September 5, 2017

Ogallala WWTP
1858 HWY 49 South, PO Box 879
Ogallala, NE 69153

Attention: Doug Flores, (308) 289-2985

Reference: Ogallala, NE (Ogallala WWTP)
Ogallala WWTP Purchase Order #LOI-PO Pending, August 15, 2017
JWC Environmental SO# 112819

Dear Doug Flores:

Enclosed please find our mechanical submittal package for the above referenced project. Please note that the electrical submittals will be provided as soon as available under separate cover in an effort to mitigate the total project time. This package includes the engineering data, pertinent drawings and bill of material for equipment as required for this project.

Review & Approval:

Once your review is complete, please return one complete copy of the approved drawings and bill of material clearly identifying all remarks or concerns that you may have.

Shipping Instructions:

Please confirm the contact person, telephone number and job site address.
Ship to:
Ogallala WWTP
c/o Ogallala WWTP
411 E. 2nd St.
Ogallala, NE 69153
Contact: Doug Flores; (308) 289-2985

Ship to: Ogallala WWTP
2820 E. Riverdale Rd
Ogallala, NE 69153

Shipping Instructions:

Upon receipt of the equipment, please check the packing list to make sure all items have been received. If there is any discrepancy, please contact JWC Environmental.

If any part of the shipment appear to be damaged upon arrival or missing, you should request a carrier inspection, and notify JWC Environmental as soon as possible.

Purchaser is responsible to keep equipment and/or material in a safe, dry place, protected from the elements, vandals or thieves.

Supplied by JWC Environmental:

The following items are to be supplied by JWC Environmental:
1. ONE (1) Chain and Rake Monster™
2. FOUR (4) Operation and Maintenance manuals
3. ONE (1) Service Technician to be on-site for advice during installation and start up. Three (3) days on two (2) trips.

Supply by Others:

The following items are to be supplied by Others:

1. Preparation of the channel and removal of existing screen or equipment.
2. Unloading and installation of new screen and equipment.
3. Civil works and electrical wiring and conduit.
4. Anchor Bolts

Currently this project has not been released for manufacturing. Upon approval of the submittal package, engineering will release the project to manufacturing, and an estimated completion date will be determined. JWC Environmental is committed to providing a successful delivery and installation of this project. Please let me know if you have any questions.

Best regards,

Randy Ullon
Applications Engineer – MSS Team
Tel: (714) 428-47873
Fax: (714) 242-0240
Email: randyu@jwce.com

PRODUCT SUBMITTAL

DATE: September 5, 2017
JWC SO#: 112819
JOB NAME: Ogallala, NE (Ogallala WWTP)

SCOPE OF SUPPLY		QUANTITY
1.	JWC ENVIRONMENTAL CHAIN AND RAKE MONSTER™	ONE (1)
2.	ELECTRICAL CONTROL PANEL (To be submitted under separate cover)	ONE (1)

JOB SITE:

Ogallala WWTP
411 E. 2nd St.
Ogallala, NE 69153
Contact: Doug Flores; (308) 289-2985

CONTACT INFORMATION:

ENGINEER

Contact:
Tel:
Fax:

REPRESENTATIVE
Electric Pump
4280 E. 14th St.
Des Moines, IA 50313
Contact: Taylor Musselman
Tel: (515) 393-6172
Fax: (515) 265-8079

CONTRACTOR
Ogallala WWTP
1858 HWY 49 South, PO Box 879
Ogallala, NE 69153
Contact: Doug Flores
Tel: (308) 289-2985
Fax: doug.flores@ogallala-ne.gov

MANUFACTURER
JWC Environmental
2600 S. Garnsey Street
Santa Ana, CA 92707
Contact: Randy Ullon
Tel: (714) 428-4622
Fax: (714) 242-0240

TABLE OF CONTENTS

1

1. SCREEN

- Equipment description
- Mechanical Drawings

DRAWING NO.	*DRAWING TITLE*	*SHEET*
MCR024-80-GA-112819	Chain & Rake Screen Monster General Arrangement	1 of 5
MCR024-80-GA-112819	Chain & Rake Screen Monster General Arrangement	2 of 5
MCR024-80-GA-112819	Chain & Rake Screen Monster General Arrangement	3 of 5
MCR024-80-GA-112819	Chain & Rake Screen Monster General Arrangement	4 of 5
MCR024-80-GA-112819	Chain & Rake Screen Monster General Arrangement	5 of 5
MCR024-80-A-112819	Chain & Rake Screen Monster Assembly	1 of 1

CHAIN AND RAKE MONSTER™

Ogallala, NE (Ogallala WWTP)

MODEL: MCR
QTY: ONE (1)

FEATURES:

- CAPACITY-SUITABLE FOR HANDLING UP TO 0.5 MGD (21.90 l/s) IN A CHANNEL 24” (610 mm) WIDE BY 60” (1524 MM) DEEP
- SCREEN ANGLE - 80 DEGREE (FROM HORIZONTAL)
- BAR SPACING, CLEAR - 0.25” (6 mm) DIAMETER
- BARS - TAPERED 1 1/2 X 5/16 X 1/4
- VERTICAL BAR HEIGHT - 31 1/8” (791 mm) 48"
- CHAIN SIZE - 6" (152mm) WITH 12000 LBF BREAKING STRENGTH
- SCREEN DRIVE - 1 1/2HP (1.1 kW) MOTOR, XPFC 1.0 S.F., 460V, 3ph, 60Hz with a 380.39:1 REDUCER
- ADJUSTABLE WIPER BLADE MECHANISM
- INCLUDES ALL SPLASH AND SAFETY GUARDS
- DISCHARGE CHUTE - 54” (1372 mm) TALL
- GENERAL MATERIAL OF CONSTRUCTION - 304 STAINLESS STEEL

SERIAL # 112819-1-1

CHAIN & RAKE BAR SCREEN

A. Operation

The Chain & Rake Bar Screen System(s) is a self-contained screenings system used to effectively capture and transport wastewater solids to a conveyor/compactor. The Chain & Rake Bar Screen uses toothed rakes or debris lifters mounted on continuous strands of chain, operating overhead driven sprocket and bottom guide rail. The rakes clean screenings from the bar rack as they ascend from the bottom, upstream side of the rack. At the top of the rakes, debris passes under a pivoting rake wiper where screenings are removed from the rake tines and discharged from the back of the machine.

B. Equipment Description

1. Drive Assembly – A direct mount assembly of a single speed motor, a reducer gearbox, drive shaft and chain sprockets produces the main drive power for the unit. The two continuous strands of chain are driven by the chain sprockets at the top and guided by stainless steel tracks at the bottom and along the sides of the screen. A motor specification sheet has been included in the cut sheet section of this submittal.

2. Drive Shaft - The stainless steel drive shaft rotates in sealed take-up bearings housed in adjustable plates attached to the top to the screen. These plates are located via threaded rod and nuts, and provide chain tension and alignment adjustment. Access to these adjustments is available from outside the screen.

3. Framework – The frame is fabricated of stainless steel members and spans the concrete channel to support the drive and bar rack. The minimum thickness of the stainless steel member is 3/16". All fasteners are also stainless steel.

4. Bar Rack - Screen bars are constructed of stainless steel bar as described in the Submittal Data sheets above. The bars are securely affixed to stainless steel cross members and assembled as an easily removed integrated unit.

5. Dead plate – The dead plate extends from the top of the bar rack to the point of discharge. Dead plate is true and flat such that a close clearance between the raking tines and the plate is maintained during the cleaning cycle.

6. Rakes, Wiper and Tines - screen rakes are designed so that screenings will not wrap around the tines or the stationary bars and will not fall back into the sewage flow during the cleaning cycle. The screenings are mechanically cleaned from the bar rack by tine plates that are mounted on rake plates attached to the links of roller chains on each side of the screen.

    - During each cleaning stroke, the raking tines pass over a curved sill plate attached to the bottom of the bar screen and sealing to the bottom of the channel which will guide the teeth smoothly into the bottom of the bar screen. The raking tines penetrate into the screen bar spaces to ensure the bars are completely cleared during each lifting operation. Screenings transported to the top of the screen are removed from the lifting tines by means of a replaceable pivoting wiper blade and ejected directly into the discharge chute.

- The wiper mechanism allows the wiper blade to fully clean the tines and return smoothly to its rest position. The replaceable wiper blade is made of UHMW. Comb plates are 6" wide and provide tooth thicknesses sufficient for long term durability. These plates consist of a single piece of stainless steel into which 3 to 4 tooth profiles are machined.

- Comb plates are securely mounted side by side to a stainless steel rake bar, forming a uniform array of rake teeth running the width of the bar screen. Rake assemblies are securely fastened to stainless steel lifting chains on either side at intervals sufficient to provide maximum effective cleaning and minimum head loss.

7. Chains and guides - The roller type lifting chains run through guides, front and back, to ensure full and continuous engagement with the upstream side of the screen. At the lower end of the screen, the chains pass around stainless steel guides. The two matched strands of stainless steel roller lifting chain are suspended at the top and driven by stainless steel sprockets which are keyed to a stainless steel shaft.

8. Discharge Chute – A discharge chute is provided for each screen to divert screenings discharged from the screen. The discharge chute is made out of stainless steel.

9. Inspection Covers - Inspection covers are provided to allow for observation and inspection during screen operation. Covers are attached to the frame with stainless steel hardware.

10. Level sensors – The FineScreen Monster is provided with ultrasonic level sensors. The level sensors will initiate screen operation based on channel differential and the parameters set in the operator interface.

    Phone Conversation with Randy indicated that there is only one level sonsor that will activate the bar screen when influent reaches a certain height caused by debris. We decided that one sensor setup is sufficient.

Global Headquarters
2850 S. Red Hill Ave, Suite 125
Santa Ana, CA 92705, USA
phone (949) 833-3888
toll-free (800) 331-2277
fax (949) 833-8858
jwce@jwce.com

BUDGET INFORMATION MSS PRODUCT LINE

DATE: 08/17/2017
PROJECT: Ogallala, NE
Number of screens: 1

Thank you for choosing JWCE's screening equipment. Enclosed you will find a specification, drawing, and flow curves based on the design parameters listed below. Please advise JWCE if any of the information below changes. The estimated performance below is based on the listed downstream flow parameters as provided to us while the equipment is operating. Any changes to these conditions will affect the overall head drop across the screen.

Model:	**MCR (Monster® Chain and Rake)**
Channel Width:	24.00 inches
Channel Depth:	60.00 inches
Top of channel to operating floor:	11.33 feet
Discharge Height:	54.00 inches
Bar thickness:	5/16 inches
Bar spacing:	1/4 inches
Bar profile:	Tapered
Angle of inclination:	80 degrees
Waste Fluid Type:	Domestic Waste Water
Amount of vertical screen recessing:	None (standard installation configured)
Peak Flow:	0.5 MGD
Water level downstream at peak flow:	8.00 inches

Peak Flow Hydraulic Performance Summary (refer to attached flow curves for full performance)

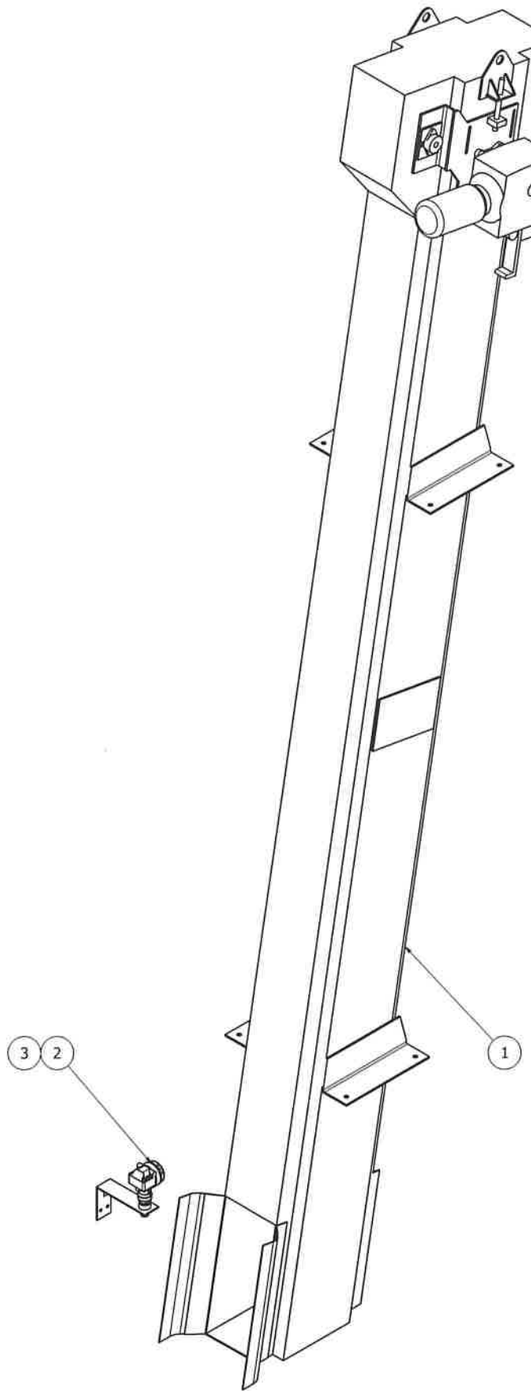
Head drop at 0% blinding (while running):	2.87 inches at peak flow
Water Level upstream at 0% blinding:	10.87 inches at peak flow
Head drop at 30% blinding (while running):	4.15 inches at peak flow
Water Level upstream at 30% blinding:	12.15 inches at peak flow
Head drop at 50% blinding (while running):	5.74 inches at peak flow
Water Level upstream at 50% blinding:	13.74 inches at peak flow

Note: The Information above is preliminary and not intended to be used for construction.

DRAWING NO. **MCR024-80-GA-112819**

REVISION HISTORY

ZONE	REV	DESCRIPTION	ECO NO.	DATE	CHKD	PE	MFG	QC
ALL	A	INITIAL RELEASE		9/5/17				



NOTES: UNLESS OTHERWISE SPECIFIED

1. FIELD MEASUREMENTS MUST BE TAKEN TO VERIFY ADEQUATE CLEARANCE AROUND THE EQUIPMENT.
2. ANCHOR BOLTS PROVIDED BY OTHERS. 8X 5/8-11 X 12, 4X 1/2-13 X 8.
3. GROUT REQUIRED UNDER ITEM 1 (OPERATING FLOOR, TOP OF CHANNEL AND CHANNEL FLOOR). PROVIDED BY OTHERS.
4. SCREENING WASHER, CONVEYORS AND/OR SLUICES TO BE MOUNTED IN SUCH A WAS AS TO CREATED A 1" MINIMUM ENGAGEMENT BETWEEN INLET AND SCREEN DISCHARGE.
5. WATER LEVELS SHOWN BASED ON 0.5 MGD WITH A 50% BLINDING FACTOR.
6. MINIMUM DISTANCE BETWEEN LEVEL SENSOR BOTTOM AND MAX WATER LEVER IS 12".
7. DRAWING FOR SUBMITTAL PURPOSES ONLY. ALL DIMS AND FIT TO BE FIELD VERIFIED BY INSTALLING CONTRACTOR PRIOR TO RELEASE FOR FABRICATION.

ITEM	QTY	PART NUMBER	DESCRIPTION	MATERIAL
4	1	E15-011-275	CORD SET, ULTRASONIC LEVEL SENSOR 66' (NOT SHOWN)	ALLEN BRADLEY
3	1	MSC1053-001-SU	SUPPORT, LEVEL TRANSDUCER	316 SST
2	1	E15-022-008	ULTRASONIC TRANSDUCER	ENDRESS HAUSER
1	1	MCR	CHAIN & RAKE MONSTER	304 SST

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
FRACTIONS ± 1/16 DECIMALS .XX ± .03 .XXX± .005 ANGLES ± 1/2°

MATERIAL: AS NOTED

FINISH:

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN R. ULLON	9/1/17
CHECKED	9/5/17
MANUF.	
Q.C.	

JWC ENVIRONMENTAL
290 PAULARINO AVE, COSTA MESA, CA 92626

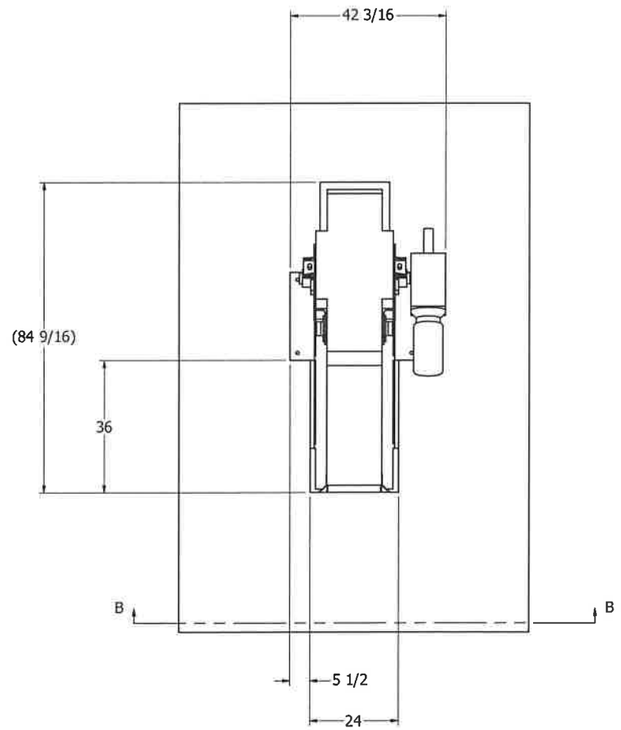
MCR GENERAL ARRANGEMENT

CHAIN & RAKE MONSTER
OGALLALA, NE (OGALLALA WWTP)

SIZE D | DRAWING NO. MCR024-80-GA-112819 | REV A

SCALE: NONE | SHEET 1 OF 5

DRAWING NO. **MCR024-80-GA-112819**



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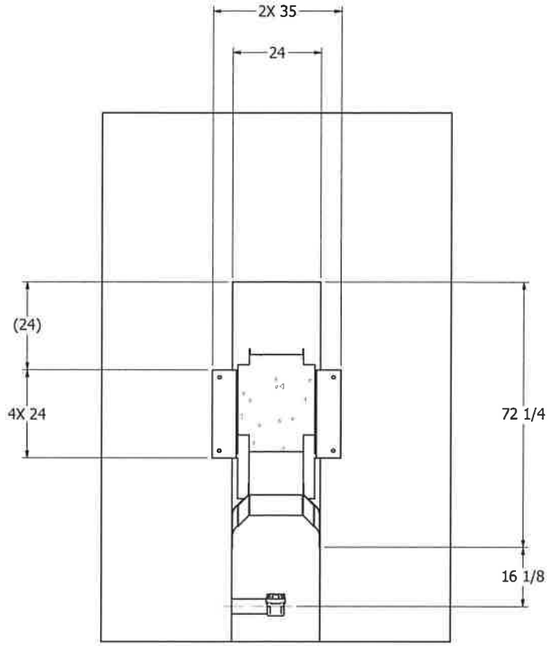
SCALE 1/20



SECTION A-A
SCALE 1/20

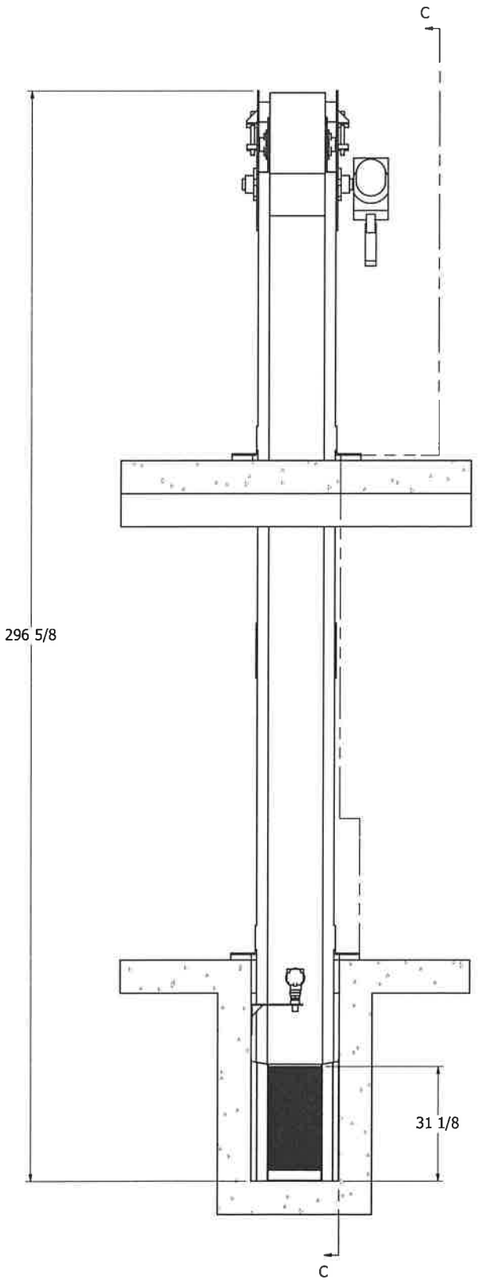
JWC ENVIRONMENTAL
290 PAULARINO AVE, COSTA MESA, CA 92626

MCR GENERAL ARRANGEMENT

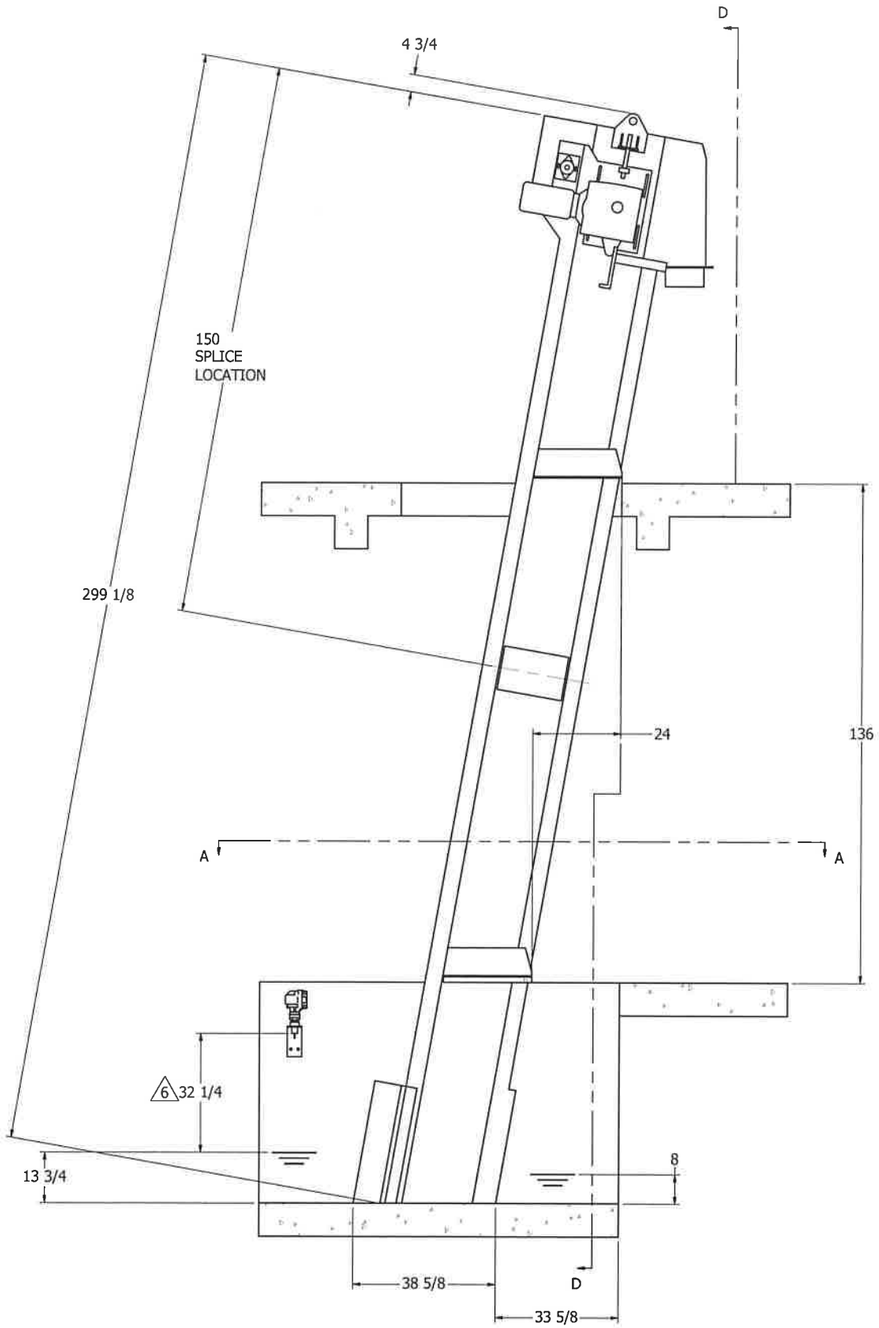
CHAIN & RAKE MONSTER
OGALLALA, NE (OGALLALA WWTP)

SIZE	DRAWING NO.	REV
D	MCR024-80-GA-112819	A
SCALE: NONE	SD PL	SHEET 2 OF 5

DRAWING NO. **MCR024-80-GA-112819**



SECTION B-B
SCALE 1/20



SECTION C-C
SCALE 1/20

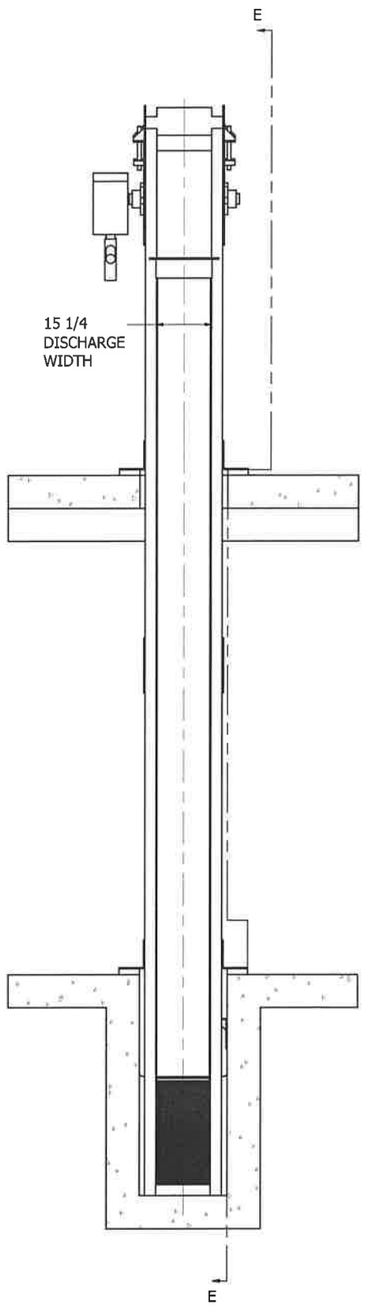
JWC ENVIRONMENTAL
290 PAULARINO AVE, COSTA MESA, CA 92626

MCR GENERAL ARRANGEMENT
CHAIN & RAKE MONSTER
OGALLALA, NE (OGALLALA WWTP)

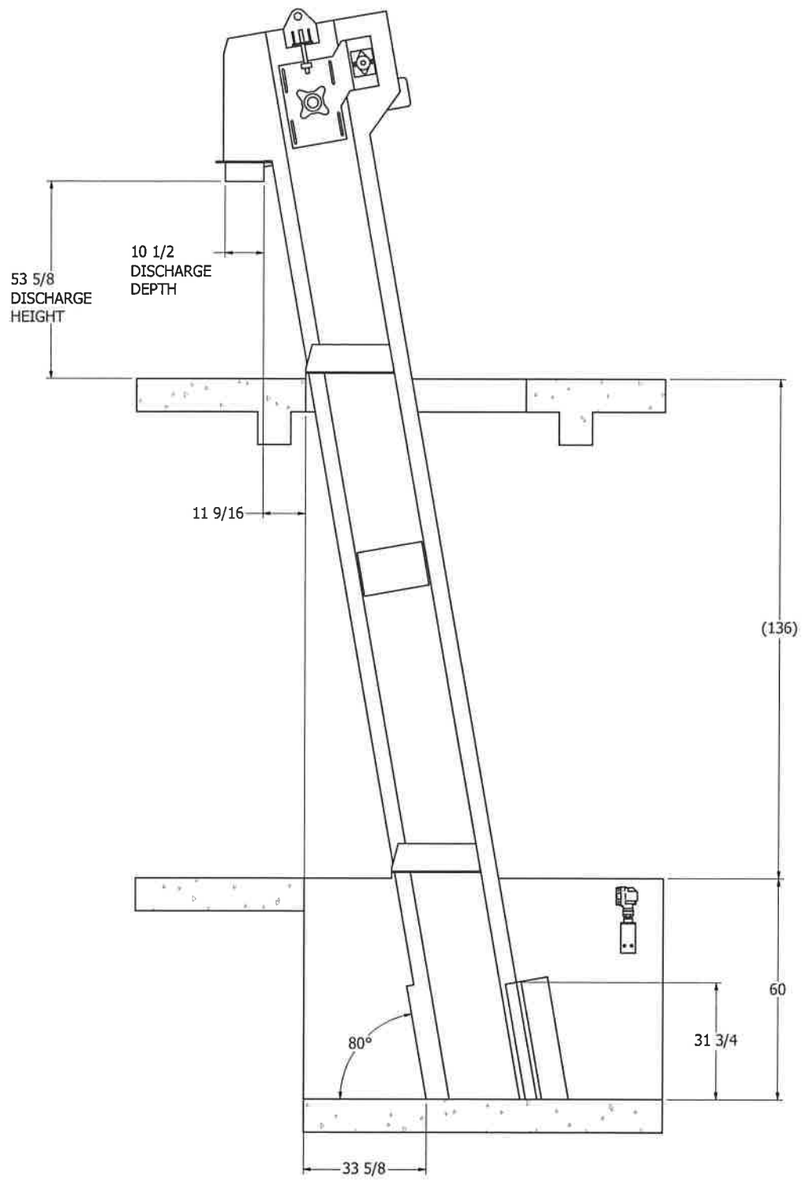
SIZE	DRAWING NO.	REV
D	MCR024-80-GA-112819	A

SCALE: NONE — SHEET 3 OF 5

DRAWING NO. **MCR024-80-GA-112819**



SECTION D-D
SCALE 1/20

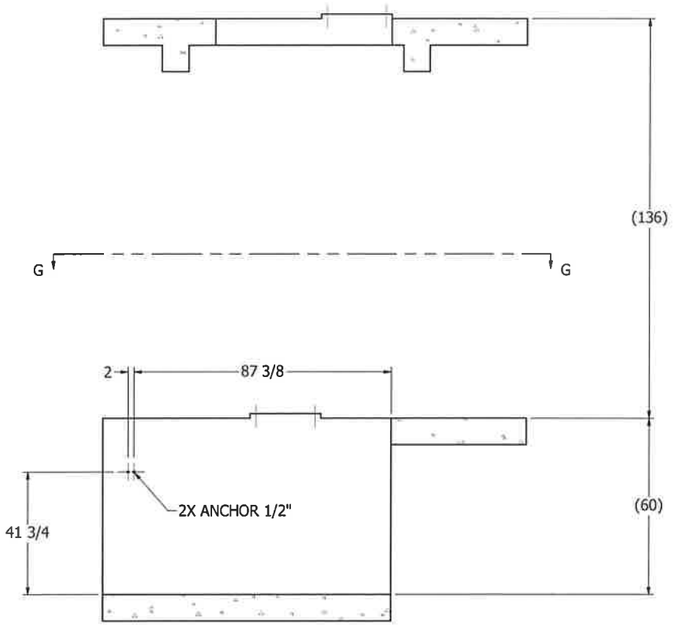


SECTION E-E
SCALE 1/20

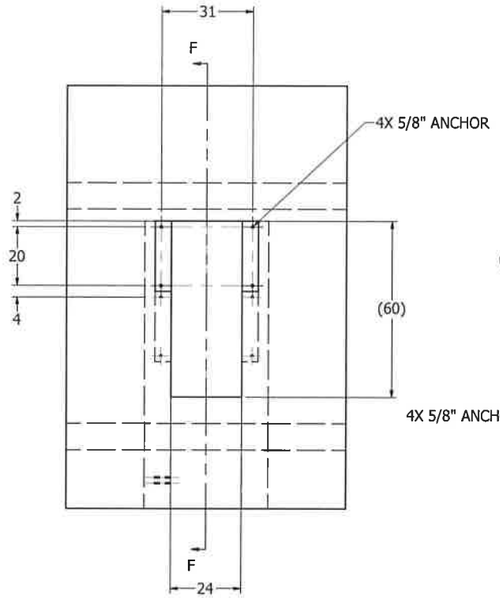
JWC ENVIRONMENTAL
290 PAULARINO AVE, COSTA MESA, CA 92626

MCR GENERAL ARRANGEMENT
CHAIN & RAKE MONSTER
OGALLALA, NE (OGALLALA WWTP)

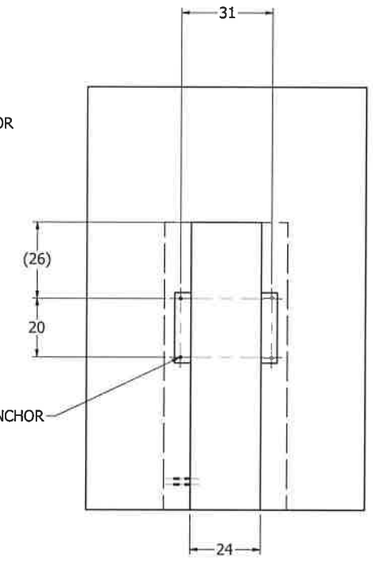
SIZE	DRAWING NO.	REV.
D	MCR024-80-GA-112819	A
SCALE: NONE	SAP YL	SHEET 4 OF 5



SECTION F-F
SCALE 1 / 25



PLAN VIEW EL: 3285.00
SCALE 1 / 25



SECTION G-G
SCALE 1 / 25

JWC ENVIRONMENTAL
290 PAULARINO AVE, COSTA MESA, CA 92626

MCR GENERAL ARRANGEMENT
CHAIN & RAKE MONSTER
OGALLALA, NE (OGALLALA WWTP)

SIZE	DRAWING NO.	REV
D	MCR024-80-GA-112819	A

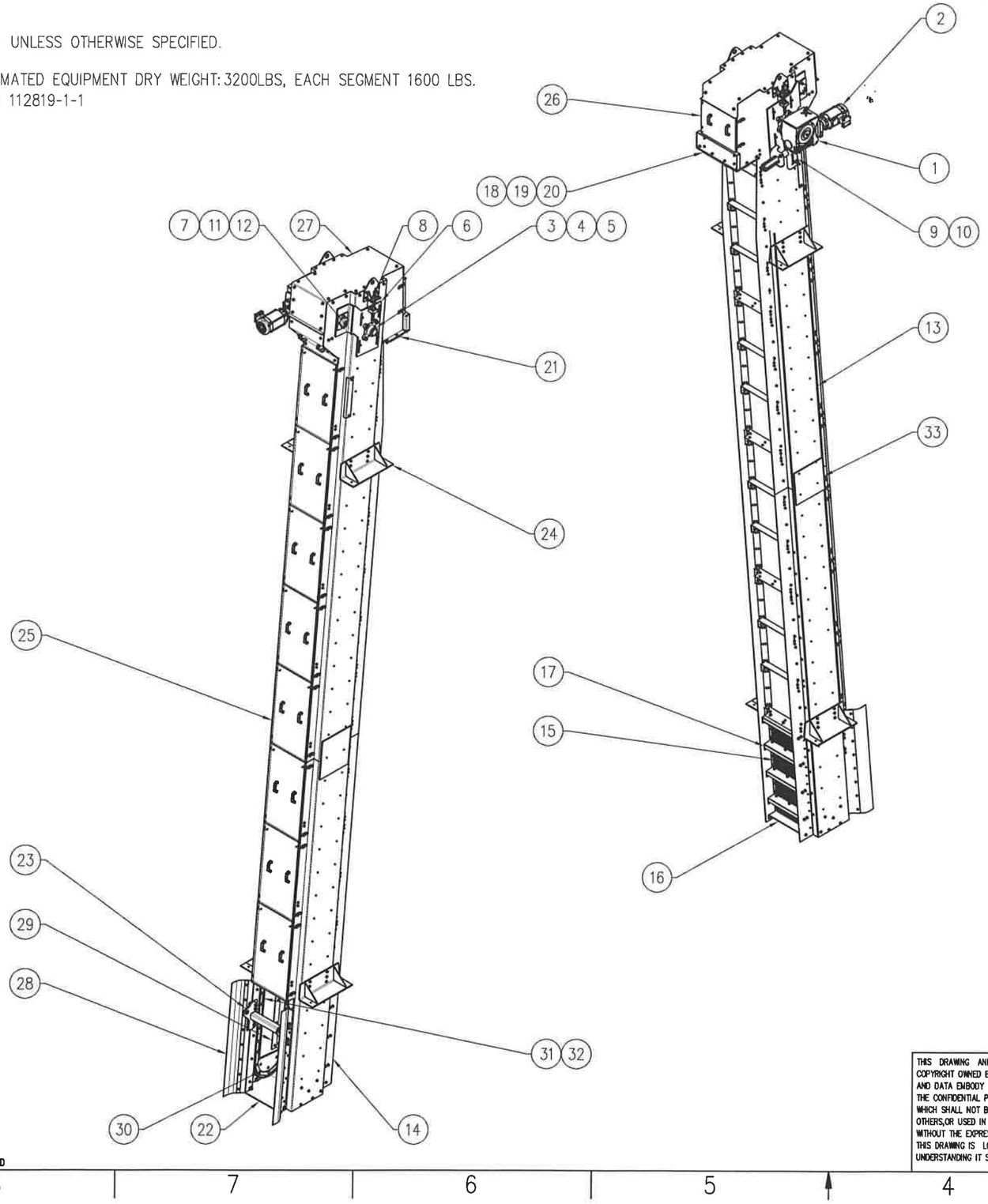
SCALE: NONE | SHEET 5 OF 5

DRAWING NO. MCR0024-80-A-112819

REVISIONS					
ZONE	LTR	DESCRIPTION	ECO NO.	DATE	APPROVED
ALL	A	INITIAL RELEASE		9/1/17	

NOTES: UNLESS OTHERWISE SPECIFIED.

1. ESTIMATED EQUIPMENT DRY WEIGHT: 3200LBS, EACH SEGMENT 1600 LBS.
2. S/N 112819-1-1



ITEM NO.	QTY REQD	PART NO.	NOMENCLATURE OR DESCRIPTION	SPECIFICATION OR MATERIAL
33	2		SPLICE PLATE	304 SST
32	6		RAKE ASSEMBLY	304 SST
31	2		CHAIN ASSY., 6" (100 LINKS EACH)	316/17-4 SST
30	2		BOTTOM CHAIN GUIDE	304 SST
29	1		INNER CHAIN ANGLE, SET	304 SST
28	2		INLET DEFLECTOR/SEAL	304/NEOPRENE
27	1		COVER, TOP	304 SST
26	1		SCREEN COVER, REAR	304 SST
25	1		SCREEN COVER, SET - FRONT	304 SST
24	4		MOUNTING ANGLE	304 SST
23	1		TEMPORARY LIFTING BAIL (REMOVE ON INSTALL)	STEEL (SST SHIMS)
22	1		BOTTOM PLATE	304 SST
21	1		DISCHARGE CHUTE	304 SST
20	1		DEBRIS PLATE SUPPORT ANGLE., SET	304 SST
19	1		DEBRIS PLATE.	304 SST
18	1		DISCHARGE PLATE.	304 SST
17	4		UPPER GRID SUPPORT CHANNEL	304 SST
16	1		LOWER GRID SUPPORT CHANNEL.	304 SST
15	1		BAR RACK TAPER (1/4 X 5/16 X 1 9/16 BARS, 1/4 GAP)	304 SST
14	2		SIDE PLATE, RIGHT	304 SST
13	2		SIDE PLATE, LEFT	304 SST
12	1		WIPER STOP ANGLE.	304 SST
11	1		WIPER ASSEMBLY	304 SST/UHMW
10	1		JUNCTION BOX, NEMA 7	AL
9	1		TORQUE ARM BRACKET.	AL/PEPPERL FUCHS
8	2		TAKE-UP SCREW.	304 SST
7	2		SCRAPPER BEARING - (F2B-GTM-103 #126285)	DODGE
6	2		BEARING TAKE-UP PLATE.	304 SST
5	1		DRIVE SHAFT	304 SST
4	2		SPROCKET	304 SST
3	2		MAIN DRIVE BEARING - (F4B-GTM-215 #126196)	DODGE
2	1		MOTOR, 1.5HP XPFC 460V/3PH/60HZ 145TC	BALDOR# CEM7034T
1	1		HELICAL REDUCER 380.39:1, 2-3/4" BORE	NORD# SK43125 AZH-140TC

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± 1/16 DECIMALS .XX ±.01 .XXX± .005 ANGLES ± .5

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN R. ULLON	9/1/17
CHECKED S. MARSHALL	9/1/17
MANUF.	
QUALITY	

JWC ENVIRONMENTAL
2600 South Garnsey, Santa Ana, California 92707

MCR ASSEMBLY

CHAIN & RAKE MONSTER

OGALLALA, NE (OGALLALA WWTP)

SIZE	CODE IDENT NO.	DRAWING NO.	REVISION
D	53242	MCR0024-80-A-112819	A

SCALE NTS SHEET 1 OF 1

2. MECHANICAL DATA

a. Screen

MANUFACTURER	***DESCRIPTION***	***MODEL***
Baldor	1.5 HP, XPFC 1.0 SF Motor	CEM7034T
Nord	Helical Worm Speed Reducer	SK43125 AZH-N140TC
Dodge	Main Drive Bearing	F4B-GTM-215
Dodge	Scraper Bearing	F2B-GTM-103
Pepperl + Fuchs	Inductive Sensor	NCN8-18GM40-N0-V1
Lee Spring	Compression Spring	LHL2000D 07
McMaster Carr	Bellows Shroud	95655K31
McMaster Carr	Cuff, Bellows Shroud	9565K351
Endress and Hauser	Ultrasonic Sensors	FMU40-SNB2A4

BALDOR
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BALDOR • RELIANCE

Product Information Packet

CEM7034T

1.5//1HP,1760//1460RPM,3PH,60//50HZ,145T

Part Detail

Revision:	N	**Status:**	PRD/A	**Change #:**		**Proprietary:**	No
Type:	AC	**Elec. Spec:**	35WGM493	**CD Diagram:**	CD0005	**Mfg Plant:**	
Mech. Spec:	35E377	**Layout:**	35LYE377	**Poles:**	04	**Created Date:**	09-27-2010
Base:	RG	**Eff. Date:**	01-19-2017	**Leads:**	9#18		

Specs

Catalog Number:	CEM7034T	**Front Shaft Indicator:**	None
Enclosure:	XPFC	**Heater Indicator:**	No Heater
Frame:	145TC	**Insulation Class:**	B
Frame Material:	Steel	**Inverter Code:**	Not Inverter
Output @ Frequency:	1.500 HP @ 60 HZ	**KVA Code:**	L
	1.000 HP @ 50 HZ	**Lifting Lugs:**	No Lifting Lugs
Synchronous Speed @ Frequency:	1800 RPM @ 60 HZ	**Locked Bearing Indicator:**	Locked Bearing
Voltage @ Frequency:	460.0 V @ 60 HZ	**Motor Lead Quantity/Wire Size:**	9 @ 18 AWG
	190.0 V @ 50 HZ	**Motor Lead Exit:**	Ko Box
	230.0 V @ 60 HZ	**Motor Lead Termination:**	Flying Leads
	380.0 V @ 50 HZ	**Motor Type:**	3526M
XP Class and Group:	CLI GP D; CLII GP F,G	**Mounting Arrangement:**	F1
XP Division:	Division I	**Power Factor:**	73
Agency Approvals:	UL	**Product Family:**	General Purpose
	CSA	**Pulley End Bearing Type:**	Ball
Auxillary Box:	No Auxillary Box	**Pulley Face Code:**	C-Face
Auxillary Box Lead Termination:	None	**Pulley Shaft Indicator:**	Standard
Base Indicator:	Rigid	**Rodent Screen:**	None

Bearing Grease Type:	Polyrex EM (-20F +300F)
Blower:	None
Current @ Voltage:	1.900 A @ 380.0 V
	2.200 A @ 460.0 V
	3.800 A @ 190.0 V
	4.400 A @ 230.0 V
	4.500 A @ 208.0 V
Design Code:	B
Drip Cover:	No Drip Cover
Duty Rating:	CONT
Electrically Isolated Bearing:	Not Electrically Isolated
Feedback Device:	NO FEEDBACK
Front Face Code:	Standard

RoHS Status:	ROHS COMPLIANT
Shaft Extension Location:	Pulley End
Shaft Ground Indicator:	No Shaft Grounding
Shaft Rotation:	Reversible
Shaft Slinger Indicator:	No Slinger
Speed Code:	Single Speed
Motor Standards:	NEMA
Starting Method:	Direct on line
Thermal Device - Bearing:	None
Thermal Device - Winding:	Normally Closed Thermostat
Vibration Sensor Indicator:	No Vibration Sensor
Winding Thermal 1:	None
Winding Thermal 2:	None
XP Temp Code:	T3C

Nameplate NP1426XPSLEV

NO.		**CC**	010A				
SER.							
SPEC.	35E377M493G1						
CAT.NO.	CEM7034T						
HP	1.5//1	**T. CODE**	T3C				
VOLTS	230/460//190/380						
AMPS	4.4/2.2//3.8/1.9						
RPM	1760//1460						
HZ	60//50	**PH**	3	**CL**	B		
SER.F.	1.00	**DES**	B	**CODE**	L		
RATING	40C AMB-CONT						
FRAME	145TC	**NEMA-NOM-EFF**	86.5				
USABLE AT 208V	4.5	**PF**	73				
BLANK							

Parts List

Part Number	Description	Quantity
SA203654	SA 35E377M493G1	1.000 EA
RA190914	RA 35E377M493G1	1.000 EA
34FN3002B01	EXTERNAL FAN, PLASTIC, .637/.639 HUB W/	1.000 EA
35CB3001A02SP	EXPL PROOF CONDUIT BOX, 3/4"PIPE TAP LEA	1.000 EA
11XW1032G06	10-32 X .38, TAPTITE II, HEX WSHR SLTD U	1.000 EA
HW3001B01	BRASS CUP WASHER, FOR #8 SCREW	1.000 EA
35EP3700A01SP	FR ENDPLATE, XPFC	1.000 EA
HW5100A03	WAVY WASHER (W1543-017)	1.000 EA
35EP3702A01SP	PU EP-205 BRG-35X-56C-143-5TC	1.000 EA
51XN1032A18	10-32 X 1 1/8 HX WS SL SR (ESKAY)	2.000 EA
HA3013A01	1/2-20X5/8 SPL.HX BOLT	2.000 EA
HW3021C06	3/32 DI X .625 PIN (F/S)	2.000 EA
XY3118A12	5/16-18 HEX NUT DIRECTIONAL SERRATION	4.000 EA
35FH4005A01SP	IEC FH NO GREASER W/PRIMED	1.000 EA
51XW1032A06	10-32 X .38, TAPTITE II, HEX WSHR SLTD S	3.000 EA
35CB3500A01SP	CONDUIT BOX LID, MACH	1.000 EA
51XN2520A16	SCREW, HEX WS SLT, ZN, 1/4-20 X 1.00	4.000 EA
HW2501D13	KEY, 3/16 SQ X 1.375	1.000 EA
HA7000A01	KEY RETAINER 7/8" DIA SHAFT	1.000 EA
85XU0407S04	4X1/4 U DRIVE PIN STAINLESS	6.000 EA
NP0018F	ALUM UL XP CONDUIT BOX NAMEPLATE	1.000 EA
MJ1000A02	GREASE, POLYREX EM EXXON (USe 4824-15A)	0.050 LB
51XB1214A16	12-14X1.00 HXWSSLD SERTYB	1.000 EA
MG1025G29	WILKOFAST, 789.229, DARK CHARCOAL GRAY	0.017 GA

Parts List (continued)

Part Number	Description	Quantity
HA3104A08	THRUBOLT-5/16-18X9.375 X X	4.000 EA
LB1119N	WARNING LABEL	1.000 EA
LC0145B01	CONNECTION LABEL	1.000 EA
NP1426XPSLEV	SS XP UL CSA-EEV CC CL-I GP-D	1.000 EA
36PA1000	PKG GRP, PRINT PK1016A06	1.000 EA
MN416A01	TAG-INSTAL-MAINT no wire (1100/bx) 11/14	1.000 EA

AC Induction Motor Performance Data

Record # 35582 - Typical performance - not guaranteed values

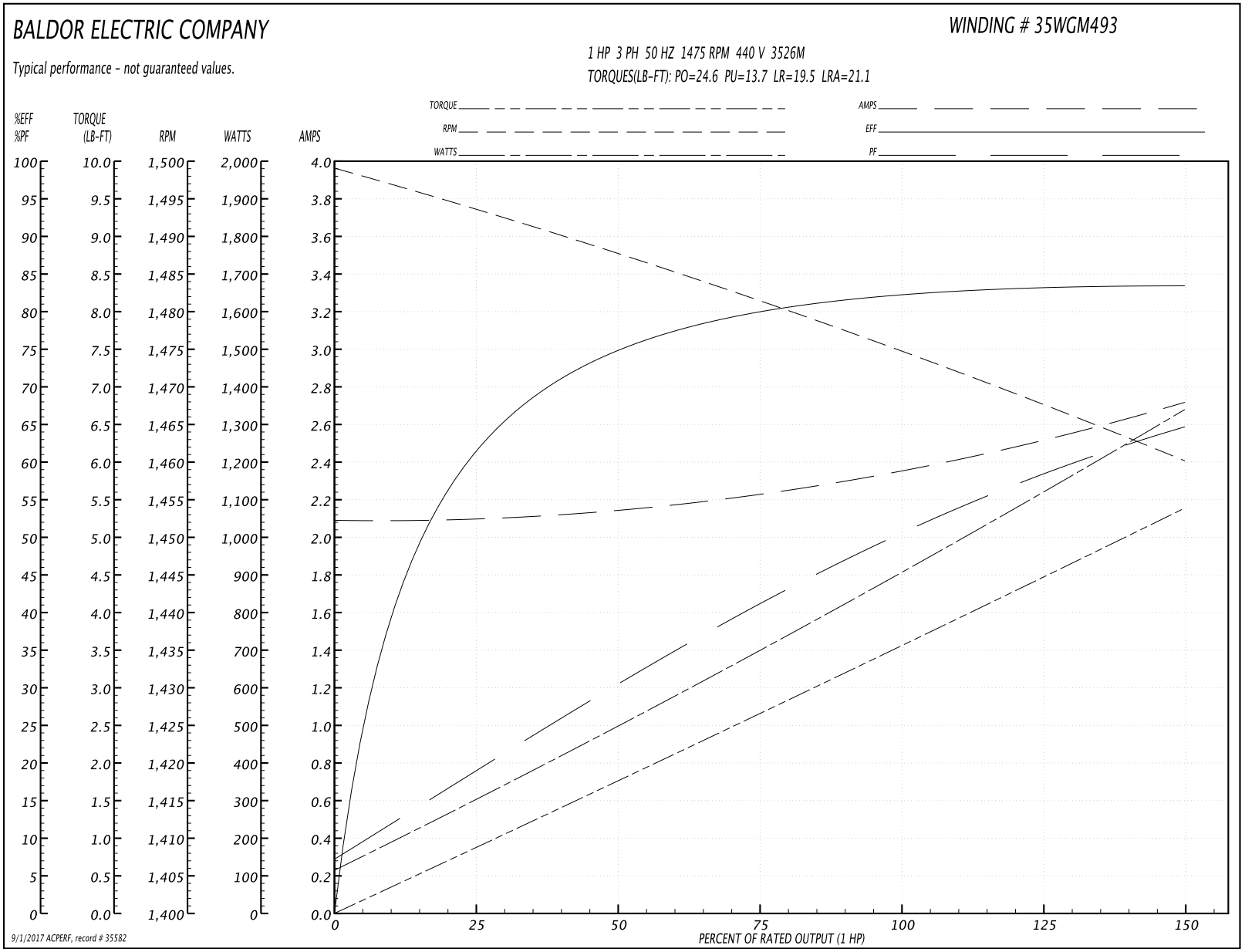
Winding: 35WGM493-R009	**Type:** 3526M	**Enclosure:** XPFC

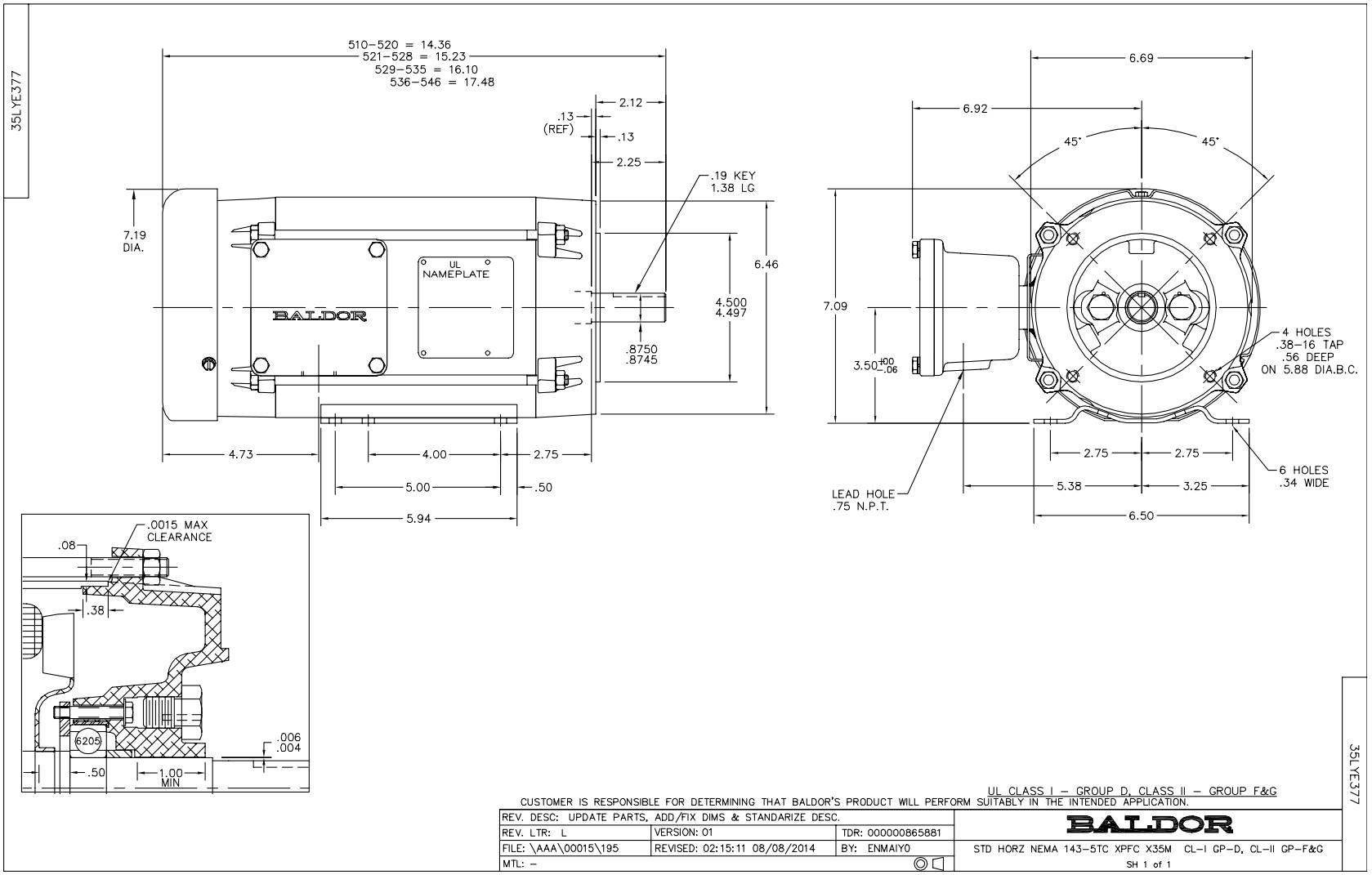
Nameplate Data				440 V, 50 Hz: High Voltage Connection	
Rated Output (HP)	1.5//1			Full Load Torque	3.56 LB-FT
Volts	230/460//220/440			Start Configuration	direct on line
Full Load Amps	4.4/2.2//4.8/2.4			Breakdown Torque	24.6 LB-FT
R.P.M.	1760//1460			Pull-up Torque	13.7 LB-FT
Hz	60//50	Phase	3	Locked-rotor Torque	19.5 LB-FT
NEMA Design Code	B	KVA Code	L	Starting Current	21.1 A
Service Factor (S.F.)	1			No-load Current	2.09 A
NEMA Nom. Eff.	86.5	Power Factor	73	Line-line Res. @ 25ºC	10.1 Ω
Rating - Duty	40C AMB-CONT			Temp. Rise @ Rated Load	46°C
S.F. Amps				Temp. Rise @ S.F. Load	51°C
				Locked-rotor Power Factor	59.7
				Rotor inertia	0.154 LB-FT2

Load Characteristics 440 V, 50 Hz, 1 HP

% of Rated Load	25	50	75	100	125	150
Power Factor	19	30	41	51	58	65
Efficiency	60.7	74.3	79.9	82.4	83.3	83.4
Speed	1494	1488	1481	1475	1468	1460
Line amperes	2.1	2.14	2.22	2.35	2.53	2.71

Performance Graph at 440V, 50Hz, 1.0HP Typical performance - Not guaranteed values





UL CLASS I – GROUP D, CLASS II – GROUP F&G

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

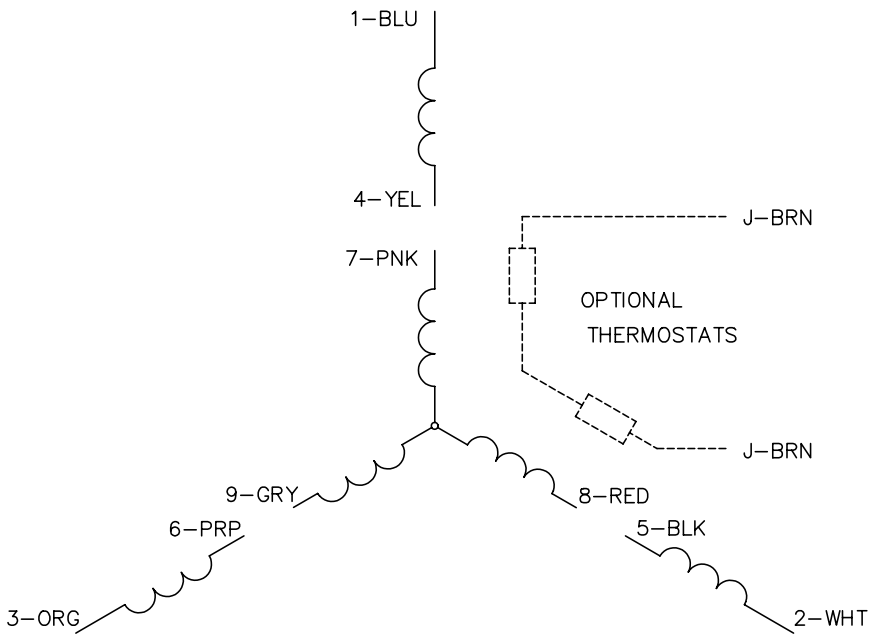
REV. DESC: UPDATE PARTS, ADD/FIX DIMS & STANDARIZE DESC.		
REV. LTR: L	VERSION: 01	TDR: 000000865881
FILE: \AAA\00015\195	REVISED: 02:15:11 08/08/2014	BY: ENMAIY0
MTL: –		

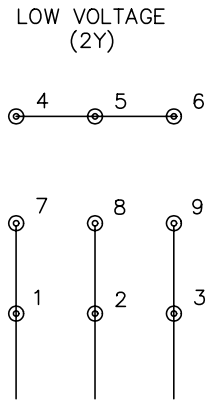
BALDOR

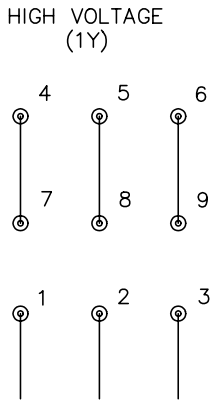
STD HORZ NEMA 143-5TC XPFC X35M CL-I GP-D, CL-II GP-F&G

SH 1 of 1

CD0005







NOTES:

1. INTERCHANGE ANY TWO LINE LEADS TO REVERSE ROTATION.
2. OPTIONAL THERMOSTATS ARE PROVIDED WHEN SPECIFIED.
3. ACTUAL NUMBER OF INTERNAL PARALLEL CIRCUITS MAY BE A MULTIPLE OF THOSE SHOWN ABOVE.
4. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.

CD0005

REV. DESC: REVISE TO SHOW OPTIONAL COLORS			BALDOR ELECTRIC Co.
REV. LTR: E	BY: JLP	REVISED: 01/19/99 10:15	TDR: 0171435
CD0005		FILE: AAA00005140	MDL: –
		MTL: –	3PH, DV, 9 LEADS

RIGHT-ANGLE HELICAL-WORM

Performance Specifications

- configuration: right angle
- integral motor HP (min. / max.): 0.16 / 20
- integral motor kW (min. / max.): 0.12 to 15
- typical efficiency: 94%
- # of gear reductions: 2 to 3

Ratio and Speed

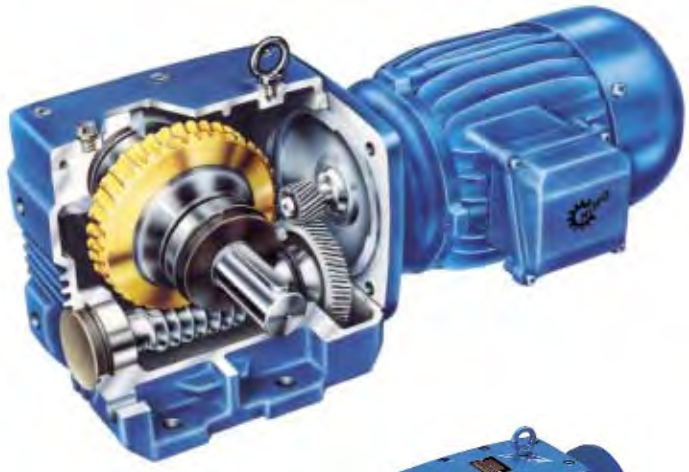
- minimum standard ratio: 4.40:1
- maximum standard ratio: 7095.12:1
- minimum output speed from 1750 rpm motor: 0.25 rpm
- maximum output speed from 1750 rpm motor: 398 rpm

Mounting Styles

- footed housing style: standard
- B5 flange outside diameter range [in]: 4.72 to 17.72
- B5 flange outside diameter range [mm]: 120 to 450
- shaft mount housing style available
- B14 flange outside diameter range [in]: 2.91 to 11.42
- B14 flange outside diameter range [mm]: 74 to 290

Options

- custom adapter flange
- flange pilot removed
- bolt-on torque arm with shock dampener



Unit Size	Torque max. [lb-in]	Torque max. [Nm]	Ratio Range min.-max.	Solid Shaft Dia. [in]	Solid Shaft Dia. [mm]	Keyed Hollow Shaft Dia. Std-[in]	Keyed Hollow Shaft Dia. Opt-[in]	Keyed Hollow Shaft Dia. Opt-[in]	Keyed Hollow Shaft Dia. Opt-[in]	Keyed Hollow Shaft Dia. [mm]	Keyed Hollow Shaft Dia. [mm]	Shrink Disc Shaft Dia. [in]	Shrink Disc Shaft Dia. [mm]
SK 02040	832	94	4.40 - 304.20	0.750	20	0.750				20			
SK 02050	1,487	168	7.13 - 524.79	1.000	25	1.188	1.250	1.000		25	30	1.250	30
SK 13050	1,584	179	41.74 - 3019.29										
SK 12063	3,115	352	7.43 - 626.79	1.250	30	1.438	1.375			30	35	1.438	35
SK 13063	3,336	377	65.20 - 3631.55										
SK 12080	6,230	704	7.55 - 656.88	1.375	35	1.813	1.750	1.500	1.438	45	40	1.750	45
SK 13080	6,744	762	97.65 - 3356.66										
SK 32100	12,558	1,419	7.19 - 645.00	1.875	45	2.438	2.375	2.000		60	50	2.438	60
SK 33100	13,974	1,579	53.70 - 5875.95										
SK 42125	24,276	2,743	7.29 - 695.60	2.375	60	2.750	2.375			70	60	2.750	70
SK 43125	27,063	3,058	62.50 - 7095.12										

Shaft Data

- input and output shaft material: ASI 1045 or 4140
- input and output shaft key dimensions [in]: according to ANSI B17
- input and output shaft key dimensions [mm]: according to DIN 747
- output shaft drill and tap: standard
- number of hollow shaft keys: 2
- shrink disc size range [in]: 1.250 to 2.750
- shrink disc size range [mm]: 25 to 70
- minimum gripping safety factor range [h6 fit]: 3.8 to 5.4

Options

- double solid output shaft
- shaft fixing element
- custom shaft diameters
- hollow spline per DIN 5480
- custom spline
- cross drilled holes
- 304 stainless steel

Motor Mounting

- integral motor: 1/6 - 20 HP
- C-face adapter frame size range: 56C to 250TC
- IEC adapter (B5) frame size range: IEC 63 to IEC 160
- sugar scoop motor availability: 56 to 256T
- top mount platform motor availability: 56 to 286T

Options

- custom motor adapter
- custom coupling diameter

Gearing

- quality rating on gears: up to AGMA Class 13
- worm wheel material: bronze alloy
- worm material: hardened steel
- minimum hardness of steel gears: 58 Rockwell C
- hard finishing of gear teeth: grinding or skive hob
- drop forged gear blanks: standard
- momentary overload capacity: 275%
- hunting tooth ratios: standard

Housing

- typical housing material: Class 35 gray iron
- machining method: single setup
- main housing design: UNICASE™ one piece
- seal carrier: direct to main housing
- housing torsional stiffness: exceptional
- housing wall section: thick
- casting sealing method: dip seal

Bearings

- bearing quality: ABEC-1
- standard output bearing: ball
- heavy-duty output bearing: tapered

Lubricant and Sealing Components

- factory filled lubricant type: ISO 680 synthetic oil
- typical breather vent style: AUTOVENT
- output seal design: QUADRILIP™ Seal System
- output shaft oil seals: 1 double lip and 1 single lip (except footed housing design)
- oil seal lip material: nitrile rubber
- oil seal to housing gasket: nitrile rubber

Options

- custom synthetic lubricating oil
- custom temperature lubricating oil
- fluid grease lubricant
- food grade lubricating oil
- long term storage preparation
- magnetic drain plug
- bullseye sight glass
- custom drain plug
- fluorinated rubber oil seal material
- custom oil seals

Internal Parts Assembly

- assembly method: heavy press fit
- reversing duty: standard
- typical backlash range [arc minutes]: 6 to 11

Environmental Protection

- exterior primer coverage: all metal exterior surfaces
- paint type: Water Based Resin
- paint additive: 316 stainless steel flakes
- USDA incidental contact exposure: H1

Options

- NSD+ protection
- custom paint
- high pressure washdown IP66 oil seals
- shaft seal covers

Mechanical Variable Speed Compatibility

- HP range with TITAN™ belt box: 0.50 to 20
- speed range with TITAN™ belt box: 1.2 to 877
- HP range with NORDISC® traction drive: 0.25 to 7.5
- speed range with NORDISC® traction drive: 0.1 to 497

NORD Gear Corporation
National Customer Service Toll Free 888.314.NORD

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Fax: 888.GOT.NORD (408.6673)

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Phone: 608.849.7300
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SOUTH
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Charlotte, NC 28217
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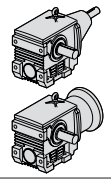
NORD Gear Limited
Toll Free in Canada 800.668.4378

CANADA
41 West Drive
Brampton, Ontario L6T 4A1
Phone: 905.796.3606
Fax: 905.796.8130

Helical Worm Speed Reducers

Table of Capacities and Ratios
with Solid input shaft, Type **"W"**
and with **NEMA** C-face Motor inputs



Size	Reduction ratio			Output speeds n_2 [RPM]				Output torques $T_{2\,max}$ [LB-IN]				Input power HP_{max} [HP]				Efficiencies η [%]	Available NEMA adapter *				
	Ratio	Helical gear	Worm gear	n_1 = 875 RPM				n_1 = 580 RPM				n_1 = 300 RPM					1 hp max	2 hp max	5 hp max	10 hp max	20 hp max
	itotal	**i1**	**z2/z1= i2**	n_2	T_{2max}	Hp_{max}	η	n_2	$T_{2\,max}$	Hp_{max}	η	n_2	T_{2max}	Hp_{max}	η						
SK 42125	**695.60**	14.80	47/1= 47.00	1.3	25338	1.02	51	0.83	26010	0.68	50	0.43	26594	0.38	48		56C	140TC	-	-	-
	495.85	10.55	47/1= 47.00	1.8	24612	1.33	53	1.2	25470	0.95	51	0.61	26417	0.52	49		56C	140TC	180TC	-	-
- W	**337.46**	7.18	47/1= 47.00	2.6	23568	1.77	55	1.7	24674	1.26	53	0.9	25922	0.74	50		-	-	180TC	210TC	-
	247.69	5.27	47/1= 47.00	3.5	22532	2.16	58	2.3	23868	1.58	55	1.2	25408	0.95	51		-	-	180TC	210TC	-
+	201.63	4.29	47/1= 47.00	4.3	21753	2.47	60	2.9	23240	1.90	56	1.5	24992	1.14	52		56C	140TC	180TC	210TC	-
	182.36	3.88	47/1= 47.00	4.8	21337	2.67	61	3.2	22904	2.04	57	1.6	24771	1.21	52		56C	140TC	180TC	210TC	-
- NEMA	160.74	3.42	47/1= 47.00	5.4	20789	2.87	62	3.6	22461	2.21	58	1.9	24470	1.39	53		56C	140TC	180TC	210TC	-
	144.76	3.08	47/1= 47.00	6.0	20311	3.07	63	4.0	22063	2.37	59	2.1	24205	1.49	54		56C	140TC	180TC	210TC	250TC
	117.50	2.50	47/1= 47.00	7.4	19311	3.49	65	4.9	21213	2.71	61	2.6	23612	1.77	55		56C	140TC	180TC	210TC	250TC
	100.58	2.14	47/1= 47.00	8.7	18505	3.81	67	5.8	20532	3.00	63	3.0	23125	1.97	56		56C	140TC	180TC	210TC	250TC
	87.30	3.88	45/2= 22.50	10	18718	3.90	76	6.6	20098	2.88	73	3.4	20656	1.60	70		56C	140TC	180TC	210TC	-
	76.95	3.42	45/2= 22.50	11	18231	4.13	77	7.5	19700	3.16	74	3.9	19505	1.73	70		56C	140TC	180TC	210TC	-
	69.30	3.08	45/2= 22.50	13	17815	4.71	78	8.4	19355	3.43	75	4.3	21240	2.04	71		56C	140TC	180TC	210TC	250TC
	56.25	2.50	45/2= 22.50	16	16930	5.44	79	10	18612	3.89	76	5.3	20718	2.41	72		56C	140TC	180TC	210TC	250TC
	48.15	2.14	45/2= 22.50	18	16222	5.72	81	12	18001	4.45	77	6.2	20284	2.73	73		56C	140TC	180TC	210TC	250TC
	40.95	1.82	45/2= 22.50	21	15461	6.27	82	14	17337	4.87	79	7.3	19789	3.10	74		56C	140TC	180TC	210TC	250TC
	35.33	3.42	31/3= 10.33	25	10877	5.07	85	16	10620	3.24	83	8.5	10363	1.73	81		56C	140TC	180TC	210TC	-
	31.82	3.08	31/3= 10.33	27	13514	6.73	86	18	13204	4.49	84	9.4	12735	2.35	81		56C	140TC	180TC	210TC	250TC
	25.83	2.50	31/3= 10.33	34	13434	8.32	87	22	13125	5.39	85	12	12664	2.94	82		56C	140TC	180TC	210TC	250TC
	22.11	2.14	31/3= 10.33	40	13364	9.64	88	26	13063	6.26	86	14	12452	3.38	82		56C	140TC	180TC	210TC	250TC
	18.80	1.82	31/3= 10.33	47	12744	10.80	88	31	12771	7.31	86	16	12319	3.77	83		56C	140TC	180TC	210TC	250TC
	15.92	3.08	31/6= 5.17	55	7080	6.86	90	36	7000	4.49	89	19	6761	2.37	86		56C	140TC	180TC	210TC	250TC
	14.57	1.41	31/3= 10.33	60	11620	12.43	89	40	12558	9.05	88	21	11992	4.76	84		-	-	180TC	210TC	250TC
	12.93	2.50	31/6= 5.17	68	7036	8.34	91	45	6876	5.51	89	23	6726	2.82	87		56C	140TC	180TC	210TC	250TC
	11.06	2.14	31/6= 5.17	79	6921	9.53	91	52	6841	6.27	90	27	6691	3.26	88		56C	140TC	180TC	210TC	250TC
	9.41	1.82	31/6= 5.17	93	6832	10.00	92	62	6761	6.60	91	32	6540	3.60	88		56C	140TC	180TC	210TC	250TC
	8.43	1.63	31/6= 5.17	104	6735	10.00	92	69	6664	6.60	91	36	6514	3.60	89		-	-	180TC	210TC	250TC
	7.76	1.50	31/6= 5.17	113	6638	10.00	92	75	6567	6.60	91	39	6425	3.60	89		-	-	180TC	210TC	250TC
	7.29	1.41	31/6= 5.17	120	6646	10.00	93	80	6496	6.60	91	41	6354	3.60	89		-	-	180TC	210TC	250TC
SK 43125	**7095.12**	150.96	47/1= 47.00	0.12	26037	0.11	47	0.08	26037	0.07	47	0.04	26037	0.04	47		56C	140TC	-	-	-
	5057.67	107.61	47/1= 47.00	0.17	27302	0.16	47	0.11	27444	0.11	47	0.06	27594	0.05	47		56C	140TC	-	-	-
- W	**3442.09**	73.24	47/1= 47.00	0.25	27116	0.23	47	0.17	27311	0.16	47	0.09	27515	0.08	47		56C	140TC	-	-	-
	2526.44	53.75	47/1= 47.00	0.35	26922	0.31	48	0.23	27170	0.21	47	0.12	27435	0.11	47		56C	140TC	-	-	-
+	**2056.63**	43.76	47/1= 47.00	0.43	26754	0.38	48	0.28	27054	0.25	48	0.15	27364	0.13	47		56C	140TC	-	-	-
	1860.07	39.58	47/1= 47.00	0.47	26665	0.42	48	0.31	26993	0.28	48	0.16	27329	0.15	47		56C	140TC	-	-	-
- NEMA	**1639.55**	34.88	47/1= 47.00	0.53	26550	0.46	49	0.35	26904	0.31	48	0.18	27276	0.16	47		56C	140TC	-	-	-
	1476.55	31.42	47/1= 47.00	0.59	26435	0.51	49	0.39	26824	0.35	48	0.20	27231	0.19	47		56C	140TC	-	-	-
	1198.50	25.50	47/1= 47.00	0.73	26187	0.62	49	0.48	26647	0.43	48	0.25	27125	0.23	47		56C	140TC	-	-	-
	928.25	19.75	47/1= 47.00	0.94	25833	0.76	50	0.62	26382	0.52	49	0.32	26966	0.28	48		56C	140TC	-	-	-
	794.58	16.91	47/1= 47.00	1.1	25577	0.87	51	0.73	26187	0.62	49	0.38	26851	0.34	48		56C	140TC	-	-	-
	689.67	30.65	45/2= 22.50	1.3	19771	0.60	67	0.84	19479	0.39	66	0.43	19187	0.20	65		56C	140TC	-	-	-
	607.91	27.02	45/2= 22.50	1.4	18665	0.62	67	0.95	18390	0.42	66	0.49	18390	0.21	66		56C	140TC	-	-	-
	547.47	24.33	45/2= 22.50	1.6	22939	0.87	67	1.1	22594	0.60	66	0.55	22594	0.29	66		56C	140TC	-	-	-
	444.38	19.75	45/2= 22.50	2.0	22674	1.06	68	1.3	22532	0.70	67	0.68	22196	0.36	66		56C	140TC	-	-	-
	380.39	16.91	45/2= 22.50	2.3	22452	1.21	68	1.5	22169	0.79	67	0.79	21833	0.42	66		56C	140TC	-	-	-
	323.51	14.38	45/2= 22.50	2.7	19753	1.22	69	1.8	19470	0.82	68	0.9	18895	0.43	66		56C	140TC	-	-	-
	269.76	11.99	45/2= 22.50	3.2	20656	1.50	70	2.2	20072	1.03	68	1.1	19771	0.51	67		56C	140TC	180TC	-	-
	236.58	10.51	45/2= 22.50	3.7	20656	1.73	70	2.5	20364	1.17	69	1.3	19771	0.60	67		56C	140TC	180TC	-	-
	187.80	8.35	45/2= 22.50	4.7	21063	2.21	71	3.1	21948	1.57	69	1.6	22939	0.87	67		56C	140TC	180TC	-	-
	152.44	6.78	45/2= 22.50	5.7	20514	2.57	72	3.8	21532	1.85	70	2.0	22674	1.06	68		56C	140TC	180TC	-	-
	130.49	5.80	45/2= 22.50	6.7	20072	2.92	73	4.4	21178	2.08	71	2.3	22452	1.21	68		56C	140TC	180TC	-	-
	110.97	4.93	45/2= 22.50	7.9	19559	2.50	74	5.2	20771	1.65	72	2.7	20727	0.90	69		56C	140TC	180TC	-	-
	86.22	8.35	31/3= 10.33	10	12735	2.49	81	6.7	12576	1.68	80	3.5	12257	0.87	78		56C	140TC	180TC	-	-
	69.99	6.78	31/3= 10.33	13	12664	2.50	82	8.3	12355	1.65	80	4.3	12045	0.90	78		56C	140TC	180TC	-	-
	62.50	6.05	31/3= 10.33	14	12815	2.50	83	9.3	12505	1.65	81	4.8	12195	0.90	79		56C	140TC	180TC	-	-

* Max. input power limit is shown for the standard NEMA motor power at 1750 rpm input. If the NEMA motor power limit generates more torque than the T_{2max} torque limit then use the lower of the two limits. For combinations with higher torque motors please contact NORD

For Overhung and Thrust loads see page A17 and for ratings see the corresponding tables in the Gearmotors ratings tables. The OHL and Thrust loads are the same gear type, hp and ratio in the Gearmotor tables.

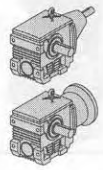
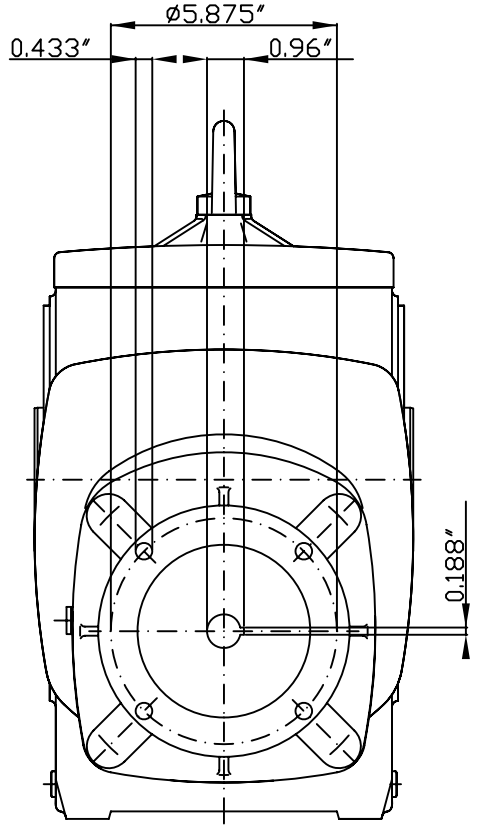
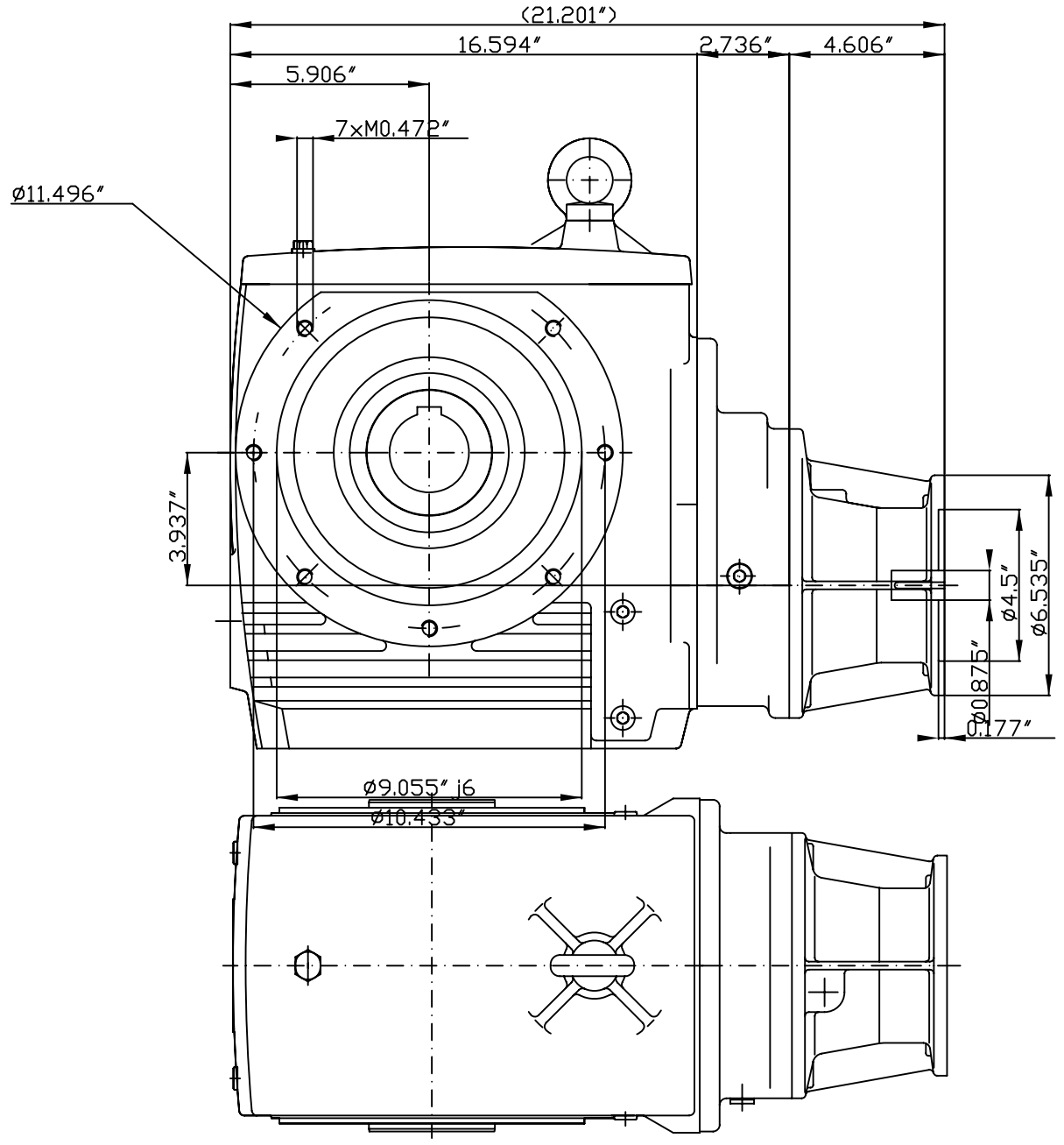


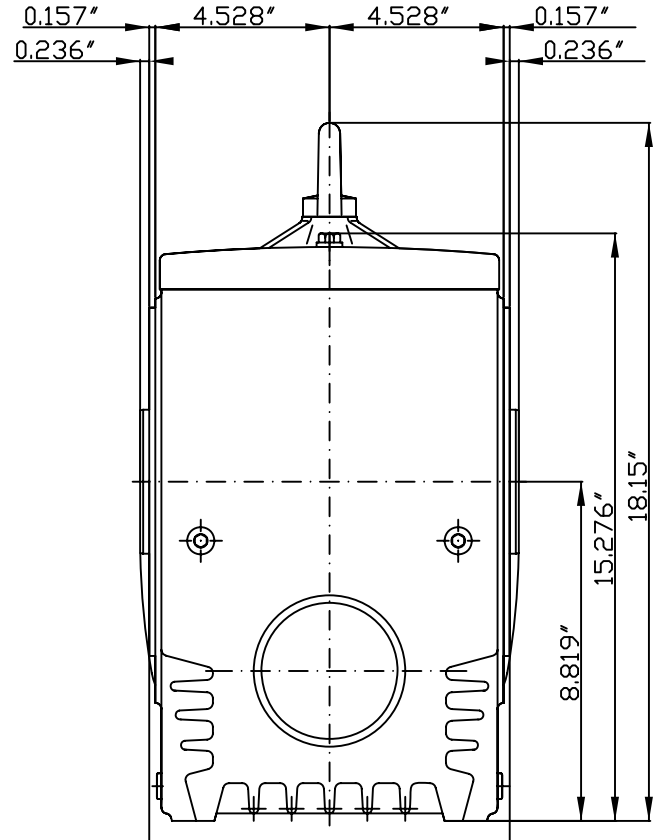
Table of weights - type W and NEMA C-face

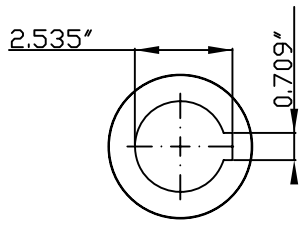
Approximate Weights approx. [lb]									
Type	W	56 C	140 TC	180 TC	210 TC	250 TC	280 TC	320 TC	360 TC
SK 02040	24	33							
SK 13050	55	66							
SK 02050	44	55	55						
SK 13063	64	75							
SK 12063	53	64	64	79					
SK 13080	86	97							
SK 12080	75	86	86	101					
SK 33100	150	161	161						
SK 32100	146	150	150	159	179				
SK 43125	271	276	276	284					
SK 42125	256	245	245	260	291	313			

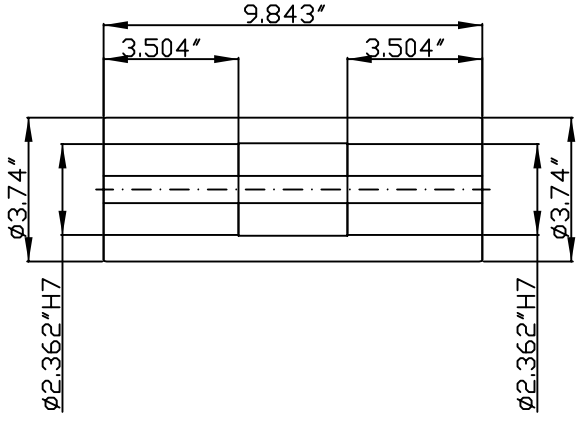
Above weights are appromimate. Dpending upon ratio, oil quantity and optional equipment, reducer weights may be different than shown.
Exact weights can be obtained after the unit is fully assembled.











SK 43125 AZ 140TC

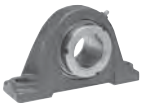
NORD

Nord Internet: http://www.nord.com

	Date	Name
Drawn	3/22/207	randyu

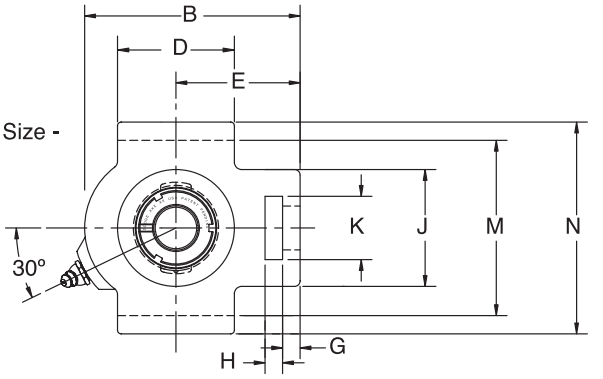
Technical design subject to change!
This drawing by NORDCAD 5.8.0

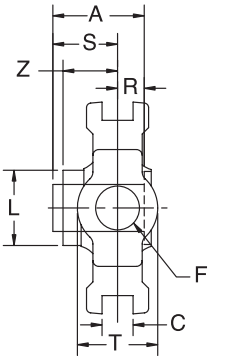
SELECTION/DIMENSIONS



GRIP TIGHT Adapter Ball Bearings
GTM MEDIUM DUTY WIDE SLOT TAKE-UP BEARINGS

Lube Fitting Thread Size - 1/8 - 27 NPT





Series	Shaft Size	Complete Unit		Unit without Adapter Sleeve & Lock Nut		Adapter Sleeve & Lock Nut Assembly	
		Part No.	Description	Part No.	Description	Part No.	Description
211	1-15/16	**136177**	WSTU-GTM-115	**136226**	WSTU-GT-11	**129931**	AN-GTM-11-115
	2	**136178**	WSTU-GTM-200			**129932**	AN-GTM-11-200
	50mm	***136308***	*WSTU-GTM-50M*			***129961***	*AN-GTM-11-50M*
212	2-3/16	**136179**	WSTU-GTM-203	**136227**	WSTU-GT-12	**129933**	AN-GTM-12-203
	2-1/4	**136180**	WSTU-GTM-204			**129934**	AN-GTM-12-204
	55mm	***136309***	*WSTU-GTM-55M*			***129962***	*AN-GTM-12-55M*
214	2-7/16	**136181**	WSTU-GTM-207	**136228**	WSTU-GT-14	**129935**	AN-GTM-14-207
	2-1/2	**136182**	WSTU-GTM-208			**129936**	AN-GTM-14-208
	65mm	***136310***	*WSTU-GTM-65M*			***129963***	*AN-GTM-14-65M*
215	2-11/16	**136183**	WSTU-GTM-211	**136229**	WSTU-GT-15	**129937**	AN-GTM-15-211
	70mm	***136311***	*WSTU-GTM-70M*			***129964***	*AN-GTM-15-70M*
216	2-15/16	**136184**	WSTU-GTM-215	**136230**	WSTU-GT-16	**129938**	AN-GTM-16-215
	3	**136185**	WSTU-GTM-300			**129939**	AN-GTM-16-300
	75mm	***136312***	*WSTU-GTM-75M*			***129965***	*AN-GTM-16-75M*

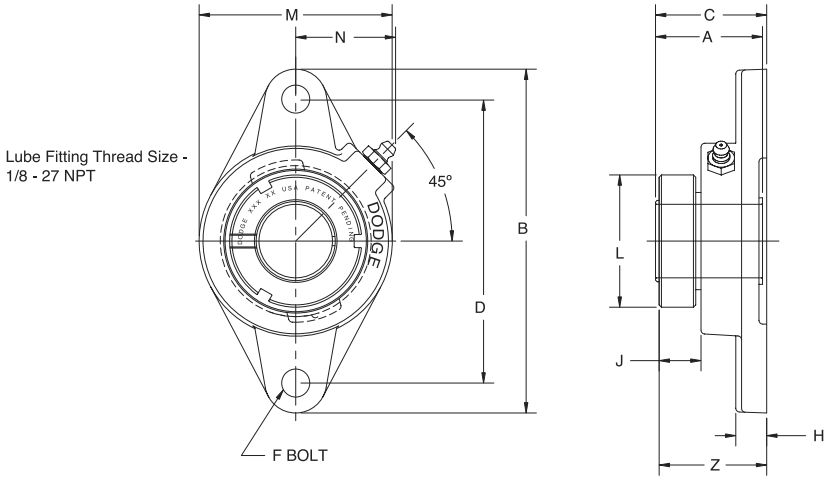
@ Assembled to order

SELECTION/DIMENSIONS

DODGE®

GRIP TIGHT Adapter Ball Bearings

GTM MEDIUM DUTY 2 BOLT FLANGE BEARINGS



Series	Shaft Size	Complete Unit		Unit without Adapter Sleeve & Lock Nut		Adapter Sleeve & Lock Nut Assembly	
		Part No.	Description	Part No.	Description	Part No.	Description
205	3/4	**129369**	F2B-GTM-012	**129492**	F2B-GT-05	**129924**	AN-GTM-05-012
206	1	**129330**	F2B-GTM-100	**129493**	F2B-GT-06	**129925**	AN-GTM-06-100
	25mm	***136268***	*F2B-GTM-25M*			***129957***	*AN-GTM-06-25M*
207	1-3/16	**129331**	F2B-GTM-103	**129494**	F2B-GT-07	**129926**	AN-GTM-07-103
	1-1/4	**129310**	F2B-GT-104			**129911**	AN-GT-07-104
	30mm	***136269***	*F2B-GTM-30M*			***129954***	*AN-GTM-07-30M*
208	1-7/16	**129332**	F2B-GTM-107	**129495**	F2B-GT-08	**129927**	AN-GTM-08-107
	35mm	***136270***	*F2B-GTM-35M*			***129958***	*AN-GTM-08-35M*
209	1-1/2	**129333**	F2B-GTM-108	**129496**	F2B-GT-09	**129928**	AN-GTM-09-108
	1-5/8	**129314**	F2B-GT-110L				
	40mm	***136271***	*F2B-GTM-40M*			***129959***	*AN-GTM-09-40M*
210	1-11/16	**129334**	F2B-GTM-111	**129497**	F2B-GT-10	**129929**	AN-GTM-10-111
	1-3/4	**129335**	F2B-GTM-112			**129930**	AN-GTM-10-112
	45mm	***136272***	*F2B-GTM-405M*			***129960***	*AN-GTM-10-45M*
211	1-15/16	**129336**	F2B-GTM-115	**129498**	F2B-GT-11	**129931**	AN-GTM-11-115
	2	**129337**	F2B-GTM-200			**129932**	AN-GTM-11-200
	50mm	***136273***	*F2B-GTM-50M*			***129961***	*AN-GTM-11-50M*
212	2-3/16	**@**	F2B-GTM-203	**129078**	F2B-GT-12	**129933**	AN-GTM-12-203
	2-1/4	**064472**	F2B-GTM-204			**129934**	AN-GTM-12-204
	55mm	***136274***	*F2B-GTM-55M*			**129962**	*AN-GTM-12-55M*

@ Assembled to order.

FEATURES/BENEFITS PAGE B2-2	HOW TO ORDER/NOMENCLATURE PAGE B2-4	SELECTION PAGE B2-5	RELATED PRODUCTS PAGE B2-96

0102

Model Number

NCN8-18GM40-N0-V1

Features

- **8 mm non-flush**
- **Stainless steel housing**
- **Usable up to SIL2 acc. to IEC 61508**

Accessories

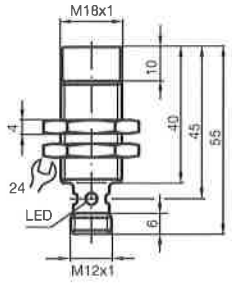
V1-W
Female connector, M12, 4-pin, field attachable

V1-G
Female connector, M12, 4-pin, field attachable

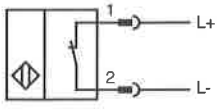
Technical Data

General specifications		
Switching element function		NAMUR, NC
Rated operating distance	s_n	8 mm
Installation		non-flush
Output polarity		NAMUR
Assured operating distance	s_a	0 ... 6.48 mm
Reduction factor r_{Al}		0.42
Reduction factor r_{Cu}		0.4
Reduction factor r_{304}		0.72
Nominal ratings		
Nominal voltage	U_o	8.2 V (R_i approx. 1 kΩ)
Switching frequency	f	0 ... 300 Hz
Hysteresis	H	1 ... 15 typ. 5 %
Reverse polarity protection		reverse polarity protected
Short-circuit protection		yes
Current consumption		
Measuring plate not detected		≥ 3 mA
Measuring plate detected		≤ 1 mA
Switching state indication		Multihole-LED, yellow
Ambient conditions		
Ambient temperature		-25 ... 100 °C (-13 ... 212 °F)
Storage temperature		-40 ... 100 °C (-40 ... 212 °F)
Mechanical specifications		
Connection type		Connector M12 x 1 , 4-pin
Core cross-section		-
Housing material		Stainless steel 1.4305 / AISI 303
Sensing face		PBT
Protection degree		IP67
General information		
Use in the hazardous area		see instruction manuals
Category		1G; 2G; 1D
Compliance with standards and directives		
Standard conformity		
NAMUR		EN 60947-5-6:2000 IEC 60947-5-6:1999
Electromagnetic compatibility		NE 21:2007
Standards		EN 60947-5-2:2007 IEC 60947-5-2:2007
Approvals and certificates		
FM approval		
Control drawing		116-0165F
UL approval		cULus Listed, General Purpose
CSA approval		cCSAus Listed, General Purpose
CCC approval		CCC approval / marking not required for products rated ≤36 V

Dimensions



Electrical Connection



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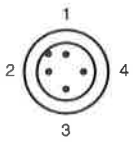
Pinout



Wire colors in accordance with EN 60947-5-6

1		BN	(brown)
2		BU	(blue)

Release date: 2013-06-26 10:06 Date of issue: 2013-06-26 181114_eng.xml

ATEX 1G

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 1G	for use in hazardous areas with gas, vapour and mist
EC-Type Examination Certificate	PTB 00 ATEX 2048 X
CE marking	CE 0102
ATEX marking	Ex II 1G Ex ia IIC T6 Ga
Directive conformity	94/9/EG
Standards	EN 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type	NCN8-18GM...-N0...
Effective internal capacitance C_i	≤ 95 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 100 µH ; a cable length of 10 m is considered.
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EC-Type Examination Certificate has to be observed. The special conditions must be adhered to! Directive 94/9/EG and hence also EC-Type Examination Certificates apply in general only to the use of electrical apparatus under atmospheric conditions. The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority. If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.
Ambient temperature	The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate. Note: Use the temperature table for category 1 !!! The 20 % reduction in accordance with EN 1127-1:2007 has already been accounted for in the temperature table for category 1.
Installation, Comissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety. The associated apparatus must satisfy the requirements of category ia. Due to the possible danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation of the power supply and signal circuit is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.

Specific conditions

Protection from mechanical danger	When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Release date: 2013-06-26 10:06 Date of issue: 2013-06-26 181114_eng.xml

ATEX 2G

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 2G	for use in hazardous areas with gas, vapour and mist
EC-Type Examination Certificate	PTB 00 ATEX 2048 X
CE marking	CE 0102
ATEX marking	Ex II 1G Ex ia IIC T6 Ga
Directive conformity	94/9/EG
Standards	EN 60079-0:2009, EN 60079-11:2007 Ignition protection "Intrinsic safety" Use is restricted to the following stated conditions
Appropriate type	NCN8-18GM...-N0...
Effective internal capacitance C_i	≤ 95 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 100 µH ; a cable length of 10 m is considered.
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EC-Type Examination Certificate has to be observed. The special conditions must be adhered to! Directive 94/9/EG and hence also EC-Type Examination Certificates apply in general only to the use of electrical apparatus under atmospheric conditions. The use in ambient temperatures of > 60 °C was tested with regard to hot surfaces by the mentioned certification authority. If the equipment is not used under atmospheric conditions, a reduction of the permissible minimum ignition energies may have to be taken into consideration.
Ambient temperature	The temperature ranges, according to temperature class, are given in the EC-Type Examination Certificate.
Installation, Comissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Specific conditions	
Protection from mechanical danger	When used in the temperature range below -20 °C the sensor should be protected from knocks by the provision of an additional housing.
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Release date: 2013-06-26 10:06 Date of issue: 2013-06-26 181114_eng.xml

ATEX 1D

Instruction	**Manual electrical apparatus for hazardous areas**
Device category 1D	for use in hazardous areas with combustible dust
EC-Type Examination Certificate	ZELM 03 ATEX 0128 X
CE marking	CE 0102
ATEX marking	Ex II 1D Ex iaD 20 T 108 °C (226.4 °F)
Directive conformity	94/9/EG
Standards	IEC 61241-11:2002: draft; prEN61241-0:2002 type of protection intrinsic safety "iD" Use is restricted to the following stated conditions
Appropriate type	NCN8-18GM...-N0...
Effective internal capacitance C_i	≤ 95 nF ; a cable length of 10 m is considered.
Effective internal inductance L_i	≤ 100 µH ; a cable length of 10 m is considered.
General	The apparatus has to be operated according to the appropriate data in the data sheet and in this instruction manual. The EC-Type Examination Certificate has to be observed. The special conditions must be adhered to!
Maximum housing surface temperature	The maximum surface temperature of the housing is given in the EC-Type Examination Certificate.
Installation, Comissioning	Laws and/or regulations and standards governing the use or intended usage goal must be observed. The intrinsic safety is only assured in connection with an appropriate related apparatus and according to the proof of intrinsic safety. The associated apparatus must satisfy at least the requirements of category ia IIB or iaD. Because of the possibility of the danger of ignition, which can arise due to faults and/or transient currents in the equipotential bonding system, galvanic isolation in the power supply and signal circuits is preferable. Associated apparatus without electrical isolation must only be used if the appropriate requirements of IEC 60079-14 are met. The intrinsically safe circuit has to be protected against influences due to lightning. When used in the isolating wall between Zone 20 and Zone 21 or Zone 21 und Zone 22 the sensor must not be exposed to any mechanical danger and must be sealed in such a way, that the protective function of the isolating wall is not impaired. The applicable directives and standards must be observed.
Maintenance	No changes can be made to apparatus, which are operated in hazardous areas. Repairs to these apparatus are not possible.
Specific conditions	
Electrostatic charging	Electrostatic charges must be avoided on the mechanical housing components. Dangerous electrostatic charges on the mechanical housing components can be avoided by incorporating these in the equipotential bonding.

Release date: 2013-06-26 10:06 Date of issue: 2013-06-26 181114_eng.xml

Compression Springs

LeeP™ Plastic Springs

REDUX™ Wave Springs

HEFTY™ Die Springs

Extension Springs

Torsion Springs

Belleville Washers

Specialty Parts/Constant Force

Custom Springs

Hefty Die Springs Specifications

CAD Drawings View/Download

LHL 2000D 07

Ordering Instructions

Pricing is available for quantities up to 1000.
For orders over 1000 pieces, add to quote list and we will contact you with pricing.
Minimum Total Order for Hefty Die Springs (LHL Series) is $40.00. Hefty products may be assorted to reach the minimum, but may not be combined with any other Stock Springs to meet the $40.00 Hefty Minimum Order.
For orders under $40.00, contact our Customer Service Dept. at 888-SPRINGS (888-777-4647).
These orders incur a $20.00 Small Order Shipping and Processing Charge per Order.

Leave Quantity Field Blank and Click **Price Check** to View ALL Available Price Breaks for This Item

Quantity Required: Price Check

ADD TO CART

Add To Quote List

** You must Shop our Catalog order.
Get Specifications for a Part Number
Find Springs by Specifications
Learn About HEFTY Die Springs

Specification

Part Number	LHL 2000D
Outside Diameter	1.960 in
Hole Diameter	2.000 in
Wire Diameter	0.393 in
Load At Solid Length	1776.000 lb
Free Length	6.000 in
Rate	1015.00 lb/in
Solid Length	4.250 in
Rod Diameter	1.000 in
Number of Coils	8.7
Total Coils	10.7
Finish	ORANGE POWDER COAT, FULL COVERAGE
Material	OTCS

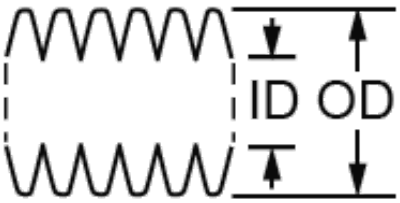
Click Here for Tolerances and Engineering Notes

McMASTER-CARR. OVER 555,000 PRODUCTS
(562) 692-5911
(562) 695-2323 (fax)
la.sales@mcmaster.com
Text 75930

Round Bellow with Interchangeable Cuff Insert

2" ID, 3-1/4" OD, 1-Foot Extended Length

In stock
$70.23 Each
95655K31



Bellows ID	2"
Bellows OD	3 1/4"
Compressed Length	1"
Additional Specifications	Bellows 1-ft. Expanded Lg.

The flange ends accept cuff inserts (sold separately), allowing you to mix and match the inserts to fit your ID connection. Temperature range is –30° to +260° F. Color is black.

Bellows are ultra flexible and resist abrasion, weathering, oils, coolants, and ozone. Install by sliding over your machine's rod or shaft. Made of molded Goralon rubber, so venting is recommended. Wall thickness is 0.03".

McMASTER-CARR. OVER 555,000 PRODUCTS
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(562) 695-2323 (fax)
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Text 75930

1" ID Cuff Insert for 2" ID Bellows Round Bellow with Interchangeable Cuff Insert

In stock
$15.36 Each
95655K351

For Bellows ID	2"
Cuff ID	1"
Additional Specifications	Cuff Inserts

The flange ends accept cuff inserts (sold separately), allowing you to mix and match the inserts to fit your ID connection. Temperature range is –30° to +260° F. Color is black.

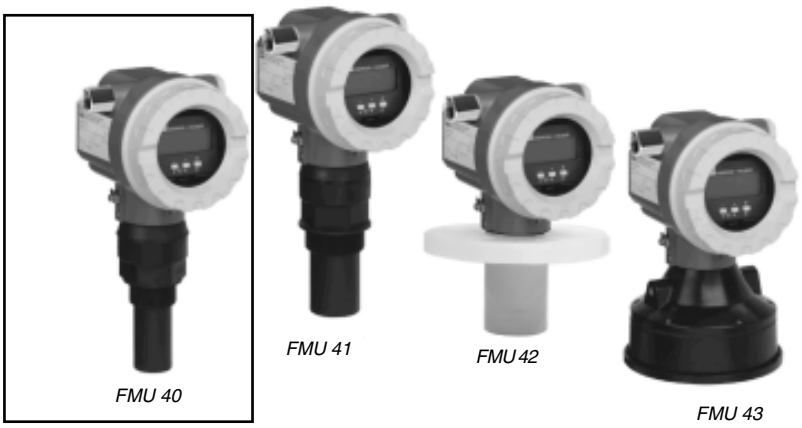
Cuff inserts are 3/4" long and made of polyurethane. Mount to your machine with hose clamps (not included, unless noted).

Technical
Information
TI 365F/24/ae

JWCE P/N E15-022-002

Ultrasonic Level Measurement
prosonic M FMU 40/41/42/43

Compact transmitters for non-contact level measurement of fluids, pastes and coarse bulk materials



Application

The compact Prosonic M transmitters are used for continuous, non-contact level measurement in fluids and coarse bulk materials.

Additionally, the sensors can be used for flow measurement in open channels and measuring weirs.

The following interfaces are available for system integration:
- HART® (standard), 4 to 20 mA
- PROFIBUS-PA
- Foundation Fieldbus

The maximum measuring range for Prosonic M sensors are:
- FMU 40:
  - Fluids, 16 feet (5 m)
  - Bulk solids, 6 feet (2 m)
- FMU 41:
  - Fluids, 26 feet (8 m)
  - Bulk solids, 12 feet (3.5 m)
- FMU 42:
  - Fluids, 33 feet (10 m)
  - Bulk solids, 16 feet (5 m)
- FMU 43:
  - Fluids, 50 feet (15 m)
  - Bulk solids, 23 feet (7 m)

Features and benefits

- Simple, menu-guided on-site operation with four-line plain text display
- Envelope curves on the on-site display for simple diagnosis
- Easy operation, diagnosis and measuring point documentation with the supplied ToF Tool operating program
- Alignable NEMA 6P (IP 68) aluminum housing
- Optional remote display and operation
- Installation via 1-1/2" NPT, 2" NPT or 4" universal slip-on flange
- Integrated temperature sensor for Time-of-Flight correction provides accurate measurements, even with temperature changes
- Linearization function (up to 32 points) for measured value output in any unit of length, volume, or flow rate
- Non-contact measurement method, therefore almost independent of product properties

Endress+Hauser
The Power of Know How

Function and system design

Measuring principle

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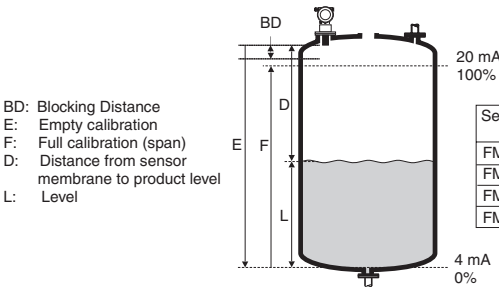


BD: Blocking Distance
E: Empty calibration
F: Full calibration (span)
D: Distance from sensor membrane to product level
L: Level

Sensor	BD	Max. range in liquids	Max. range in solids
FMU 40	9.84" (250 mm)	16 ft (5 m)	6.5 ft (2 m)
FMU 41	13.8" (350 mm)	26 ft (8 m)	11.5 ft (3.5 m)
FMU 42	15.7" (400 mm)	33 ft (10 m)	16.4 ft (5 m)
FMU 43	23.6" (600 mm)	50 ft (15 m)	23 ft (7 m)

Time-of-Flight method

The Prosonic M sensor transmits ultrasonic pulses in the direction of the product surface. The ultrasonic pulse is reflected back and received by the sensor. The Prosonic M electronics measures the time t between pulse transmission and reception. Using the time t (and the velocity of sound c), the system calculates the distance D between the sensor membrane and the product surface

$$D = c \times t/2$$

As the device knows the empty distance E from the user entry, it can calculate the level as follows:

$$L = E - D$$

An integrated temperature sensor compensates for changes in the velocity of sound caused by temperature changes.

Interference echo suppression

The interference echo suppression feature ensures that interference echos (such as welded joints, internal ladder steps, edges and installations) are not interpreted as a level echo.

Calibration

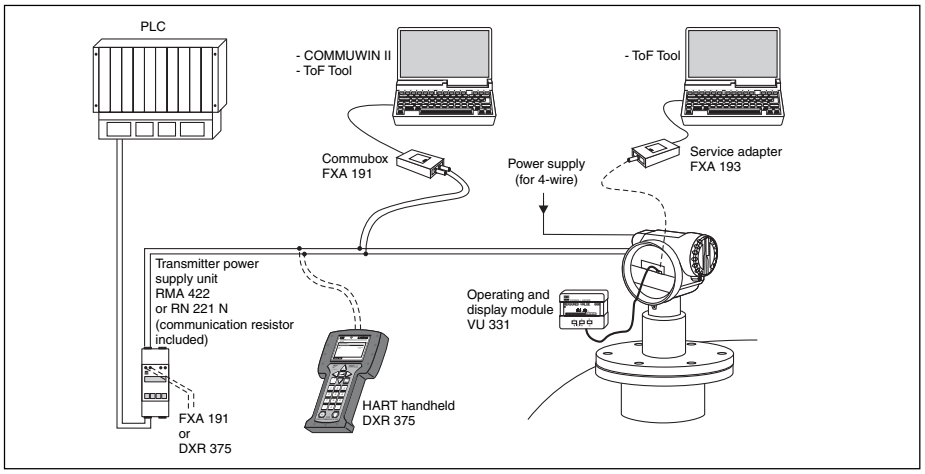
Enter the empty distance E and the span F to calibrate the system.

Blocking distance

Span F may not extend into the blocking distance BD. Level echos within the blocking distance cannot be evaluated due to the transient characteristics of the sensor.

Equipment architecture

4 to 20 mA ouput with HART® protocol



The Prosonic M can be operated on-site using either the display module VU 331 or the supplied ToF Tool program. The system can also be operated remotely using the HART® handheld terminal DXR 375 or using the ToF Tool.

NOTE: If a HART® communication resistor is not built into the power supply device, a 250Ω communication resistor in the 2-wire line must be inserted.

Output

Output signal

- 4 to 20 mA with HART® protocol
- Profibus-PA
- Foundation Fieldbus (FF)

Signal on alarm

Error information can be accessed via the following interfaces:
- On-site display (error symbol, error code and plain text description)
- Current output (configurable)
- Digital interface

Load HART®

Minimum load for HART® communication, 250Ω

Output damping

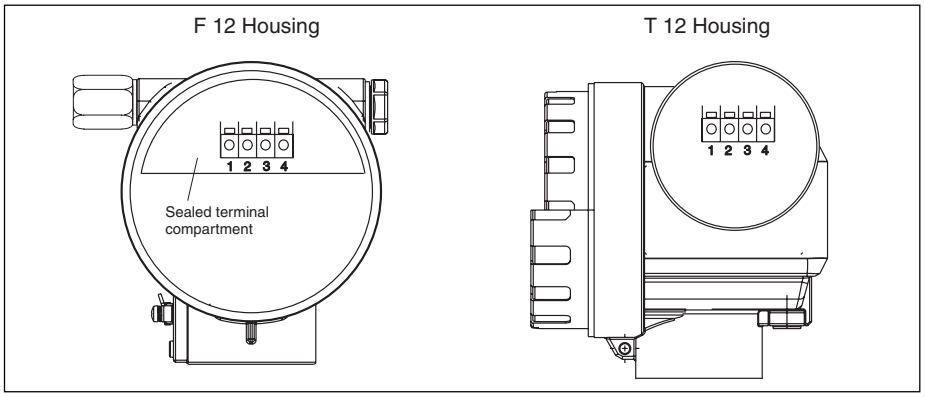
Freely selectable, 0 to 255 seconds

Linearization

The linearization function of the Prosonic M allows conversion of the measured value into any unit of length or volume. In open channels or measuring weirs, it is also possible to linearize the flow. Linearization tables for calculating volume in horizontal cylindrical tanks are preprogrammed. You can also enter any number of other tables containing up to 32 value pairs either manually or semi-automatically (by filling the vessel under controlled conditions). You can use the ToF Tool operating program to calculate the table automatically for any tank form and then enter it into the device.

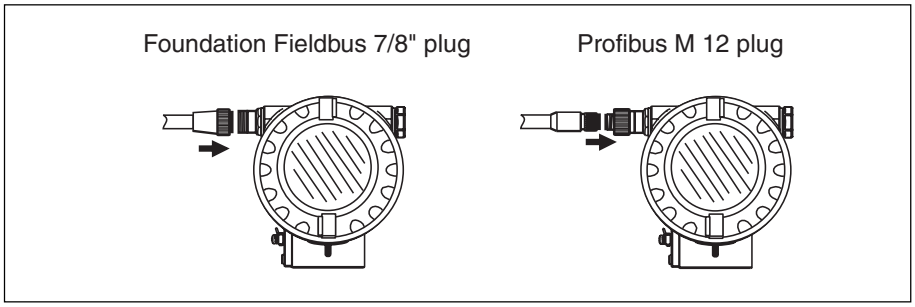
Power supply

Terminal compartment



In the F 12 housing, the terminals are located underneath the housing cover. In the T 12 housing, they are under the cover of the separate terminal compartment.

Fieldbus plug connector



- For the Foundation Fieldbus version, a 7/8” plug connector is available.
- For the Profibus-PA version, an M12 plug connector is available

Both versions are supplied fully wired.

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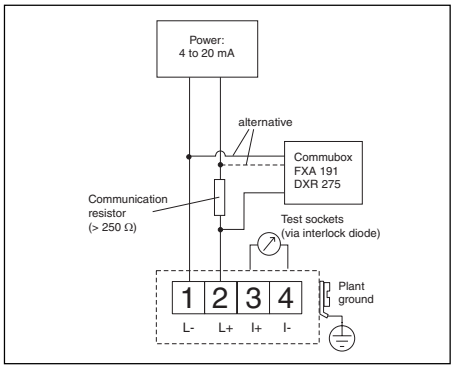
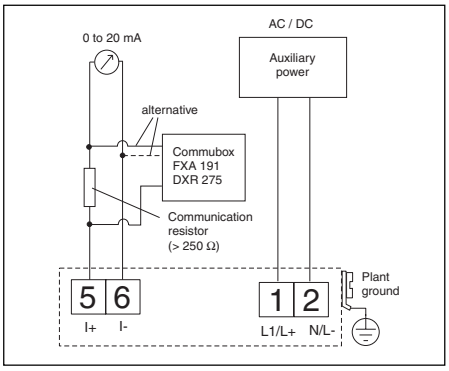
Terminal assignment

4 to 20 mA with HART®, 2-wire

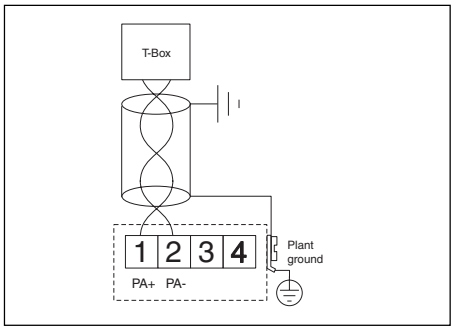


4 to 20 mA with HART®, active, 4-wire

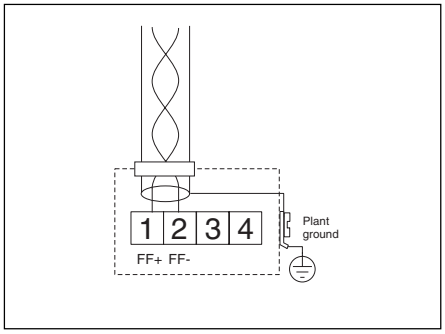


- Connect the connecting line to the screw terminals (up to 18 AWG) in the terminal compartment
- Use 2-wire twisted pair cable with shield for the connection
- Units are internally protected against reverse polarity, RFI and over-voltage peaks

PROFIBUS-PA



Foundation Fieldbus



The digital communication signal is transmitted to the bus via a 2-wire connection. The bus also provides the auxiliary power. Please use 2-wire twisted pair cable with shield. Refer to the following operating manuals for information on cable types, and how to set and ground the network:

- BA 198F/00/en “PROFIBUS-DP/-PA: Guidelines for planning and commissioning”
- BA 013S/04/en “Foundation Fieldbus, Installation and Commissioning Guidelines”

Cable entry

- Cable gland: M20x1.5, recommended cable diameter 0.23” to 0.39” (6 to 10 mm)
- Cable entry 1/2” NPT or G 1/2
- PROFIBUS-PA M12 plug
- Foundation Fieldbus 7/8” plug

Power supply

HART, 2-wire

The following values are the voltages across the terminals directly at the instrument.

Version		Current consumption	Terminal voltage Min.	Max.
2-wire HART	Standard	4 mA	14 V	36 V
		20 mA	8 V	36 V
	IS	4 mA	14 V	30 V
		20 mA	8 V	30 V
	XP	4 mA	14 V	30 V
		20 mA	11 V	30 V
Fixed current (measured value transmitted by HART)	Standard	11 mA	10 V	36 V
	IS	11 mA	10 V	30 V
Fixed current for HART multidrop mode	Standard	4 mA *	14 V	36 V
	IS	4 mA *	14 V	36 V

* Start-up current, 11 mA

HART, 4-wire, active

Version	Voltage	Maximum load
DC	10.5 to 32 V	600 Ω
AC 50/60 Hz	90 to 253 V	600 Ω

Power consumption

2-wire, 51 mW to 800 mW
4-wire AC, maximum 4 VA
4-wire DC FMU 40/41, 330 mW to 830 mW
4-wire DC FMU 42/43, 600 mW to 1 W

Current consumption (2-wire units)

HART®, 3.6 to 22 mA
PROFIBUS-PA, maximum 13 mA
Foundation Fieldbus, maximum 15 mA

HART® ripple

47 to 125 Hz: Vpp = 200 mV (measured at 500 Ω)

Maximum noise HART®

500 Hz to 10 kHz: Vrms = 2.2 mV (measured at 500 Ω)

Galvanic isolation

With 4-wire units, the evaluation electronics and power supply voltage are galvanically isolated from each other.

Performance characteristics

Reference operating conditions

- Temperature = 68°F (20°C)
- Pressure = 14.7 psia (1013 mbar abs.)
- Humidity = 50%
- Ideal reflective surface (calm, smooth fluid surface)
- No interference reflections within signal beam area
- Set application parameters:
  Tank shape = flat ceiling
  Medium property = liquid
  Process conditions = calm surface

Measuring error

Typical specifications for reference operating conditions (include linearity, repeatability, and hysteresis):
FMU 40 / 41: ± 0.08" (2 mm) or 0.2% of set measuring range, which ever is greater
FMU 42 / 43: ± 0.15" (4 mm) or 0.2% of set measuring range, which ever is greater

Measured value resolution

FMU 40 / 41: 0.04" (1 mm)
FMU 42 / 43: 0.08" (2 mm)

Reaction time

The reaction time depends on the parameter settings (minimum 0.5 seconds for 4-wire devices, minimum 2 seconds for 2-wire devices)

Ambient conditions

Ambient temperature	-40° to + 176°F (-40° to + 80°C) The function of the LCD becomes restricted at T_{amb} < -5°F and T_{amb} > 140°F (-20°C and 60°C). If the device is operated outdoors in strong sunlight, a protective cover should be used.
Storage temperature	-40° to +176°F (-40° to +80°C)
Resistance to alternating temperature cycles	To DIN EN 60068-2-14; Nb test: 176°F / -40°F (+80°C / -40°C), 1 K/min, 100 cycles
Climate class	DIN EN 60068-2-38 (Test Z/AD) EIN/IEC 68 T2-30Db
Ingress protection	• With closed housing, tested according to NEMA 6P (IP 68), 24 hours at 6 feet (1.83 m) under water surface. NEMA 4X (IP 66) • With open housing, NEMA 1 (IP 20) Caution! Degree of protection NEMA 6P / IP 68 applies to M 12 PROFIBUS-PA cable connectors only when plugged in.
Vibration resistance	DIN EN 60068-2-64 / IEC 68-2-64: 20 to 2000 Hz, 1 $(m/x^2)^2/Hz$; 3 x 100 min
Electromagnetic compatibility (EMC)	• Interference emission to EN 61326, Equipment Class B • Interference immunity to EN 61326, Appendix A (Industrial) and NAMUR Recommendation NE 21 (EMC) • A standard installation cable is sufficient if only the analog signal is used. Use shielded cable when working with a superimposed communication signal (HART®)

Process conditions

Process temperature	-40° to +176°F (-40° to +80°C) A temperature sensor is integrated in the sensor for temperature-dependent time-of-flight correction.
Process pressure	• FMU 40/41: 44 psia (3 bar abs.) • FMU 42/43: 36 psia (2.5 bar ads.)

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Weight

- FMU 40: Approximately 5.5 lb (2.5 kg)
- FMU 41: Approximately 6 lb (2.6 kg)
- FMU 42: Approximately 6.6 lb (3 kg)
- FMU 43: Approximately 8 lb (3.5 kg)

Housing

Types of housings:
- F 12 housing with sealed terminal compartment for standard or hazardous areas
- T 12 housing with separate terminal compartment for explosion proof areas

Material:
- Aluminum, chromed, powder-coated, seawater resistant

Cover:
- Aluminum, for version without on-site display
- Inspection glass for version with on-site display (this version cannot be specified with the ATEX II 1/2 D certificate)

Process connection and sensor material

Sensor	Process connection	Wetted material
FMU 40	Thread, 1-1/2" - 11.5 NPT Thread, G 1-1/2"	Sensor: PVDF Seal: EPDM
FMU 41	Thread, 2" - 11.5 NPT Thread, 2"	Sensor: PVDF Seal: EPDM
FMU 42	3" or 4" ANSI flange, universal (DN 80 / 100 JIS 10K80 / 16K 100) Mounting bracket	Sensor: PVDF Seal: Viton or EPDM Flange: PP, PVDF or 316 SS
FMU 43	3" or 4" ANSI flange, universal (DN 80 / 100 JIS 10K80 / 16K 100) Mounting bracket	Sensor: UP and 316 Ti SS Seal: EPDM

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Operation with Commuwin II (for communication versions HART® or PROFIBUS-PA)

Commuwin II is an operating software with graphical support (MS Windows) for intelligent transmitters with the communication protocols Rackbus, Rackbus RS-485, HART® and PROFIBUS-PA.

Commuwin II supports the following functions:

- Online configuration of transmitters
- Loading and saving of instrument data (Upload/Download)
- Orderly visulization of measured values and limit values
- Display and recording of measured values with a line recorder

NOTE: It is not possible to display envelope curves with Commuwin II. To display curves, use the ToF Tool program supplied.

Connections:

- HART® with Commubox FXA 191 (available as accessory)
- PROFIBUS-PA

Operation with NI-FBUS Configurator (only with Foundation Fieldbus)

The NI-FBUS Configurator is an easy-to-use graphical environment for creating linkages, loops, and a schedule based on the fieldbus concepts.

The NI-FBUS Configurator is used to configure a fieldbus network as follows:

- Set block and device tags
- Set device addresses
- Create and edit function block control strategies (function block applications)
- Configure vendor-defined function and transducer blocks
- Create and edit schedules
- Read and write to function block control strategies (function block applications)
- Invoke Device Description (DD) methods
- Download a configuration
- Verify a configuration and compare it to a saved configuration
- Monitor a downloaded configuration
- Replace devices
- Save and print a configuration

Certificates and Approvals

CE mark

By attaching the CE mark, Endress+Hauser confirms that the instrument fulfills all the requirements of the relevant EC directives.

Hazardous areas

FMU 40 / 41:

- FM approved Intrinsically safe Class I, II, III; Division 1, Groups A-G / Non-incendive Class I, Division 2
- FM approved explosion proof Class I, II, III; Division 1, Groups A-G
- CSA approved Intrinsically safe Class I, II, III; Division 1, Groups A-G / Non-incendive Class I, Division 2
- CSA approved explosion proof Class I, II, III; Division 1, Groups A-G

FMU 42:

- FM approved Intrinsically safe Class I, II, III; Division 1, Groups A-G / Non-incendive Class I, Division 2
- FM approved explosion proof Class I, II, III; Division 1, Groups A-G
- CSA approved Intrinsically safe Class I, II, III; Division 1, Groups A-G / Non-incendive Class I, Division 2
- CSA approved explosion proof Class I, II, III; Division 1, Groups A-G

FMU 43:

- FM approved dust-ignition proof Class I, Division 2, Groups E-G, non-incendive
- CSA approved dust-ignition proof Class I, Division 2, Groups E-G, non-incendive

ATEX and TIIS approvals available, please consult factory.

WARRANTY CERTIFICATE

Date of Issue:	9/5/17	Sales Order Number:	112819
Date of Startup:	Pending		

End User:	Ogallala, NE (Ogallala WWTP)
Project Name:	Ogallala, NE (Ogallala WWTP)
Project Location:	Ogallala, NE 69153

Equipment Supplied	MCR, PC2530		
Model Number:	MCR		
Serial Number:	112819-1-1		
Controller Serial Number:	112819-2-1		

The Warranty procedures, provisions and terms stated in JWC Environmental Terms and Conditions of Sale, Form F360JWCE0107, shall apply, copy attached. Only those exceptions to which seller has specifically agreed and that are listed below, if any, shall apply.

1 year standard warranty is included.

The standard warranty document included here and as indicated on this document is for reference. The final negotiated warranty via the purchase order acknowledgement takes precedence over this referenced document, and approval of this submittal will not limit the negotiated warranty or terms.

JWC ENVIRONMENTAL
TERMS AND CONDITIONS OF SALE

Unless otherwise specifically agreed to in writing by the buyer ("Buyer") of the products and or related services purchased hereunder (the "Products") and JWC Environmental (the "Seller"), the sale of the Products is made only upon the following terms and conditions. Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional, conditional and different terms in Buyer's form or documents.

PAYMENT TERMS

Subject to any contrary terms set forth in our price quotation, order acceptance or invoice the full net amount of each invoice is due and payable in cash within 30 days from the date of the invoice. If any payment is not received within such 30-day period, Buyer shall pay Seller the lesser of 1 ½% per month or the maximum legal rate on all amounts not received by the due date of the invoice, from the 31st day after the date of invoice until said invoice and charges are paid in full. Unless Sellers documents provide otherwise, freight, storage, insurance and all taxes, duties or other governmental charges related to the Products shall be paid by the Buyer. If Seller is required to pay any such charges, Buyer shall immediately reimburse Seller for said charges. In all cases, regardless of partial payment, title to the Products shall remain the Sellers until payment for the Products has been made in full. All orders are subject to credit approval by Seller. All offers by Seller and/or acceptance of Buyer's order shall be nullified by any failure of Buyer to obtain credit approval. Furthermore, Buyer shall not assert any claim against Seller due to Buyer's inability to obtain credit approval. Irrevocable Letter of Credit from Buyer in form and term acceptable to Seller is required for Product orders delivered outside the United States of America.

DELIVERY

Unless otherwise provided in our price quotation, delivery of the Products shall be made F.O.B. place of manufacture. Any shipment, delivery, installation or service dates quoted by the Seller are estimated and the Seller shall be obligated only to use reasonable efforts to meet such dates. The Seller shall in no event be liable for any delays in delivery or failure to give notice of delay or for any other failure to perform hereunder due to causes beyond the reasonable control of the Seller. Such causes shall include, but not be limited to, acts of God, the elements, acts or omissions of manufacturers or suppliers of the Products or parts thereof, acts or omissions of Buyer or civil and military authorities, fires, labor disputes or any other inability to obtain the Products, parts thereof, or necessary power, labor, materials or supplies. The Seller will be entitled to refuse to make, or to delay, any shipments of the Products if Buyer shall fail to pay when due any amount owed by it to the Seller, whether under this or any other contract between the Seller and Buyer. Any claims for shortages must be made to the Company in writing within five calendar days from the delivery date and disposition of the claim is solely subject to Sellers determination.

PRICES

Prices of the Seller's Products are subject to change without notice. Quotations are conditioned upon acceptance within 30 days unless otherwise stated and are subject to correction for errors and/or omissions. Prices include charges for regular packaging but, unless expressly stated, do not include charges for special requirements of government or other purchaser. Prices are subject to adjustment should Buyer place an order past the validity period of the quotation or delay delivery of Products beyond the quoted lead time for any reason.

RETURNS

No Products may be returned for cash. No Product may be returned for credit after delivery to Buyer without Buyer first receiving written permission from the Seller. Buyer must make a request for return of Product in writing to Seller at its place of business in Costa Mesa, California. A return material authorization number must be issued by the Seller to the Buyer before a Product may be returned. Permission to return Product to Seller by Buyer is solely and exclusively the Sellers. Product must be returned to Seller at Buyers expense, including packaging, insurance, transportation and any governmental fees. Any credit for Product returned to Seller shall be subject to the inspection of and acceptance of the Product by the Seller and is at the sole discretion of the Seller.

LIMITED WARRANTY

Subject to the terms and conditions hereof, the Seller warrants until one year after commissioning (written notification to Seller by Buyer required) of the Product or until 18 months after delivery of such Product to Buyer, whichever is earlier, that each Product will be free of defects in material and workmanship. If (a) the Seller receives written notification of such defect during the warranty period and the defective Products use is discontinued promptly upon discovery of alleged defect, and (b) if the owner ("Owner") forwards the Product to the Seller's nearest service/repair facility, transportation and related insurance charges prepaid. The Seller will cause any Products whose defect is covered under this warranty to either be replaced or be repaired at no cost to the Owner. The foregoing warranty does not cover repairs required due to repair or alteration other than by the Seller's personnel, accident, neglect, misuse, transportation or causes other than ordinary use and maintenance in accordance with the Seller's instructions and specifications. In addition, the foregoing warranty does not cover any Products, or components thereof, which are not directly manufactured by the Seller. To the extent a warranty for repair or replacement of such Products or components not manufactured directly by the Seller is available to Buyer under agreements of the Seller with its vendors; the Seller will make such warranties available to Buyer. Costs of transportation of any covered defective item to and from the nearest service/repair center and related insurance will be paid or reimbursed by Buyer. Any replaced Products will become the property of the Seller. Any replacement Products will be warranted only for any remaining term of the original limited warranty period and not beyond that term.

DISCLAIMER OF WARRANTIES AND LIMITATIONS OF LIABILITIES

THE SELLER'S FOREGOING LIMITED WARRANTY IS THE EXCLUSIVE AND ONLY WARRANTY WITH RESPECT TO THE PRODUCTS AND SHALL BE IN LIEU OF ALL OTHER WARRANTIES (OTHER THAN THE WARRANTY OF TITLE), EXPRESS, STATUTORY OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY STATEMENTS MADE BY EMPLOYEES, AGENTS OF THE SELLER OR OTHERS REGARDING THE PRODUCTS. THE OBLIGATIONS OF THE SELLER UNDER THE FOREGOING WARRANTY SHALL BE FULLY SATISFIED BY THE REPAIR OR THE REPLACEMENT OF THE DEFECTIVE PRODUCT OR PART, AS PROVIDED ABOVE. IN NO EVENT SHALL THE SELLER BE LIABLE FOR LOST PROFITS OR OTHER SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, EVEN IF THE SELLER HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. THE TOTAL LIABILITY OF THE SELLER TO BUYER AND OTHERS ARISING FROM ANY CAUSE WHATSOEVER IN CONNECTION WITH BUYER'S PURCHASE, USE AND DISPOSITION OF ANY PRODUCT COVERED HEREBY SHALL, UNDER NO CIRCUMSTANCES, EXCEED THE PURCHASE PRICE PAID FOR THE PRODUCT BY BUYER. NO ACTION, REGARDLESS OF FORM, ARISING FROM THIS AGREEMENT OR BASED UPON BUYER'S PURCHASE, USE OR DISPOSITION OF THE PRODUCTS MAY BE BROUGHT BY EITHER PARTY MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION ACCRUES, EXCEPT THAT ANY CAUSE OF ACTION FOR THE NONPAYMENT OF THE PURCHASE PRICE MAY BE BROUGHT AT ANY TIME.

The remedies provided to Buyer pursuant to the limited warranty, disclaimer of warranties and limitations of liabilities, described herein are the sole and exclusive remedies.

Unless specifically agreed to in writing by the Seller, no charges may be made to the Seller by Buyer or any third party employed by buyer for removing, installing or modifying any Product.

The Seller and its representatives may furnish, at no additional expense, data and engineering services relating to the application, installation, maintenance or use of the Products by Buyer. The Seller will not be responsible for, and does not assume any liability whatsoever for, damages of any kind sustained either directly or indirectly by any person through the adoption or use of such data or engineering services in whole or in part.

CONFIDENTIAL INFORMATION

Except with the Seller's prior written consent, Buyer shall not use, duplicate or disclose any confidential proprietary information delivered or disclosed by the Seller to Buyer for any purpose other than for operation or maintenance of the Products.

CANCELLATION AND DEFAULT

Absolutely no credit will be allowed for any change or cancellation of an order for Products by Buyer after fabrication of the Products to fill Buyer's order has been commenced. If Buyer shall default in paying for any Products purchased hereunder, Buyer shall be responsible for all reasonable costs and expenses, including (without limitation) attorney's fees incurred by the Seller in collecting any sums owed by Buyer. All rights and remedies to the Seller hereunder or under applicable laws are cumulative and none of them shall be exclusive of any other right to remedy. No failure by the Seller to enforce any right or remedy hereunder shall be deemed to be a waiver of such right or remedy, unless a written waiver is signed by an authorized management employee of the Seller and the Seller's waiver of a breach of this agreement by Buyer shall not be deemed to be a waiver of any other breach of the same or any other provision.

CHANGES IN PRODUCTS

Changes may be made in materials, designs and specifications of the Products without notice. The Seller shall not incur any obligation to furnish or install any such changes or modifications on Products previously ordered by, or sold to, Buyer.

APPLICABLE LAW, RESOLUTION OF DISPUTES AND SEVERABILITY

This agreement is entered into in Costa Mesa, California. This agreement and performance by the parties hereunder shall be construed in accordance with, and governed by, the laws of the State of California. Any claim or dispute arising from or based upon this agreement or the Products which form its subject matter shall be resolved by binding arbitration before the American Arbitration Association in Los Angeles, California, pursuant to the Commercial Arbitration Rules, excepting only that each of the parties shall be entitled to take no more than two depositions, and serve no more than 30 interrogatories, 10 requests for admissions and 20 individual requests for production of documents, such discovery to be served pursuant to the California Code of Civil Procedure. Any award made by the arbitrator may be entered as a final judgment, in any court having jurisdiction to do so. If any provision of this agreement shall be held by a court of competent jurisdiction or an arbitrator to be unenforceable to any extent, that provision shall be enforced to the full extent permitted by law and the remaining provisions shall remain in full force and effect.

ASSIGNMENT

This agreement shall be binding upon the parties and their respective successors and assigns. However, except for rights expressly provided to subsequent Owners of the Products under "Limited Warranty" above, any assignment of this agreement or any rights hereunder by Buyer shall be void without the Company's written consent first obtained. Any exercise of rights by an Owner other than Buyer shall be subject to all of the limitations on liability and other related terms and conditions set forth in this agreement.

EXCLUSIVE TERMS AND CONDITIONS

The terms and conditions of this agreement may be changed or modified only by an instrument in writing signed by an authorized management employee of the Seller. This instrument, together with any amendment or supplement hereto specifically agreed to in writing by an authorized management employee of the Seller, contains the entire and the only agreement between the parties with respect to the sale of the Products covered hereby and supersedes any alleged related representation, promise or condition not specifically incorporated herein.

SELLER'S PRODUCTS ARE OFFERED FOR SALE AND SOLD ONLY ON THE TERMS AND CONDITIONS CONTAINED HEREIN. NOTWITHSTANDING ANY DIFFERENT OR ADDITIONAL TERMS OR CONDITIONS CONTAINED IN BUYER'S SEPARATE PURCHASE ORDERS OR OTHER ORAL OR WRITTEN COMMUNICATIONS, BUYER'S ORDER IS OR SHALL BE ACCEPTED BY THE COMPANY ONLY ON THE CONDITION THAT BUYER ACCEPTS AND CONSENTS TO THE TERMS AND CONDITIONS CONTAINED HEREIN. IN THE ABSENCE OF BUYER'S ACCEPTANCE OF THE TERMS AND CONDITIONS CONTAINED HEREIN, THE SELLER'S COMMENCEMENT OF PERFORMANCE AND/OR DELIVERY OF THE PRODUCTS, OR THE SELLER'S STATEMENT OF ACKNOWLEDGMENT OF THE RECEIPT OF BUYER'S PURCHASE ORDER, SHALL BE FOR BUYER'S CONVENIENCE ONLY AND SHALL NOT BE DEEMED OR CONSTRUED TO BE ACCEPTANCE OF BUYER'S DIFFERING TERMS OR CONDITIONS, OR ANY OF THEM. ANY DIFFERENT OR ADDITIONAL TERMS ARE HEREBY REJECTED UNLESS SPECIFICALLY AGREED UPON IN WRITING BY AN AUTHORIZED MANAGEMENT EMPLOYEE OF THE SELLER. IF A CONTRACT IS NOT EARLIER FORMED BY MUTUAL AGREEMENT IN WRITING, BUYER'S ACCEPTANCE OF ANY PRODUCTS COVERED HEREBY SHALL BE DEEMED ACCEPTANCE OF ALL OF THE TERMS AND CONDITIONS STATED HEREIN. THE SELLER'S FAILURE TO OBJECT TO PROVISIONS INCONSISTENT HEREWITH CONTAINED IN ANY COMMUNICATION FROM BUYER SHALL NOT BE DEEMED A WAIVER OF THE PROVISIONS CONTAINED HEREIN.