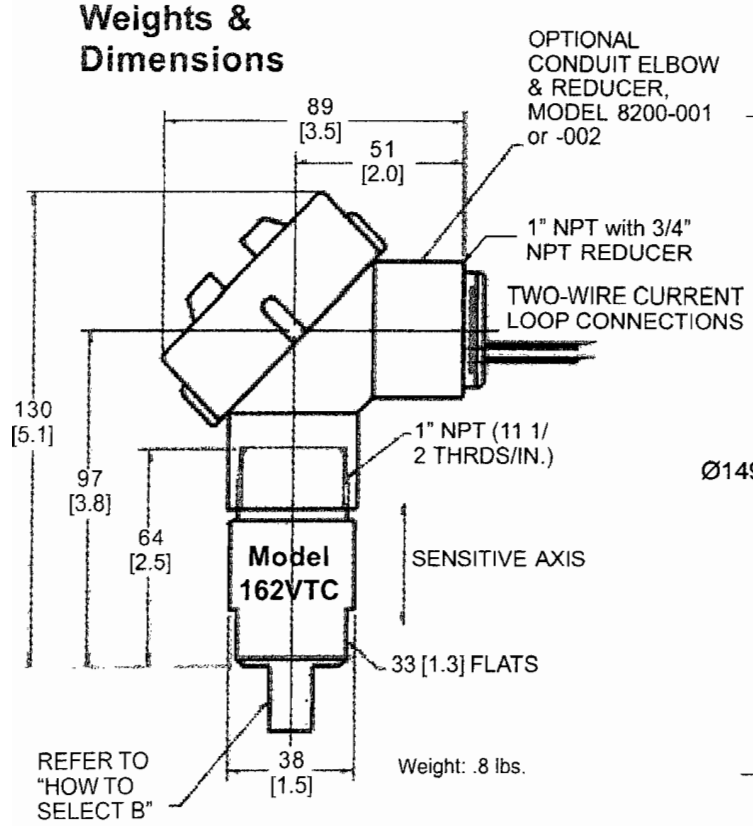
0	= No filter (1500 Hz)
1	= 500 Hz
2	= 1000 Hz
3	= 2000 Hz

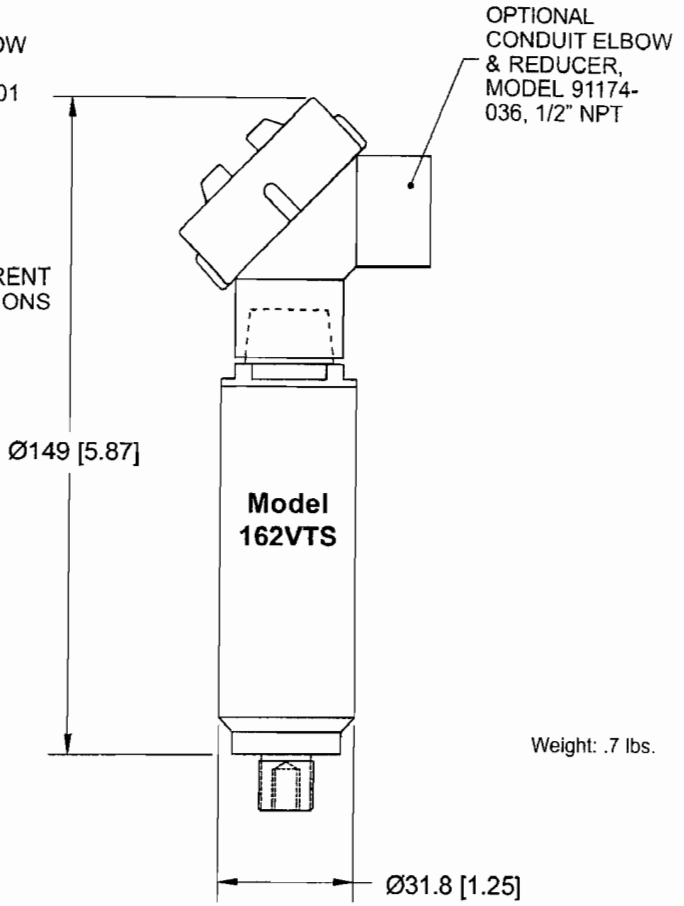
D - Connection

5	= 4-20 mA; 1/2" NPT top
6	= 4-20 mA; 3 pin MS connector (C = 3)
7	= 4-20 mA; cable gland (C = 3)
8	= 4-20 mA; cable gland w/ 20' red cable

PMC/BETA Model 162 VT Series

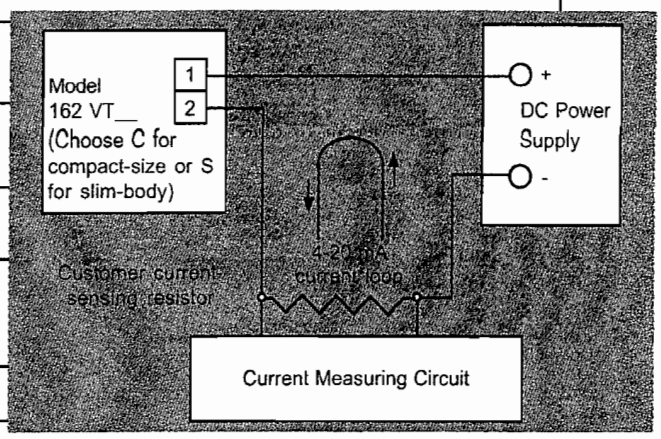
Weights & Dimensions





Specifications

Vibration Range:	4 to 20 mA output proportional to velocity. Refer to "How to Select A" for ranges. Nonstandard ranges available.
Dynamic Signal:	Acceleration, 100 mV/g. The dynamic signal has the same frequency range as in "How to Select E/F". 6 dB / oct high pass and 12 dB / oct low pass response.
Frequency Response:	Standard: 2 - 1500 Hz, available up to 2000 Hz Refer to "How to Select E/F". 12 dB / oct high pass and low pass filters are used.
Axis Orientation:	Any
Supply Voltage (Vs):	11 to 30 VDC, Non-polarity sensitive, IPT™
Isolation:	500Vrms, circuit to case
Electrical Connection:	Flying leads w/18 AWG wire 457 mm (24 in.) long, terminals (accepts up to 16 AWG wire) or MIL style 2-pin connector
Maximum Load Resistance (R_L):	R_L = 50 x (Vsupply-11) ohms
Service Temp. Rating:	-40° to 100°C
Enclosure Materials:	303 SS
Enclosure Environmental Rating:	NEMA 4X, IP 65, IP 67 for 2 pin style connector
Approvals:	Refer to "How to Select C".



Accessories for 162 VTC and VTS

7084-001, Stainless Steel Flange Mount Adaptor
Provides a means to surface mount transmitters rather than NPT stud (½": NPT center hole). Three equally spaced 6.6 mm (0.26') diameter mounting holes on 38 mm (1.50") diameter circle.

7084-002, Flange Mount Adaptor
Same as 7084-001, except center hole is ¼" NPT. Material: SS

8253-002, Bushing
Bushing for ½" NPT mount when screwed onto standard ¼" NPT base. Material: stainless steel.

8169-75-002-XXX, Two-wire, Cable Assembly
2 conductor (20 AWG) twisted, shielded PVC jacketed cable, with plated steel grip for cable strain relief, male ¾" NPT end. Specify -XXX for length in feet. Example: 8169-75-002-010 =10 ft (3.1M). Material: zinc plated steel.

Accessories for 162 VTC Series

8200-001, Conduit Elbow & Reducer
Provides access and physical protection for field wiring. Suitable for Class I, Div. 1 (Grps C & D) and Class II, Div. 1 (Grps E, F & G), hazardous areas. 1" to ¾" NPT reducer for customer connection included. NEMA 4 IP 65. Material: copper free aluminum.

8200-002, Conduit Elbow & Reducer
Conduit Elbow with terminal block

8200-005, Stainless Steel Conduit Elbow & Reducer
Provides access and physical protection for field wiring. ½" NPT suitable for Class I, Div. 1 (Grps B, C & D)*, Class II, Div. 1 (Grps E, F & G)*. Material: stainless steel

8200-006, Conduit Elbow & Reducer
Stainless Steel Conduit Elbow with terminal block

8201-001, Conduit Union
Fits between transmitter and 8200-001 conduit elbow to facilitate installation and wiring where there is not enough room to rotate the elbow. Suitable for Class I, Div. 1 (Grps A, B, C & D) and Class II, Div. 1 (Grps E, F & G), hazardous areas. Material: zinc plated steel.

Accessories for 162 VTS Series

91174-036, Conduit Elbow & Reducer
Provides access and physical protection for field wiring. Suitable for Class I, Div. 1 (Grps C & D) and Class II, Div. 1 (Grps E, F & G), hazardous areas. 1/2" to 1/2" NPT reducer for customer connection included. NEMA 4 IP 65. Material: copper free aluminum.

8200-004, Conduit Elbow
Conduit Elbow with terminal block, 1/2" to 1/2" NPT female.

Accessories for VTC 2 Pin MS Style Connector

8978-111-XXXX, Splashproof Cable Assembly
Two (2) pin socket connector with integral, molded splash proof boot with 6.4 mm (0.25") diameter polyurethane jacketed cable with twisted shielded pair wires. xxx.x = Cable length in meters.

9334-111-YYYY-XXXX, Splashproof Cable Assembly w/SS Armor
Two (2) pin socket connector with integral, molded splash proof boot with 7.1 mm (0.28") diameter, SST armored jacket with cable, twisted shielded pair wires. xxx.x = Cable length in meters. yyy.y = Armor length in meters.

8978-211-XXXX, Cable Assembly
Two (2) pin socket connector with cable strain relief with 6.4 mm (0.25") diameter polyurethane jacketed cable with twisted shielded pair wires. xxx.x = Cable length in meters.

Note: All 8978 connector/cable assemblies rated to 121°C (250°F) max.

9334-211-XXXX-YYYY, Cable Assembly, w/SS Armor
Two (2) pin socket connector with 7.1 mm (0.28") diameter, SS armored jacket with cable, twisted shielded pair wires. xxx.x = Cable length in meters. yyy.y = Armor length in meters.

8978-200-0000, Connector Assembly
Two (2) pin socket connector with cable strain relief, no cable.

Supporting Accessories for MS Style Connector

93818-004, Cable Grip Strain Relief Fitting
3/4" NPT male thread to cable grip. Diameter range: .156" to .25". Complete with sealing ring and locknut. Hot dip / mechanically galvanized finish. Suitable for NEMA 4 enclosures.

93818-018, Armored Cable Grip Strain Relief Fitting
3/4" NPT male thread to cable grip. Armor diameter range: .40" to .50". Complete with sealing ring and locknut. Hot dip / mechanically galvanized finish. Suitable for NEMA 4 enclosures.

8841-058, 1" to 1/2" Reducer Retrofit adapter

1711 Townhurst Dr. • Houston, TX 77043 • Tel: 713-461-2131 • Toll Free (US): 800-638-7494 • Fax: 713-461-8223
www.pmcbeta.com • www.metrix1.com

SECTION III

MagnaDrive
CORPORATION

600 108TH AVE NE, SUITE 1014
BELLEVUE, WA 98004

CUSTOMER: **FLOWSERVE**
5310 TANEYTOWN PIKE
TANEYTOWN, MD 21787

AGNADRIVE SPECIFICATION SHEET: J14210001 Rev: D
PRODUCT DESCRIPTION: HORIZONTAL WATER COOLED ADJUSTABLE SPEED DRIVE (ASD)

DISTRIBUTOR: POWER & MINE SUPPLY CO.
MAGNADRIVE JOB NO.: 1421

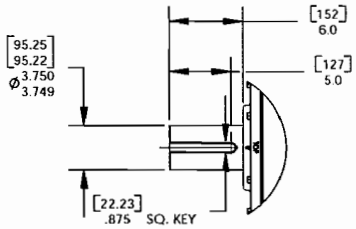
MODEL NUMBER:	WH-2500	**ESTIMATED WEIGHT:**	2400 KG
OUTLINE DRAWING:	J14210002	**AMBIENT TEMP RANGE:**	0-50°C
IOM MANUAL:	D0165	**SLIP HEAT CAPACITY:**	110 kW
ACTUATOR:	ROTORK	**COOLANT FLOW:**	38-57 LPM
ACTUATOR VOLTAGE:	575V/3PH/60HZ	**MAX INLET COOLANT TEMP:**	27°C
ACTUATOR MODEL:	Rotork IQM35FA16Z	**CONDUCTOR MATERIAL:**	COPPER
SYSTEM RATED kW:	300	**OIL TYPE:**	Royal Purple
INSTALLED MOTOR kW:	335		Synfilm GT150
FULL LOAD MOTOR RPM:	393	**APPROX OIL CAPACITY:**	11.3 L
EST. SLIP (AT RATED kW):	24	**HIGH THRUST BEARING ALARM:**	90°C
EST. EFF. (AT RATED kW):	94.0%	**HIGH COOLANT OUTLET ALARM:**	74°C
		INPUT SHAFT TORSIONAL STIFFNESS:	222E-9 Rad/Nm
		CONDUCTOR ROTOR Wr^2	552 Nm
		OUTPUT SHAFT TORSIONAL STIFFNESS:	454E-9 Rad/Nm
		MAGNET ROTOR WR^2	436 Nm

ADDITIONAL NOTES:

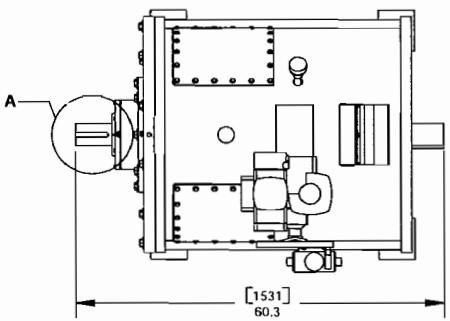
ACTUATOR SUPPLIED BY POWER & MINE SUPPLY CO

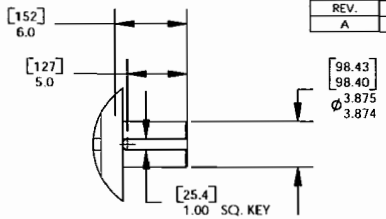
BEARING RTD PROBE SUPPLIED BY POWER & MINE SUPPLY CO

REVISIONS					
REV.	DESCRIPTION	DATE	DRAWN	DATE	APPROVED
A	INITIAL RELEASE 2495	05-05-05	TBB		

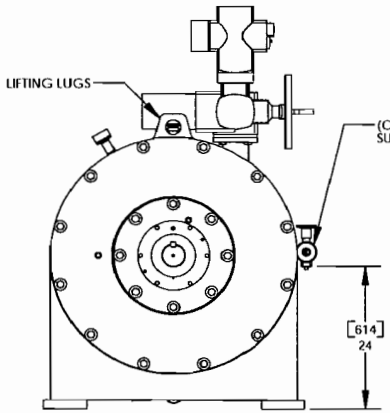


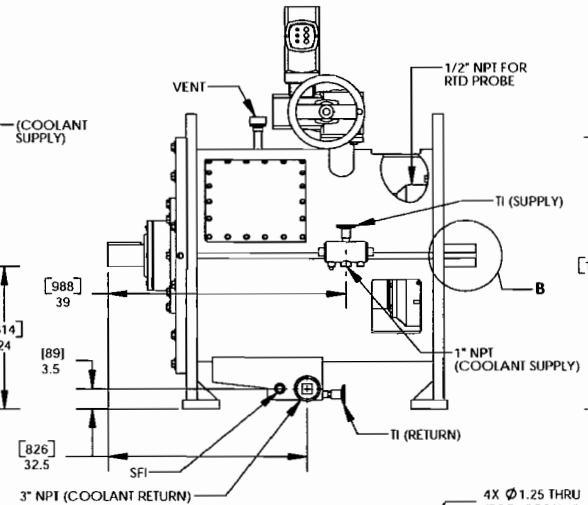
DETAIL A
INPUT SHAFT
SCALE 1:10

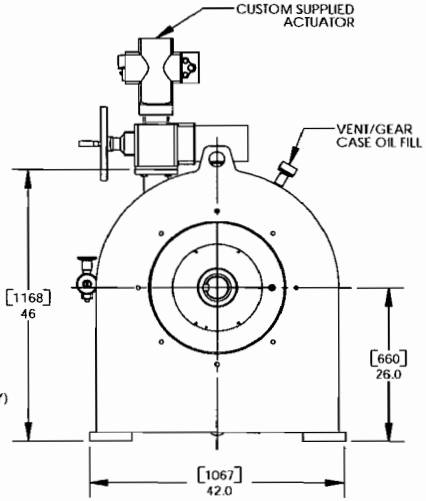


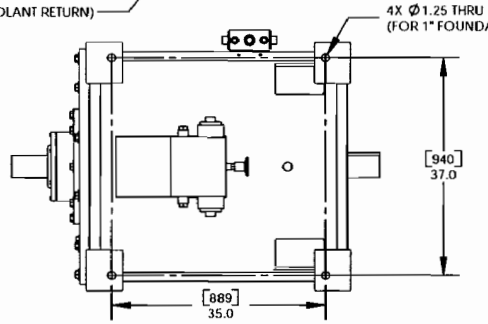


DETAIL B
OUTPUT SHAFT
SCALE 1:10



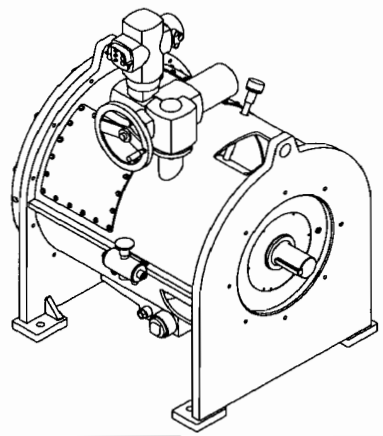






NOTES: UNLESS OTHERWISE SPECIFIED ON JOB SPECIFICATION SHEET.

1. REFER TO JOB SPECIFICATION SHEET FOR OPTIONAL ITEMS AND JOB SPECIFIC FEATURES.
2. RATED PERFORMANCE: 400 HP AT 400 RPM
3. MAGNADRIVE CORP. COOLING WATER PIPING/TUBING NOT SHOWN, MATERIAL: 304/316 SST
4. SFI: SIGHT FLOW INDICATOR (VIEW GAGE)
5. TI: THERMOMETER - ASHCROFT OR EQUAL
   SUPPLY: 0-200 °F RANGE
   RETURN: 50-300 °F RANGE
6. COOLING WATER REQUIREMENTS (BY OTHERS)
   SUPPLY: 15 GPM @ 50-70 PSIG
   QUALITY: CLEAN, POTABLE WATER
   - INLET WATER TEMP: 90 °F (32 °C) MAX
   - OUTLET WATER TEMP: 165 °F (74 °F) MAX
   DISCHARGE WATER RETURN AT ATMOSPHERIC PRESSURE MUST BE REJECTED AT SITE
   - RETURN PIPING MUST SLOPE 1/2" PER FOOT
   - INTERCONNECTING PIPING BY OTHERS
7. LUBRICATION REQUIREMENTS
   - INPUT SHAFT ASSEMBLY = GREASE LUBE
   - OUTPUT SHAFT ASSEMBLY = OIL LUBE
   - APPROXIMATELY: 2.0 U.S. GALLONS OIL CAPACITY
   - UNIT SHIPPED DRY. CUSTOMER TO FILL OIL
8. INERTIAL MASS DATA:
   -CONDUCTOR ROTOR (INPUT SHAFT) = 79,400 LB.IN^2
   -MAGNET ROTOR (OUTPUT SHAFT) = 62,700 LB.IN^2
9. TORSIONAL STIFFNESS DATA:
   -INPUT SHAFT = 39.3 X 10^-9 RAD/IN.LB
   -OUTPUT SHAFT = 80.3 X 10^-9 RAD/IN.LB



P/N M00002812-01 SHOWN

CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
DECIMALS: XXX ± .005, XX ± .010, X ± .030
ANGLES: X ± 5°

MATERIAL: -
FINISH:

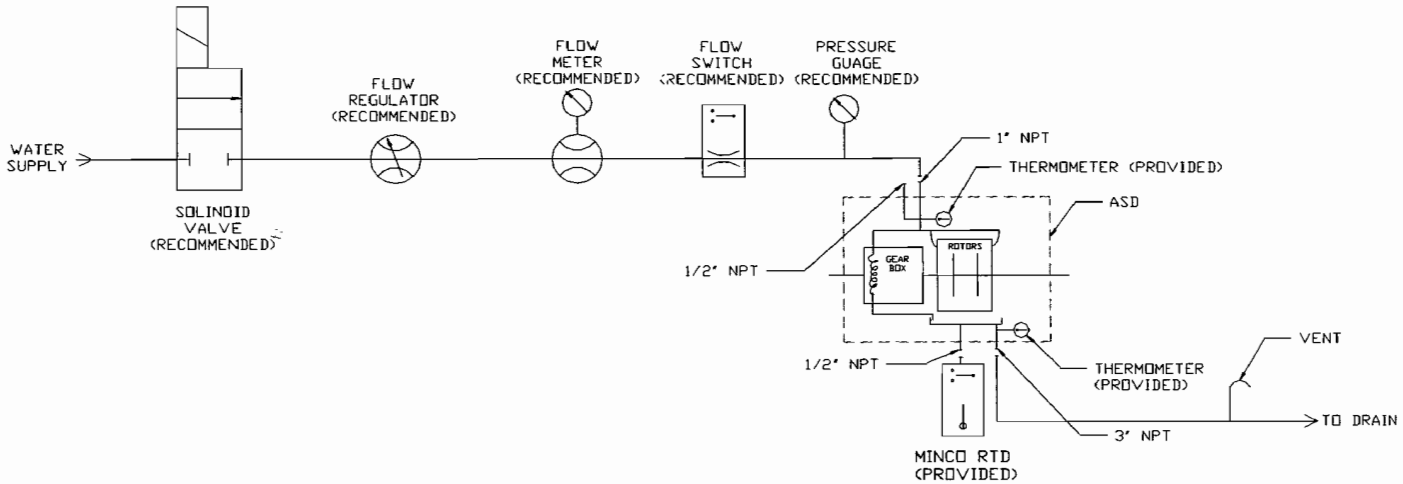
THIRD ANGLE PROJECTION

DRAWN	MSL	09-01-05
CHECKED		
ENG	GSH	09-01-05
OTHER		

MagnaDrive CORPORATION
600 108th Ave NE 1014
Bellevue, WA 98004

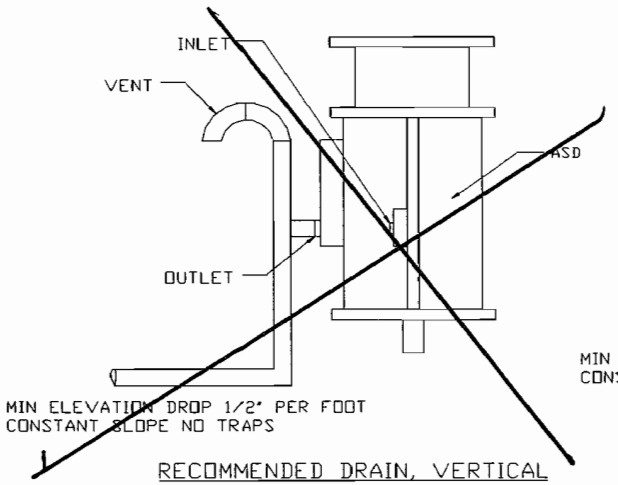
TITLE: OUTLINE, WH-2500
DWG. NO: J14210002
REV: A
SIZE: B
MODEL: ASD, W-C, WH-2500
EST WEIGHT: 5286 LB
SCALE: 1:20
CAD FILE: J14210002
SHEET 1 OF 1

REVISIONS					
REV	DESCRIPTION	DATE	DRAWN	DATE	APPROVED
A	DCO 2728	11-14-06	MSL		

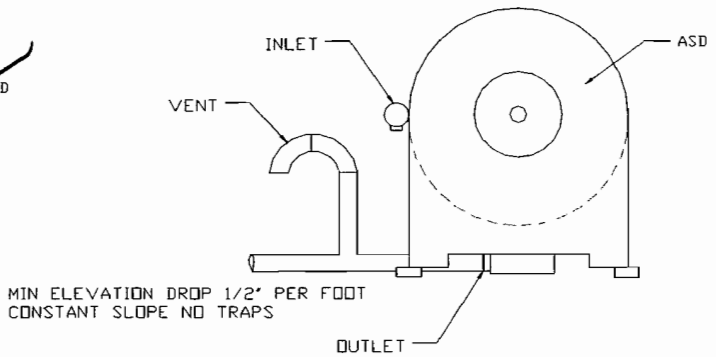


NOTES:

1. SEE WATER-COOLED ASD MANUAL FOR START-UP/SHUT DOWN-LOGIC EXAMPLE.
2. SEE JOB SPECIFICATION SHEET FOR COOLANT FLOW REQUIREMENTS.



RECOMMENDED DRAIN, VERTICAL



RECOMMENDED DRAIN, HORIZONTAL

CAD GENERATED DRAWING, DO NOT MANUALLY UPDATE. DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE
DECIMALS: XXX ± .005, XX ± .010, X ± .030
ANGLES: X ± .5°

MATERIAL: N/A
FINISH: N/A

THIRD ANGLE PROJECTION

DRAWN: MSL 11-14-06
CHECKED:
ENG: LAH 11-14-06
OTHER:

MagnaDrive CORPORATION
www.magnadrive.com
BELLEVUE, WA, USA

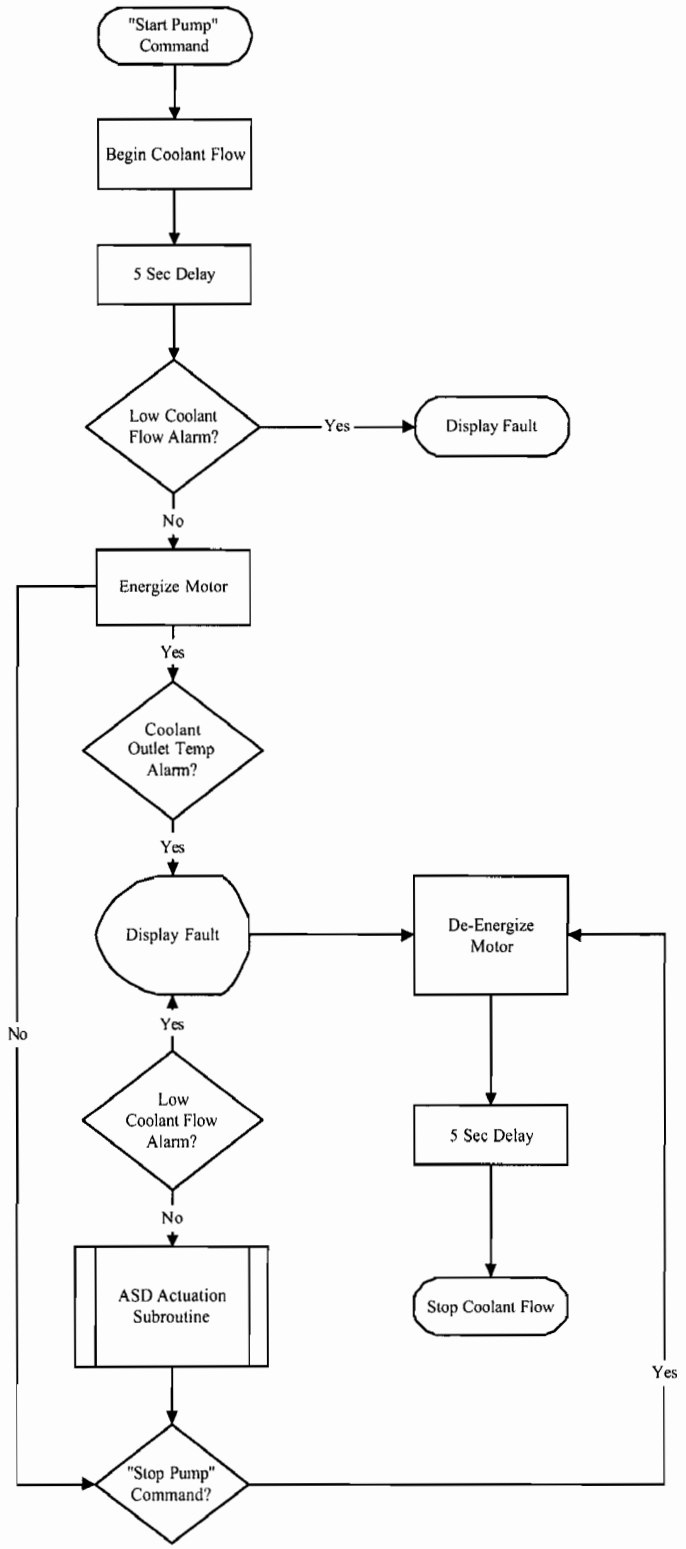
TITLE: SCHEMATIC, WATER PIPING, TYPICAL, W-C

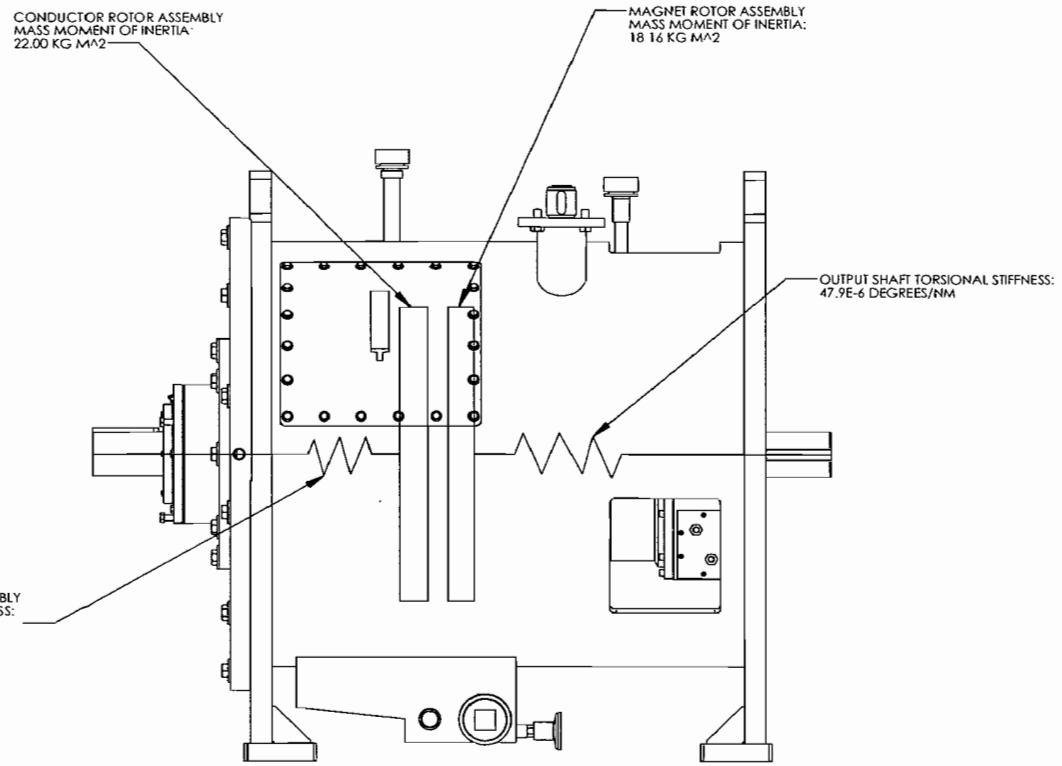
DWG NO: M00003166 REV: A

SIZE: B MODEL: W-2500/W-1000 EST WEIGHT: N/A LB

SCALE: N/A CAD FILE: M00003166 SHEET: 1 OF

Appendix D – Sample Start-Up/Shut-Down Logic





PHYSICAL PROPERTIES:

ESTIMATED WEIGHT OF
TOP ASSEMBLY:
5000 LB (2270 KG)

ESTIMATED WEIGHT OF
ASD, TOTAL:
1100 LB (500 KG)

CONDUCTOR ASSEMBLY.
500 LB (225 KG)
MAGNET ROTOR ASSEMBLY
600 LB (275 KG)

P/N J14210050-01 SHOWN

CAD GENERATED DRAWING.
DO NOT MANUALLY UPDATE.
DO NOT SCALE DRAWING

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES ARE
DECIMALS ANGLES
XXX ± .005 X ± .5°
XX ± .010
X ± .030

MATERIAL -

FINISH -

THIRD ANGLE PROJECTION

DRAWN	TBB	1/3/07
CHECKED		
ENG	TBB	1/3/07
OTHER		

MagnaDrive CORPORATION
www.magnadrive.com
BELLEVUE, WA, USA

TITLE: OUTLINE, WH-2500

DWG NO: J14210002 REV: D

SIZE: B MODEL: ASD, W-C, WH-2500 EST WEIGHT: 5008 LB

SCALE: 1:20 CAD FILE: J14210002 SHEET 2 OF 2

WHEN ORDERING SPECIFY ESSENTIAL INFORMATION.

AS5004PA67Z2C ← EXAMPLE OF MODEL NUMBER

AS5004 SPECIFICATIONS DRAWING NUMBER.

PA SENSING ELEMENT: (PA = .00392 PLATINUM).
SEE TABLE BELOW.

CODE	ELEMENT	RESISTANCE	Ω/Ω/°C
PA	PLATINUM	100.0Ω ±.5% @0°C	.00392
PD (10)	PLATINUM	100.0Ω ±.1% @0°C	.00385
PE	PLATINUM	100.0Ω ±.5% @0°C	.00385
CA	COPPER	10.0Ω ±.2% @25°C	.00427
NA	NICKEL	120.0Ω ±.5% @0°C	.00672

30 INSERTION DEPTH D IN .1" INCREMENTS (67 = 6.7").
MINIMUM D = 10 (1.0") [25]; (12)
MAXIMUM D = 444 (44.4") [1128].

Z NUMBER OF LEADS:
Y = 2 LEADS (EXCEPT CA ELEMENT MODELS);
Z = 3 LEADS;
X = 4 LEADS (PD ELEMENT MODELS ONLY).

1 CONDUIT THREAD:
1 = 1/2 - 14 NPT; (11)
2 = 3/4 - 14 NPT.

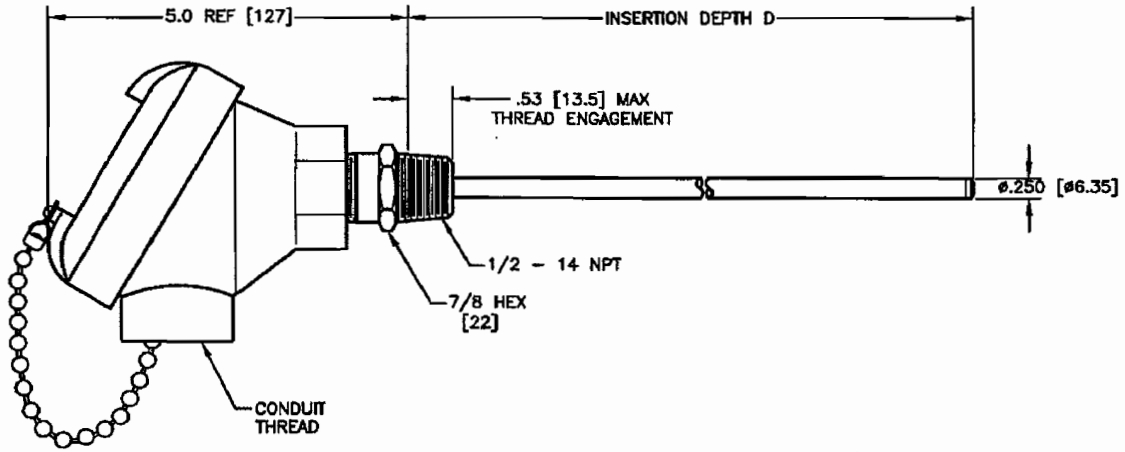
A CONNECTION HEAD:
A = ALUMINUM;
C = CAST IRON;
S = STAINLESS STEEL.

TO ORDER STANDARD ASSEMBLY, STOP HERE. TO ORDER WITH TRANSMITTER (*PLATINUM ELEMENT WITH 2-LEADS OR 3-LEADS REQUIRED*), ADD THE FOLLOWING INFORMATION:

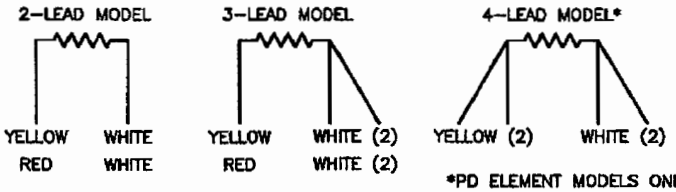
176 TEMPTRAN MODEL:

MINIATURE (2-LEADS REQUIRED):
211 = TT211 (NOMINAL CALIBRATION);
711 = TT711 (INDIVIDUAL CALIBRATION).
STANDARD (3-LEADS REQUIRED):
176 = TT176 (NOMINAL CALIBRATION);
676 = TT676 (INDIVIDUAL CALIBRATION).

A TEMPERATURE RANGE CODE:
A = 20 TO 120°F (-6.7 TO 48.9°C).
SEE CATALOG FOR COMPLETE LIST OF AVAILABLE TEMPERATURE CODES.



SCHEMATIC DIAGRAMS



*PD ELEMENT MODELS ONLY

1. ELEMENT: SEE TABLE ABOVE FOR ELEMENT OPTIONS.
2. RESISTANCE: SEE TABLE ABOVE FOR RESISTANCE OPTIONS.
3. RESISTANCE-TEMPERATURE COEFFICIENT: SEE SENSING ELEMENT IN TABLE ABOVE (NOMINAL FROM 0°C TO 100°C).
4. TEMPERATURE LIMITS:
   PROBE: -50°C TO 260°C (-58°F TO 500°F);
   TERMINAL BLOCK FOR ALUMINUM AND STAINLESS STEEL CONNECTION HEADS: -50°C TO 121°C (-58°F TO 250°F).
5. INSULATION RESISTANCE: 1000 MEGOHMS MINIMUM AT 500 VOLTS DC, LEADS TO CASE.
6. LEADS: AWG #22, STRANDED, TFE INSULATED. LEAD LENGTH = 4.0 [102] REF INSIDE CONNECTION HEAD.
7. PROBE CASE: STAINLESS STEEL, COPPER ALLOY TIP.
8. CONNECTIONS (MODELS WITHOUT TEMPTRAN): TERMINAL BOARD FOR WIRES TO AWG #14 [2.08].
9. SEE MINCO FORM #911217 FOR ASSEMBLY INSTALLATION INSTRUCTIONS.

(10) THE PD ELEMENT RESISTANCE THERMOMETER WILL MEET THE RESISTANCE-TEMPERATURE RELATIONSHIP AND TOLERANCES SPECIFIED IN EN 60751 (IEC 751), CLASS B.

(11) THE 1/2 - 14 NPT PIPE THREAD ON THE CONDUIT OPENING ON THE STAINLESS STEEL HEAD USES A STAINLESS STEEL REDUCER BUSHING.

(12) FOR OPTIMAL PERFORMANCE, SUGGESTED MINIMUM INSERTION DEPTH D IS 17 (1.7") [43].

REVISIONS

REV	DESCRIPTION	DATE	ECO	DR	APPD
A	ADDED NUMBER OF LEADS REQUIRED TO TEMPTRAN MODELS	02-17-04	41602	WAB	DLW
B	5.0 REF WAS 5.0 MAX	03-15-05	42919	WAB	DLW

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES IN INCHES DIMENSIONS IN [ ] ARE IN MILLIMETERS
ONE PLACE (.0) ±.020 [±0,51]
TWO PLACE (.00) ±.010 [±0,25]
THREE PLACE (.000) ±.005 [±0,13]
ANGLES:

MATERIAL:

FINISH:

	INITIALS	DATE
DR	WAB	05-27-03
CHK	DES	08-21-03
APP		
ENGR	DLW	08-21-03
QA		
PRD		
NEXT ASSY		CATEGORY 5—
USED ON		INIT. JOB

ITEM	REQD	PART/STOCK NO	MATERIAL DESCRIPTION

TITLE:
RESISTANCE THERMOMETER ASSEMBLY
TIP-SENSITIVE, SPRING-LOADED
SINGLE ELEMENT RTD, AS5004 SERIES

CGP Transferred 3/17/05 LRS

STOCK NO | SCALE NONE | DWG SIZE B

MINCO
www.minco.com

AS5004 REV B

CAGE IDENT. 09359 | SHEET 1 OF 1

Print Date: 10/12/2005 13:06

rotork

Rotork Controls (Canada) Ltd.
2850 Argentia Road, Unit #4
Mississauga, Ontario, Canada, L5N 8G4
Telephone (905-363-0313) Facsimile (905-363-0320) http://www.rotork.com

Customer: Power and Mine	**Customer P.O. Number: PO71090**	**Engineer:**
Contract Number:	**Project Name: City of Winnepeg, Raw Water Pumps**	

ROTORK ITEM (S):	D127790101					
Valve Type	Magna Drive					
Valve Size	N/A					
Actuator Type and Size	IQM35Z					
Mounting Base Type	FA16Z					
Enclosure Type	WTC					
Unit Thrust # / Torque (Ft.Lb)	230					
Control Voltage	24 VDC					
Handwheel Diameter (in/mm)	30.93"/786mm					
Handwheel Sga ratio	N/A					
Gearbox Type	N/A					
Gearbox Ratio	N/A					
Seating Type	N/A					
Seating Stroke Time (Sec.)	N/A					
Outline Drawing	B-923323-01					
Wiring Diagram	5010-100					
Voltage/Phase/Frequency (Ac)	575/3/60					
Output RPM	57					
Locked Rotor Current (A)	14.50					
Rated Torque Current (A)	5.40					
Horse Power / Kilowatts	3.10 / 2.31					
Quantity	2					
Tag Number(s)	A					

Tagging and Information:

Full travel time on Magnadrive WH-2500 is 150 seconds

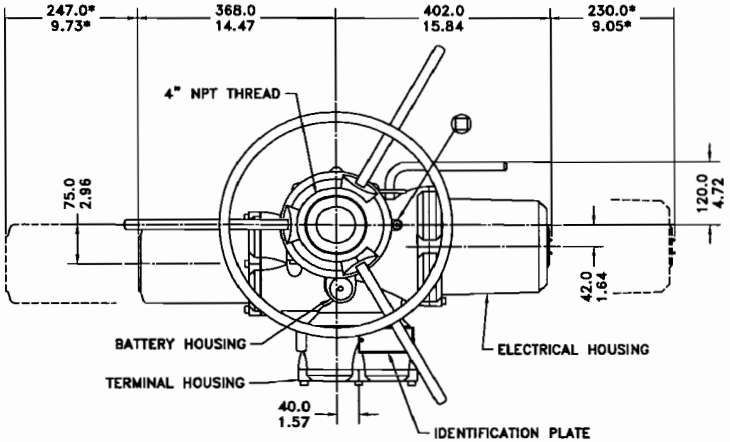
Name:	Signed:	Date:	Sheet:	Certification Sheet Drawing No.:	Rev:
Maria Kristaqi	*John Favaro*	October 31, 2006	1 of 1	D1277900	2

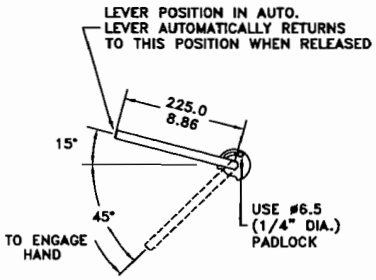
ROTORK Document No.: R3300
ROTORK Document Revision No.: 002

SCALE: 1:9

Notes:

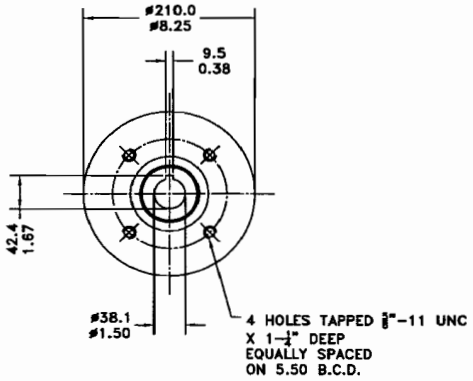
1) All dimensions are in mm/inches.
2) Dimensions indicated by * are service entry allowances.
3) ⊙ Actuator oil filler and drain plugs.
4) For project specific certified data, refer to certification sheet.
5) Actuator weight: 165lbs/75kg.

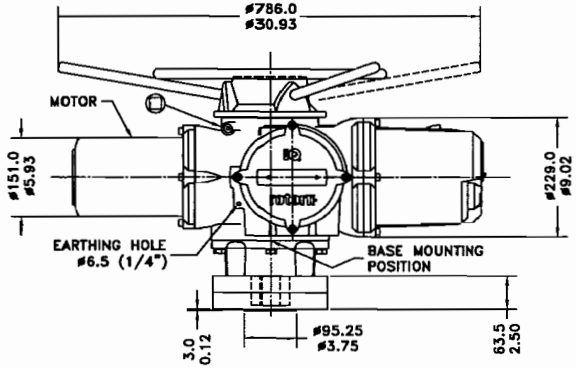


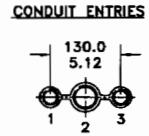


PADLOCKABLE HAND–AUTO LEVER

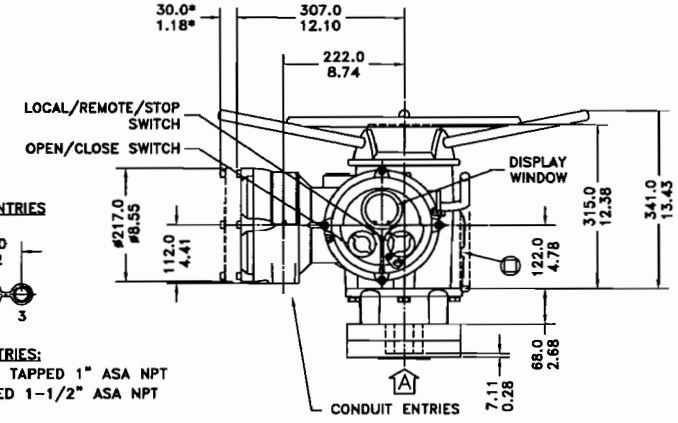
VIEW A
BOTTOM OF MOUNTING FLANGE
(ENLARGED FOR CLARITY)







CONDUIT ENTRIES:
NO.S 1 & 3 TAPPED 1" ASA NPT
NO. 2 TAPPED 1–1/2" ASA NPT



REV	DESCRIPTION	DATE	APVD
01	FIRST ISSUE	08/29/06	—

REVISION HISTORY

rotork

Rotork Controls (Canada) Ltd.
2850 Argentia Road, Unit #4
Mississauga, Ontario
Tel (905) 363-0313

Rotork Controls (Canada) Ltd.
#9, 820-28th St.
Calgary, Alberta
Tel (403) 589-9455

TITLE: Rotork Model IQM35FA16Z MKII Electric Actuator with FA14 Base

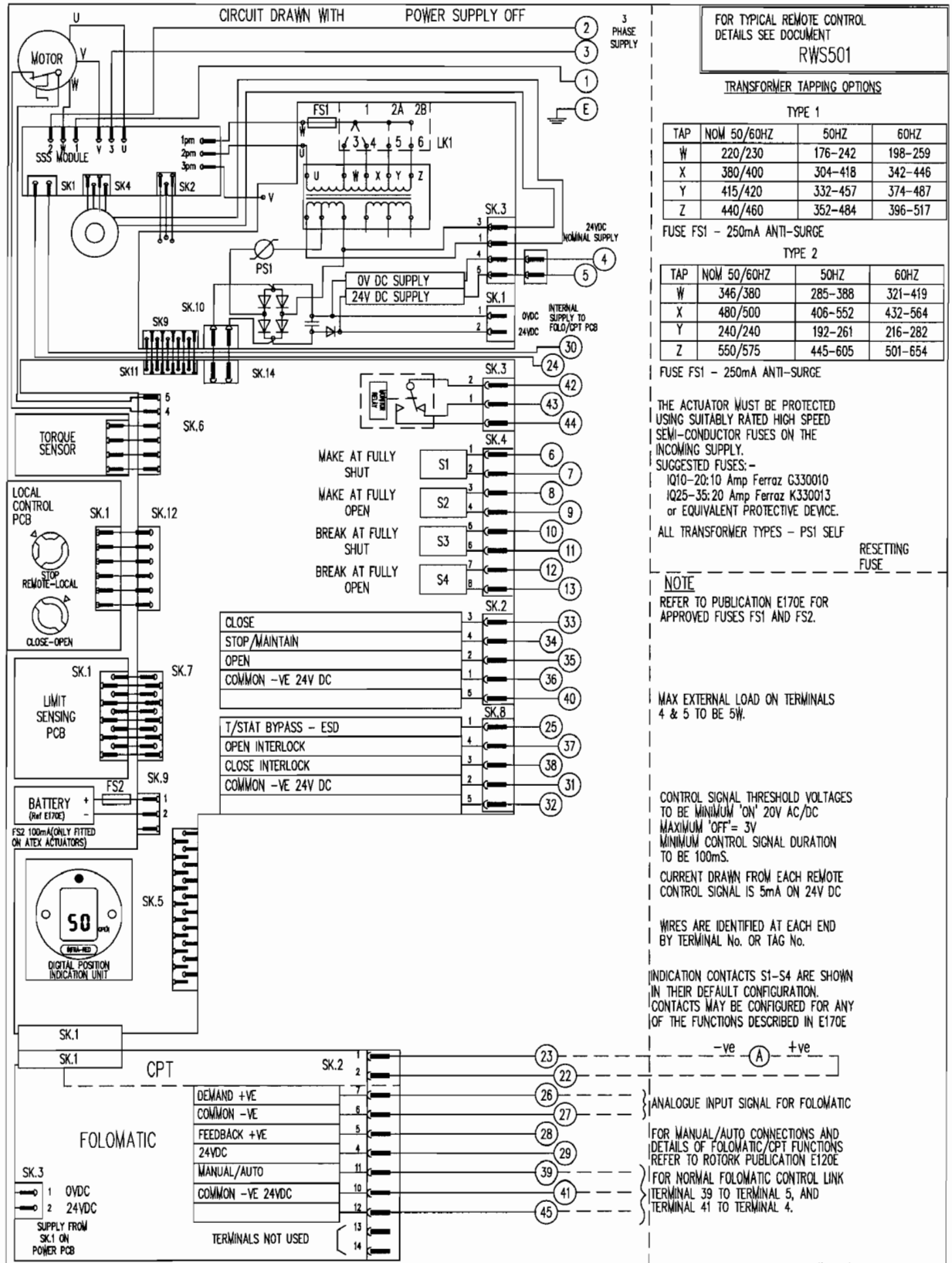
CERTIFIED

THIRD ANGLE PROJECTION

DRAWN: Andrea Swan DATE: 08/29/06

CHECKED: John Favaro DATE: 08/29/06

DWG. NO.: B-923323-01



FOR TYPICAL REMOTE CONTROL DETAILS SEE DOCUMENT
RWS501

TRANSFORMER TAPPING OPTIONS

TYPE 1

TAP	NOM 50/60HZ	50HZ	60HZ
W	220/230	176-242	198-259
X	380/400	304-418	342-446
Y	415/420	332-457	374-487
Z	440/460	352-484	396-517

FUSE FS1 - 250mA ANTI-SURGE

TYPE 2

TAP	NOM 50/60HZ	50HZ	60HZ
W	346/380	285-388	321-419
X	480/500	406-552	432-564
Y	240/240	192-261	216-282
Z	550/575	445-605	501-654

FUSE FS1 - 250mA ANTI-SURGE

THE ACTUATOR MUST BE PROTECTED USING SUITABLY RATED HIGH SPEED SEMI-CONDUCTOR FUSES ON THE INCOMING SUPPLY.
SUGGESTED FUSES:-
IQ10-20:10 Amp Ferraz G330010
IQ25-35:20 Amp Ferraz K330013
or EQUIVALENT PROTECTIVE DEVICE.

ALL TRANSFORMER TYPES - PS1 SELF RESETTING FUSE

NOTE
REFER TO PUBLICATION E170E FOR APPROVED FUSES FS1 AND FS2.

MAX EXTERNAL LOAD ON TERMINALS 4 & 5 TO BE 5W.

CONTROL SIGNAL THRESHOLD VOLTAGES TO BE MINIMUM 'ON' 20V AC/DC
MAXIMUM 'OFF'= 3V
MINIMUM CONTROL SIGNAL DURATION TO BE 100mS.
CURRENT DRAWN FROM EACH REMOTE CONTROL SIGNAL IS 5mA ON 24V DC

WIRES ARE IDENTIFIED AT EACH END BY TERMINAL No. OR TAG No.

INDICATION CONTACTS S1-S4 ARE SHOWN IN THEIR DEFAULT CONFIGURATION. CONTACTS MAY BE CONFIGURED FOR ANY OF THE FUNCTIONS DESCRIBED IN E170E

No	DATE	REVISION DETAILS
02	301004 ECI353	DIAGRAM RE-FORMATTED TO SEPERATE REMOTE CONTROL CIRCUITRY (See 'RWS' Ref)
03	260405	S2 text (OPEN) corrected

www.rotork.com

ROTORK CONTROLS LTD
BATH, BA1 3JQ
ENGLAND
Tel: 01225-733200

ROTORK CONTROLS INC
ROCHESTER
NY 14624, USA
Tel: 585-328-1550

CONFIG BY	PRE
DATE	111004
CHECKED	PJW
BASE WD	.
JOB No	--
M.I.No	.

IQM + FOLOMATIC + CPT

CIRCUIT DIAGRAM No -REV
5010-100-03
B1 C1 B2 C2

Notes:

January 31, 2007

1. All bearing RTD's are terminated in weather proof heads as shown on Minco drawing page AS5004.

2. Motor winding RTD's are terminated in an auxiliary terminal box mounted on the motor.

3. The pump speed transmitter enclosure is mounted on the pump base plate.

4. One PMC Beta transmitter is mounted directly on the motor enclosure and one PMC Beta transmitter is mounted directly on the pump outboard bearing housing.

5. Alarm and shutdown values:

    a. Motor bearing RTD's
        i. Alarm set point = 90°C
        ii. Shut down set point = 100°C

    b. Motor Winding RTD's
        i. Alarm set point = 160°C
        ii. Shut down set point = 165°C

    c. Motor Vibration Transmitter
        i. Alarm set point = .20 in/sec
        ii. Shut down set point = .50 in/sec

    d. MagnaDrive Bearing RTD's
        i. Alarm set point = 90°C
        ii. Shut down set point = 95°C

    e. Magna Drive Cooling Water Inlet and Outlet Temperature Alarm/Shutdown
        i. Alarm set point = 27°C Inlet, 74° Outlet
        ii. Shut down set point = 35°C Inlet, 85°C Outlet

    f. Pump Vibration Transmitter
        i. Alarm set point = .20 in/sec
        ii. Shut down set point = .50 in/sec

6. Instrument List

    <u>Pump</u>
    - Pump bearing temperature RTD's (one per bearing)
    - Pump speed sensor (reverse rotation detection included)

- Pump vibration transmitter (one located on outboard bearing)

6. Instrument List – continued

Motor

- motor winding temperature RTD's (two per phase)
- motor bearing temperature RTD's (one per bearing)
- vibration transmitter (one located on outboard bearing)

MagnaDrive

- output shaft bearing temperature RTD
- cooling water inlet thermometer (dial type)
- cooling water outlet thermometer (dial type)
- cooling water inlet temperature RTD
- Cooling water outlet temperature RTD