Trio Engineered Products, Inc. • 12823 Schabarum Ave. • Irwindale, CA 91706 • Telephone 626-851-3966 • Fax 626-851-9526

Self-Cleaning Permanent Magnet Manual

Model

CRP36B

Size:	36”x42”
Serial Number:	

HAZARD WARNING

Any machinery may be hazardous to the user if it is not maintained and operated properly. The following precautions should always be observed:

CRUSHING MACHINERY

1. Take special care to see that all parts of your body are clear of moving parts and pinch points before starting or operating machinery.
2. Make sure that all rotating sheaves, pulleys and belts are properly guarded to prevent being caught by them.
3. Be sure that the feed and discharge systems for material processing equipment are designed and maintained so that processed materials (rocks, gravel, coal, etc.) are retained within the system. Do not allow any part of your body to enter in or near the material flow.
4. Never sit or stand on any component of the machinery while it is in operation to prevent injuries arising from vibration.
5. Verify that the supporting structure(s) provided by your company for the machinery is sufficient to support both the total weight of the equipment and the dynamic load and stresses created by the equipment.

CONVEYING MACHINERY

1. Be sure that all parts of your body are kept clear of moving conveyor belts, especially at pinch points.
2. Do **NOT** lubricate machinery while it is in motion.
3. Never lean over a moving conveyor belt, or ride on a conveyor belt intended only for material transport.
4. Always keep clear of feed or discharge points of all material conveyor systems.
5. Be sure that all guards are securely fastened in place on sheaves, pulleys, and belts before and during equipment operation.

SAFETY EQUIPMENT

Trio provides only such safety equipment and guards as are specified by the Purchaser on the Shop Order or the Customer Order Acknowledgment. All other required safety devices must be furnished by the Purchaser.

GENERAL SAFETY PRACTICES

Safety Practices affect everyone. Any and all personnel who operate or maintain your equipment are expected to comply with the basic safety practices which follow.

This manual contains the best available information on proper installation, operation and maintenance of the equipment which it addresses. It does **NOT** replace or supersede applicable federal, state, or local regulations, your company safety rules, or insurance carrier requirements. It definitely is not intended to replace good judgment or common sense!

Equipment operators, plant management and safety engineers are required and expected to be aware of potential hazards that may exist in the specific workplace where the equipment is installed and operated. All personnel are expected to develop, implement and maintain a safe work environment compatible with operating conditions, requirements, and practices.

Additional safety precautions suited to the specific conditions of the work site and the equipment installation are the responsibility of the user.

Experience has demonstrated that the greatest number of workplace accidents are caused by failure to follow established safety rules. Be sure that you are fully familiar with the safety program requirements applicable to operating this type of equipment. Consult your supervisor concerning any operating procedure that you are not sure about before operating or working on this equipment.

Note: It is strongly recommended that properly constructed and guarded access platforms be erected at convenient locations on the equipment installation site to allow safe inspection, adjustment, maintenance and repair of the equipment described in this manual. It is the responsibility of the purchaser of this equipment to ensure that such platforms comply with applicable federal, state, and local standards and regulations.

PERSONAL SAFETY PRACTICES

ARRANGEMENTS FOR EMERGENCY SITUATIONS

Supervisory and operating personnel should develop an emergency response profile for possible emergencies on the worksite. All personnel should know the location of fire-extinguishers, where to obtain first-aid assistance and supplies, emergency report telephone numbers, power shut-off points, and other equipment shut-down control locations. Appropriate tools and equipment should be available to allow immediate response to emergency situations. Always follow the requirements and regulations of your company's Emergency Action Plan.

SAFE INSTALLATION

1. Read and understand all parts of this manual including General Dimension Drawings.
2. Review your Plant Engineer's Installation Drawings for this equipment.
3. Select, Assemble, and Test the correct hoisting and rigging equipment required to move the equipment to the installation site in your family.

If there is **any** question regarding the proper rigging of the equipment or necessary hardware to make the lift/movement of the equipment to its' designated mounting location, contact your local representative or Trio to resolve the questions **prior** to beginning installation activities.

KNOW AND UNDERSTAND HOW THE EQUIPMENT WORKS

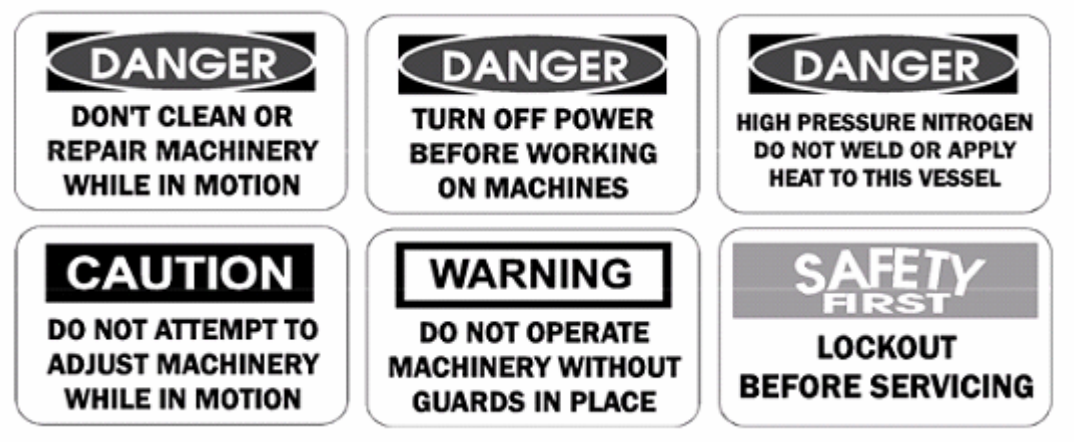
It is absolutely essential that machine operators understand completely how the crusher works. The operator must know the location and function of all controls, gauges, indicators and alarms included with the unit. Operators and maintenance personnel must be completely familiar with maintenance procedures and schedules. Only if the equipment is given maintenance on the prescribed schedule can costly and time-consuming breakdowns be prevented.

DO NOT OPERATE THE MACHINE WHEN ITS PARTS ARE WORN BEYOND DESIGNATED TOLERANCES. REPAIR OR REPLACE THEM BEFORE TROUBLE OCCURS.

READ THE MANUAL AND UNDERSTAND YOUR MACHINERY

Have everyone READ THE MANUAL (and all related literature) furnished with your equipment to learn its operating and maintenance characteristics, capacities, and limitations. Learn the location and function of ALL CONTROLS, indicators, warning devices and WARNING instructions.

READ AND OBSERVE THE SAFETY DECALS! REPLACE THE DECALS WHEN IT BECOMES NECESSARY



INSPECT YOUR MACHINE BEFORE START-UP

Make a visual inspection of the machine for loose, worn, or damaged parts or faulty safety devices. Inspect all drive belts and pulleys for excessive wear. Test alarm systems and check fluid levels. Make sure that hydraulic, air, and lubrication systems and their respective valves, drains, and fittings are in proper working order. Report or repair any problem before starting the machine.

FOLLOW THE RECOMMENDED EQUIPMENT START-UP INSTRUCTIONS

Be sure that control systems and alarms are working properly. Check gauges for proper readings. Check for any unusual noises that may indicate bearing failure or other mechanical problems. Check for sudden rises in lubricant temperature. Shut the equipment down immediately if problems are detected, and report the problem(s) to your supervisor. Always refer to the Operating Section of this manual if you are unsure about a start-up procedure or for additional information.

STOP THE MACHINE PROPERLY AND SAFELY

The machine must be completely stopped with power off and locked-out with controls tagged before any cleaning, repairs, adjustments, or service is performed. All provisions of your company's Control of Hazardous Energy (Lock-Out/Tag-Out) program must be followed.

REPORT THE NEED FOR NECESSARY REPAIRS IMMEDIATELY

Report any situation involving the need for repair, replacement or adjustment of an equipment component immediately. Remember, the most minor defect could result in injuries to yourself or others or serious damage to the machinery if it is not corrected promptly.

Do **NOT** work on the equipment unless you have been properly and completely trained to do the work involved.

PREVENT FIRE HAZARDS

Never weld or use a cutting torch near open or exposed fuels, lubricants, or other flammable materials. Follow your company's Hot Work Policy.

Do not let greasy or oily rags accumulate in poorly ventilated areas. Store oily rags and other combustible materials in an approved storage container and dispose of them properly.

Never use an open flame to check for fluid leaks in the equipment. Use an approved low voltage electric light or flashlight.

Never smoke in undesignated areas. Follow your company's Smoking Rules. Always extinguish smoking materials properly. Know where the nearest fire extinguisher is located, how to operate it, and what types of fires it can be used to extinguish. Make sure that fire extinguishers are in place, are in proper working condition, and have a current, valid inspection tag. If a fire extinguisher is not readily available, or does not meet these requirements, report the situation to your supervisor.

KEEP YOUR WORK AREA CLEAN

Become fully familiar with the worksite where the equipment is installed. Inspect the area daily and see that unsafe conditions are corrected. Make sure that all equipment guards are securely fastened in place, that steps, stairways, work platforms and barrier rails are sound and free of spills or obstructions. Keep the floor/work surface clean and free of oil, greasy rags, cables, chains, buckets and other obstructions. Keep tools and loose parts in a tool box or appropriate storage areas. Use high flashpoint/low toxicity solutions for cleaning.

HANDLE TOOLS, HEAVY PARTS, AND MACHINE COMPONENTS PROPERLY

Do not toss parts or tools or drop them off platforms. Do not lower or swing electric or air power tools by their powercords or air lines. Use a suitable rope and/or container to lower tools or parts to the floor. Review job activities and arrange to get help before you attempt to lift, carry or move heavy parts. For heavy or awkward lifts use proper hoisting devices.

DRESS PROPERLY FOR THE JOB AND USE APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT

Follow your company Personal Protective Equipment Policy. Discuss personal protective equipment requirements with your supervisor before operating equipment or performing service, repair or adjustment work. Don't wear loose clothes or jewelry, and restrain long hair.

FOLLOW YOUR COMPANY SUBSTANCE ABUSE CONTROL POLICY

Report any use of prescription or over-the-counter medications to your supervisor prior to operating this equipment or making any adjustments or repairs to it.

ALCOHOL OR OTHER CONTROLLED SUBSTANCES SHOULD NOT BE USED PRIOR TO OR DURING WORK ON THIS EQUIPMENT.

AVOID SERIOUS EYE/SKIN INJURIES

Hydraulic fluid or compressed air can penetrate or burn the skin or damage the eyes causing serious injury, blindness, or death.

Mineral-based hydraulic oil is hazardous. Always wear goggles when working with hydraulic fluid. Flush your skin or eyes thoroughly with water if you spill or splash hydraulic fluid on yourself. Remove clothing on which hydraulic fluid has splashed. Get immediate assistance and report the matter to your supervisor. Get appropriated medical care. Wear appropriate personal protective equipment as set forth in your company's Personal Protective Equipment Policy when handling hydraulic fluid. Wash your hands with soap and water after handling hydraulic fluid. Never eat, drink or smoke while handling hydraulic fluid.

Make sure that all compressed air lines and couplings are in proper operating condition at all times. Be sure that all compressed air lines intended for chip or dust removal are fitted with OSHA compliant pressure relief nozzles. Never use compressed air to clean your clothing or any part of your body.

DISPOSE OF ALL WASTE MATERIALS PROPERLY

Dispose of all waste materials such as fuels, lubricants, hydraulic fluid, etc. in accordance with your company waste management policies, and federal, state, and local regulations. If you have a question concerning proper procedures to be followed, consult with your supervisor, or the company safety administrator.

SAFETY AND MAINTENANCE PRACTICES

REPLACE LOOSE OR DEFECTIVE PARTS

Keep the equipment clean and free of dirt and oil so that loose, broken, defective, or worn parts can be easily identified. Make daily visual checks for missing, cracked, or frayed V-belts. Also check daily for frayed, broken or kinked cables. Inspect end connections for wear. Replace sheaves with cracked rims or spokes immediately. Report suspected defects to your supervisor.

PROPERLY GROUND MACHINE ELECTRICAL COMPONENTS

Check frequently to ensure that the equipment is properly grounded as stipulated in your company electrical safety rules. Prevent any electric cable from coming in contact with water in puddles, drainage channels, etc. Protect power cables from vehicular traffic such as forklifts and other motor vehicles. Power cables should be bridged over traffic lanes. All permanent electric cables should be in proper conduit or other approved insulation. Follow your company electrical safety rules with regard to periodic inspection of the condition of electric line insulation and couplings. Do NOT use portable, flexible electric cords to deliver electric power to the equipment.

CONTROL OF HAZARDOUS ENERGY (LOCK-OUT/TAG-OUT) PROGRAM

CAUTION: Purchaser must implement a Control of Hazardous Energy (Lock-Out/Tag-Out) Program which complies with 29 CFR 1910.147 and 133 regulations.

It is the responsibility of the purchaser to provide a suitable Control of Hazardous Energy program for the protection of its' employees while they are engaged in the installation, maintenance, repair, or modification of equipment powered by electricity, hydraulic, pneumatic or mechanical energy in order to meet the regulations of the U.S. Dept. of Labor, Occupational Health and Safety Administration (OSHA).

Under certain conditions, and in certain operating environments, regulations concerning this area are promulgated by the federal Mine Safety and Health Administration (MSHA). Certain state, county, or local regulations may also apply. Assistance in establishing specific regulatory obligations may be obtained from regulatory agencies, insurance carriers, or private consultants.

Specific information concerning electrical operating characteristics such as output, rated capacity, etc. of electrical motors supplied with the equipment may be obtained by review of the technical data contained in this manual or from the specific equipment supplier stipulated in the Shop Order.

OBTAINING CONTROL OF HAZARDOUS ENERGY PROGRAM MATERIALS

Listed below are three possible suppliers of materials to aid you in development, documentation and maintenance of your program. Inclusion of the names of these firms in this manual does not represent an endorsement of them by Trio. These firms provide some of the materials required for a comprehensive program.

1. SETON Name Plate Company
   P. O. Box BD - 1331
   New Haven, CT 06505-9770
   Telephone 203-488-8059
   Toll Free 800-243-6624
   Fax Toll Free 800-345-7819
2. EMED Co., Inc.Telephone
   Graphic Communications Products
   Buffalo, NY 14240-0369
   P. O. Box 369
   Toll Free 800-442-3363
   Fax Toll Free 800-344-2578
3. D & G Sign and Label
   P. O. Box LA - 157
   Toll Free 800-356-9269
   Northford, CT 06472
   Telephone 203-483-0491
   Fax 203-488-4770

The Purchaser has sole responsibility for safe operation of this equipment. The Purchaser is responsible for ensuring that on-site machine operation is in compliance with any and all applicable federal, state, county or city safety standards and regulations.

The equipment may be moved from one site to another a number of times by various purchasers, lessees, etc. Consequently, responsibility for compliance with applicable safety and environmental codes lies with the entity responsible for operating the equipment within each jurisdiction.

Purchaser is wholly responsible for any ancillary or support equipment such as, but not limited to, processed material receiving devices, and inspection or service platforms.

Purchaser is required to perform periodic maintenance of the type and on the recommended schedules set forth in this manual. Maintenance shall include, but is not limited to safety devices delivered with the equipment set forth in the Shop Order, and Warning and Instruction labels affixed to the equipment. Replacement parts including warning and instructional labels are available from Trio. Purchaser is invited to call for availability and current price of such parts and labels at 1-626-851-3966.

Any modifications or machinery as designed, manufactured, and delivered by Trio without the express written approval and consent of Trio will void all warranties and remove all responsibility of Trio for any and all damages to persons or property.

GENERAL INFORMATION

INTRODUCTION

This Operation and Maintenance Manual has been prepared to assist in the installation, operation, and maintenance of Trio self cleaning permanent magnets.

The information contained in this manual is intended to familiarize the operator with the general configuration and assembly of this equipment. It should aid in providing the necessary information for the efficient operation and maintenance of this machine.

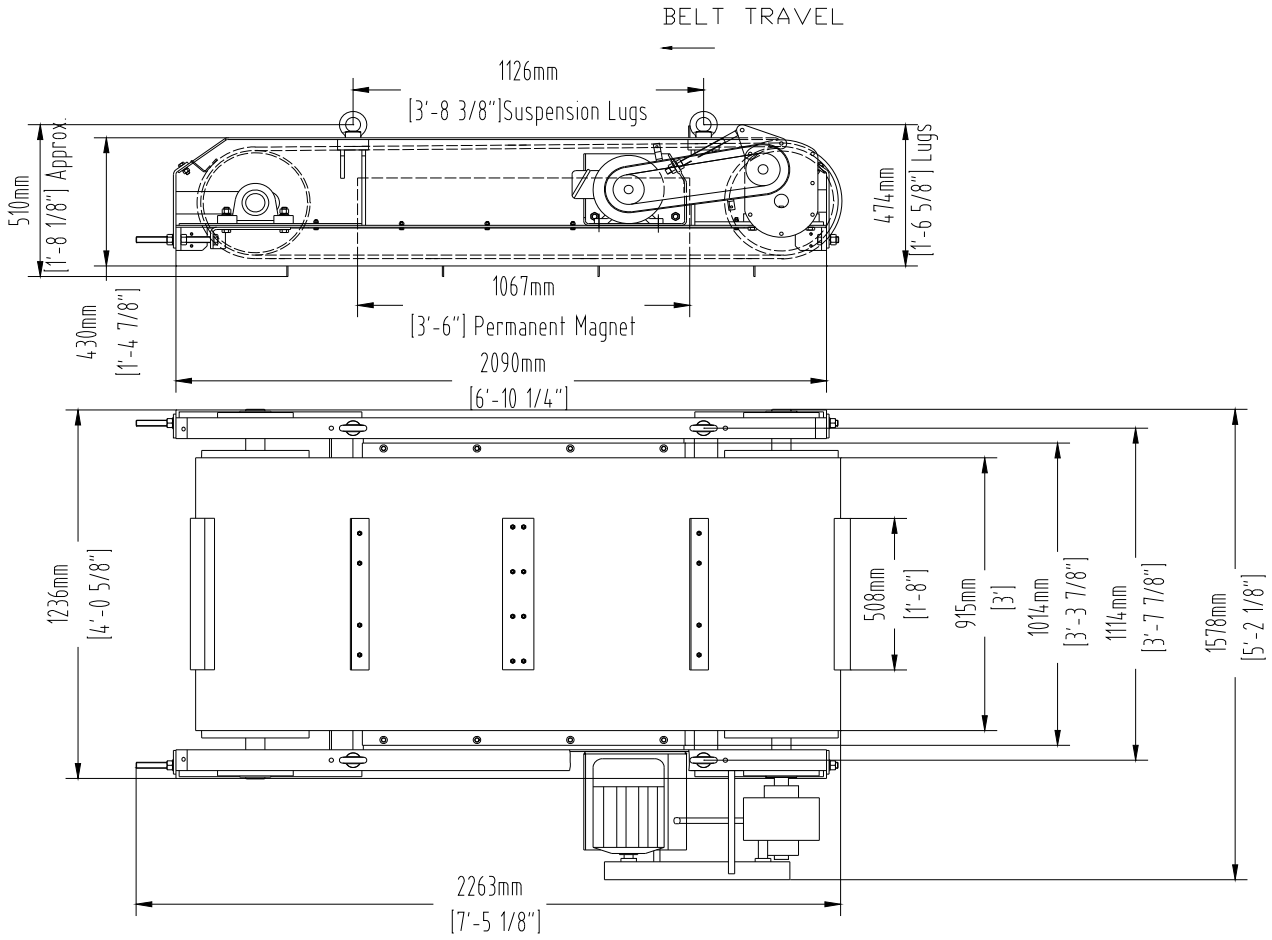
MACHINE DESCRIPTION

The magnets are designed for inline or cross-belt installations.

Designed with maintenance ease in mind, the magnet's wear and replacement parts are easily accessible and removable. The following pages provide a more detailed description of the recommended maintenance procedures.

MACHINE SCHEMATIC

The diagram below presents a general schematic of the machine.



SHIPPING CONDITION

The magnets are sold and delivered partially assembled.

The motor will need to be installed along with the V-belt drive and guard. The V-belt guards are not included with the unit.

The motor power supply is to be determined by the end user. No provisions or controls for its operation are included with the unit.

The control panel will need to be wired along with the magnet once the power supply arrangement has been identified.

INITIAL ASSEMBLY

Upon receipt, inspect the delivery to ensure that all parts are accounted for. After unpacking the loose parts, check all installed bolts to ensure that they are installed with the proper torque.

The adjustable pulley will need to be tightented to ensure the belt runs as smoothly as possible.

RECOMMENDED TOLLS

The machines are built using metric sized bolts, washers, and nuts. Consequently, a complete set of metric sized tools should be readily available for installation, removal, as well as emergency and scheduled repairs. Refer to the parts manual for exact sizes.

REPLACEMENT PARTS

Trio stocks a limited supply of replacement parts to provide responsive service on replacement and wear part orders. When ordering parts, please have the following information available:

Magnet Model Number
Magnet Serial Number
Part Number
Address to Ship Part(s)
Purchase Order Number

BOLT TIGHTNESS

The initial tightening of bolts should prevent premature loosening, but the tightness of all nuts and bolts should be checked regularly to ensure that no loose bolts contribute to machine down time.

Appendix A table illustrates the bolts torque specifications.

INSTALLATION AND MAINTENANCE INFORMATION

GENERAL ASSEMBLY INSTRUCTIONS

Upon receipt, inspect the delivery to ensure that all parts are accounted for. After unpacking the loose parts, check all installed bolts to ensure that they are installed with the proper torque.

1. Mount the electric motor on the motor base.
2. Install the drive sheave on the motor.
3. Install the V-belt drives on the sheaves.
4. Grease each of the pillow block bearing.
5. Pour oil into the gearbox.

After installing the magnet in the desired position, connect the power supply to the motor.

Should any strange noise, smell or smoke develop after starting, immediately stop the unit and check for problems.

FRAME ASSEMBLY

When moving the machine always lift equally at each corner - using the lifting eyes to prevent over loading.

The supporting structure for the machine must be strong enough and rigid enough not to induce out of sync vibrations.

OPERATING INSTRUCTIONS

If all of the pre-checks are OK, and all guards are in place, power may be supplied to the machine.

When the machine has settled down and if everything looks and sounds OK, then material may be fed to the conveyors under the magnet.

RUNNING SPEED

The machine was designed to run at a particular speed for the mounting, slope, load and other conditions already discussed. At 394 fpm, the unit will operate optimally in in-line applications. For cross belt installations, a slightly slower speed is recommended, though the exact speed will need to be determined in the field.

Lowering the speed is always more advisable as it will prolong the life of the machine. In no case should the change be more than 50 RPM either way.

POTENTIAL PROBLEMS

Once a machine has been set-up and is operating properly, the most likely problems occur with loosened belts which slow the machine or cause it to operate sporadically.

If the machine has been serviced: check the motor rotation often when a motor is replaced the phase of the electrical power might have been inadvertently changed causing the direction of conveyor operation to be reversed.

MAINTENANCE

General maintenance should include a review of the pre-start procedure in addition to checking bolt tension, and examining the magnet for abnormal wear and correcting obvious problems. Motion and running speed checks should also be performed. Check and grease the pulley bearings.

DRIVE MAINTENANCE

Always keep the V belts and sheaves properly aligned. Check to be sure that all bolts are properly tightened and that the motor base springs are in good order. Replace belts whenever a belt begins to crack from age or whenever a belt stretches out of limits. Never allow safety aspects to reach a state of disrepair.

ALWAYS LOCK-OUT THE ELECTRICAL CONTROL WHEN WORKING ON THE MACHINE.

GEARBOX LUBRICATION

Use a high grade petroleum base, rust and oxidation inhibited (R&O) gear oil.

After the first 100 hours running, drain reducer and flush with kerosene, clean the drain plug and refill to proper level with new lubricant. Under average industrial operating conditions, the lubricant should be changed every 2500 hours of operating or every 6 months.

Caution

Gearbox ships without oil. Oil must be added before operation to prevent damage to gear box and the rest of the machine. Failure to add oil will void any warranty.

Oil Volume

The gearbox can hold 72 ounces (2.25 Qts). Under average industrial operating conditions, the lubricant should be changed every 2,500 hours of operation or every 6 months, whichever occurs first.

Drain reducer and flush with kerosene, clean magnetic drain plug and refill to proper level with new lubricant. Check oil level regularly.

Caution

Extreme pressure (EP) lubricants are not recommended for average operating conditions. Failure to observe these precautions could result in damage to, or destruction of, the equipment.

Caution

Too much oil will cause overheating and too little will result in gear failure. Check oil level regularly. Failure to observe these precaution could result in damage to, or destruction of, the equipment.

Under extreme operating conditions, such as rapid rise and fall of temperature, dust, dirt, chemical particles, chemical fumes, or oil sump temperatures above 200°F, the oil should be changed every 1 to 3 months depending on severity of conditions.

Caution

Do not use EP oils containing slippery additives such as graphite or molybdenum disulphide in the reducer when backstop is used. These additives will destroy sprag action. Failure to observe these precautions could result in damage to, or destruction of, the equipment.

Lubrication Recommendations-ISO Grades

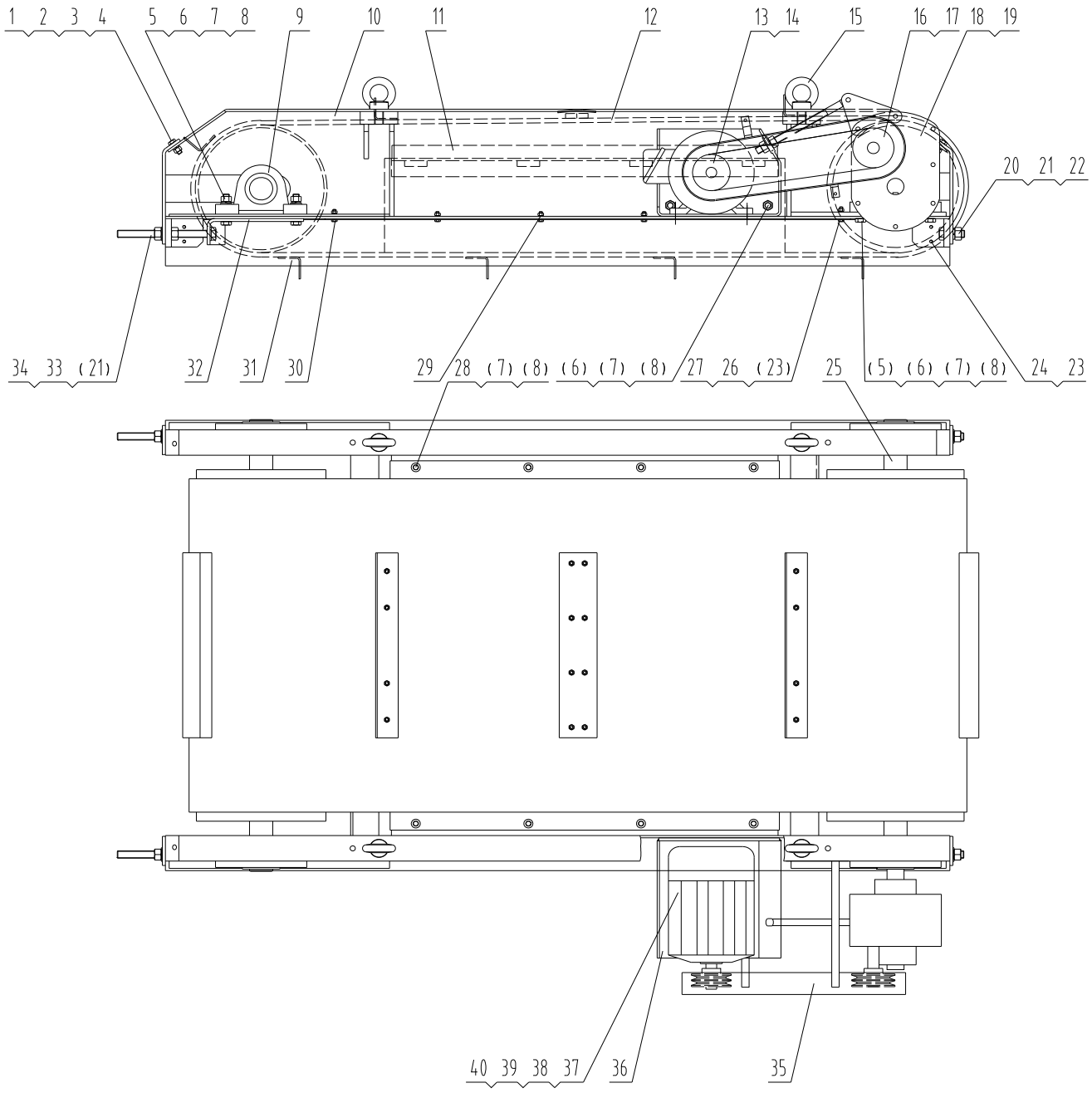
	Ambient Temperature	TXS315 (1:15) RATIO GEARBOX Output RPM	
		81-150 rpm	151-400rpm
ISO Viscosity Grade	50F~125F (10C~52C)	320	220
	15F~60F (-9.5C~15.5C)	220	150

Note: This magnet gearbox output speed factory default is 155RPM

Lubrication Grade Equivalents

ISO	AGMA
150	4
220	5
320	6

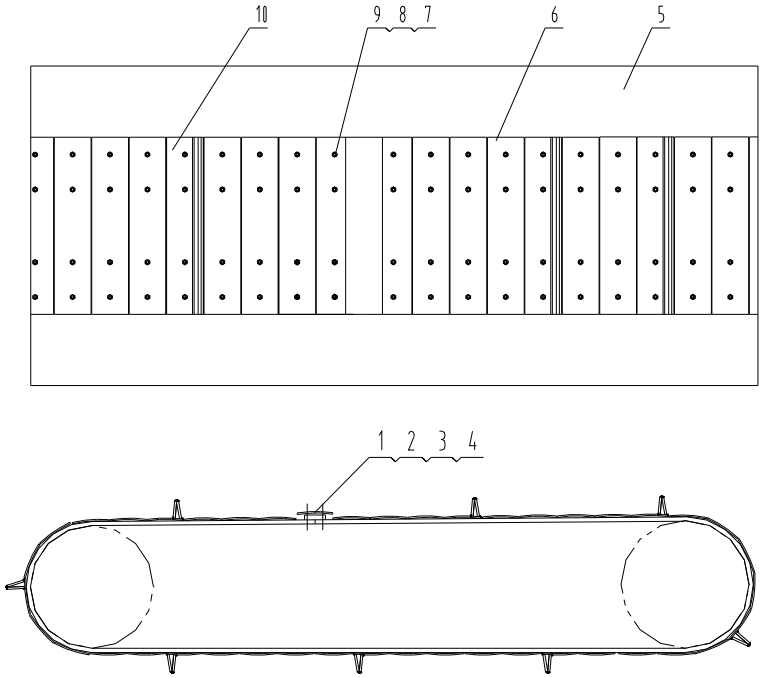
PARTS INFORMATION



Parts List

Item	Part Number	Description	Qty.
1	CRP36A-1	Clamp Plate (LH & RH Each)	Total 4
2	GB5783/M12X35	Bolt M12X35	4
3	GB6170/M12	Nut M12	4
4	GB93/12	Lock Washer 12	4
5	GB5782/M16x75	Bolt M16X75	8
6	GB6170/M16	Nut M16	12
7	GB97.1	Washer 16	20
8	GB93/16	Lock Washer 16	20
9	CRP36B.1	Drum (I) Assembly	1
	UCP212-39	Pillow Bearing	2
		Bolt 7/16"-14UNC L=50mm(2")	8
	GB93/12	Lock Washer 12	8
	K30-39	Key 5/8X5/8X50	2
	XTB30X2 7/16	Bushing	2
	CRP36B.1-2A	Shaft for Drum (I)	1
	CRP36B.1.1	Drum	1
10	CRP36B.2	Frame	1
11	RCYB36"	Permanent Magnet	1
12	CRP36B.3	Rubber Belt With Stainless Steel Claddings	1
13	EB0360-5	Drive Sheave (for 60Hz Motor)	1
	EB0480B-1(4KW)	Drive Sheave (for 50Hz Motor)	1
14	GB77/M8x12	Bolt M8X12	2
15	GB825/M24	Eyebolt M24	4
16	CRP42A-1	Driven Sheave	1
17	GB11544-89	V-Belt A46 L =1200mm(47.3")	2
18	TXS315	Reducer 1:15	1
19	GB97.1/18	Washer 18	2

Item	Part Number	Description	Qty.
20	GB5782/M20X55	Bolt M20X55	2
21	GB6170/M20	Nut M20	6
22	GB93/20	Lock Washer 20	2
23	GB5783/M8X14	Bolt M8X14	8
24	GB93/8	Lock Washer 8	18
25	CRP36B.4	Drum (II) Assembly	1
	UCP212-39	Pillow Bearing	2
		Bolt 7/16"-14UNC L=50mm(2")	8
	GB93/12	Lock Washer 12	8
	K30-39	Key 5/8X5/8X50	2
	XTB30X2 7/16	Bushing	2
	CRP36B.4-1B	Shaft for Drum (II)	1
	LGCR14X38-30	Drum 14"X38"	1
31	CRP36B-2	Stainless Steel Side Plate (LH & RH Each)	Total 2
32	CRP36A.5	Adjustment Plate	2
33	GB5782/M20x250	Bolt M20X250	2
34	GB95/20	Washer 20	2
35	CRP42A.6	V-Belt Guard	1
36	CRP36B.7	Motor Mount	1
37	182T	Motor 3HP/60Hz/1750RPM	1
	Y2-100L1-4	Motor 2.2Kw/50Hz/1410RPM	1
38	GB5782/M10X45	Bolt M10X45	4
39	GB6170/M10	Nut M10	4
40	GB95/10	Washer 10	4



Parts List

Item	Part Number	Description	Qty.
	CRP36B.3	Rubber Belt Assembly	1
1		Fastener	30
2	EB0360A.2-2	Fastener Plate	1
3	GB6170/M6	Nut M6	8
4	GB93/6	Lock Washer 6	8
5		Rubber Belt 4X5.5/3, 915mmx4600mm(36”X181.1”)	1
6	EB0360A.2-1	Stainless Steel Angle	34
7		Fastener Bolt M8x35	168
8	GB6170/M8	Nut M8	168
9	GB93/8	Lock Washer 8	168
10	EB0360A.2.1	Vertical Stainless Steel Clad	8

Appendix A Bolts Torque Specifications

For Metric Bolts

Diameter (mm)	Pitch (mm)	Grade 8.8				Grade 10.9				Grade 12.9			
		Dry		Lube		Dry		Lube		Dry		Lube	
		FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M
6		6.9	9.3	5.2	7	9.7	13.2	7.3	9.9	11.6	15.7	8.7	11.8
8		17.7	23.9	13.3	18	24.9	33.8	18.7	25.4	29.8	40.4	22.4	30.4
10	1.5	30	41	24	32	44	60	34	46	52	71	40	54
10	1.25	32	43	24	33	46	63	36	49	55	74	42	57
12	1.75	53	72	41	55	77	105	60	81	91	123	70	95
12	1.25	58	78	44	60	85	115	65	88	99	134	76	103
14	2	85	115	65	88	124	168	95	129	145	196	111	151
14	1.5	91	124	70	95	134	181	103	139	156	212	120	163
16	2	131	178	101	137	192	260	148	200	225	305	173	234
16	1.5	140	190	108	146	204	277	157	213	240	325	184	250
18	2.5	181	246	139	189	265	359	204	276	311	421	239	324
18	1.5	204	276	156	212	297	403	229	310	349	473	268	364
20	2.5	256	347	197	267	374	507	288	390	439	595	338	458
20	1.5	284	385	218	296	415	563	319	433	487	660	375	508
22	2.5	349	473	268	364	510	692	392	532	599	812	460	624
22	1.5	383	519	294	399	560	759	431	584	657	891	505	685
24	3	443	600	340	461	647	877	497	674	759	1029	583	791
24	2	482	654	371	503	705	956	543	736	828	1122	637	863
27	3	648	879	499	676	949	1286	729	989	1112	1508	856	1160
27	2	700	949	538	730	1023	1387	787	1067	1200	1627	923	1252
30		985	1335	741	1004	1389	1883	1044	1416	1665	2257	1252	1697
36		1716	2326	1290	1749	2419	3280	1819	2466	2900	3931	2180	2956
42		2753	3732	2070	2806	3882	5263	2919	3957	4652	6307	3498	4742
48		4156	5634	3124	4236	5860	7944	4406	5973	7023	9521	5280	7159
56		6662	9032	5009	6791	9393	12735	7063	9575	11259	15264	8465	11477
64		9954	13496	7484	10147	14035	19028	10553	14307	16822	22807	12648	17148
72		14410	19536	10835	14689	20319	27547	15277	20712	24353	33016	18310	24824

ASSUMPTIONS: (1) The maximum torque values are based on 75% of the specified proof strength.
(2) The term "lube" includes the application of thread lubricants, cadmium plating,
and the use of hardened washers; regardless of whether standard or lock nuts are used.

For SAE (Inch) Bolts

Diameter (inches)	N (threads/in)	S.A. E. Grade 5				S.A. E. Grade 8			
		Dry		Lube		Dry		Lube	
		FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M	FT-LBS	N-M
1/4	20	8	11	6	8	12	16	9	12
1/4	28	10	14	7	9	14	19	11	15
5/16	18	17	23	13	18	25	34	19	26
5/16	24	19	26	15	20	27	37	21	28
3/8	16	31	42	24	33	44	60	34	46
3/8	24	35	47	27	37	49	66	38	52
7/16	14	49	66	38	52	70	95	54	73
7/16	20	55	75	42	57	78	106	60	81
1/2	13	75	102	58	79	106	144	82	111
1/2	20	85	115	65	88	120	163	92	125
9/16	12	109	148	84	114	154	209	118	160
9/16	18	121	164	93	126	171	232	132	179
5/8	11	150	203	115	156	212	287	163	221
5/8	18	170	231	131	178	240	325	185	251
3/4	10	266	361	205	278	376	510	289	392
3/4	16	297	403	229	311	420	570	323	438
7/8	9	430	583	330	447	606	822	466	632
7/8	14	473	641	364	494	668	906	514	697
1	8	644	873	495	671	909	1233	699	948
1	14	704	955	542	735	995	1349	765	1037
1 1/8	7	794	1077	611	829	1288	1747	990	1342
1 1/8	12	891	1208	685	929	1445	1959	1111	1507
1 1/4	7	1120	1519	862	1169	1817	2464	1398	1896
1 1/4	12	1241	1683	954	1294	2012	2728	1548	2099
1 3/8	6	1469	1992	1130	1532	2382	3230	1832	2484
1 3/8	12	1673	2269	1287	1745	2712	3677	2086	2829
1 1/2	6	1949	2643	1500	2034	3161	4286	2432	3298
1 1/2	12	2194	2975	1687	2288	3557	4823	2736	3710
1 3/4	5	2286	3100	1758	2384	4988	6764	3837	5203
2	4.5	3438	4662	2644	3585	7500	10170	5769	7823
2 1/4	4.5	5027	6817	3867	5244	10969	14874	8438	11442
2 1/2	4	6875	9323	5288	7171	15000	20340	11538	15646
2 3/4	4	9321	12639	7170	9723	17794	24129	13688	18561
3	4	12313	16696	9472	12844	23507	31875	18082	24519

ASSUMPTIONS: (1) The maximum torque values are based on 75% of the specified proof strength.
(2) The term "lube" includes the application of thread lubricants, cadmium plating, and the use of hardened washers; regardless of whether standard or lock nuts are used.

SAFETY DECAL KIT

Sample Figure

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	SDK-001	Safety Decal Kit and Charts	1 Kit (2 x 11 Stickers)

Warranty Terms and Conditions

Seller warrants all new equipment manufactured or imported by Trio Engineered Products, Inc. (Trio) against defects in material or workmanship attributed to the original machine manufacturing. No other warranties are expressed or implied.

Warranty claims must be made through the dealer or agent responsible for the original equipment sale, as the equipment will have been registered with them at the time of sale from Trio. Claims must be made within twelve (12) months or 2,000 working hours, whichever occurs first, from the date of readiness for operation, but not more than fifteen (15) months from the date of shipment from Trio. All parts claimed to be defective shall be returned to Trio, freight prepaid, for inspection to determine that the said part or parts are defective.

If it is determined that the fault lies with Trio, Trio will ship a replacement part or parts at no cost, but freight charges will be paid by customer. If it is determined that the fault does not lie with Trio, a replacement part or parts will be shipped, freight collect, to the customer with the receipt of a purchase order from the dealer or agent. Trio will not be responsible for freight costs associated with warranty claims.

When petitioning for a warranty item, the serial number of the equipment must be referenced. The serial number must be clearly identifiable on the Trio nameplate on the equipment. This warranty is void if:

- The serial number plate and/or other markings identifying the machine as Trio have been altered or removed.
- The machine was not sold under the Trio brand name or another brand name approved by Trio.
- Parts have been used other than those supplied by Trio.

Trio makes no warranty with respect to damages or defects in any product caused by improper installation, operation, maintenance, and storage or caused by negligence or accident. In addition, any product repaired or altered in any way as reasonably determined by Trio, that affects the performance or purpose for which the equipment was originally manufactured, will not be covered under this warranty.

Under this warranty, the buyer will not be entitled to any labor charges involving the repair of the equipment involving warranty items, unless authorized by Trio in writing.

Warranties of merchantability or of fitness for any particular purpose or arising from the course of dealing or usage of trade are specifically excluded. Any affirmation of fact, description of goods, or sample or model referred to in this agreement or elsewhere, whether or not the same relate to production or capability of the goods to perform, are not the basis of this agreement, unless specifically made a party of the agreement in writing.

Under no circumstances will Trio be responsible for consequential or punitive damages of any nature, whether based on contract or tort, including but not limited to lost profits, loss of production, delays or other expenses. Under no circumstances shall the liability of Trio exceed the purchase price of the equipment furnished.

The laws of the state of California shall govern the warranty. The parties agree that exclusive jurisdiction for any claim for breach of this warranty shall rest in the Los Angeles County Superior Court in the State of California.