

Project No.: <u>79538 - C12</u>	-5	Date: <u>March 30, 2006</u>
Project Name: <u>Winnipeg Water Treatment Program</u>	Sent by: <u>Sandra Peters on behalf of Kristina Roberts</u>	

TO: <u>Power &amp; Mine Supply Co. Ltd.</u>	c.c. <u>UMA Engineering Ltd.</u>
<u>75 Meridian Drive, Unit 4,</u>	<u>1479 Buffalo Place</u>
<u>Winnipeg, Manitoba R2R 2V9</u>	<u>Winnipeg, Manitoba R3T 1L7</u>
ATTN: <u>Mr. Dan Shamlock</u>	<u>Mr. Bill Richert</u>

We are sending to you by:     BUS     MAIL     COURIER     HAND    WAY BILL NUMBER:

<input checked="" type="checkbox"/> REVIEWED AS NOTED	<input type="checkbox"/> FOR APPROVAL	<input type="checkbox"/> CONTRACT DOCUMENTS
<input type="checkbox"/> FOR YOUR ATTENTION	<input type="checkbox"/> FOR INFORMATION	<input checked="" type="checkbox"/> Shop Drawings
<input type="checkbox"/> AS REQUESTED	<input type="checkbox"/> FOR REVIEW	<input type="checkbox"/>

QUANTITY	IDENTIFICATION NUMBER	DESCRIPTION
2		Shop Drawing Package for supply of Raw Water Pumps, Bid Opportunity No. 515-2005
1		Originator's Instructions Sheet

COMMENTS:    2 Copies to Power & Mine Supply Co. Ltd.  
1 Copy to UMA (CM)

Received by: \_\_\_\_\_ Date Received: \_\_\_\_\_

**Please sign and return one copy to sender.**

TO:

<input type="checkbox"/> Head Office 105 Commerce Valley Dr. W., 7 <sup>th</sup> Floor Markham ON L3T 7W3 Ph: (905) 886-7022 Fax: (905) 886-9494	<input type="checkbox"/> Edmonton Office 17203 - 103 Avenue Edmonton AB T5S 1J4 Ph: (780) 488-6800 Fax: (780) 488-2121	<input type="checkbox"/> Regina Office 2629 - 29th Avenue Regina, SK S4S 2N9 Ph: (306) 584-8580 Fax: (306) 584-3822	<input type="checkbox"/> Victoria Office #203, 4430 Chatterton Way Victoria BC V8Z 5J2 Ph: (250) 744-2100 Fax: (250) 744-1700
<input type="checkbox"/> Calgary Office 300 - 340 Midpark Way S.E. Calgary AB T2X 1P1 Ph: (403) 254-3301 Fax: (403) 254-3333	<input type="checkbox"/> Kelowna Office #201, 3275 Lakeshore Road Kelowna BC V1W 3S9 Ph: (250) 762-3727 Fax: (250) 762-7789	<input type="checkbox"/> Vancouver Office 6 <sup>th</sup> Floor, 1901 Rosser St. Burnaby BC V5C 6S3 Ph: (604) 298-6181 Fax: (604) 294-8597	<input checked="" type="checkbox"/> Winnipeg Office 850 Pembina Highway Winnipeg, MB R3M 2M7 Ph: (204) 477-5381 Fax: (204) 284-2040



**Reference Figure 2.8.1**

**Originator:** Kristina Roberts

**Date:** March 30, 2006

**Please Issue the following Documents:**

<input type="checkbox"/> For Information	<input type="checkbox"/> For Review & Return By Date:	<input type="checkbox"/> For Quotation By Date:	<input type="checkbox"/> For Construction	<input checked="" type="checkbox"/> Other Shop Drawings
<b>To:</b> Dan Shamlock		<b>At:</b> Power & Mine Supply Co. Ltd.		
<b>Cc:</b> Bill Richert		UMA Projects (CM) Ltd.		

Documents # (attach list if necessary)	Rev.	Date	Comments / Notes to Document
WWTP – Supply of Raw Water Pumps, Bid Opportunity No. 515-2005			
Table of Contents		Mar 22/06	Reviewed
Honeywell High-torque Actuator ✓		Mar 22/06	Revise and Re-Submit
Flowserve 38PMR Pump Assembly (Drawing # 38PMR-1 VCT)	2	Mar 22/06	Revise and Re-Submit
Vertical Motor (Drawing # 09-2549-43) ✓		Mar 28/06	Reviewed
Magna Drive 26.5 VSSF ✓		Mar 22/06	Reviewed
Materials of Construction ✓		Mar 22/06	Reviewed
Final Conditions of Service ✓		Mar 22/06	Reviewed
Electro Sensors Speed Sensor ✓		Mar 16/06	Reviewed
Ashcroft Pressure Gauge ✓		Mar 22/06	Reviewed
Emerson Motor Technologies ✓		Mar 16/06	Reviewed
Winding RTD Wiring Data (Drawing # 833989 A)	A	Mar 16/06	Revise and Re-Submit
Bearing RTD Data (Drawing # 338312A)	A	Mar 16/06	Revise and Re-Submit
PMC/Beta Model 162 VT Series ✓		Mar 16/06	Revise and Re-Submit
Minco AS5004 ✓	B	Mar 17/06	Revise and Re-Submit
Component Drawing		Mar 22/06	Reviewed
Raytek MI Series – Infrared Temperatures ✓		Mar 16/06	Revise and Re-Submit
Beck Product Description ✓		Mar 22/06	Revise and Re-Submit
Beck Wiring Diagram Drawing # 17-5122-90	B	Mar 22/06	Revise and Re-Submit



**Winnipeg Water  
Treatment Program**

**ORIGINATOR'S INSTRUCTIONS**  
(For Issuance of Documents through Document Control)

Beck Outline Dimensions Drawing # 11-300 Drive	E	Mar 22/06	Revise and Re-Submit
Notes		Mar 17/06	Revise and Re-Submit
<b>Comments:</b> to be added to Transmittal	2 copies to Power & Mine Supply Co. Ltd 1 copy to UMA (CM)		

# SUBMITTAL REVIEW COMMENTS



DATE: March 28/06 PROJECT: WINNIPEG WTP

SUBMITTAL NO.

SPEC SECTION. 11320

DESCRIPTION Bid No. 515-2005 Package for supply of Raw Water Pumps PAGE(S)

SUBMITTAL TYPE:  SHOP DRAWINGS  SAMPLE

(Double Click on Check Box)  Administrative  Technical

Quality Control  Contract Closeout

**STATUS OPTIONS:**

- REVIEWED (R)
- REVIEWED AS MODIFIED (RAM)
- REVISE AND RE-SUBMIT (RAR)
- RECEIVED FOR INFORMATION (FIO)

## CH2M HILL Canada Limited

CONSULTING ENGINEERS

### SUBMITTAL STATUS

STATUS		
<input checked="" type="checkbox"/>	REVIEWED	(R)
<input type="checkbox"/>	REVIEWED AS MODIFIED	(RAM)
<input type="checkbox"/>	REVISE AND RE-SUBMIT	(RAR)
<input type="checkbox"/>	RECEIVED FOR INFORMATION	(FIO)

Per L. L. Lavelle

Date March 28/06

REFER TO CONTRACT SPECIFICATIONS FOR SUBMITTAL REQUIREMENTS CH2M HILL Canada Limited's review of this submittal does not relieve the manufacturer of complete and exclusive responsibility for the design and manufacture of this product in conformity with the specifications of this project.

NO.	COMMENT	REVIEWER	STATUS
1	Reviewed	L.L.	R
2			
3			
4			

**CH2MHILL** TRANSMITTAL

**To:**  
 Earth Tech  
 850 Pembina Hwy  
 Winnipeg, Manitoba R3M 2M7

**Project No.:** 321352  
**From:**  
 CH2M HILL Canada Limited  
 Suite 1500, 800 Sixth Ave S.W.  
 Calgary, Alberta T2P 3G3

**Attn:** Sandra Peters / Kristina Roberts      **Date:** March 28, 2006

**Re:** Winnipeg Water Treatment Program: Shop Drawing Package for Supply of Raw Water Pumps, Bid No 515-2005 – Submission 2

**We Are Sending You:**  Shop Drawings    Sample    Other

CH2M HILL #	# of Copies	Spec #	Drawing No.	Description	Status
515-11320-002-2	1	11320	11280A	Honeywell High- Torque Actuator	R
			Rev1(2/27)	Flowserve 38PMR Pump Assembly	
			09-2549-43	Vertical Motor (Motor Drawing)	
			J1367001R.0	Magna Drive 26.5 VSSF	

**Status:** R – Reviewed      **RAM** – Reviewed As Modified      **RAR** – Revised And Resubmit  
 NR – Not Revised      **FIO** – For Information Only

If material received is not as listed, please notify us at once

Remarks:

Note: Only 1 copy was received from Earth Tech. We made copy of original for our office. We never received Submission 1.

Copies To:	Number
CH2M HILL Office / CGY	1
Earth Tech Client / WPG	1

**Table of Contents**

Before Section 1 Honeywell 11280A High-Torque Actuator  
 Section 1 Equipment Drawings 4 pages.

Title	Drawing No.	Description
Flowserve 38 PMR Pump Assembly	Rev 1 (2/27)	Pump Assembly <i>Rev. 2</i>
Vertical Motor	09-2549-43	Motor Drawing
Magna Drive 26.5 VSSF	J1367001 Rev 0	Magna Drive Air Cooled VSD <i>Rev 1</i>

**Section 2 Pump Data**

Title	No. of Pages	Description
Pump BOM	1 Page	Materials of Construction
Final Conditions of Service	1 Page	Final Pump Conditions
Pump Speed Sensor	6 Pages	Electro Sensors Speed Sensor
Ashcroft Pressure Gauge	2 Pages	Pressure Gauge & Shut-off

**Section 3 Motor Data**

Title	No. of Pages	Description
Motor Data Sheets	2 Pages	Motor Data (Rev0) (2/6/2000)
Motor Nameplate Data	1 Page	Motor Nameplate
Motor Performance	2 Pages	Motor Performance
Reed Frequency Data	1 Page	Motor Reed Frequency Data
Motor Wiring Data	1 Page	Page #499495
Winding RTD Wiring Data	1 Page	#833989-A
Bearing RTD Data	1 Page	#338312-A
PMC/Beta Vibration Transmitter	1 Page <i>3 pages</i>	Model 162VTS
RTD Data (Bearings)	1 Page	Minco AS5004 <i>Rev. B</i>

**Section 4 Magna Drive VSD Data**

Title	No. of Pages	Description
Component Drawing	1 Page	DO148B
RTD Data (Bearings)	1 Page	Minco AS5004
Infrared Temp. Sensor	4 Pages	Raytek MI Series
Beck Actuator Data	<del>4</del> Pages	Beck model 11-300

N/A

Beck Wiring Diagram Group

← 175122-90 Rev. B  
 Wiring Diagram

Outline Dimensions | 18-0300-01 Rev. E | Beck 11-300 Drive

Notes

**Earth Tech (Canada) Inc.**

Reviewed for general conformance with design intent.  
Responsibility for detailed design in the shop drawings  
rests with the Contractor.

Responsibility for verification and correlation of field  
dimensions, fabrication process, techniques of  
construction, installation and coordination of all  
parts of the work rests with the Contractor.

REVIEWED

REVIEWED AS MODIFIED

REVISE AND RE-SUBMIT

NOT REVIEWED

Project No. 79538 - C12-16

Date: Mar 22/00 By: BW

## 11280A High-torque Actuator

### Improve Your Bottom Line

To operate with maximum efficiency and improve process uptime, state-of-the-art control systems require accurate, responsive, and repeatable actuation of final control devices. Actuators are often overlooked when considering maintenance and ancillary support costs, yet they play an important role in system performance and can directly impact your company's bottom line.

Honeywell's 11280A high-torque, industrially rated rotary actuator is engineered for exceptional reliability, accurate positioning, and low maintenance. The 11280A uniquely combines fast, full travel speeds, high torque, and continuous duty.

Designed for very precise positioning of dampers, vanes, and quarter-turn valves, the 11280A performs especially well in extremely demanding environments requiring continuous duty, high reliability, and low maintenance. Typical applications include induced and forced draft fan dampers, burner tilts, and fluid couplings.

### Major Features and Benefits

#### Responsive, Positive Electric Control:

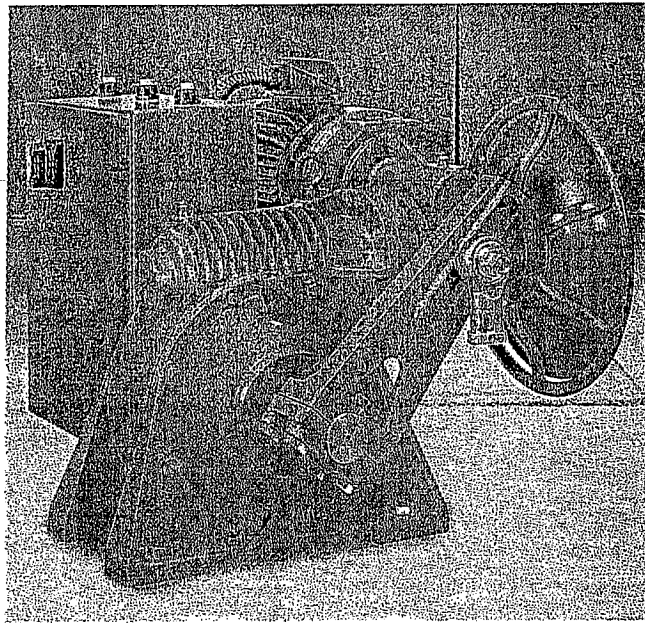
Electric actuators provide instantaneous response to a demand signal, eliminating system non-linearity due to dead time. Additionally, because the actuator is electric, the costs associated with providing and maintaining a clean, dry air supply are eliminated.

#### Non-Contact Position Sensing (NCS):

Non-contact position sensing eliminates maintenance problems and nuisance shutdowns that are common with slidewire or potentiometer position sensing. Once calibrated, the truly non-contacting sensor requires no maintenance.

#### True Position Indication:

Directly connected to the actuator output shaft, the non-contact sensor measures actual shaft position. This eliminates the hysteresis inherent with other means of position indication, giving tighter process control and allowing faster tuning.



PLEASE CLARIFY WHICH ACTUATOR YOU ARE PROPOSING. IF YOU ARE REQUESTING BEK TO BE CONSIDERED AS A SUBSTITUTE GIVE REASONS WHY.

#### Slidewire Emulation Circuit (SEC):

A truly unique feature, slidewire emulation provides backward compatibility of three-wire position proportional control schemes while eliminating control and maintenance problems associated with slidewire wear. The SEC provides the function of a slidewire but uses non-contact position sensing to determine shaft position.

#### Accurate Positioning:

Precise positioning of the actuator is achieved through state-of-the-art variable-speed motor control and positioning electronics that eliminate overshoot and hunting. Positioning accuracy of 0.2% span or better is achievable for extremely tight process control.

#### Fast Response Speed:

Instantaneous full-torque characteristics of the motor provide travel speeds as fast as 10 seconds for control loops such as ID/FD fan dampers or other pressure control applications that require fast full stroke response.

#### Self-Locking/Releasing Gear Train:

The double-reduction worm gear combination is self-locking and self-releasing and maintains position on loss of power. It is designed to hold greater than two times the rated output torque in a back-driving condition. This design provides superior reliability without the maintenance associated with other self-locking and brake mechanisms.

#### Torque Limiting and Stall Annunciation:

The 11280 actuator limits output torque, avoiding damage to the final control element and actuator. Stall conditions can be annunciated.

#### Warranty:

The 11280A warranty is effective for 30 months from the date of shipment and 24 months from the date of installation.

#### Closing The Loop:

To complement the 11280A actuator, Honeywell provides a compatible line of temperature and process controllers. The S9000 and UDC line of controllers, the Micromax™ 2 loop and logic system, and the UMC 800 multi-loop controller tightly integrate with Honeywell actuators to provide precise and reliable control of your process.



## Sales and Service:

The 11280A Industrial Actuator and hundreds of other Honeywell industrial devices can be purchased on line through the Honeywell Industrial Store on our Web site at <http://www.iac.honeywell.com>.

This product is backed by Honeywell's global sales and service team, including the toll-free Technical Assistance Center (TAC) for after-sale support. For more information on this or other Honeywell products and services, please contact your local Honeywell representative, visit our Web site, or call 1-800-343-0228.

## Abbreviated Specifications

### Physical

Enclosure	Precision machined ductile iron weatherproof with corrosion resistant paint
Operating Temperature	-30°C to +65°C (-20°F to +150°F)
Relative Humidity	Fully operable over the range of 0-99% R.H. non-condensing
Crank Arm	Adjustable radii (8" to 14") crank arm
Rotation	90°-100°. Factory set at 90°
Manual Handwheel	Provides a means of positioning the actuator in the event of a power failure or set-up.

Catalog #	Torque (lb-ft)	Output Shaft Size	Shaft Key Size	Output Shaft Length	Net Weight
11284A	425	1 1/2" (51 mm)	1/2" (13 mm)	5" (127 mm)	150 lbs. (56 kg)
11285A	840	2" (51 mm)	1/2" (13 mm)	5" (127 mm)	225 lbs. (84 kg)
11286A	1500	2" (51 mm)	1/2" (13 mm)	5" (127 mm)	300 lbs. (112 kg)
11288A	2500	2 1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	550 lbs. (205 kg)
11289A	4000	2 1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	600 lbs. (224 kg)
11287A	5500	2 1/2" (64 mm)	5/8" (16 mm)	6" (152 mm)	600 lbs. (224 kg)

### Electrical

Power	115/220 VAC, single phase 50/60 Hz up to 1500 lb-ft 208/240/480/575 VAC, 3 phase, 60 Hz; 380 VAC, 3 phase, 50 Hz
Loss of Power	Stays in place
Local Auto/Manual switch	Optional - allows local and automatic operation of the actuator.
Limit Switches	Standard - two SPDT end of travel limits rated (10 A at 125 VAC, 5 A at 250 VAC).
Auxiliary Switches	Two additional SPDT switches are standard (10 A at 125 VAC, 5 A at 250 VAC)
Direction of Rotation	Field-selectable via switch and jumper. Clockwise rotation - looking into the output shaft.

### Actuator with Positioner

Input Range (CAT/PAT board)	Input: 4-20 mA, 1-5 VDC, 3-wire position proportional, ON/OFF
Fail-safe operation	If input falls below 2% of span, there are four choices selected by a movable jumper: stop, go full upscale, go full downscale, or go to a selected (adjustable) position.
Sensitivity	0.20% to 5% of span adjustable. Shipped at 0.5% of span
Hysteresis	Less than 0.4% of full scale
Linearity	± 0.25% of span
Repeatability	0.20% of span

### 4-20 mA Output and Slidewire Emulation

Feedback Signals	0/4 - 20 mA 0/1 - 5 VDC with 250 ohm resistor (0 - 16 VDC with 800 ohm resistor)
Slidewire Emulation	Provides output voltage proportional to shaft position and to supply voltage (1-20 VDC) without a slidewire. Emulates 100 to 1000 ohm slidewire.

### Certifications

NEMA 4 enclosure	Standard
------------------	----------

**Honeywell**

Sensing and Control  
Honeywell Inc.  
11 West Spring Street  
Freeport, IL 61032  
1-800-343-0228



64-85-57-11 (1.5M) 5/00

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)

## 10260A Industrial Actuator

### Improve Your Bottom Line

To operate with maximum efficiency and improve process uptime, state-of-the-art control systems require accurate, responsive, and repeatable actuation of final control devices. Actuators are often overlooked when considering maintenance and ancillary support costs, yet they play an important role in system performance and can directly impact your company's bottom line.

Honeywell's 10260A medium-torque industrially rated rotary actuator is engineered for exceptional reliability, accurate positioning, and low maintenance. Designed for very precise positioning of dampers and quarter-turn valves in the power and processing industries, the 10260A performs especially well in extremely demanding environments requiring continuous duty, high reliability, and low maintenance. Typical applications include furnace pressure dampers, fuel/air ratio valves, windbox dampers, and coal mill dampers.

### Major Features and Benefits

#### Responsive, Positive Electric Control:

Electric actuators provide instantaneous response to a demand signal, eliminating system non-linearity due to dead time. Additionally, because the actuator is electric, the costs associated with providing and maintaining a clean, dry air supply are eliminated.

#### Non-Contact Position Sensing (NCS):

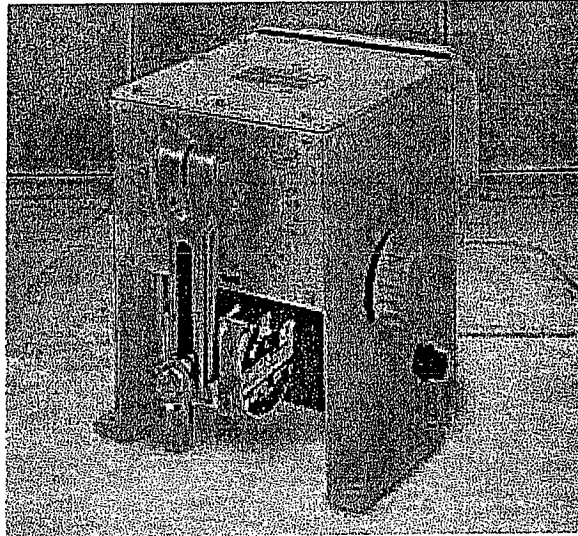
Non-contact position sensing eliminates maintenance problems and nuisance shutdowns that are common with slidewire or potentiometer position sensing. Once calibrated, the non-contacting position sensor requires no maintenance.

#### True Position Indication:

Directly connected to the actuator output shaft, the non-contact sensor measures actual shaft position. This eliminates the hysteresis inherent with other means of position indication, giving tighter process control and allowing faster tuning.

#### Slidewire Emulation Circuit (SEC):

A truly unique feature, slidewire emulation provides backward compatibility of three-wire position proportional control schemes while eliminating control and maintenance problems associated with slidewire wear. The SEC provides the function of a slidewire but uses non-contact position sensing to determine shaft position.



#### Accurate Positioning:

Precise positioning of the actuator is achieved through state-of-the-art motor control and positioning electronics. The motor starts and stops instantaneously, preventing overshoot and hunting. Positioning accuracy of 0.2% span or better is achievable for extremely tight process control.

#### Self-Locking/Releasing Gear Train:

The worm gear output combination is self-locking and self-releasing and maintains position upon loss of power. It is designed to hold greater than two times the rated output torque in a back-driving condition. This design provides superior reliability without the maintenance associated with other self-locking and brake mechanisms.

#### Closing The Loop:

To complement the 10260A actuator, Honeywell provides a compatible line of temperature and process controllers. The S9000 and UDC line of controllers, the Micromax™ 2 loop and logic system, and the UMC 800 multi-loop controller tightly integrate with Honeywell actuators to provide precise and reliable control of your process.

#### Sales And Service:

This product is backed by Honeywell's global sales and service team, including the toll-free Technical Assistance Center (TAC) for after-sale support. For more information on this or other Honeywell products and services, please contact your local Honeywell representative, visit our Web site [www.honeywell.com/sensing](http://www.honeywell.com/sensing), or call 1-800-343-0228.

## Abbreviated Specifications

### Physical

Weight	40 lb. (18 kg) net			
Enclosure	Precision-machined aluminum alloy casting, finished in light gray powder coat epoxy.			
Mechanical stops	Backup to the CW and CCW end-of-travel limit switches.			
Operating Temperature	-30°C to +85°C (-20°F to +185°F)			
Relative Humidity	Fully operable over the range of 0-99% R.H. non-condensing			
Crank Arm	Adjustable radii (1 7/16" to a maximum of 5"). Position adjustable through 360° rotation. Optional 12" crank arm adjustable 0-12" radii.			
Rotation	90° between 0 and 100% on scale, limited by mechanical stops.			
Manual Handwheel	Provides a means of positioning the actuator in the event of a power failure or setup.			
Output Torque/Full Travel	Model #	Torque		Output Shaft Speed sec/90°
Stroking Time		Lb-ft	N-M	@ 60Hz @ 50Hz
	10261A	10	15	10 12
	10262A	20	27	20 24
	10264A	40	55	40 48
	10266A	60	80	60 72
	10267A	40	55	20 24
	10268A	80	110	40 48
	10269A	150	200	60 72
	10263A	200	270	40 48
	10265A	300	400	60 72

### Electrical

Power Input	120 VAC single phase, 50 or 60 Hz or 240 VAC single phase, 50 or 60 Hz		
Motor	100% duty cycle, instant start/stop, non-coasting, and non-burnout synchronous induction motor. Can be stalled up to 100 hours without damage.		
Motor Current	No load=full load=locked rotor		
	Model No.	120 V, 50/60 Hz	240 V, 50/60 Hz
	10261A, 62A, 64A, 66A	0.4 A (48 VA)	0.3 A (24 VA)
	10263A, 10265A	1.0 A (120 VA)	1.0 A (60 VA)
	10267A, 68A, 69A	0.8 A (96 VA)	0.3 A (36 VA)
Loss of Power	Actuator stays in place on loss of power		
Local Auto/Manual switch	Optional - provides local electrical operation with "out of auto" contact for annunciation		
Limit/Auxiliary Switches	Rated 10 A at 125 VAC, 5 A at 250 VAC - up to six total		
Direction of Rotation	Field-selectable via switch and jumper. Clockwise rotation - looking into the output shaft.		

### Actuator with Positioner

Input Range (CAT/PAT board)	Input: 4-20 mA, 1-5 VDC, 3-wire position proportional, ON/OFF
Fail-safe operation	If input falls below 2% of span, there are four choices selected by a movable jumper: stop, go full upscale, go full downscale, or go to a selected (adjustable) position.
Sensitivity	0.20% to 5% span adjustable. Shipped at 0.5% span
Hysteresis	Less than 0.4% of full scale
Linearity	± 0.25% of span
Repeatability	0.20% span

### 4-20 mA Output and Slidewire Emulation

Feedback signals	0/4 - 20 mA 0/1 - 5 VDC with 250 ohm resistor (0 - 16 VDC with 800 ohm resistor)
Slidewire Emulation	Provides output voltage proportional to shaft position and to supply voltage (1-20 VDC) without a slidewire. Emulates 100 to 1000 ohm slidewire.

### Certifications

UL/CSA	Optional
CE Compliance	Optional
NEMA 4	Optional

**Honeywell**

### Sensing and Control

Honeywell Inc.  
11 West Spring Street  
Freeport, IL 61032  
1-800-343-0228

Recycled Paper  
64-85-57-10 (1.5M) 6/00

[www.honeywell.com/sensing](http://www.honeywell.com/sensing)

**Earth Tech (Canada) Inc.**

Reviewed for general conformance with design intent.  
Responsibility for detailed design in the shop drawings  
rests with the Contractor.

Responsibility for verification and correlation of field  
dimensions, fabrication process, techniques of  
construction, installation and coordination of all  
parts of the work rests with the Contractor.

REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_ ✓

NOT REVIEWED \_\_\_\_\_

Project No. 79538 - C12-16

Date: Mar 22/06 By: Bu

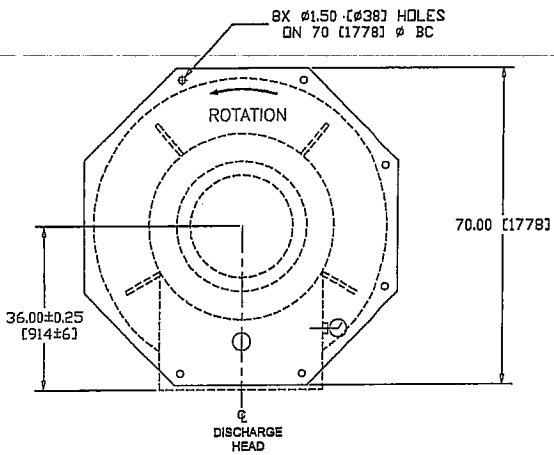
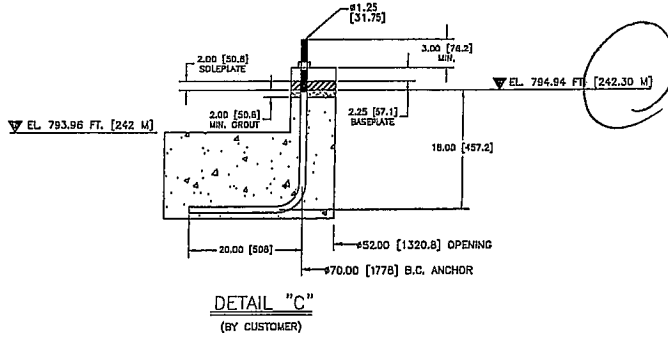
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# **EQUIPMENT DRAWINGS**

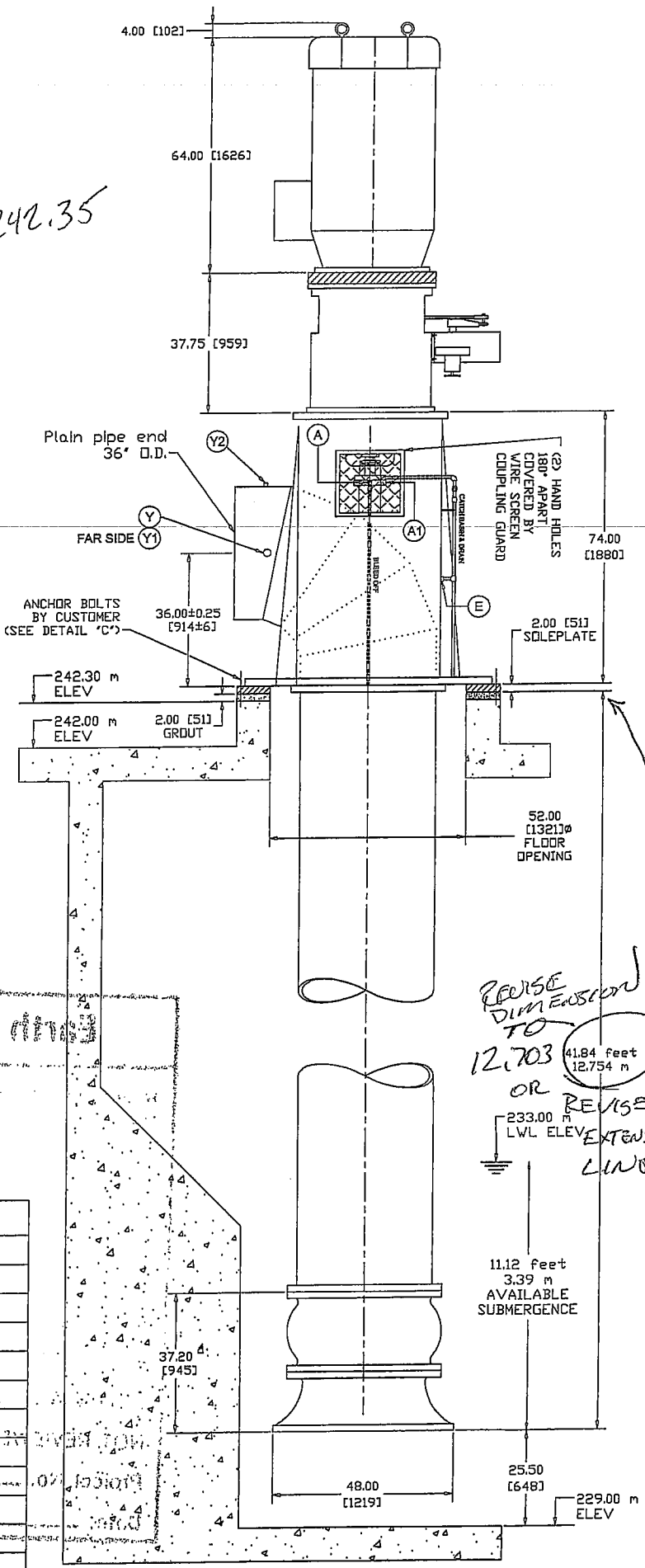


Power & Mine Supply Co. Ltd.  
 4-75 Meridian Drive  
 Winnipeg, Manitoba  
 Canada R2R 2V9

Revisions	Date	Details
1	2/27/2006	Corrected pump length, removed flange, add benching
2	3/2/2006	Added sole plate, anchor bolt details, piping, motor rev.



Y2	3/4" NPT HALF PIPE COUPLING - PLUGGED
Y1	3/4" NPT GAUGE CONNECTION - PLUGGED
Y	3/4" NPT GAUGE CONNECTION - PLUGGED
E	3/4" NPT CATCH BASIN DRAIN DISCH. HEAD
A1	3/4" NPT STUFF-BOX CONNECT. - PLUGGED
A	3/4" NPT BLEED OFF



REVISE DIMENSION TO 12.703  
 41.84 feet  
 12.754 m  
 OR REVISE AVAILABLE SUBMERGENCE LINE  
 233.00 m LWL ELEV

**Flowsolve 38PMR pump assembly**

Date	March 2, 2006
Customer	City of Winnipeg
Engineer	Earthtech
Project	Supply of raw water pumps
Contract	Bid opportunity no. 515-2005
Power & Mine Ref. No.	ORD35010
Drawing number	38PMR-1 VCT r2
Revision	2
Units (unless noted)	Inches [mm]
Total pump weight	9123 kg.
Heaviest pump section	3015 kg.
Magnadrive VSD weight	1045 kg.
Vertical motor weight	2955 kg.

## Earth Tech (Canada) Inc.

Reviewed for general performance with design intent.  
Responsibility for details of design in the shop drawings  
rests with the Contractor.

Responsible for monitoring and coordination of field  
dimensions of work and process techniques of  
construction, and coordination of all  
parts of the work with the Contractor.

REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_ ✓

NOT REVIEWED \_\_\_\_\_

Project No. \_\_\_\_\_

Date: \_\_\_\_\_

By: \_\_\_\_\_

79538 - C12-16

Mar. 22/06

EWJ

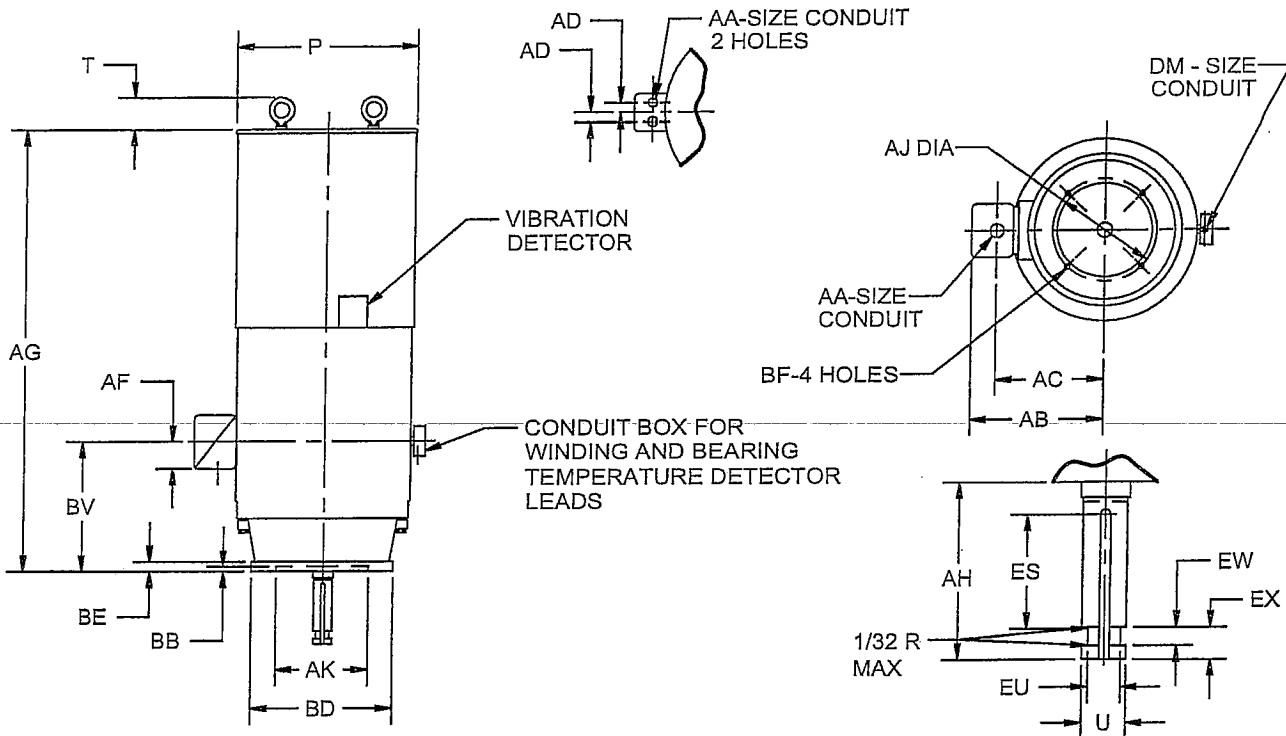
EFFECTIVE:  
**06-FEB-06**

SUPERSEDES:  
**NEW**

**VERTICAL MOTORS**  
WITH STYLE "P" BASE  
FRAME: 5807P THRU 5811PH  
TYPE: JV

PRINT:  
**09-2549-43**

SHEET:  
**1 OF 1**



ALL DIMENSIONS ARE IN INCHES

FRAME	HP	VOLTS	AB	AC	AD	AF
5800	THRU 500	460	26.13	20.63	-	8.06
	ALL	3800				
	OVER 500	460	32.00	25.38	3.00	10.94
	ALL	4000	27.13	24.63	-	10.00

AA
3 NPT
3-1/2 NPT
4 NPT

DM
1 NPT
1-1/2 NPT

FRAME	AG	FRAME	P	T	AJ	AK +.005	BB MIN	BD MAX	BE	BF	BV	XP
5807	57.00	5800P	28.000	4.00	28.000	22.000	.25	30.50	1.25	.81	16.75	17.63
5809	64.00	5800PH	31.13	4.00	14.750	13.500		24.50		.69		
5811	72.00	5800PH	32.000	4.00	14.750	13.500		24.50		.94		

HP	POLES(RPM)				U	AH	ES	EU	EW	EX	SQ
	2(3600)	4(1800)	6(1200)	8(900)	MIN	MIN	MIN	MIN	MIN	MIN	KEY
HP	ALL THRU 600	ALL THRU 300	ALL THRU 200	ALL THRU 150	2.125	4.500	3.00	1.750	0.375	0.750	.500
	350 THRU 450	250 THRU 300	200	200	2.375	5.000	3.50	2.000	0.375	0.750	.625
	500 THRU 600	350 THRU 400	250 THRU 300	250 THRU 300	2.625	5.000	3.50	2.250	0.375	0.750	.625
	700 THRU 800	450 THRU 500	350 THRU 400	350 THRU 400	2.875	7.000	5.00	2.375	0.500	1.000	.750
HP	600	450 THRU 500	450 THRU 500	450 THRU 500	3.125	7.000	5.00	2.625	0.500	1.000	.750

HP	POLES(RPM)				U	AH	ES	EU	EW	EX	SQ
	10(720)	12(600)	14(514)	16(450)	MIN	MIN	MIN	MIN	MIN	MIN	KEY
HP	ALL THRU 125	ALL THRU 100	ALL THRU 75	ALL THRU 75	2.125	4.500	3.00	1.750	0.375	0.750	.500
	150	125 THRU 150	100 THRU 125	100	2.375	5.000	3.50	2.000	0.375	0.750	.625
	200	200	150	125 THRU 150	2.625	5.000	3.50	2.250	0.375	0.750	.625
	250 THRU 300	250	200	200	2.875	7.000	5.00	2.375	0.500	1.000	.750
	350 THRU 400	300	250	250	3.125	7.000	5.00	2.625	0.500	1.000	.750

- ROUGH DIMENSIONS MAY VARY BY +/- .25" DUE TO CASTING AND/OR FABRICATION VARIATIONS.
- CONDUIT OPENINGS MAY BE LOCATED IN STEPS OF 90 DEGREES. STANDARD IS AS SHOWN WITH CONDUIT OPENING DOWN.

TOLERANCES	
FACE RUNOUT	.007 F.I.R.
PERMISSIBLE ECCENTRICITY OF MOUNTING RABBET	.007 F.I.R.
PERMISSIBLE SHAFT RUNOUT	.003 F.I.R.
MAXIMUM SHAFT END PLAY	.010



## Earth Tech (Canada) Inc.

Reviewed for general conformance with design intent.  
Responsibility for detailed design in the shop drawings  
rests with the contractor.

Responsibility for installation and coordination of field  
dimensions rests with the contractor. Accuracy of  
construction measurements is the responsibility of all  
parts of the work force involved in the installation or.

REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_

NOT REVIEWED  \_\_\_\_\_

Project No. 79538 C12-16

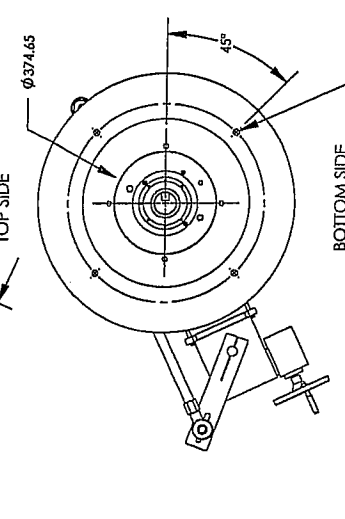
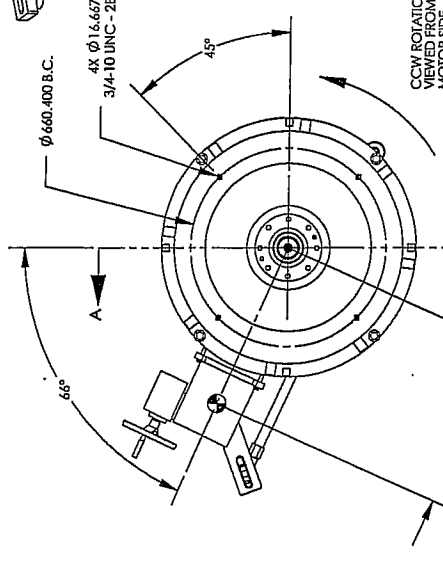
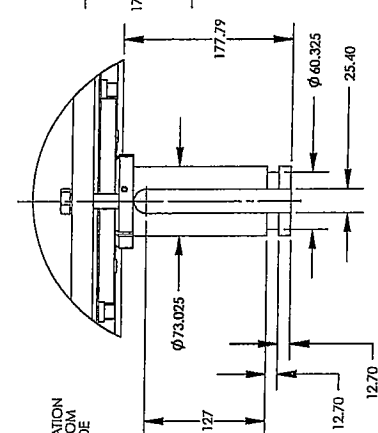
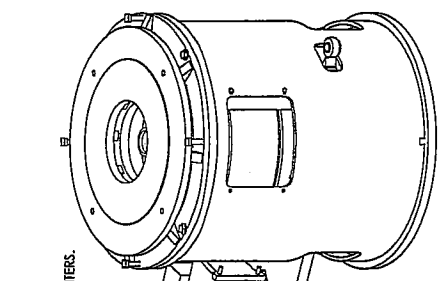
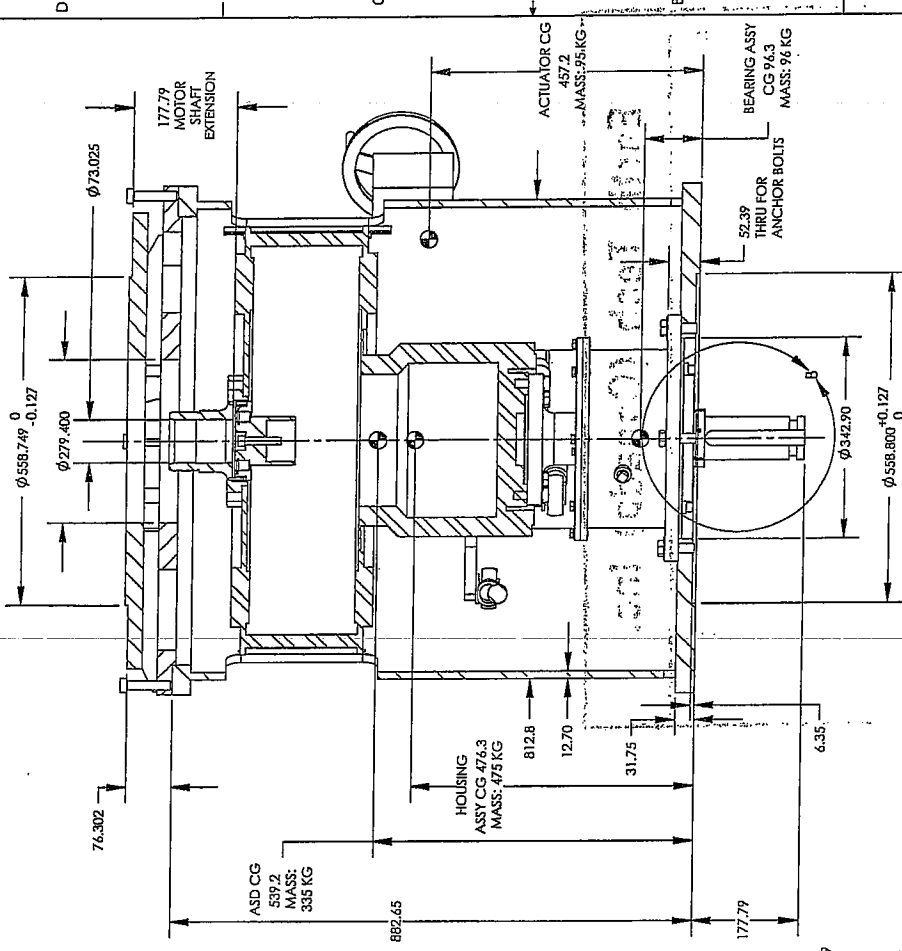
Date: Mar 22/06 By: Bar

REV.	DESCRIPTION	DATE	DRAWN	DATE	APPROVED
0	PRELIMINARY	02/19/05	TPK	02/21/05	CSH

REV.	DESCRIPTION	DATE	DRAWN	DATE	APPROVED
0	PRELIMINARY	02/19/05	TPK	02/21/05	CSH

NOTES: UNLESS OTHERWISE SPECIFIED

- REFER TO MAGNADRIVE CORP. OPERATION AND MAINTENANCE MANUAL FOR INSTALLATION INSTRUCTIONS AND TORQUE SPECIFICATIONS.
- VERTICAL KIT AND ACTUATOR KIT REQUIRE STAINLESS STEEL HARDWARE.
- APPLY LOCTITE #242 (BLUE) TO ALL FASTENERS.
- COVER FRAMEWORK OPENINGS WITH STAINLESS STEEL EXPANDED METAL GUARDS (PROVIDED).
- CUSTOMER TO FILL OIL RESERVOIR WITH OIL. REFER TO JOB ORDER. QUANTITY APPROXIMATELY 4.75 LITERS.
- BEARING DOWNTHRUST RATING: 45 KN @ 1800RPM.
- VERTICAL ENCLOSURE AND THRUST BEARING ASSEMBLY TO BE POWDER COATED, COLOR: GREY.
- REED CRITICAL > 400 HZ
- DEFLECTION AT CG: 97 MICRONS
- UNIT MASS: 1000 KG
- ASD WR#2: 137.3 N/MM<sup>2</sup>



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

SECTION A-A  
SCALE 1:8

THIRD ANGLE PROJECTION

CAD GENERATED DRAWINGS DO NOT MANUALLY UPDATE UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN MM DECIMALS ARE TRUNDED TO 3 DECIMALS UNLESS NOTED OTHERWISE SEE BOM

DWG. NO. J113670001  
TITLE OUTLINE, 26.5 VSSF  
DATE 1/24/06  
DRAWN TBB  
CHECKED TBB  
ING TBB  
OTHER TBB  
SCALE 1:8  
SHEET 1 OF 1

THE TECHNICAL INFORMATION CONTAINED HEREIN IS CONSIDERED MAGNADRIVE PROPRIETARY AND SHALL NOT BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT PRIOR WRITTEN PERMISSION FROM MAGNADRIVE CORP.

REV.	DATE	BY	CHKD	APP'D
1	02/21/05	TPK	CSH	

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Responsibility for verification and correlation of field dimensions, fabrication process, techniques of construction, erection and coordination of all parts of the work rests with the Contractor.

REVIEWED

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REVISE AND RE-SUBMIT

\_\_\_\_\_

NOT REVIEWED

\_\_\_\_\_

Project No.

79538-C12-46

Date:

Mar 24/06

By:

BR

# **PUMP DATA**

AFV/PMR Summary

Materials of Construction

Part Description	Metallurgy	
	ASTM Designation	Common Term
Suction Bell	A48 CL30	Cast Iron
Impeller Case	A48 CL30	Cast Iron
Stator Case	A48 CL 30	Cast Iron
Impeller	ASTMB148-952	Aluminum Bronze
Case Wear Ring	410 SS, ASTM A240	410SS
Thrust Collar	A479 TP 410	410 SS
Shafting	416 SS A582	Type 416SS
Shaft Coupling	A479 TP 410	410 SS
Bearing, suction bell	B584 AI 836	Bronze
Bearing, Stator case	B584 AI 836	Bronze
Bearing, Column ( Note 1 )	B584 AI 836	Bronze
Bearing, Stuffing Box	B584 AI 836	Bronze
Discharge Head	A-36 / A-53	Fabricated low carbon steel
Column, Outer	A-36 / A-53	Fabricated low carbon steel
Fasteners	AISI 316,ASTM AI93 Grade B 8M Class 2	
Drive Coupling assembly	AISI Grade 1010 – 1025	Low carbon steel
Paint (coating)	Tnemc White (NSF61 compliant)	Epoxy, min. 2 coats. Dry film thickness, 406 microns

← PLEASE  
PROVIDE  
COATING  
INFO

Notes:

1. Graph alloy on upper bearings.

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Reviewed for general performance with design intent.  
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REVISE AND RE - SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. 79538-CR-16

Date: Mar 22/06 By: EW

## Final Conditions of Service:

Maximum design flow = 1578 L/S @ 7m TDH  
Pump Speed = 687 RPM

Normal design flow = 1470 L/S @ 4.9 m TDH

Minimum design flow = 1160 L/S @ 7 m TDH

Special operating condition = 980 L/S @ 10.1 m TDH

### Notes:

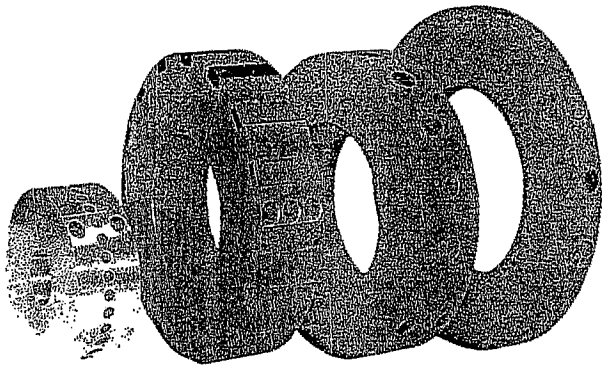
1. Pump will operate using a MagnaDrive ASD variable speed drive.
2. TDH values / do not included pump column and head losses. TDH is measured from wet well level.

*PLEASE PROVIDE PUMP  
CURVES.*

Earth Tech (Canada) Inc.	
Reviewed for general conformance with design intent. Responsibility for detailed design in the shop drawings rests with the Contractor.	
Responsibility for verification and correlation of field dimensions, fabrication methods, techniques of construction, installation and contribution of all parts of the work rests with the Contractor.	
REVIEWED	<input checked="" type="checkbox"/>
REVIEWED AS MODIFIED	<input type="checkbox"/>
REVISE AND RE-SUBMIT	<input type="checkbox"/>
NOT REVIEWED	<input type="checkbox"/>
Project No.	79538-02-16
Date:	Mar. 22/06 By: <i>B.</i>

# ELECTRO•SENSORS

## Superior • Systems • Solutions



### 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

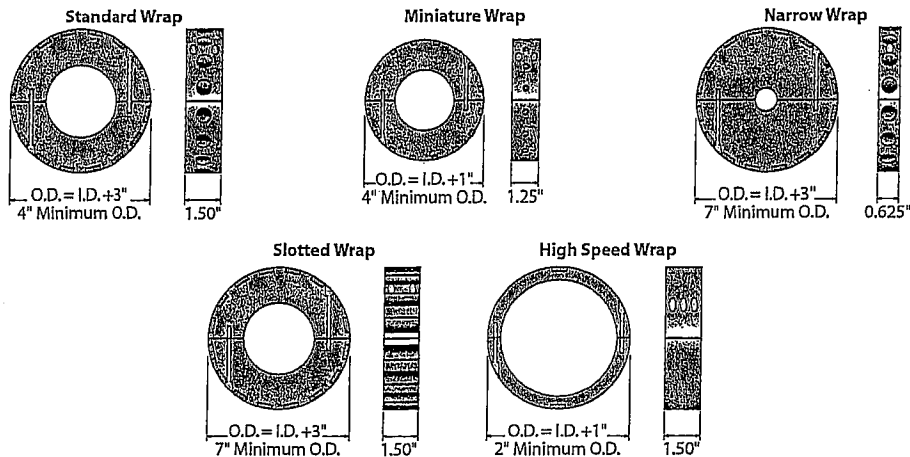
### Description

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 outside 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



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Phone: 952-930-0100  
Fax: 952-930-0130  
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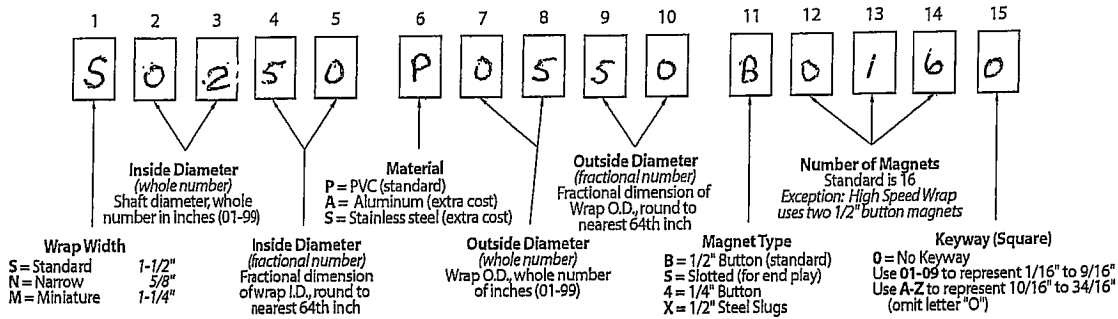
[www.electro-sensors.com](http://www.electro-sensors.com)

# Split Collar Pulser Wraps

## 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)

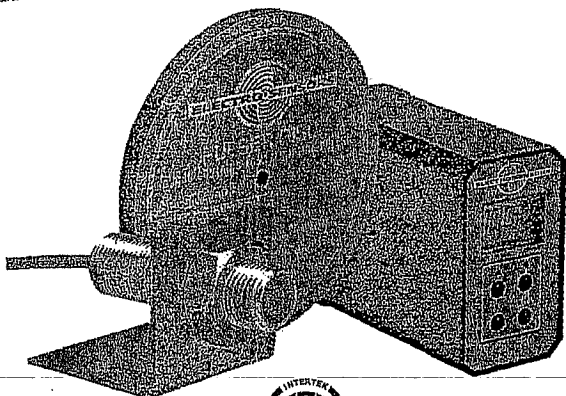
Specifications subject to change without notice.

ES-102 Rev. E



# ELECTRO-SENSORS

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## SA420 Digital Signal Conditioner

- Easy field-adjustable calibration
- 4-20 mA and 0-10 Vdc outputs
- Accepts wide range of input frequencies 0.01 Hz to 10 KHz
- Interfaces with a wide variety of sensors
- ETL® approved to applicable UL and CSA standards
- DIN rail mount module
- 5-Year Limited warranty on all products\*

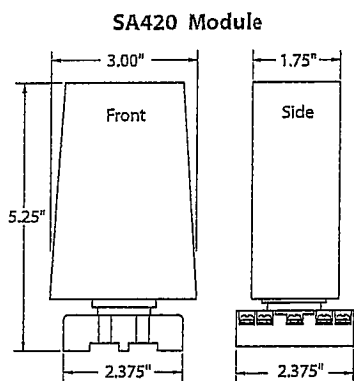
\* Excludes motor controllers and MKS products

## Product Information

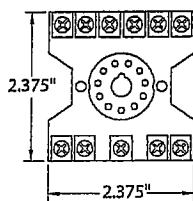
### Description

Electro-Sensors' SA420 Digital Signal Conditioner provides an analog signal directly proportional to the speed of a rotating shaft. The 0-10 Vdc and 4-20mA output signals can be sent to a digital display, PLC, chart recorder, loop controller, drive speed controller or other control/monitoring device. The wide voltage range and wave shape flexibility of the SA420's sensor input circuitry enables it to translate input signals from Hall Effect sensors, proximity switches, magnetic sensors, and a wide variety of other pulse generator devices, into analog outputs. The standard SA420 system includes the SA420 DIN rail mount module, a 906 sensing Head and a 255 Pulser Disc. Electro-Sensors' products bring efficiency and safety to your operations by preventing machine damage, product waste and costly downtime.

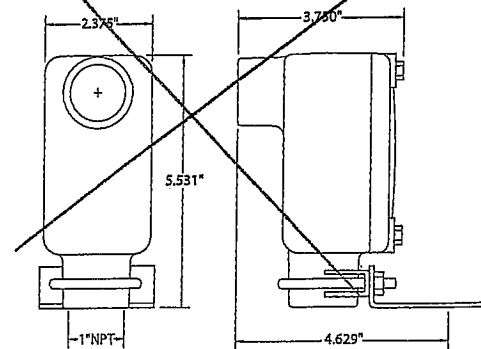
### Dimensional Drawings • SA420 Digital Signal Conditioner



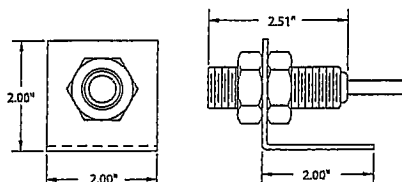
**Terminal Block**  
Stock No. 569-006100



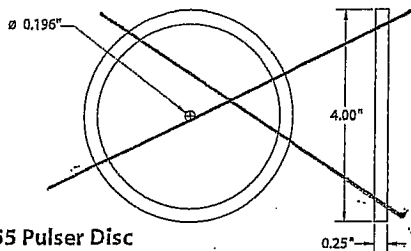
~~**907 Explosionproof Sensor**  
Stock No. 775-000600~~



**906 Digital Sensor**  
Stock No. 775-000500



**255 Pulser Disc**  
Stock No. 700-000200



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# SA420 Digital Signal Conditioner

## Large-Gap Sensor Installation

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 & 2) is  $3/8" \pm 1/8"$ . When using a standard 4" Pulser Disc, the center of the magnetized area of the disc (dimension B in Figure 1) is  $1-3/4"$  from the center hole of the disc.

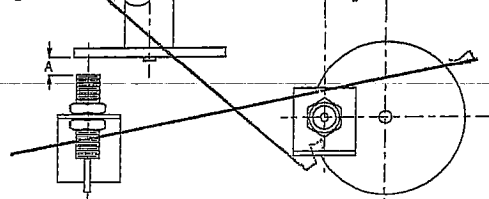
## Available Options

- Explosionproof 907 sensing head.
- Split Collar Pulser Wrap for when end of shaft is inaccessible. Wraps available in the following materials:
  - PVC
  - Aluminum
  - Stainless Steel
- Explosionproof/waterproof NEMA rated enclosures.
- Stainless Steel Disc-Guard.
- EZ100 Easy Mount Bracket Assembly for use with 907 Series explosionproof sensor (Figure 3 below).

(Consult factory for further options.)

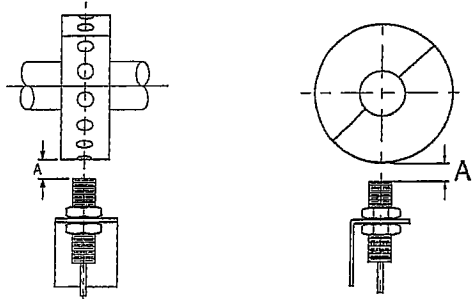
Standard 906 Sensor and Disc\*

Figure 1



Standard 906 Sensor and Wrap\*

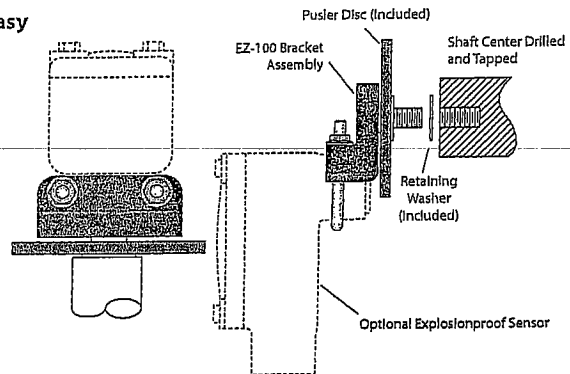
Figure 2



\* 907 Explosionproof Sensing Head is also compatible with discs and wraps.

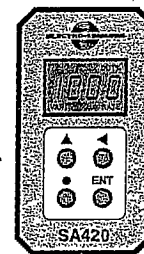
Optional EZ100 Easy Mount Bracket

Figure 3



## Calibration is Made Easy Using the 4 Buttons on the Front Panel

- ▲ **Up Arrow Button** changes the value of the position in focus (flashing) while in the calibration mode. In standard mode this button will toggle the display between frequency input (hertz) and output percentage of 4-20 mA or 0-10 Vdc.
- **Decimal Point Button** changes the position of the decimal point while in calibration mode.



- ◀ **Left Arrow Button** moves the focus to the next position when in the calibration mode.
- ENT Enter Button** enters or exits the calibration mode.

## Specifications • SA420 Digital Signal Conditioner

### Input Power

Voltage .....	115Vac Standard. 230 Vac, 12 Vdc, 24 Vdc Optional
Frequency .....	50-60 Hz
Requirements .....	2.5 VA @ 115/230 Vac 65mA @ 12 Vdc, 40 mA @ 24 Vdc

### Input Signal

Type .....	Open collector NPN and PNP Logic level 5 V Nominal, 3V Min. Magnetic Sensor $\pm 50$ MV
Amplitude .....	25 Vp-p Maximum
Sensor Supply .....	12 Vdc (Unregulated) at 50 mA Max.
Frequency .....	0.01 Hz Min, 10 KHz Max.
Minimum Input for Full Scale Output .....	0.5 Hz = 3.8 rpm at 8 PPR, Consult Factory for Lower Full Scale Range

### Output Signal

Type .....	0-10 Vdc 4-20 mA, 500 $\Omega$ Load Max.
------------	--

Accuracy .....	0-10 Vdc & 4-20 mA 0.1% Linearity
Step Response Time .....	10 to 90% at 50 Hz Input & above will be 50ms or 30ms + 1/50 Hz. Below 50Hz Input will be 30ms + 1/Hz Input.

### General Specifications

Housing and Cover .....	NEMA 1
Electrical .....	ETL® Approved to UL 508 Standard CSA C22.2 #14-95
Mounting .....	DIN Rail Mount or Stand-Alone
906 Sensor .....	Aluminum 3/4" - 16 UNF body with 10 ft of 3-conductor shielded cable.
907 Explosionproof Sensor .....	Cast Aluminum, CSA Approved. Meets UL Class I, Group D; Class II, Groups E, F, G; Class III
255 Pulser Disc .....	Nylon® 12, 4" dia, 16 magnetic poles
Gap distance .....	$3/8" \pm 1/8"$
Operating Temperature .....	0° C to + 60° C*

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

ES-334 Rev D

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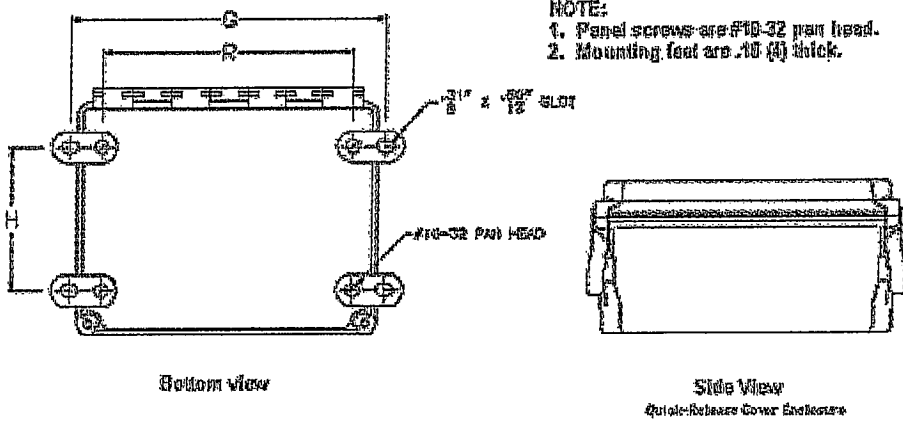
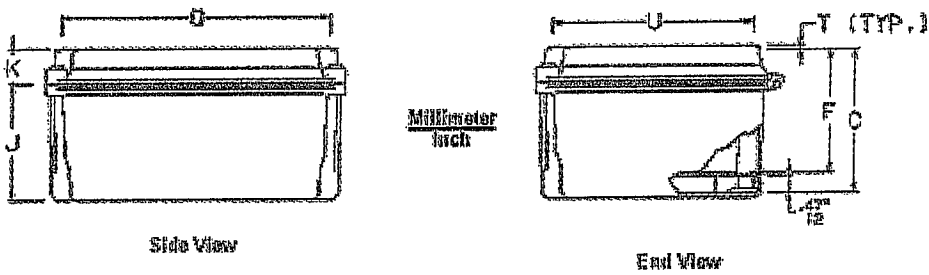
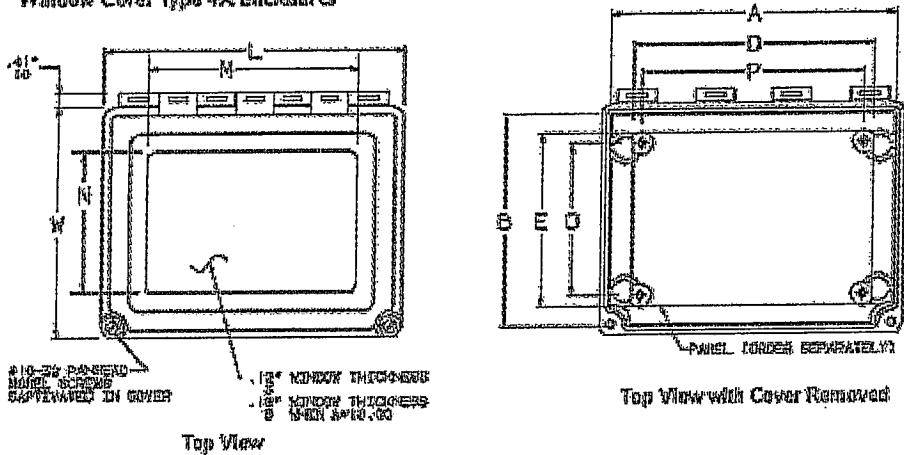
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**Corrosion-Resistant Enclosures: Fiberglass: Junction Boxes: Hinged Window Cover  
Type 4X Enclosures**

**Window Cover Type 4X Enclosures**



CS267



Catalog Number	Size	Height A (inch)	Height A (mm)	Width B (inch)	Width B (mm)	Depth C (inch)	Depth C (mm)	Panel Catalog Number	Panel Size D x E (inch)	Panel Size D x E (mm)	Mounting G x H (inch)	Mounting G x H (mm)	Overall L x W (inch)	Overall L x W (mm)
A1086CHQRFGW	10.00x8.00x6.00	10.0	254.0	8.0	203.0	6.0	152.0	A-10P8	8.75 x 6.88	222 x 175	10.94 x 6.00	278 x 152	10.50 x 8.50	267 x 216

**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

**Finish**

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

**Options**

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

**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**

- Panels
- Threaded Panel Extenders
- Quick-Release Latch Kit
- Swing-Out Panel Kit
- Terminal Block Kit Assembly
- Ventilators

<b>Earth Tech (Canada) Inc.</b>	
Reviewed for general conformance with design intent. Responsibility for correct design in the shop drawings rests with the drafter.	
Responsibility for verification and completion of field dimensions, placement, and construction of all parts of the work rests with the Contractor.	
REVIEWED	✓
REVIEWED AS MODIFIED	_____
REVISE AND RE-SUBMIT	_____
NOT REVIEWED	_____
Project No. <u>7953B - C12-16</u>	
Date: <u>March 16/06</u> By: <u>B. Moor</u>	

**DESIGNED FOR SAFETY AND LONGER LIFE**

- 5-year limited warranty
- Patented PowerFlex™ movement isolates movement from shock and vibration for longer life
- All stainless, all-welded construction for long life
- ASME Grade 1A, 1% accuracy full scale
- New PLUS!™ Performance Option:
  - Liquid-filled performance in a dry gauge

- Fights vibration and pulsations without liquid-fill headaches
- See page 166 for details
- Order as option XLL
- True Zero™ pointer indication – no stop pin to mask false zero reading – ensures safety and process control

**OTHER FEATURES:**

Available in 2 1/2" and 3 1/2" dial sizes, Duralife® pressure gauges are liquid fillable and field convertible for panel mounting. Both zero and span adjustments are standard.

The gauge is available dry, liquid-filled weatherproof or hermetically sealed and now with PLUS!™ performance option. A five year limited warranty is standard with the Duralife® 1009.



The following Table is *not* for conversion purposes.

STANDARD RANGES (4)(5)(6)		
Pressure psi	kg/cm <sup>2</sup> - bar	kPa
0/15	0/1	0/100
0/30	0/1.6	0/160
0/60	0/2.5	0/250
0/100	0/4	0/400
0/160	0/6	0/600
0/200	0/10	0/1000
0/400	0/16	0/1600
0/600	0/25	0/2500
0/800	0/40	0/4000
0/1000	0/60	0/6000
0/1500	0/100	0/10,000
0/2000	0/160	0/16,000
0/3000	0/250	0/25,000
0/4000	0/400	0/40,000
0/5000	0/600	0/60,000
0/7500	0/1000	0/100,000
0/10,000		
0/15,000		
<b>Vacuum</b>		
30" Hg	-1/0	-100/0
<b>Compound</b>		
30" Hg/15 psi	-1/0/1.5	-100/0/150
30" Hg /30 psi	-1/0/3	-100/0/300
30" Hg /60 psi	-1/0/5	-100/0/500
30" Hg /100 psi	-1/0/9	-100/0/900
30" Hg /150 psi	-1/0/15	-100/0/1500
30" Hg /300 psi	-1/0/24	-100/0/2400

**BOURDON SYSTEM SELECTION**

Ordering Code	Bourdon Tube & Tip Material <sup>(1)</sup>	Socket Material	Tube Type	Range Selection Limits (psi)	NPT Conn. <sup>(2)</sup>
AW	316 stainless steel	Bronze	C-Tube	Vac/800	1/4"
-AW	316 stainless steel	Bronze	Helical	1000	1/4"
SW	316 stainless steel	316 stainless steel	C-Tube	Vac/800	1/4" & 1/2"
SW	316 stainless steel	316 stainless steel	Helical	1000/15,000	1/4" & 1/2"

(1) For selection of the correct bourdon system material, see the media application table on page 178.  
 (2) 1/2" NPT available 3 1/2" lower SW system only.  
 (3) Type 1009 gauges may be ordered with metric single-scale dial: kPa, bar or kg/cm<sup>2</sup>.

(4) Dual-scale dials will be supplied with standard metric inner scale and equivalent psi outer scale or with standard psi inner scale and equivalent metric outer scale—please specify.  
 (5) Special logos and scales available upon request.  
 (6) 1/4" JIS, BSP or DIN threads available on SW systems. See Bulletin GS-4.

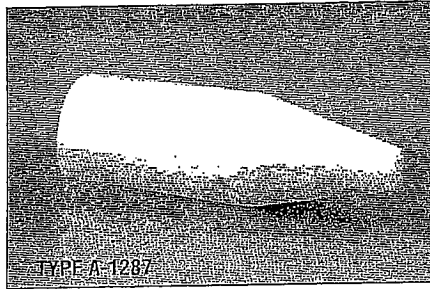
**TO ORDER THIS 1009 DURALIFE PRESSURE GAUGE:**

Select:

- Dial size—2 1/2", 3 1/2" 2 1/2"
- Case type—1009 1009
- Tube and socket material SW
- Connection size—1/8" (01), 1/4" (02) 1/2" (04) 02L
- Connection location—Lower (L), Back (B) XXX
- Optional Features—see page 108
- Standard pressure range—1000 psi 1000KPA

**TYPE A-1287****Cone Tool**

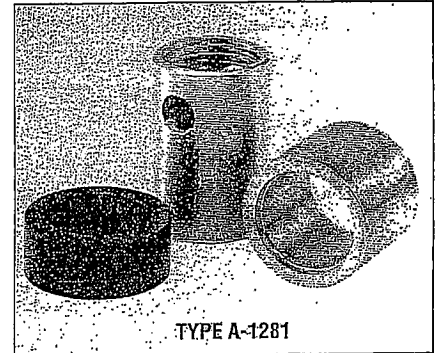
For installing diaphragm and garter spring on back connected liquid-filled or hermetic sealed Duragauge gauges.



TYPE A-1287

**TYPE A-1281****Socket O-ring Insertion Tool Kit**

For lower connection type 4½" – 1279 and 1379 and 6" – 1379 Ashcroft Duragauge gauges.



TYPE A-1281

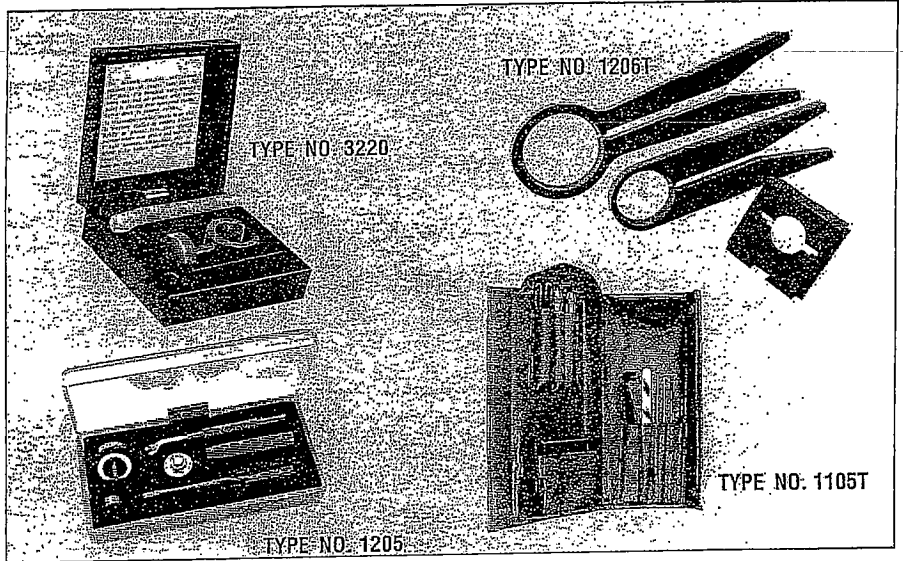
**TOOLS**

**Hand Jack Set** – gauge pointer remover and a pointer set to secure pointer to the shaft. Type No. 3220.

**Ring Removal** – For the 2½" and 3½" 1009 gauge. Includes 2½" and 3½" wrench and nest. Type No. 1206T.

**Small Tools** – For the 2½" and 3½" 1009. Includes pointer puller, span adjust wrench, slotted screw driver for pointer adjustment, pointer staker and pinion backup. Type No. 1205.

**Gauge Tool Kit** – A complete kit for gauge maintenance. Includes hand jack set, screw driver, five reamers, pin vise holder, wiggler and tweezers all packed in a neat carrying case. Ideal for a gauge maintenance shop. Type No. 1105T.



TYPE NO. 3220

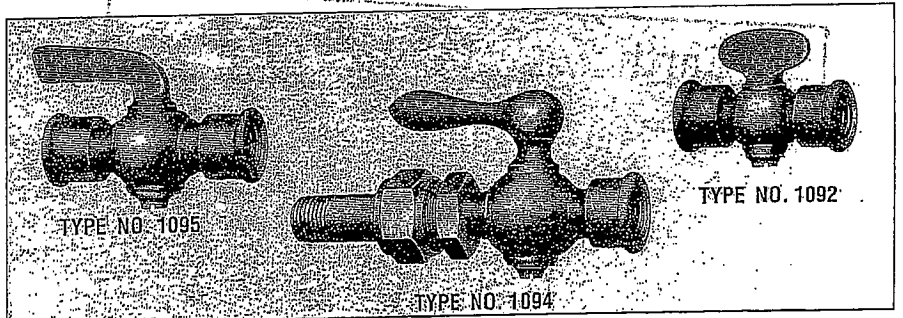
TYPE NO. 1206T

TYPE NO. 1205

TYPE NO. 1105T

**COCKS**

- ¼" brass Tee Handle Cock No. 1092 – Wgt. 3 oz.
- ¼" brass Lever Handle Union Cock No. 1094 – Wgt. 10 oz.
- ¼" brass Lever Handle Cock No. 1095 – Wgt. 4 oz.
- All rated 100 psi air.



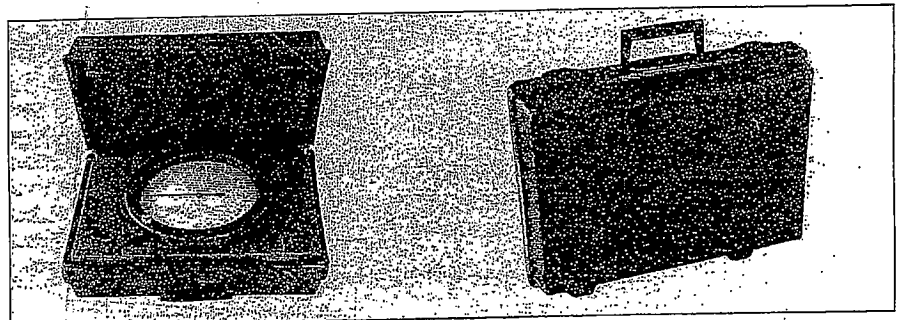
TYPE NO. 1095

TYPE NO. 1094

TYPE NO. 1092

**TEST GAUGE CARRYING CASE**

This rugged blow-molded high-density polyethylene carrying case accommodates the standard 4½", 6 & 8½" Ashcroft Type 1082 analog test gauge. It accepts both lower and back connect gauges. A foam insert protects the gauge when not in use. Type No. 2505.



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REVIEWED

REVIEWED AS MODIFIED

REVISE AND RE-SUBMIT

NOT REVIEWED

Project No. 79538-C12-116

Date: Mar 22/06 By: [Signature]

---

# **MOTOR DATA**





**EMERSON MOTOR COMPANY**

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

DATE: 2/6/2006

P.O. NO.: 46780D  
USEM Order/Line NO.: 20041485 SO 100

TO: EMERSON ELECTRIC Fluid  
9999 MARKHAM ROAD  
ATTN: Nick Kinsella  
MARKHAM, ON, L3P3J3, CANADA  
ATTN: POWER&MINE 70182

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

REVISIONS:  
(NONE)

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

**Features:**

HOLD PRODUCTION  
Horsepower ..... 00250.00~00000.00 ~ KW: 186.5  
Enclosure ..... TEFC  
Poles ..... 10~00 ~ RPM: 720~0  
Frame Size ..... 5809~P  
Phase/Frequency/Voltage.. 3~060~575 ~ Random Wound  
Service Factor ..... 1.15  
Insulation Class ..... Class "F" ~ VPI-1000  
Altitude In Feet (Max) .. 3300 Ft.(1000 M)  
Ambient In Degree C (Max) +40 C  
Efficiency Class ..... Premium Efficiency  
Application ..... Centrifugal Pump  
Customer Part Number ....  
Base Diameter (Inches) ..... 30.5  
Pricebook Thrust Value (lbs).. 1200  
Customer Down Thrust (lbs) ... 1200  
Customer Shutoff Thrust (lbs).  
Up Thrust (lbs) .....  
"AK" Dimension (Inches).. NA  
Shaft Dimensions:~U=2.875 ~ AH/V=7.000  
KEYWAY=0.750 ~ ES=5.000  
Temperature Rise (Sine Wave): "B" Rise @ 1.0 SF (Resist)  
Starting Method ..... Direct-On-Line Start  
Duty Cycle ..... Continuous Duty  
Load Inertia (lb-ft2): NEMA ~ NEMA Inertia: 9526.00 ~ 1.00  
Number Of Starts Per Hour: NEMA  
Motor Type Code ..... JVCE  
Rotor Inertia (LB-FT<sup>2</sup>) 430. LB-FT<sup>2</sup>  
Qty. of Bearings PE (Shaft) 1  
Qty. of Bearings SE (OPP) 1  
Bearing Number PE (Shaft) 6226-J/C3  
Bearing Number SE (OPP) 6226-Z-J/C3



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**EMERSON MOTOR COMPANY**

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

DATE: 2/6/2006

P.O. NO.: 46780D  
USEM Order/Line NO.: 20041485 SO 100

TO: EMERSON ELECTRIC Fluid  
9999 MARKHAM ROAD  
ATTN: Nick Kinsella  
MARKHAM, ON, L3P3J3, CANADA  
ATTN:POWER&MINE 70182

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

REVISIONS:  
(NONE)

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
- Counter CW Rotation FODE
- Ground Lug In Conduit Box
- Grounding Pad On Frame
- Insul. Bearing - Upper Bracket
- Stainless Steel Hardware
- Bearing RTD-100 Ohm, 3 Lead
- Both Bearings
- Winding RTDs-100 Ohm Precision
- 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 Steel Accessory Outlet Box ~ Opposite Side of Main O/B
- 1" NPT Conduit Opening
- One Box with Terminal Board
- 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)

and (shown) for the

USE THE DATA PROVIDED BELOW TO SELECT THE APPROPRIATE DIMENSION PRINT

Horsepower	250
Pole(s)	40
Voltage(s)	575
Frame Size	5809P
Shaft U Diameter	2.875
Outlet Box AF	10.94
Outlet Box AA	3.5
Accessory Outlet Box DM	



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rests with the Contractor.

Responsibility for verification and correlation of field  
dimensions, fabrication process, techniques of  
construction, installation and coordination of all  
parts of the work rests with the Contractor.

REVIEWED

REVIEWED AS MODIFIED

REVISE AND RE-SUBMIT

NOT REVIEWED

Project No. 79538-C12-16

Date: March 16/06 By: B. Moor

# NAMEPLATE DATA

CATALOG NUMBER: \_\_\_\_\_

NAMEPLATE PART #: 422705-006

MODEL \_\_\_\_\_ FR 5809P

TYPE JVCE ENCL TE

SHAFT END BRG 6226-J/C3 - QTY 1

OPP END BRG 6226-Z-J/C3 - QTY 1

PH 3 MAX AMB 40 C

ID# (ref: Order#: 20041485, Type: SO, Line#: 100)

INSUL CLASS F Asm. Pos. \_\_\_\_\_

DUTY CONT

HP 250 RPM 714

HP \_\_\_\_\_ RPM \_\_\_\_\_

VOLTS 575

VOLTS \_\_\_\_\_

FL AMPS 256.0

FL AMPS \_\_\_\_\_

SF AMPS 290.0

SF AMPS \_\_\_\_\_

SF 1.15 DESIGN # # CODE G

SF \_\_\_\_\_ DESIGN \_\_\_\_\_ CODE \_\_\_\_\_

NEMA NOM EFFICIENCY 95.0 NOM PF 78.9 KiloWatt 186.5

NEMA NOM EFFICIENCY \_\_\_\_\_ NOM PF \_\_\_\_\_

GUARANTEED EFFICIENCY 94.1 MAX KVAR 103 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 \_\_\_\_\_

## Earth Tech (Canada) Inc.

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Responsibility for detail design in the shop drawings  
rests with the contractor.

Responsibility for the accurate correlation of field  
dimensions with the shop drawings of various  
construction items rests with the contractor of all  
parts of the work, not with the contractor.

REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE - SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. \_\_\_\_\_

Date: \_\_\_\_\_ By: \_\_\_\_\_

## MOTOR PERFORMANCE

MODEL NO.	CATALOG NO.	PHASE	TYPE	FRAME
NA	NA	3	JVCE	5809P

ORDER NO.	20041485	LINE NO.	100
-----------	----------	----------	-----

MPI:	94949
HP:	250
POLES:	10
VOLTS:	575
HZ:	60
SERVICE FACTOR:	1.15
EFFICIENCY (%):	
S.F.	94.9
FULL	95
3/4	95.7
1/2	95.4
1/4	93
POWER FACTOR (%):	
S.F.	78.4
FULL	76.9
3/4	71.5
1/2	60.5
1/4	38.3
NO LOAD	2.3
LOCKED ROTOR	21.1
AMPS:	
S.F.	290
FULL	256
3/4	205
1/2	162
1/4	132
NO LOAD	121.7
LOCKED ROTOR	1577
NEMA CODE LETTER	G
NEMA DESIGN LETTER	#
FULL LOAD RPM	714
NEMA NOMINAL EFFICIENCY (%)	95
GUARANTEED EFFICIENCY (%)	94.1
MAX KVAR	103
AMBIENT (°C)	40
ALTITUDE (FASL)	3300
SAFE STALL TIME-HOT (SEC)	30
SOUND PRESSURE (DBA @ 1M)	92
TORQUES:	
BREAKDOWN{% F.L.}	175
LOCKED ROTOR{% F.L.}	60
FULL LOAD{LB-FT}	1839.2

The Above Data Is Typical, Sinewave Power Unless Noted Otherwise



EMERSON MOTOR COMPANY  
ST. LOUIS, MO



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ADDITIONAL NAMEPLATE DATA:

Decal / Plate	WD=499495	Customer PN	
Notes		Non Rev Ratchet	
Max Temp Rise	80C RISE/RES@1.00SF	OPP/Upper Oil Cap	GREASE
Thermal (WDG)	OVER TEMP PROT 2	SHAFT/Lower Oil Cap	GREASE
Altitude			
EPACT Note		EPACT Compliance	
COS		Marine Duty	
Balance	0.05 IN/SEC	Arctic Duty	
3/4 Load Eff.	95.7	Inrush Limit	
Motor Weight	6800	Direction of Rotation	
Sound Level		Special Note 1	
Vertical Thrust	1200	Special Note 2	
Thrust Percentage		Special Note 3	
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	
380V 50 Hz Max Amps		SH Watts	
NEMA Inertia		Load Inertia	
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 COMPANY  
ST. LOUIS, MO



**Earth Tech (Canada) Inc.**

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

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REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_ ✓

Project No. 79538 - 012-16

Date: Nov 12/10 By: [Signature]

# TYPICAL REED CRITICAL FREQUENCY DATA

USEM MODEL NO: NA  
USEM CATALOG NO: NA

Frame: 5809P Type: JVCE

REED CRITICAL FREQUENCY:	32	HZ
CENTER OF GRAVITY:	32	IN
DEFLECTION @ CENTER OF GRAVITY:	0.010	IN
UNIT WEIGHT:	5700	LBS.
BASE DIAMETER:	30.5	IN.
MAXIMUM MOTOR DIAMETER:	31.875	IN.
DATE:	2/13/2006	



[Home](#) [Email](#)

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REVISE AND RE-SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. 79538-C12-16

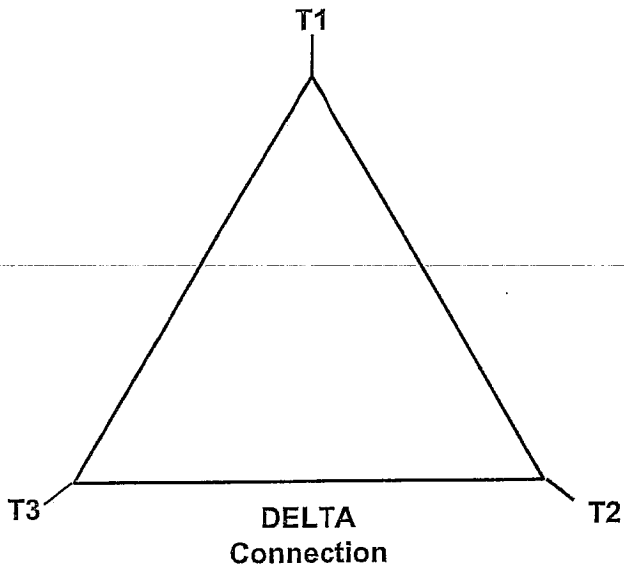
Date: Mar. 22/06 By: [Signature]



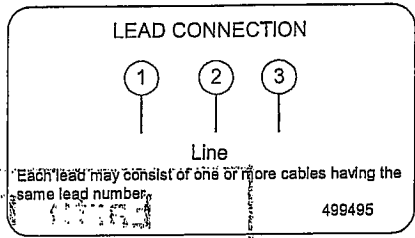
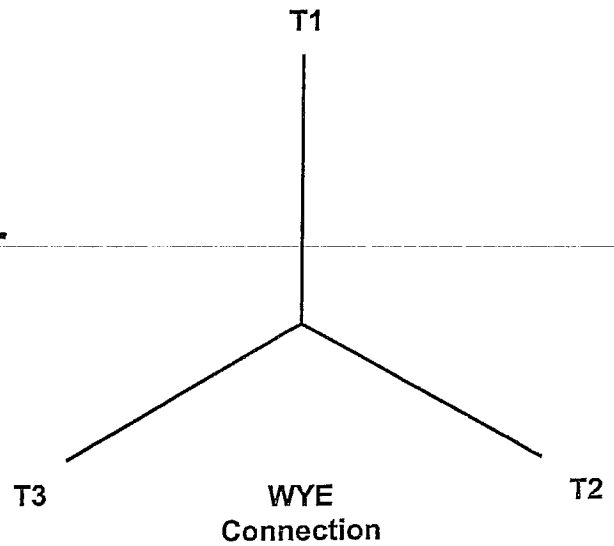


499495

### Motor Wiring Diagram



or



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.

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REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. 79538 - C12-16

Date: Mon. 22/00 By: [Signature]

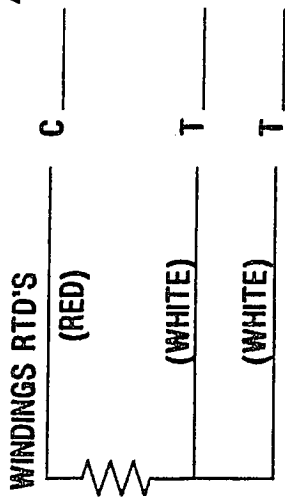
Fi A 833989 A

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

RTD NO.



Indicate temperature warning and alarm setpoints

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REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT

NOT REVIEWED \_\_\_\_\_

Project No. 79538-C12-16

Date: June 16/06 By: B. Moor

ACCESSORY LISTING

QTY-6 3 LEAD RTD'S

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

U.S. ELECTRICAL MOTORS DIVISION OF EMERSON ELECTRIC CO. ST. LOUIS, MISSOURI	CUSTOMER
SCALE: NONE 1 IN 3	CONNECTION DIAGRAM
MATERIAL: ---	TYPE FRAME: ---
DRWN 9-MAY-79, HEB	
RVSD 6-JUN-00, RWK	
APPD 6-JUN-00, REP	
1 1 CDG	833989 A

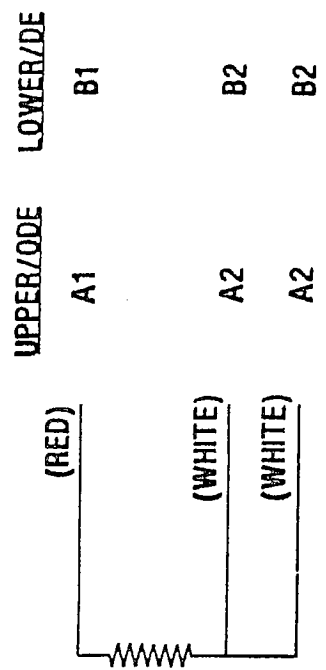
A 338312 A

**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**



*indicate temperature  
warning and alarm  
setpoints*

**Earth Tech (Canada) Inc.**

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REVIEWED \_\_\_\_\_  
REVIEWED AS MODIFIED \_\_\_\_\_  
REVISE AND RE-SUBMIT   
NOT REVIEWED \_\_\_\_\_

Project No. 79538 - C12-16  
Date: March 16/06 By: B. Moore

**ACCESSORY LISTING**

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

CUSTOMER CONNECTION  
DIAGRAM

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

SCALE NONE IN

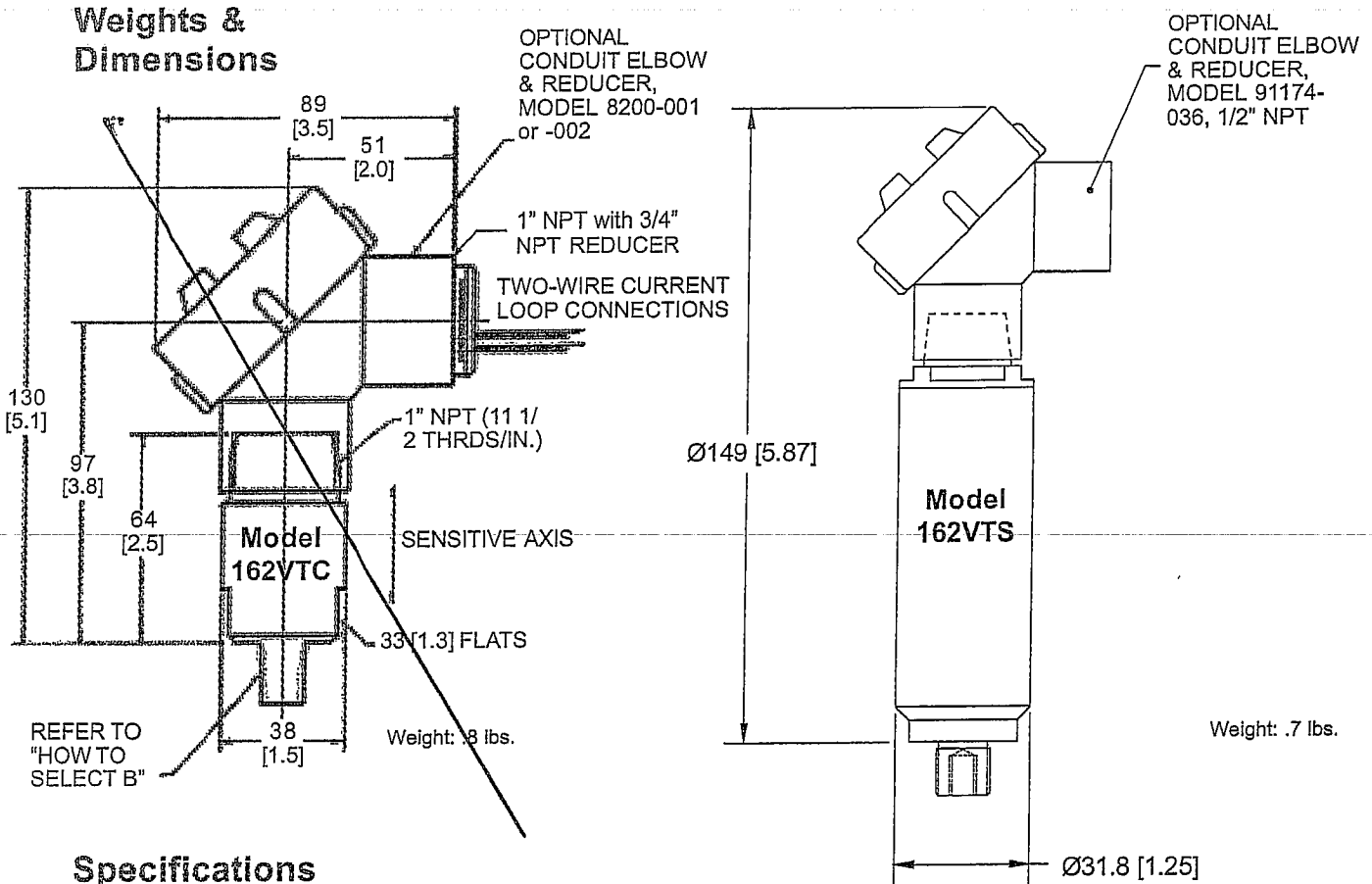
DATE DRWN 12-APR-00, RAW  
RVSD 11-JUL-00, RWK  
APPD 11-JUL-00, REP

MATERIAL

SHEET 1 of 1  
PREFIX CDG

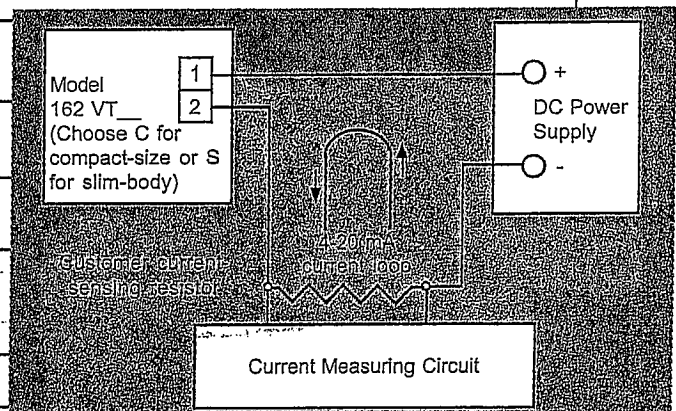
A 338312 A

## Weights & Dimensions



## Specifications

<b>Vibration Range:</b>	4 to 20 mA output proportional to velocity. Refer to "How to Select A" for ranges. Nonstandard ranges available.
<b>Dynamic Signal:</b>	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.
<b>Frequency Response:</b>	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.
<b>Axis Orientation:</b>	Any
<b>Supply Voltage (Vs):</b>	11 to 30 VDC, Non-polarity sensitive, IPT™
<b>Isolation:</b>	500Vrms, circuit to case
<b>Electrical Connection:</b>	Flying leads w/18 AWG wire 457 mm (24 in.) long, terminals (accepts up to 16 AWG wire) or MIL style 2-pin connector
<b>Maximum Load Resistance (R<sub>L</sub>):</b>	$R_L = 50 \times (V_{supply} - 11)$ ohms
<b>Service Temp. Rating:</b>	-40° to 100°C
<b>Enclosure Materials:</b>	303 SS
<b>Enclosure Environmental Rating:</b>	NEMA 4X, IP 65, IP 67 for 2 pin style connector
<b>Approvals:</b>	Refer to "How to Select C".



Indicate warning and alarm setpoints

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REVIEWED \_\_\_\_\_

REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT  \_\_\_\_\_

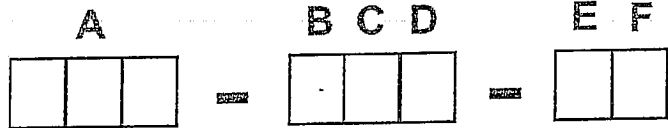
NOT REVIEWED \_\_\_\_\_

Project No. 79538-C12-16

Date: March 16/06 By: B. Moore

## Compact-Size Transmitter

162VTC



### 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

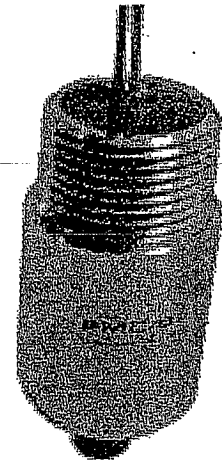
0	= Integral 1/4" NPT
1	= Integral 1/2" NPT
2	= 3/8 - 24 UNF X 1/2"
3	= 1/2 - 20 UNF X 1/2"
4	= M8X 1 - 12
5	= M10X 1.25 - 12

### 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

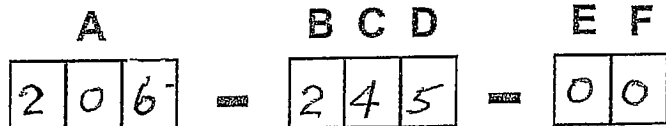
0	= 4-20 mA; Flying leads (C = 1 or 2)
1	= 4-20 mA & Dynamic Signal; Flying leads (C = 1 or 2)
2	= 4-20 mA; 2-pin terminal block (C = 1)
3	= 4-20 mA & Dynamic Signal; 4-pin terminal block (C = 1)
4	= 4-20 mA; 2-pin MS connector (C = 1)

### F - LP Filter

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

## Slim-body Transmitter

162VTS



### A - Full Scale

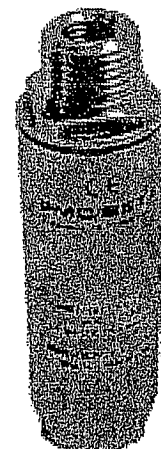
1	2	1	= 1.0 ips (25.4 mm/s), pk
1	2	3	= 2.0 ips (50.8 mm/s), pk
1	2	6	= 0.8 ips (20.3 mm/s), pk
1	3	4	= 1.97 ips (50.0 mm/s), pk
2	0	0	= 1.60 ips (40.6 mm/s), pk
2	0	1	= .32 ips (8.0 mm/s), pk
2	0	2	= .64 ips (16 mm/s), pk
2	0	3	= 1.26 ips (32.0 mm/s), pk
2	0	4	= 2.52 ips (64.0 mm/s), pk
2	0	5	= 3.2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



### 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

### 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

## Accessories for 162 VTC and VTS



**7084-001, Stainless Steel Flange Mount Adaptor**  
Provides a means to surface mount transmitters rather than NPT stud (1/2" 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 1/4" NPT. Material: SS



**8253-002, Bushing**  
Bushing for 1/2" NPT mount when screwed onto standard 1/4" 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 3/4" 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 3/4" 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. 1/2" 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



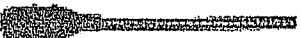
**91174-036, Conduit Elbow & Reducer**  
Provides access and physical protection for field wiring. Suitable for Class I, Div. 1 (Grps C & D) and Class II, Div. 1 (Grps E, F & G), hazardous areas. 1/2" to 1/2" NPT reducer for customer connection included. NEMA 4 IP 65. Material: copper free aluminum.

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

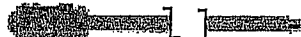
## Accessories for VTC 2 Pin MS Style Connector



**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**



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REVISE AND RE-SUBMIT \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. \_\_\_\_\_

Date: \_\_\_\_\_

By: \_\_\_\_\_

WHEN ORDERING SPECIFY ESSENTIAL INFORMATION.

AS5004PAB7ZC ← EXAMPLE OF MODEL NUMBER

AS5004 SPECIFICATIONS DRAWING NUMBER.

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

ELEMENT	RESISTANCE	0.101°C
PA	100.00 ±.5%	60°C .00392
PLATINUM	100.00 ±.1%	60°C .00385
PE	100.00 ±.5%	60°C .00385
PLATINUM	100.00 ±.2%	60°C .00427
COOPER	100.00 ±.5%	60°C .00427
IRON	100.00 ±.5%	60°C .00472

67 INSERTION DEPTH D IN .1" INCREMENTS (67 = 6.7).  
MINIMUM D = 10 (1.0") (26); (27)  
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).

2 CONDUIT THREAD:  
1 = 1/2 - 14 NPT; (17)  
2 = 3/4 - 14 NPT.

C 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:

211 TEMPTRAN MODEL:

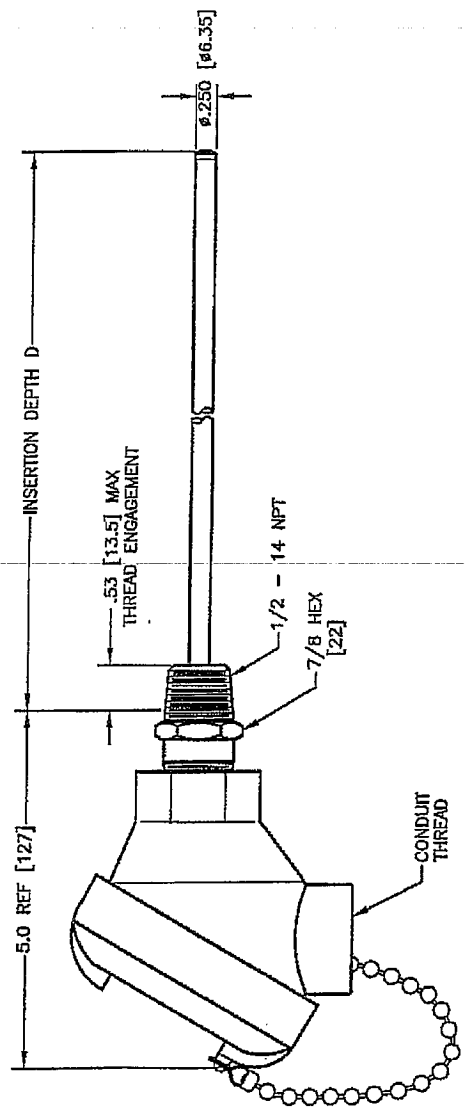
MINIATURE (2-LEADS REQUIRED):  
211 = TT211 (NOMINAL CALIBRATION);  
711 = TT711 (INDIVIDUAL CALIBRATION).  
STANDARD (3-LEADS REQUIRED):  
175 = TT175 (NOMINAL CALIBRATION);  
678 = TT678 (INDIVIDUAL CALIBRATION).

A TEMPERATURE RANGE CODE:  
A = 20 TO 120°F (-6.7 TO 48.8°C).  
SEE CATALOG FOR COMPLETE LIST OF AVAILABLE TEMPERATURE CODES.

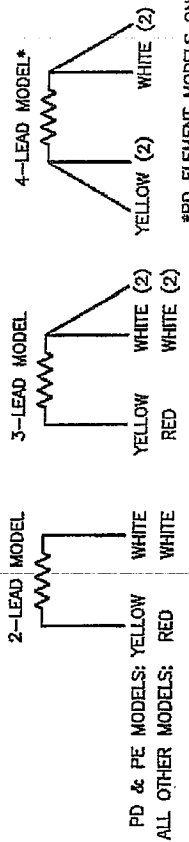
- ELEMENT: SEE TABLE ABOVE FOR ELEMENT OPTIONS.
- RESISTANCE: SEE TABLE ABOVE FOR RESISTANCE OPTIONS.
- TEMPERATURE RANGE: SEE TABLE ABOVE FOR RESISTANCE OPTIONS.
- LEADS: AWG #22, STRANDED, TFE INSULATED, LEAD LENGTH = 4.0 (102) REF INSIDE CONNECTION HEAD.
- CONNECTION HEADS: STAINLESS STEEL, COPPER ALLOY TIP.
- CONNECTIONS (MODELS WITHOUT TEMPTRAN): TERMINAL BOARD FOR WIRES TO AWG #14 (2.08).
- SEE MINCO FORM #11217 FOR ASSEMBLY INSTALLATION INSTRUCTIONS.
- THE PD ELEMENT RESISTANCE THERMOMETER WILL MEET THE RESISTANCE-TEMPERATURE RELATIONSHIP AND TOLERANCES SPECIFIED IN EN 80751 (IEC 751), CLASS B.
- THE 1/2 - 14 NPT PIPE THREAD ON THE CONDUIT OPENING ON THE STAINLESS STEEL HEAD USES A STAINLESS STEEL REDUCER BUSHING.
- FOR OPTIMAL PERFORMANCE, SUGGESTED MINIMUM INSERTION DEPTH D IS 17 (1.7") (43).

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

Indicate part number, warning & alarm setpoints



SCHEMATIC DIAGRAMS



PD & PE MODELS: YELLOW WHITE WHITE  
ALL OTHER MODELS: RED WHITE WHITE (2)

\*PD ELEMENT MODELS ONLY

INITIALS	DATE	ITEM	PARTY/STOCK NO	MATERIAL DESCRIPTION
WAB	05-27-03			
DES	08-21-03			
DLW	08-21-03			
PRU				
USG				
DR				

UNLESS OTHERWISE SPECIFIED DIMENSIONS AND TOLERANCES IN INCHES ONE PLACE (0) ±.020 [40.25] TWO PLACE (.00) ±.010 [40.25] THREE PLACE (.000) ±.005 [40.13] ANGLES

FINISH:

TEST	DATE	SCALE	TITLE
AS5004	3/17/05	NONE	RESISTANCE THERMOMETER ASSEMBLY TIP-SENSITIVE, SPRING-LOADED SINGLE ELEMENT RTD, AS5004 SERIES

CGP Transferred

MINCO  
www.minco.com  
CORPAC CORPORATION, PRODUCTS, INC.  
PROPRIETARY INFORMATION. DO NOT DUPLICATE

AS5004  
REV B

SCALE NONE

TIME PER SHEET 8

DATE IDENT 08558

SHEET 1 OF 1

Print Date: 10/12/2005 13:06

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REVISE AND RE - SUBMIT \_\_\_\_\_ ✓

NOT REVIEWED \_\_\_\_\_

Project No. 79538-C12-16

Date: Nov 17/06 By: B.M.

# VSD DATA

MagnaDrive™ Vertical Rack & Pinion ASD (22.5 – 26.5) w/AC Bearings for Solid Shaft Motor  
w/Full Shaft Support (VSSF)

Figure 1A: Vertical Solid Shaft (Fully Supported Shaft) Components

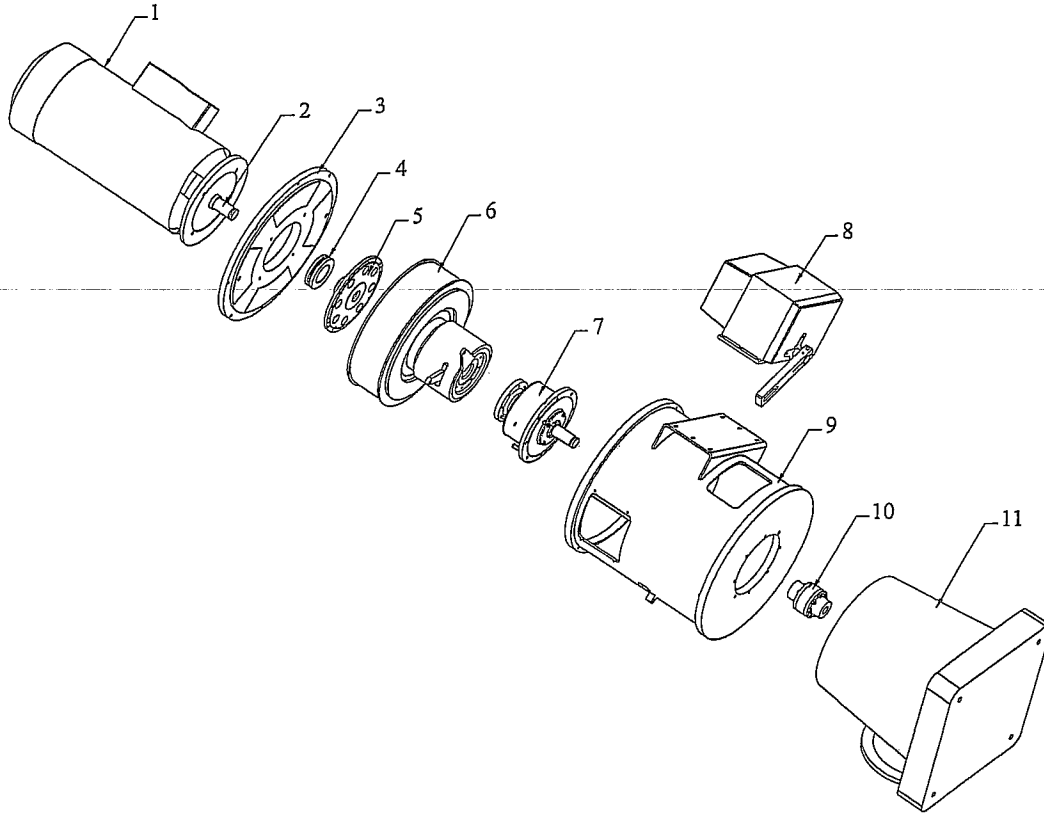


Table 1A System Components	
Item	
1	Motor
2	Motor Shaft
3	Motor Adapter Plate
4	Shrink Disc
5	Hub
6	MagnaDrive ASD (refer to Figure 1)
7	Support Bearing Assembly
8	Rotary Actuator
9	Vertical Frame
10	Pump Shaft Adjustment Coupling
11	Pump/Pump Base

**Earth Tech (Canada) Inc.** ✻

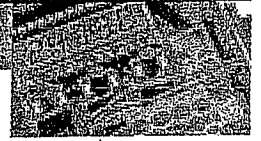
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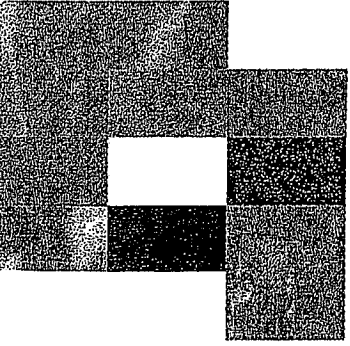
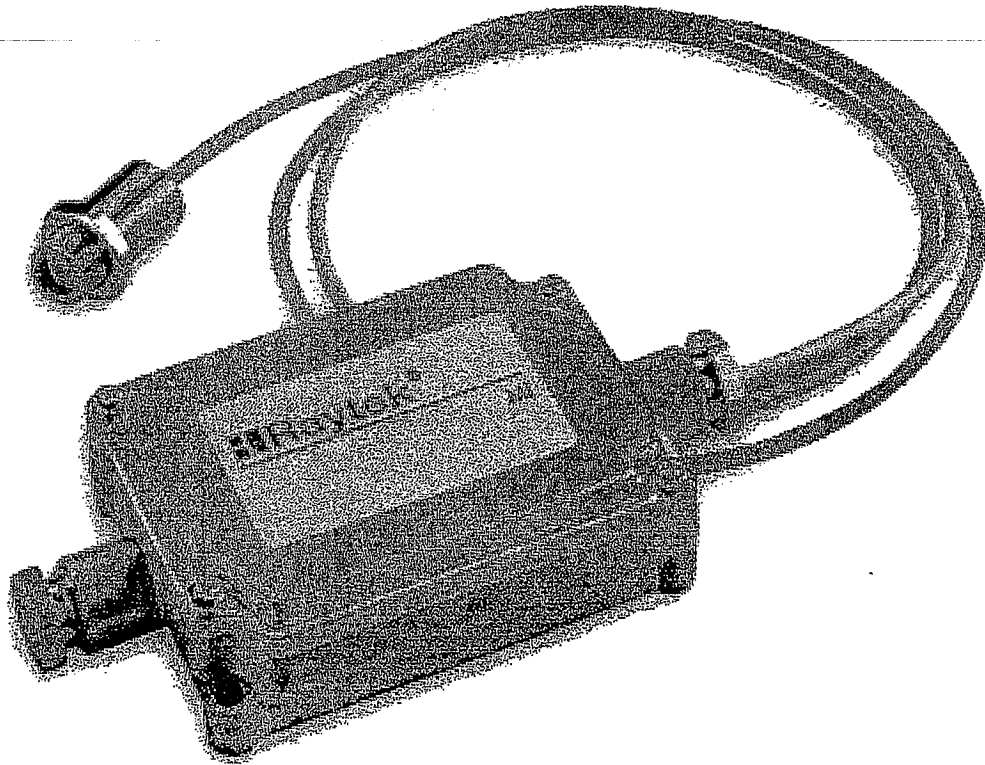
- REVIEWED \_\_\_\_\_ ✓
- REVIEWED AS MODIFIED \_\_\_\_\_
- REVISE AND RE - SUBMIT \_\_\_\_\_
- NOT REVIEWED \_\_\_\_\_

Project No. 79538- C12-16  
Date: Mar. 22/06 By: [Signature]

MI  
Datasheet



Noncontact Temperature Measurement for Industrial Applications



## MI Highlights

- Small sensing head fits where other sensors can't
- Three Ambient operating ranges  
MID 85°C (185°F) MIC 125°C (257°F) MIH 180°C (356°F)
- 5-digit backlit LCD user interface
- Adjustable Emissivity, Peak Hold, Valley Hold and Averaging functions
- 1% accuracy from -40°C to 600°C (-40°F to 1112°F)
- 10:1 optics
- Powered by 12-24 VDC at  $\leq 100$  mA
- Accessories for cooling and air purging
- Remote electronics box
- RS-232 or optional RS-485 digital communications for remote setup and monitoring

The Raytek MI is a two-piece infrared temperature measurement system with miniature sensing head and separate electronics. The sensor is small enough to be installed just about anywhere, yet it performs as well as much larger systems. The MI electronics include a host of signal processing features which you won't normally find in systems in this price range, including Emissivity, Peak Hold, Valley Hold, and Averaging function, all of which are adjustable on the 5-digit LCD user interface.

Designed for a wide range of applications where the target temperature is in the -40°C to 600°C (-40°F to 1,112°F) range, the sensor is housed in a rugged stainless steel enclosure to ensure long term performance, even in harsh industrial environments with ambient temperatures up to 180°C (356°F) without cooling. Although the MI unit is small in size, it still has the features you need, with 1% accuracy, 10:1 optics and user selectable output signals. And the MI system's response time is as fast or faster than many advanced systems.

Even more features are available with the RS-232 or optional RS-485 communications and the new DataTemp® MultiDrop Software. These features include remote control and monitoring of all sensor variables, a 5V alarm signal triggered by a target temperature or head ambient temperature, an 8-position "recipe" table that can be easily interfaced to an external control system, an external reset signal input for signal processing, and even external inputs for analog emissivity adjustment or reflected energy compensation.

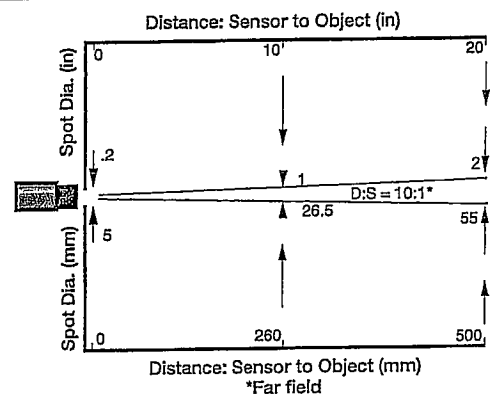
The MI unit's miniature size and low cost make it ideal for installation at multiple points along your process. Accurate. Rugged. Easy to install. Affordable. With the MI, precision infrared temperature measurement is now an economical alternative. Raytek MI - the hottest sensor in the industry.

## Measurement Specifications

Spectral Response	
Model	
LT (Low Temp.)	8 to 14 microns
Optical Resolution:	
LT	10:1
Temperature Range	
Model	
LT	-40°C to 600°C (-40°F to 1112°F); -25°C to 600°C for J-thermocouple output
System Accuracy:	
	$\pm 1\%$ of reading or $\pm 1^\circ\text{C}$ , whichever is greater Thermocouple output accuracy $\pm 1\%$ of reading or $\pm 2.5^\circ\text{C}$ , whichever is greater
System Repeatability:	
	$\pm 0.5\%$ of reading or $\pm 0.5^\circ\text{C}$ ( $1^\circ\text{F}$ ), whichever is greater
Temperature Coefficient	
MID	0.15K per K or 0.15% per K,
MIC	0.05K per K or 0.05% per K
MIH	0.05K per K or 0.05% per K whichever is greater*
Temperature Resolution:	
LT	0.3°C or 0.5°F
System Response Time: 150ms (95%)	
Emissivity:	
	0.100 to 1.100 digitally adjustable increments of .001
Transmission:	
	0.100 to 1.100 digitally adjustable increments of .001
Signal Processing:	
	Peak hold, valley hold, variable averaging filter, adjustable up to 999 seconds

\* NIST/DKD certified models available with 0.05K per K

## Nominal Optical Specifications



D:S is the optical resolution expressed as a ratio of the distance to the measurement spot divided by the diameter of the spot.

Optical resolution for the MI is 10:1.

Nominal spot size based on 90% energy.



## Electrical Specifications

Outputs:	Scalable 4-20mA, 0-20mA, 0-5V, <del>1 or K thermocouple</del>
Alarm Relay	10mV/°C Head Ambient signal
Cable Length:	1 m (3.2 ft) standard
Output Impedance (T/C output):	20 ohms
Minimum Load Impedance (mV output):	100K ohms
Maximum Loop Impedance (mA output):	500 ohms with 24 VDC power supply
Current Draw:	100 mA
Power Supply:	12-24 VDC

## Sensor Specifications

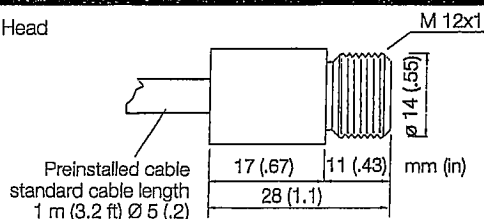
Environmental Rating:	NEMA-4 (IP 65)
Ambient Temperature Range:	
<del>MID</del>	<del>0°C to 85°C (32°F to 185°F)</del>
MIC	0°C to 125°C (32°F to 257°F)
<del>MHI</del>	<del>0°C to 180°C (32°F to 356°F)</del>
Electronics housing	0°C to 65°C (32°F to 150°F)
Storage Temperature:	-18°C to 85°C (0 to 185°F)
Relative Humidity:	10 to 95%, non-condensing
Construction:	
Sensing head	Stainless steel
Electronics housing	Zinc, die-cast

Weight:	
Sensing head (w/1 m cable)	50 g (1.75 oz)
Electronics housing	270 g (9.5 oz)

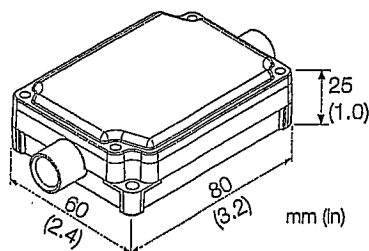
Shock IEC 68-2-27 (MIC ST 810D)-50g's, 11 ms on any axis  
 Vibration 68-2-27 (MIC ST 810D)-3g's, 11-200 Hz on any axis

## Sensor Dimensions

Sensing Head



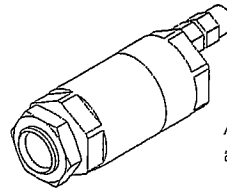
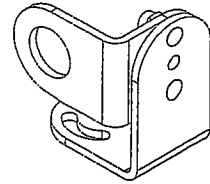
Electronics Housing



## Accessories / Options

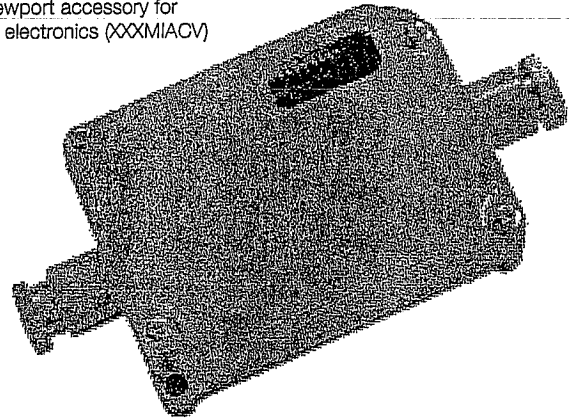
Each standard MI package includes a sensing head, one mounting nut, 1 m (3.2 ft) of cable, die-cast housing with premounted electronics, and an operator's manual. Longer cables up to 15m (50 ft) maximum are available and must be specified at time of order.

Adjustable or fixed mounting bracket for sensing head (XXXMIACAB or XXXMIACFB)



Air purge jacket to keep lens or right angle mirror clean (XXXMIACAJ)

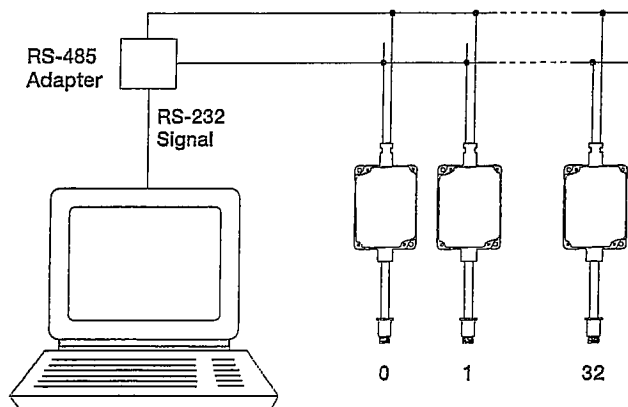
Viewport accessory for MI electronics (XXXMIACV)



## DataTemp® Multidrop software puts you in control.

## Multidrop Network Installation

RS-485 sensors can be configured in a multidrop network or point-to-point installation. In multidrop networks, a dedicated PC with DataTemp Multidrop software supports online system monitoring and configuration.



RAYMI

A  
C  
Model

B  
1 0  
Optics

C  
L T  
Temperature Range

D  
C B 3 V  
Options

Model	Description
RAYMI	Modular Infrared Thermometer
Code A	Model
D	Standard model includes selectable 4-20mA/0-20mA, 0-5 V, or J/K thermocouple output and head temperature output 85°C (185°F) ambient operating range .05k/k temperature coefficient
C	MID with DKD/NIST calibration certificate and optimized performance 125°C (257°F) ambient operating range .05k/k temperature coefficient
H	MID with DKD/NIST calibration certificate and optimized performance 180°C(356°F) ambient operating range .05k/k temperature coefficient
Code B	Optics
10	10:1 D:S sensor with 1m wiring cable
Code C	Temperature Range
LT	-40°C to 600°C (-40°F to 1112°F); 8 – 14 microns
Code D	Options
4	RS485 communication for multidrop networks
CB3	3m (9.8') cable
CB8	8m (26') cable
CB15	15m (49') cable
V	Display window for electronics housing
Typical Model Number	RAYMIH10LTGB3

Indicate warning and alarm setpoints

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REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT  \_\_\_\_\_

NOT REVIEWED \_\_\_\_\_

Project No. 79538-C12-16

Date: March 16/06 By: B. Hooper

Raytek Automation Products: Noncontact Temperature Measurement for Industrial Applications

Raytek Corporation  
 Worldwide Headquarters  
 1201 Shaffer Rd. PO Box 1820  
 Santa Cruz, CA 95061-1820 USA  
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 1 831 458 1110  
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 solutions@raytek.com

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# PRODUCT DESCRIPTION

WHY TWO DIFFERENT ACTUATORS?  
PLEASE CLARIFY.

Beck control drives are engineered for precise, reliable operation of dampers, quarter-turn valves and fluid drives. The cool, stable operation of Beck's control motors coupled with the powerful gear train provide the tight, responsive control required by modern control loops to optimize output while keeping operating costs low.

The unique all spur gear construction used in the Beck control drive is designed for long term durability. Gear modules and motors can be interchanged in the field to alter the torque and timing as needed if the application requirements change. Mechanical stops in the gear train prevent overtravel.

An easy to turn, spoke-free Handwheel is incorporated into the design to allow manual operation during installation or power outages. The Handwheel can be used to move dampers and valves to any position smoothly and easily under full load conditions.

Dampers and valves may also be operated at their individual locations with built-in electric Handswitches.

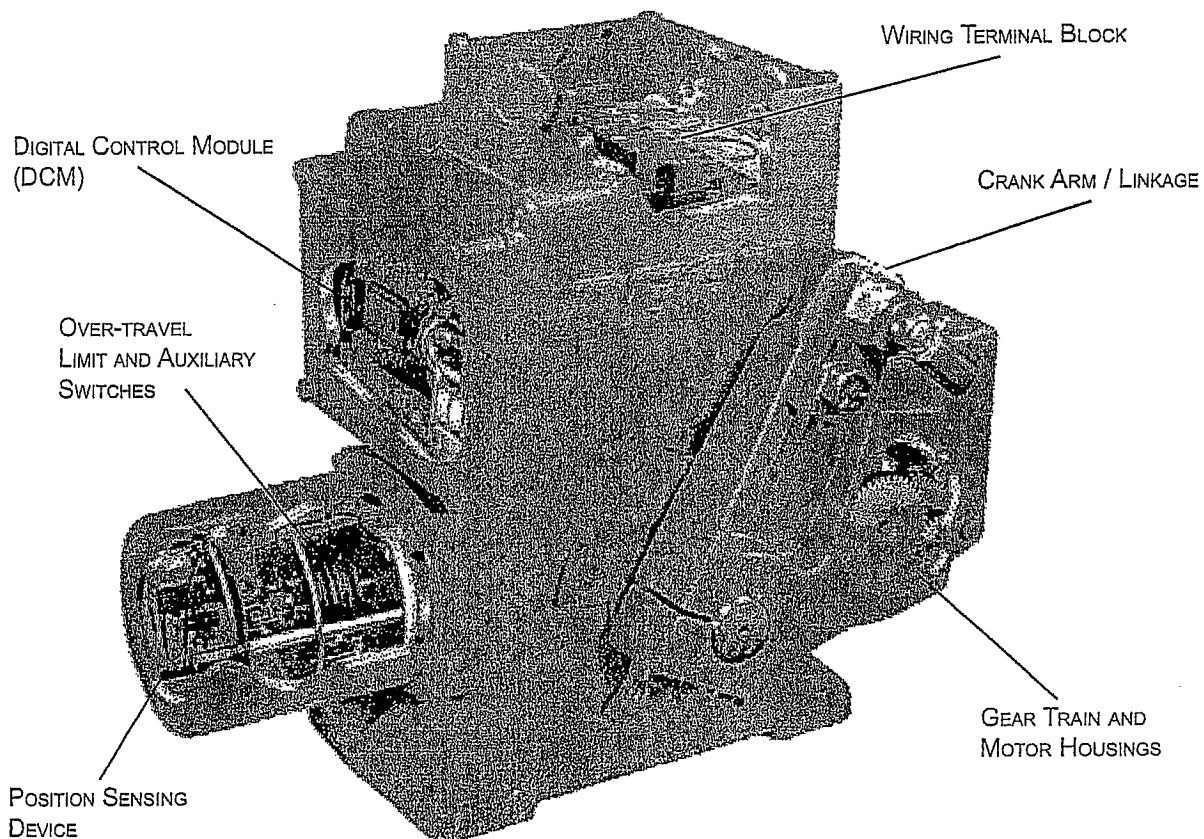
The heavy-duty crank arm (if applicable) of these control drives can be field-adjusted to travel anywhere in the 360° range. The forged rod end fitting may be field-adjusted to any point

in the cast slot of the crank arm. Special linkage arrangements allow total application versatility for connection directly on or remote from the driven load.

Beck's Digital Control Module (DCM) provides precise drive control in response to a modulating Demand input signal. It also provides intelligent calibration, easy drive setup changes, and diagnostic information. A local interface provides quick pushbutton setup and diagnostics without the need for a handheld or remote device. A HART® communications interface allows remote access of all features and information. A serial interface also allows for drive configuration changes, drive information reporting and to assist in troubleshooting.

Beck's CPS-2 Contactless Position Sensor provides accurate position measurement in demanding environmental conditions, with no contacting or wiping surfaces to wear or intermittently lose contact. The CPS-2 provides infinite resolution with linearity error of less than  $\pm 1\%$  of span over full control drive travel.

Beck electronic control drives are designed with individual weatherproof enclosures to protect the main components. The cutaway illustration below is intended to provide the user with a basic orientation to the product.

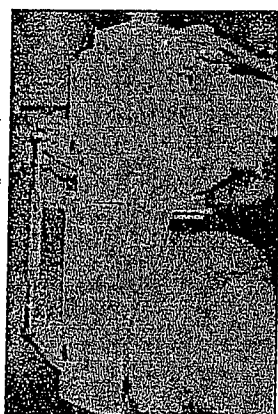
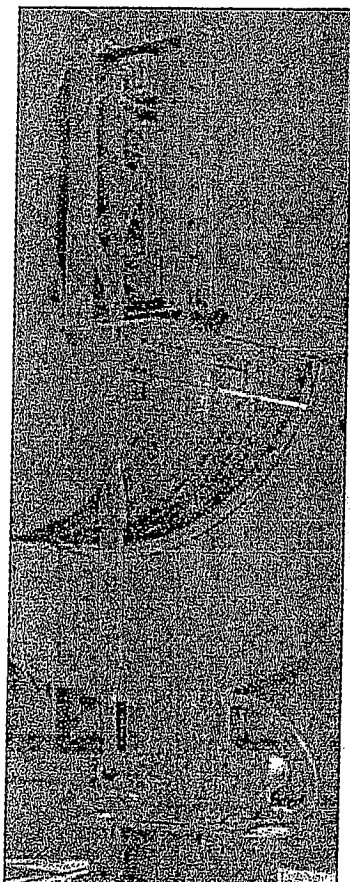


## TYPICAL APPLICATIONS

Beck control drives are ideally suited for use on ball, plug and butterfly valves, as well as dampers and fluid drives. When equipped with a sheave and multi-turn option (consult your Beck Sales Engineer for details), the drive can be used to raise and lower a weight-balanced damper.

DCM equipped Beck drives are designed for precise position control in modulating applications. The drive is best utilized when its full travel is employed to achieve its greatest sensitivity and resolution, although the driven device may operate through a considerably smaller range. Beck drives can be configured with special linkage to deliver greater torque where needed, so that drive size and resultant cost can be minimized.

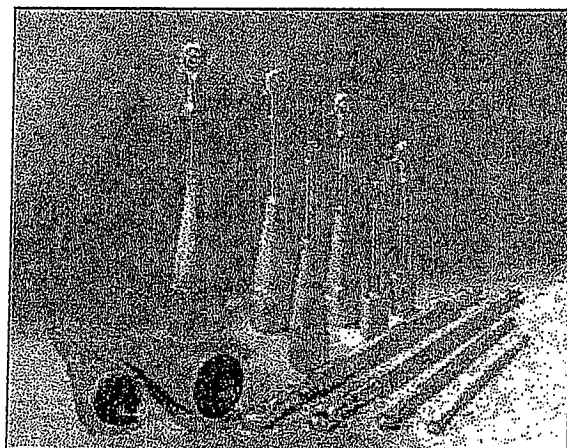
Valves can be furnished by Beck as unitized assemblies with control drives mounted and tested in the factory. Depending on the valve and application, valves can be mounted directly or using a bracket and linkage. Also, drives may be installed in the field with mounting hardware furnished by Beck or the customer. Drives for dampers are generally installed at the site on a mounting platform separate from the damper.



## BECK LINKAGE KITS

Beck hex and pipe linkage kits are available for completing the mechanical connection from the drive crank arm to the load. Through the use of a standardized selection, the linkage can be ordered even if the exact length is not determined until the drive and driven device are installed.

All Beck foot-mounted drives are furnished with a crank arm and rod end (see pages 8, 10 and 13 for dimensions). All rod ends furnished by Beck incorporate bearings to accommodate some lateral misalignment. Once the connection is made, linkage kits can be adjusted  $\pm 1 \frac{1}{2}$ " without removal of the crank arm or load lever, making final mechanical calibration simple.



# PRODUCT DESCRIPTION

## GENERAL SPECIFICATIONS—ALL MODELS

Drive Power	120 V ac single-phase 50 or 60 Hz 240 V ac single-phase 50 or 60 Hz	Allowable Tolerance	+10% -15%
Model	Max. Current and Power		
	120 V ac	240 V ac	
11-159, -169	.40 A      48 W	.20 A	48 W
11-209, -269	.65 A      78 W	.33 A	78 W
11-309, -369	.65 A      78 W	.33 A	78 W
11-409, -469	3.10 A     400 W	1.55 A	400 W
Operating Conditions	-40° to 85°C (-40° to 185°F) 0 to 100% relative humidity		
Communication Interface	HART protocol, local pushbutton/LED panel and RS-232 Serial commands.		
Demand input Signal Options (DCM)	4–20 mA, 1–5 V dc		
Adjustability for Split Range Operation	0%: 0.1 V to 4 V dc 100%: 0% + 1 V min. to 5 V max.		
Dead band	0.6% of span (configurable).		
Minimum Step	0.1% typical.		
Linearity	±1% of span, max. independent error		
Hysteresis	0.25% of span at any point		
Demand input Signal Characterization	Linear: Drive output shaft moves proportionally to the input signal. Square: Drive output shaft moves proportionally to the square of the input signal.		
Position Feedback Signal for Remote Indication	4–20 mA		
Isolation	Demand input and position Feedback signals are isolated from ground and the ac power line. Signal buffering provides 24 V dc isolation between the Demand and Feedback signals.		
Action on Loss of Power	Stays in place		
Action on Loss of Input Signal (Power On)	Stays in place or drives to any preset position (configurable).		
Stall Protection	If the motor tries to run in one direction for more than 300 seconds (configurable from 30 to 300 seconds), the DCM will shut off power to the motor.		

## GENERAL SPECIFICATIONS—ALL MODELS (cont'd)

Overtorque Protection (Optional)	If the output torque of the drive exceeds 115% of the drive rating, the motor will shut off (feature can be enabled/disabled).
Alarm Annunciation	120 V, 80 mA max. available at terminal E (not available on drives configured for 240V operation).
Temperature Indication	Measures the internal temperature of the drive and triggers an alarm when the temperature exceeds the rating range.
Over-travel Limit Switches	Two SPDT (CW and CCW) provide over-travel protection.
Auxiliary Switches	Up to four 6 A, 120 V ac switches available. Switches are labeled S1 to S4 and are cam-operated, field-adjustable. Unless otherwise specified, auxiliary switches are factory set: S1 and S4 are set to operate just before reaching the CCW travel limit. S2 and S3 are set to operate just before reaching the CW travel limit.
Handswitch	Permits local electrical operation, independent of controller signal. Standard on all units.
Handwheel	Provides manual operation without electrical power.
Motor	120 V ac, single-phase, no-burnout, non-coasting motor has instant magnetic braking. Requires no contacts or moving parts.
Gear Train	High-efficiency, precision-cut, heat-treated alloy steel and ductile iron spur gears. Interchangeable gear modules permit field change of timing.
Mechanical Stops	Prevent overtravel during automatic or manual operation.
Enclosure	NEMA 4X, precision-machined, aluminum alloy castings painted with corrosion-resistant polyurethane paint provide a rugged, dust-tight, weatherproof enclosure. Drives designed for hazardous classified locations are also available.
Mounting Orientation	Any orientation—no limitations.

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dimensions, fabrication process, techniques of  
construction, installation and coordination of all  
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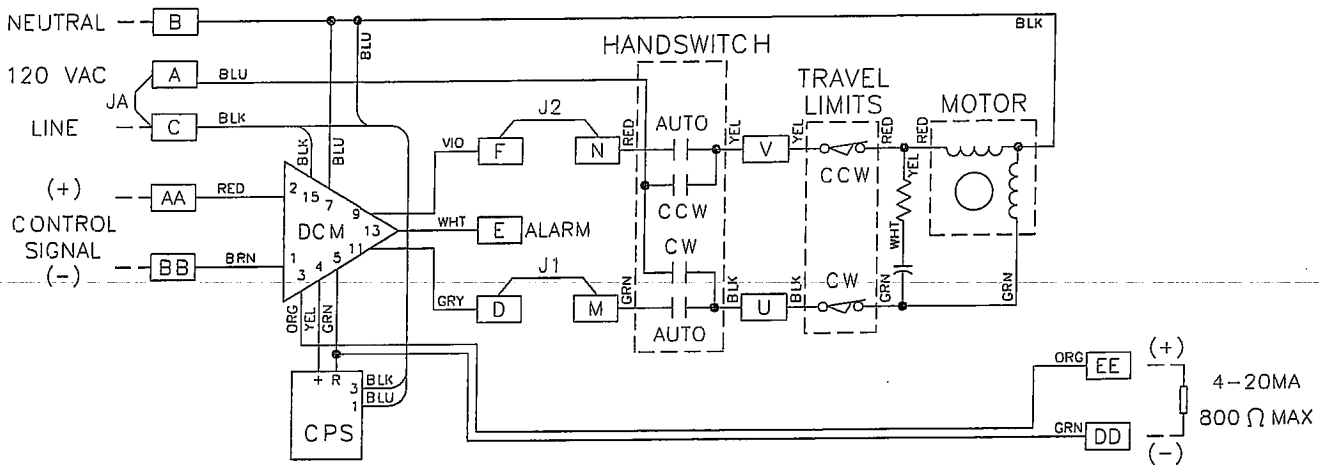
REVIEWED AS MODIFIED \_\_\_\_\_

REVISE AND RE-SUBMIT \_\_\_\_\_ ✓

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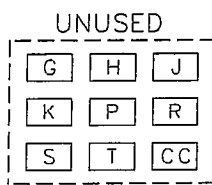
Project No. 79538-012-16

Date: Mar 22/00 By: BW



**NOTES:**

1. REMOVE JUMPER JA TO PREVENT HANDSWITCH INITIATED MOTION
2. J1 AND J2 ARE REQUIRED AS SHOWN
3. 120VAC ERROR ALARM AVAILABLE BETWEEN TERMINALS B AND E.



17-5122-90 B

SIZE:  
**A**

## HAROLD BECK & SONS INC

NEWTOWN INDUSTRIAL COMMONS    NEWTOWN, PENNSYLVANIA 18940 USA

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TITLE:  
**WIRING DIAGRAM GROUP 11-1X9/2X9/3X9/409/419**  
**120 VOLT 0 AUX SWITCHES INT CPS**  
**W/ DCM**

DRAWN: CHH 9-16-98	SCALE: NONE	DRAWING NO: <b>17-5122-90</b>	REV: <b>B</b>
CHECKED: BDP 9-16-98		SHEET NO.    1    OF    1	
APPROVED: JHM 9/23/98			



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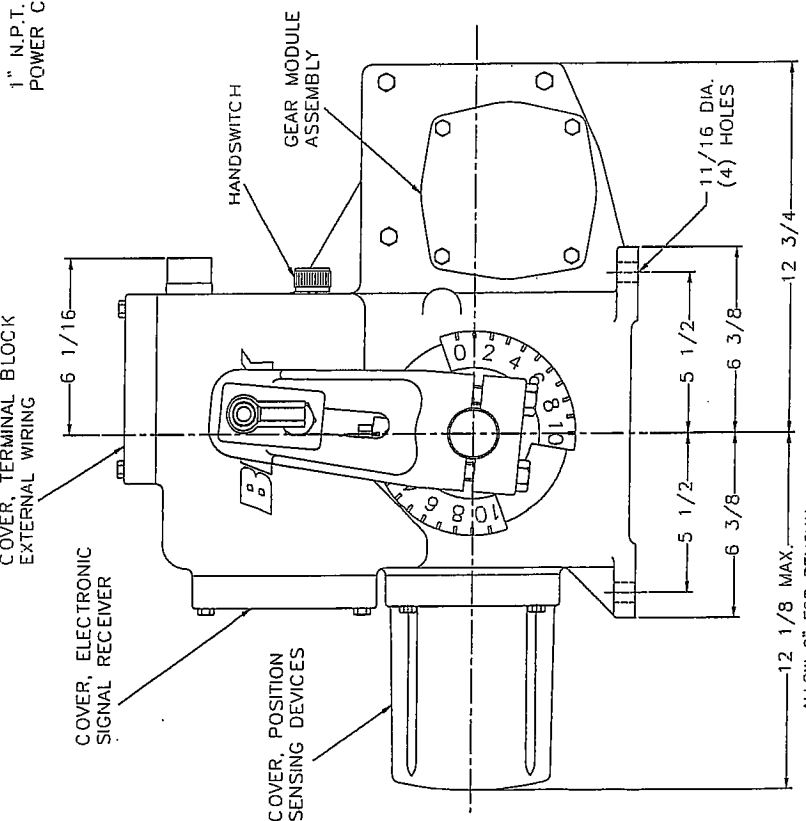
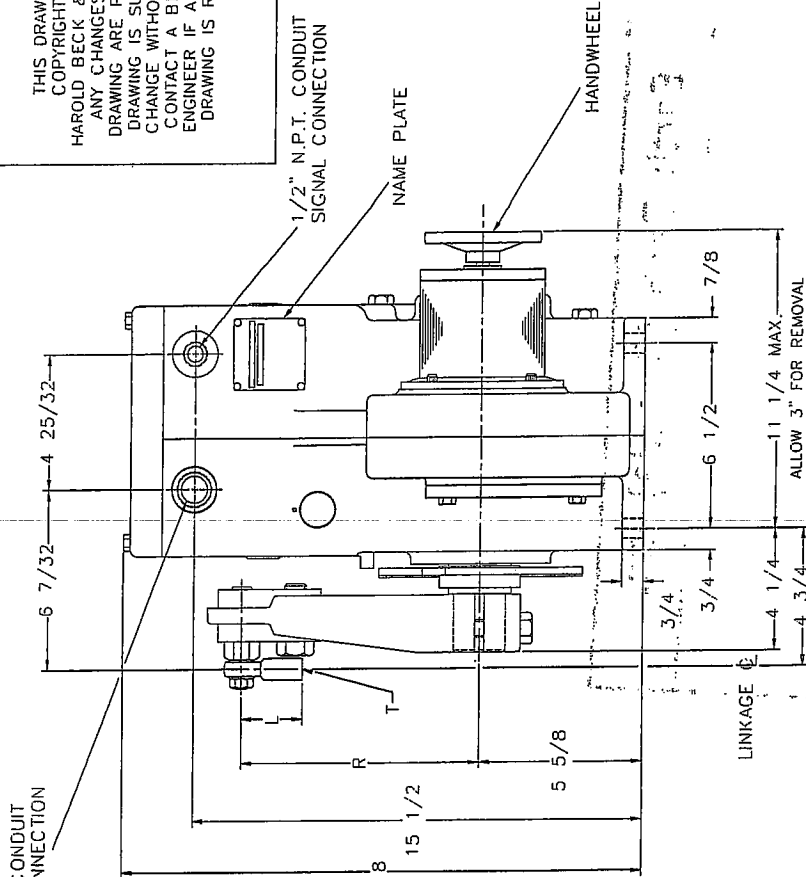
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Project No. 79538-002-16

Date: Mar. 27/06 By: B.

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BECK DRIVE MODEL NO.	TORQUE RANGE (LB. FT.)	APPROX. WT. (LBS.)	OUTPUT SHAFT DIA.	CRANKARM & SWIVEL SUPPLIED AS STANDARD				MAXIMUM OVERHUNG LOAD (LBS.)
				CRANKARM PART NO.	CRANKARM RADIUS (ADJUSTABLE)	SWIVEL LENGTH	SWIVEL INTERNAL THREAD	
11-300	300 TO 650	125	1 3/4	14-8010-34	3-1/2 TO 8	2-1/2	5/8-18x1-1/2	4500

RECOMMENDED BOLT TORQUES		TORQUE (LB.-FT.)	
SIZE	TYPE	11-200	11-300
CRANK ARM BOLT	5/16-18	300	300
CRANK PIN BOLT/STUD	3/4-16	300	300
CRANK PIN BOLT	3/4-16	300	300
ROD END LOCK NUT.	1/2-20	35	65
BODY BOLTS	5/8-16	20	20
BODY BOLTS	3/8-16	20	20
LOUISER BOLTS	1/2-13	50	50
LOUISER BOLTS	5/16-18	10	10
GEAR MODULE BOLTS	5/16-18	6	6
GEAR MODULE BOLTS	5/16-18	10	10

TOLEANCES:  
OUTLINE DIMENSIONS ±1/4  
MOUNTING DIMENSIONS ±1/16

ALL DIMENSIONS ARE IN INCHES  
METRIC DIMENSIONS AVAILABLE UPON REQUEST

18-0300-01

**HAROLD BECK & SONS INC.**  
10000 W. 130TH ST. - OVERLAND PARK, MISSOURI 66204  
TEL. (913) 541-3333

OUTLINE DIMENSIONS  
BECK 11-300 DRIVE

REV D

DATE	18-0300-01	REV	E
BY		DATE	18-0300-01
CHKD		BY	
APP'D		DATE	
DATE		BY	

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REVISE AND RE-SUBMIT \_\_\_\_\_ ✓

NOT REVIEWED \_\_\_\_\_

Project No. \_\_\_\_\_

Date: \_\_\_\_\_

1538-02-16  
By: [Signature]

# NOTES

**NOTES:**

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 discharge head.
4. There will be two infrared temperature sensors / transmitters mounted on the body of the Magna Drive VSD.
5. The PMC Beta transmitter is mounted directly on the motor enclosure at the top bearing location.

*recommended*  
Provide all <sup>^</sup> temperature and vibration warning  
and alarm setpoints

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REVIEWED AS MODIFIED	_____
REVISE AND RE-SUBMIT	_____ ✓
NOT REVIEWED	_____
Project No.	79538-C12-16
Date:	March 17/06 By: B Moore