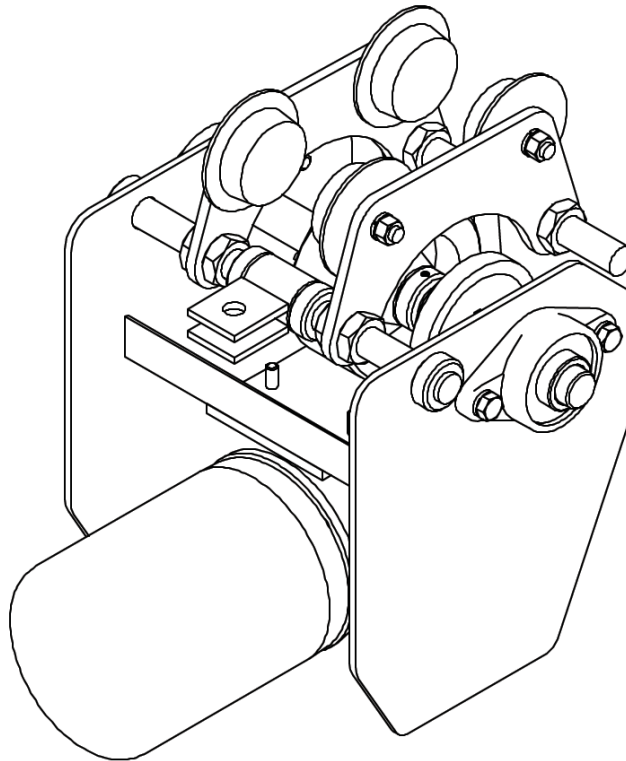




## Installation and Maintenance Manual for the SPANCO® Beam Boss Beam Tractor Drive



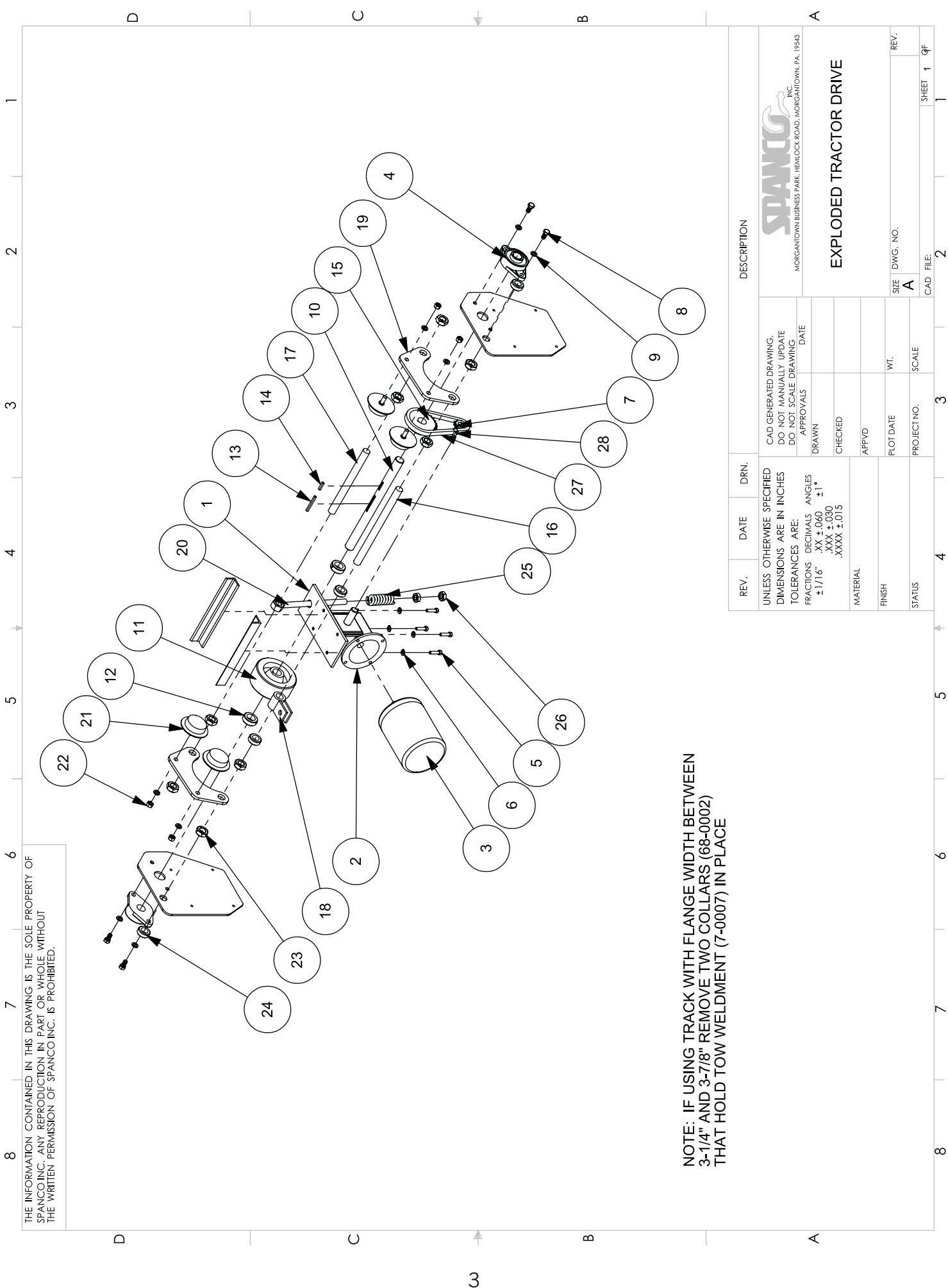
# TABLE OF CONTENTS

Bill of Materials.....	2
Exploded Beam Tractor Drive Schematic.....	3
Forward.....	4
Installation.....	4
Drive Wheel Spring Tension.....	4
Tow Bar.....	5
Controls.....	5
Drive Chain & Sprockets.....	5
Gear Reducer.....	5
Inspection, Testing and Maintenance.....	5
Beam Boss Wiring Diagrams	
230V 3PH 60HZ w/ 1/3 HP NEMA 1.....	6
230V 3PH 60HZ w/ 1/2 HP NEMA 1.....	7
230V 3PH 60HZ w/ 3/4 HP NEMA 1.....	8
460V 3PH 60HZ w/ 1/3 HP NEMA 1.....	9
460V 3PH 60HZ w/ 1/2 HP NEMA 1.....	10
460V 3PH 60HZ w/ 3/4 HP NEMA 1.....	11
Winsmith D-90 Type SE Speed Reducers Installation, Operation, and Lubrication.....	12-17
Bulletin 193 MCS-E1 Overload Relay Application and Installation.....	18-23
Equipment Warranty and Service Policy.....	24


## **BILL OF MATERIALS:**

ITEM	QTY.	PART NO.	DESCRIPTION	BOLT TORQUE (FT-LBS)
1	1	7-0002	BEAM TRACTOR FRAME WELDMENT	-
2	1	43-1725L	REDUCER 917 MDS	-
3	1	48-0001	LEESON MOTOR C56 1725RPM 1/3HP	-
4	2	46-0001	FLANGE BEARING 1 1/4 BORE	-
5	4	10-0104	3/8"-16UNC X 1 1/2" HEX HEAD BOLT	31
6	4	14-0002	3/8" LOCKWASHER	-
7	1	38-0002	SPROCKET No.40 1/2"P. 12T 1"BORE	-
8	4	10-0201	1/2-13 NC X 1 GRADE 5 BOLT	75
9	8	14-0003	1/2" LOCK WASHER	-
10	1	7-0006	BEAM TRACTOR SHAFT	-
11	1	33-0007B&K	DRIVE WHEEL	-
12	2	68-0003	COLLER 1 1/4" ID. X 2" OD. X 1 1/16" TH.	-
13	1	47-0001-00.23	KEY 1/4" X 1/4" X 2 3/4"	-
14	2	47-0001-00.10	KEY 1/4" X 1/4" X 1 1/4"	-
15	1	38-0009	SPROCKET No.40 1/2"P. 27T. 1 1/4"BORE	-
16	1	51-0005-01.19	ALLTHREAD 1"-8NC X 1'-2 1/4"LG.	644
17	1	51-0005-00.98	ALLTHREAD 1"-8NC X 11 3/4"LG.	644
18	1	7-0007	BEAM TRACTOR TOW WELDMENT	-
19	2	7-0005	BEAM TRACTOR TROLLEY PLATE	-
20	1	7-0008	BEAM TRACTOR ADJUSTMENT HINGE	-
21	4	54-0010	TROLLEY WHEEL	-
22	4	11-0030	NUT, HEX 1/2" -13NC	75
23	8	12-0010	NUT, HEX JAM 1"-8NC	644
24	4	68-0002	COLLAR 1" DIA.	-
25	1	62-0001	SPRING, 1712# CAP. 3/4ID X 4	-
26	2	12-0051	NUT, HEX JAM 3/4-10 NC	266
27	1	39-0001-03.79	CHAIN No.40, 1/2"P X 3'-9 1/2"	-
28	1	40-0001	LINK, CONN NO. 40 1/2 PITCH	-

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SPANCO INC. ANY REPRODUCTION IN PART OR WHOLE WITHOUT THE WRITTEN PERMISSION OF SPANCO INC. IS PROHIBITED.



NOTE: IF USING TRACK WITH FLANGE WIDTH BETWEEN 3-1/4" AND 3-7/8" REMOVE TWO COLLARS (68-0002) THAT HOLD TOW WELDMENT (7-0007) IN PLACE

REV.		DATE	DRN.	DESCRIPTION				
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS    DECIMALS    ANGLES XX ±.060    ±1° .XXX ±.030 .XXXX ±.015				CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE DO NOT SCALE DRAWING		<div></div>		
				APPROVALS				
				DRAWN				
				CHECKED				
MATERIAL				APPVD	EXPLODED TRACTOR DRIVE			
FINISH				PLOT DATE				WT.
STATUS				PROJECT NO.				SCALE
						SIZE	DWG. NO.	REV.
						A		
						CAD FILE:		SHEET 1 of 1

## **FORWARD:**

Read instructions carefully before installing your SPANCO Beam Tractor.

SPANCO Beam Tractors are engineered to pull (or push) a load along S-Flange and Wide Flange beams, monorails, bridge girders or bridge runways. They are not designed to support a hung load. Never hang a load on any part of the Beam Tractor.

Before installing Beam Tractor:

1. Double check supply voltage with motor name plate voltage.
2. Double-check oil level in speed reducer. (All SPANCO tractors are shipped from the factory with the correct amount of lubricant)
3. Make sure breather plug on gear reducer is in the “vent” orientation, if so equipped
4. Make certain that the supplied wheels match your rail. SPANCO tractors can be furnished with two wheel contours:

“Crowned” for S-beams and W-beams (STANDARD)

or

“Hardened Flat” patented track

## **INSTALLATION:**

Loosen drive wheel tensioning spring. Adjust side plates far enough apart so tractor will fit over the beam flange. Adjust wheels to the flange width of beam

Adjust side plates so drive wheel is in the center of the beam.

Air gap between edge of beam flange at its widest point, and wheel flanges should be 1/16” on both sides, or 1/8” total.

If the SPANCO tractor is found to pull to one side during operation, the wheel spacing should be adjusted.

## **DRIVING WHEEL SPRING TENSION:**

Tighten spring assembly such that the wheel just touches the beam. Turn the nut one more full turn.

Run the Beam Tractor along the full length of the beam to check for hazards or binding. Only tighten the spring tension to a point where the drive wheel will not slip under a full load. Over-tightening will result in premature wear and possible failure.

### **TOW BAR:**

All SPANCO drive tractors are supplied with a tow bar attachment point to allow attachment of a tow bar (by others) to the customer's load. Connection is made by means of a 5/8" diameter Clevis pin. Tow bar must be attached to be as level as possible.

Tow bars should be as short as possible if the tractor will be expected to traverse through curves and switches.

### **CONTROLS:**

If ordered with motor controls, a wiring diagram will be provided. Check for proper voltage. Make electrical connection and test run tractor.

When using two drive tractors to pull a bridge crane, make sure that motors are connected properly, and tractors move in same direction.

Inverter controls can be provided as an option to provide greater flexibility and control of tractor speeds.

### **DRIVE CHAIN & SPROCKETS:**

Inspect chain and sprockets for lubrication, alignment, and proper tension at least once a month.

DO NOT over-tighten chain as this could result in damage to the speed reducer.

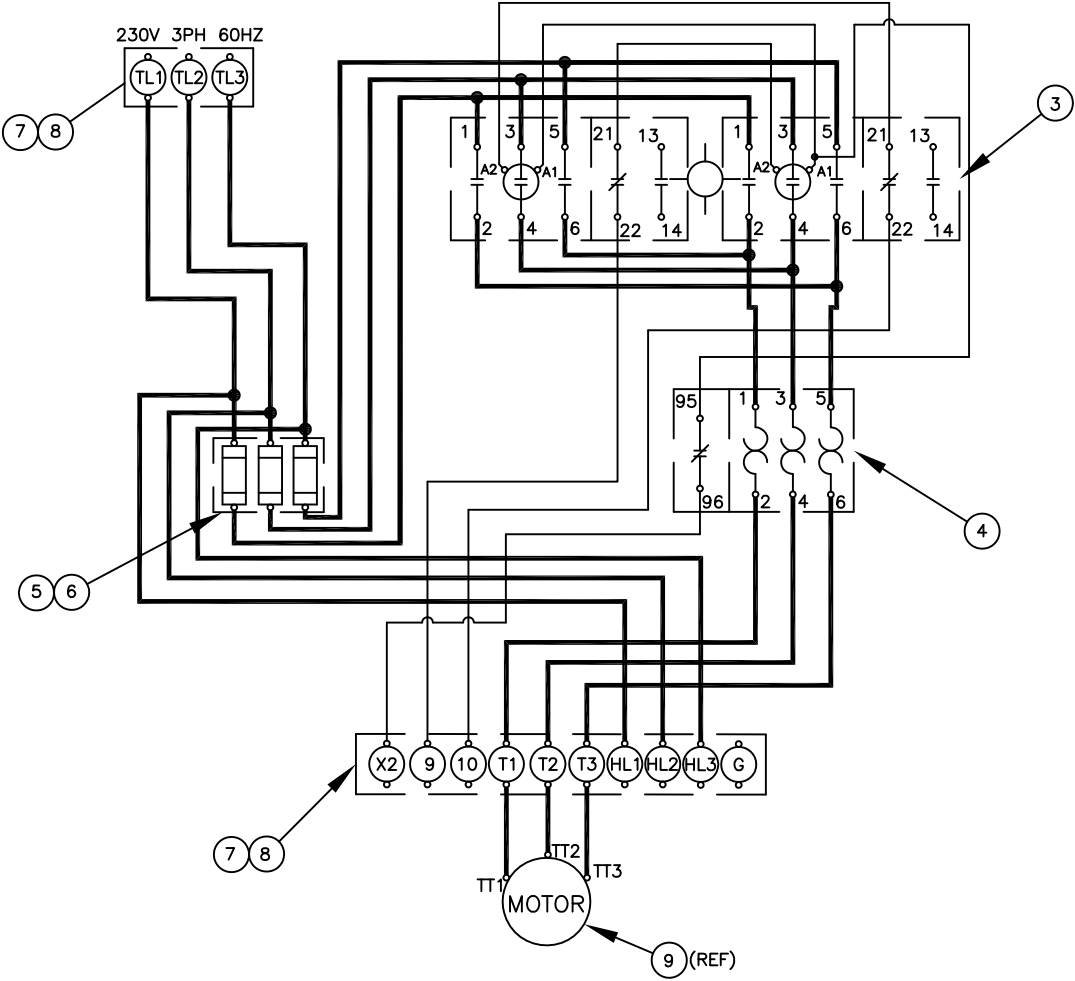
### **GEAR REDUCER:**


SPANCO drive tractors are equipped with a worm gear drive reducer. Check oil level and proper oil breather opening.

### **INSPECTION, TESTING AND MAINTENANCE:**

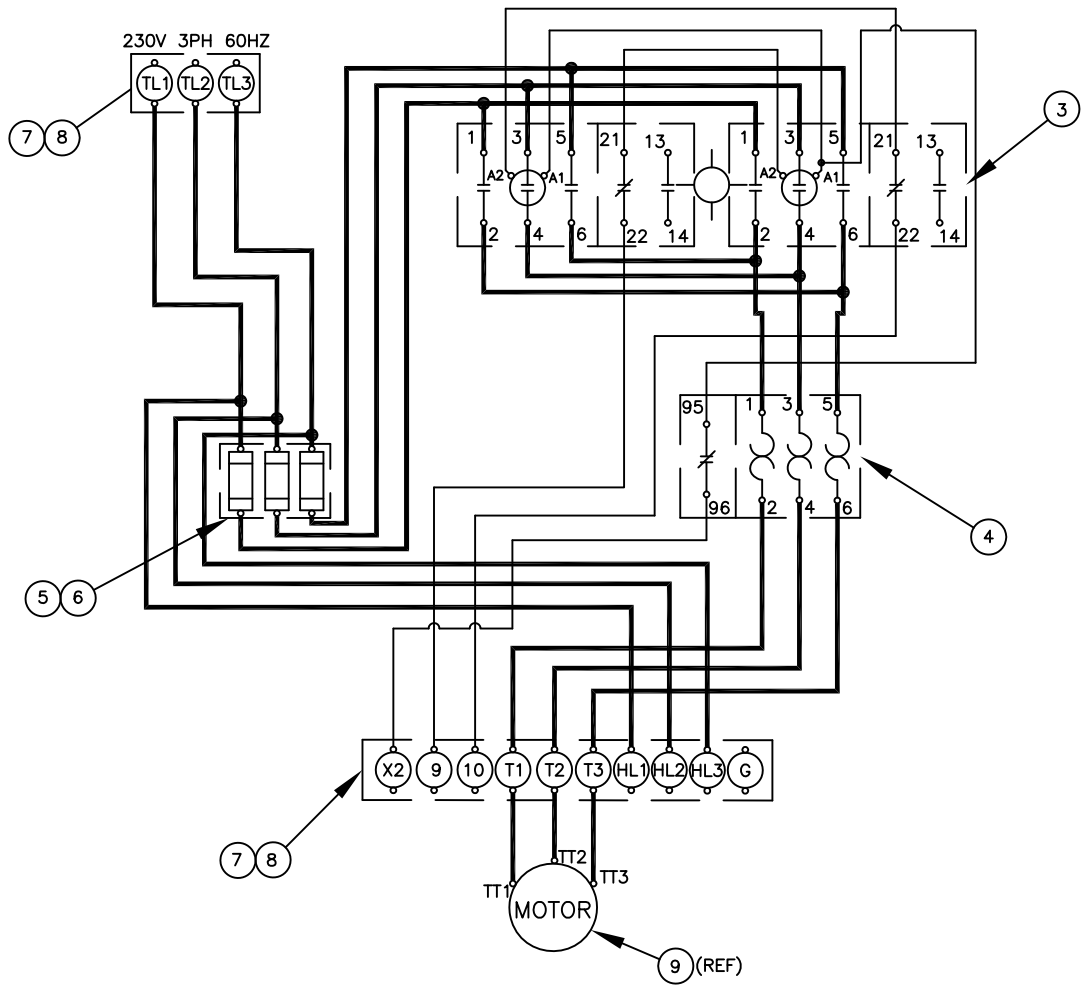
1. All parts subject to wear should be inspected at regular intervals. Unsafe conditions must be corrected immediately. Intervals between inspections should be short enough to insure that the SPANCO Beam Tractor will never be operated in an unsafe condition. To insure safe operation of equipment, all replacement parts should be genuine SPANCO parts.
2. SPANCO Beam Tractors should be kept clean and free of dust, dirt, moisture, etc., that would, in any way affect the safe operation of the equipment.
3. Lubrication – Working parts, including chain, should be properly lubricated. All parts should be inspected to confirm that all wearing surfaces receive the proper lubrication. The gear reducer should be maintained and lubricated in accordance with the reducer manufacturer's recommendations.
4. Electric Apparatus – Installation, inspection and repair of electric components should be done only by a certified industrial electrician. All electrical contacts should be examined periodically for signs of damage or deterioration, and if required, promptly replaced.

BILL OF MATERIALS						
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L.	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 1.3 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	2 1/4 AMP FUSE	74-0032			FNQ-R-2 1/4
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 1/3HP 1725 RPM C56C	48-0001			230/460V 3PH 60HZ



DRN.: JJB	DATE: 10/29/07	 MORGANTOWN BUSINESS PARK, HEMLOCK ROAD, MORGANTOWN, PA. 19543	
CHKD.:	DATE:		
APPVD.:	DATE:	<b>WIRING DIAGRAM FOR BEAM TRACTOR</b> <b>230V 3PH 60HZ W/ 1/3 HP NEMA 1</b>	
SCALE: NTS			
PROJECT NO.: ELECT	PLOT DATE:	DWG. NO. 95-0112	REV. —
ACAD FILE: 95-0112	STATUS: FAB		

BILL OF MATERIALS						
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L.	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 2 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	3 1/2 AMP FUSE	74-0033			FNQ-R-3 1/2
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 1/3HP 1725 RPM C56C	48-0001			230/460V 3PH 60HZ

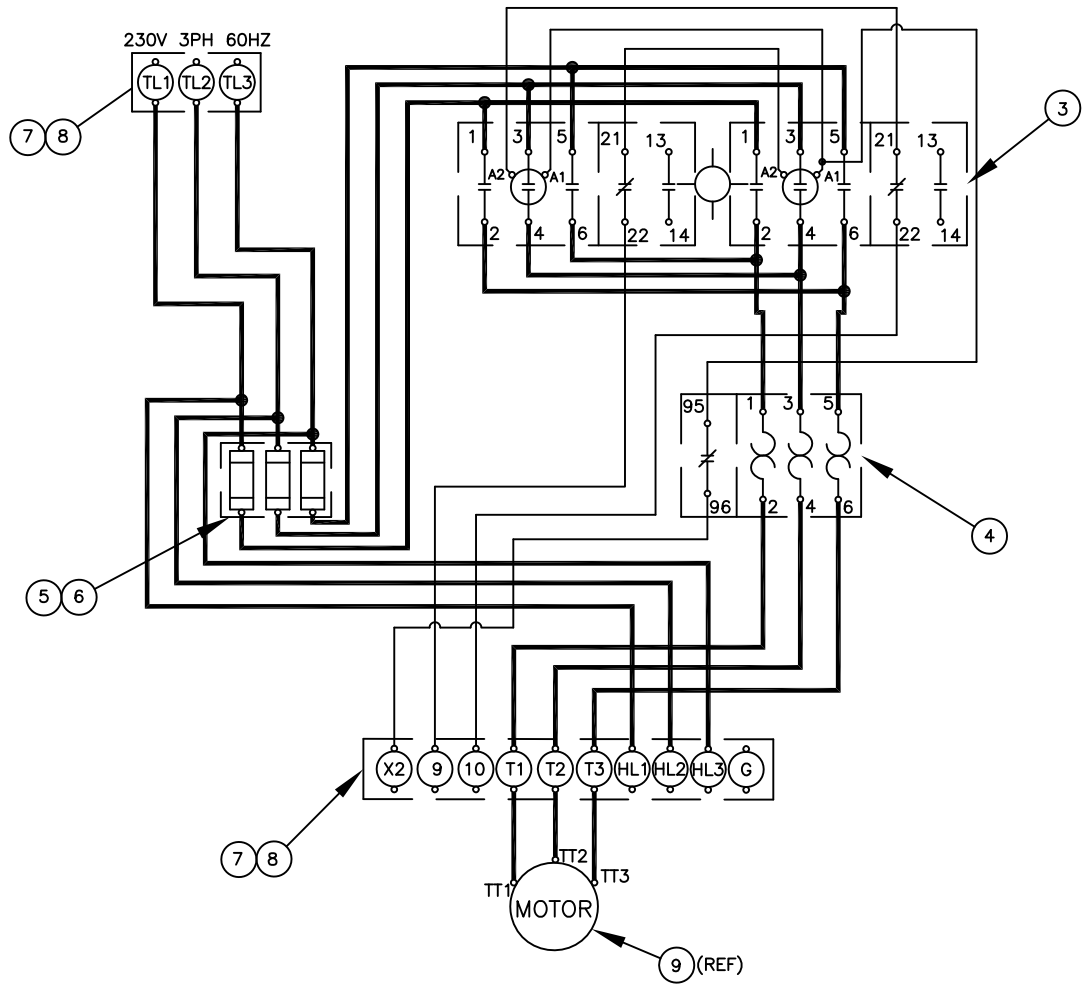


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APPVD.:	DATE:
SCALE: NTS	
PROJECT NO.: ELECT	
ACAD FILE: 95-0114	

<b>SPANCO</b> INC. MORGANTOWN BUSINESS PARK, HEMLOCK ROAD, MORGANTOWN, PA. 19543		
WIRING DIAGRAM FOR BEAM TRACTOR 230V 3PH 60HZ W/ 1/2 HP NEMA 1		
PLOT DATE:	DWG. NO. 95-0114	REV. -
STATUS: FAB		

PLOT SCALE: 1=1

BILL OF MATERIALS						
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 2.8 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	5 AMP FUSE	74-0034			FNQ-R-5
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 3/4HP 1725 RPM C56C	48-0003			230/460V 3PH 60HZ

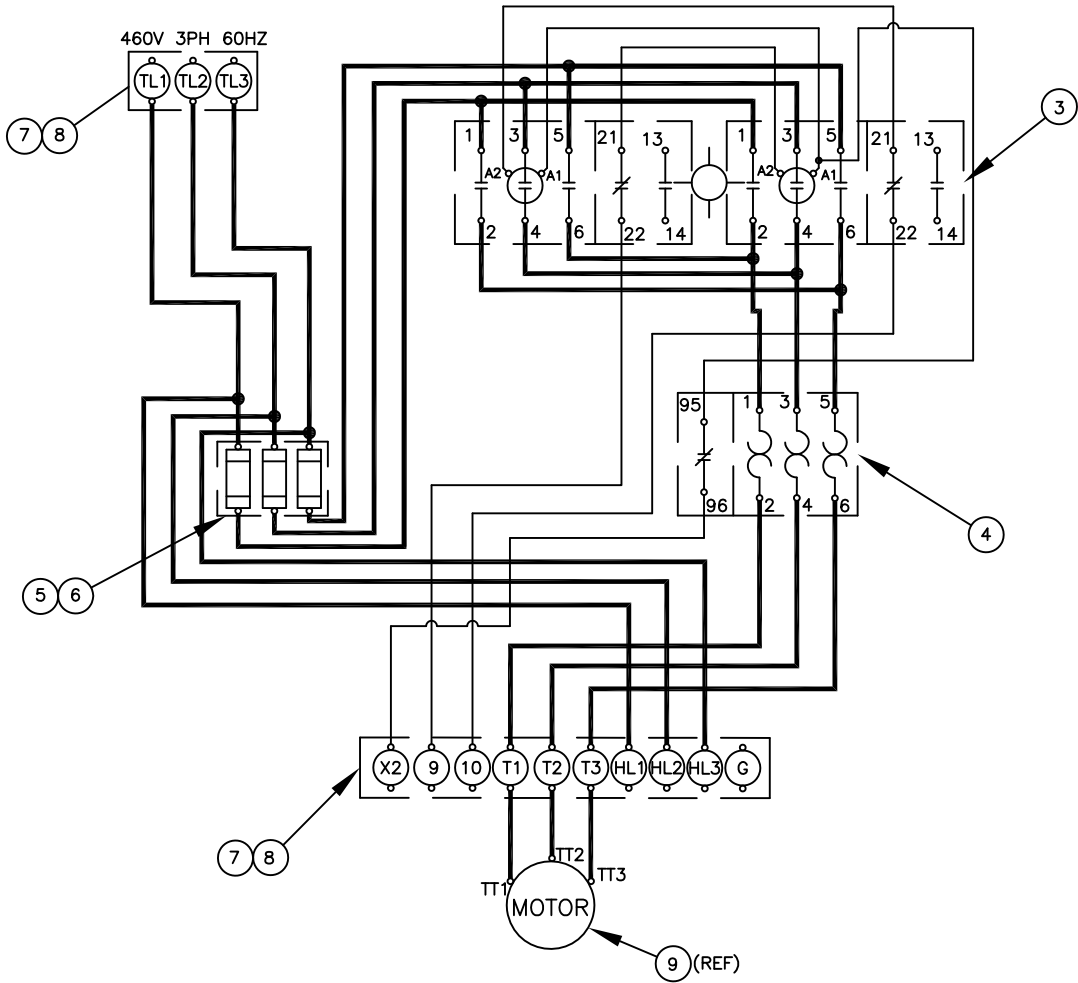


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APPVD.:	DATE:		
SCALE: NTS			
PROJECT NO.: ELECT	PLOT DATE:	DWG. NO.	REV.
ACAD FILE: 95-0116	STATUS: FAB	95-0116	—

PLOT SCALE: 1=1



BILL OF MATERIALS						
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L.	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 1 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	1 1/8 AMP FUSE	74-0037			FNQ-R-1 1/8
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 1/3HP 1725 RPM C56C	48-0001			230/460V 3PH 60HZ



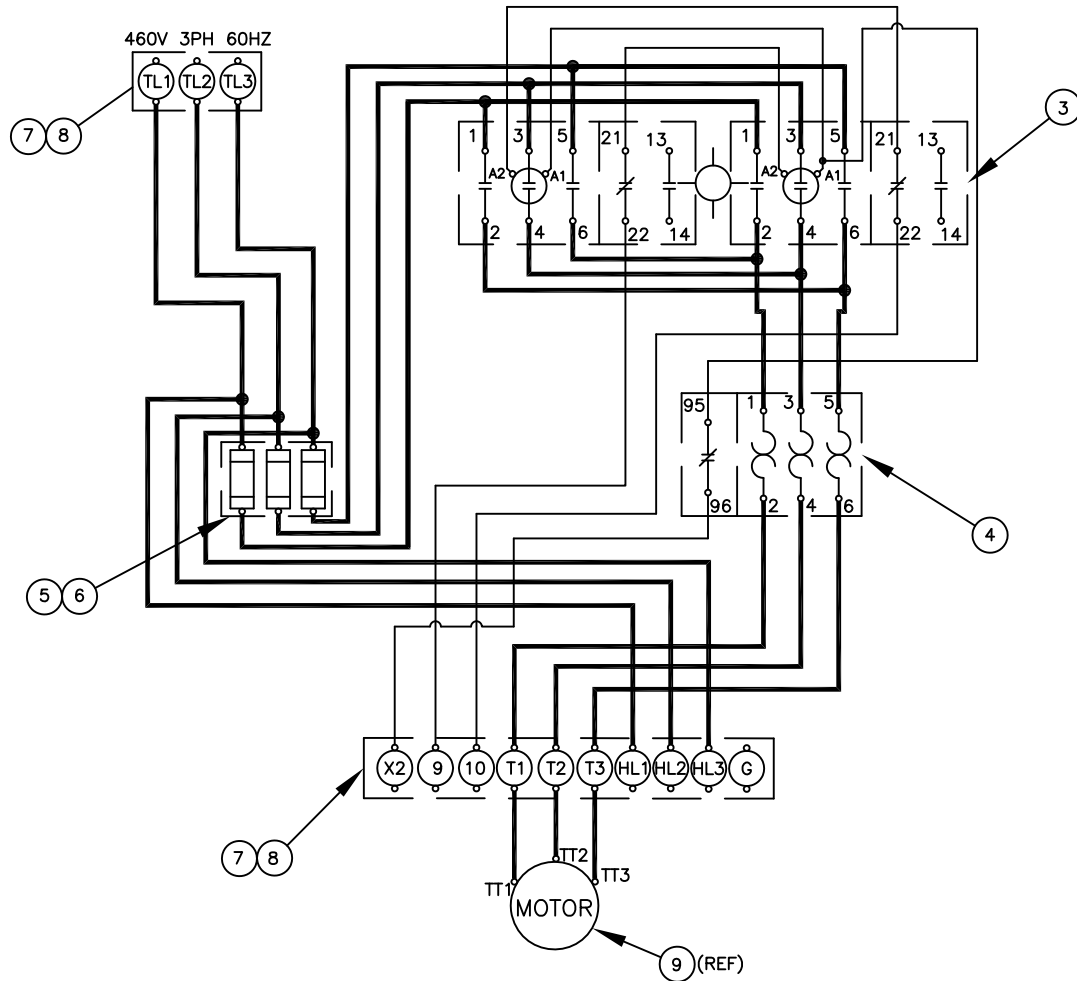
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APPVD.:	DATE:
SCALE: NTS	
PROJECT NO.: ELECT	
ACAD FILE: 95-0111	


<div> <div>SPANG</div> <div>INC.</div> <div>MORGANTOWN BUSINESS PARK, HEMLOCK ROAD, MORGANTOWN, PA. 19543</div> </div>		
WIRING DIAGRAM FOR BEAM TRACTOR 460V 3PH 60HZ W/ 1/3 HP NEMA 1		
PLOT DATE:	DWG. NO. 95-0111	REV. —
STATUS: FAB		

PLOT SCALE: 1=1

# BILL OF MATERIALS

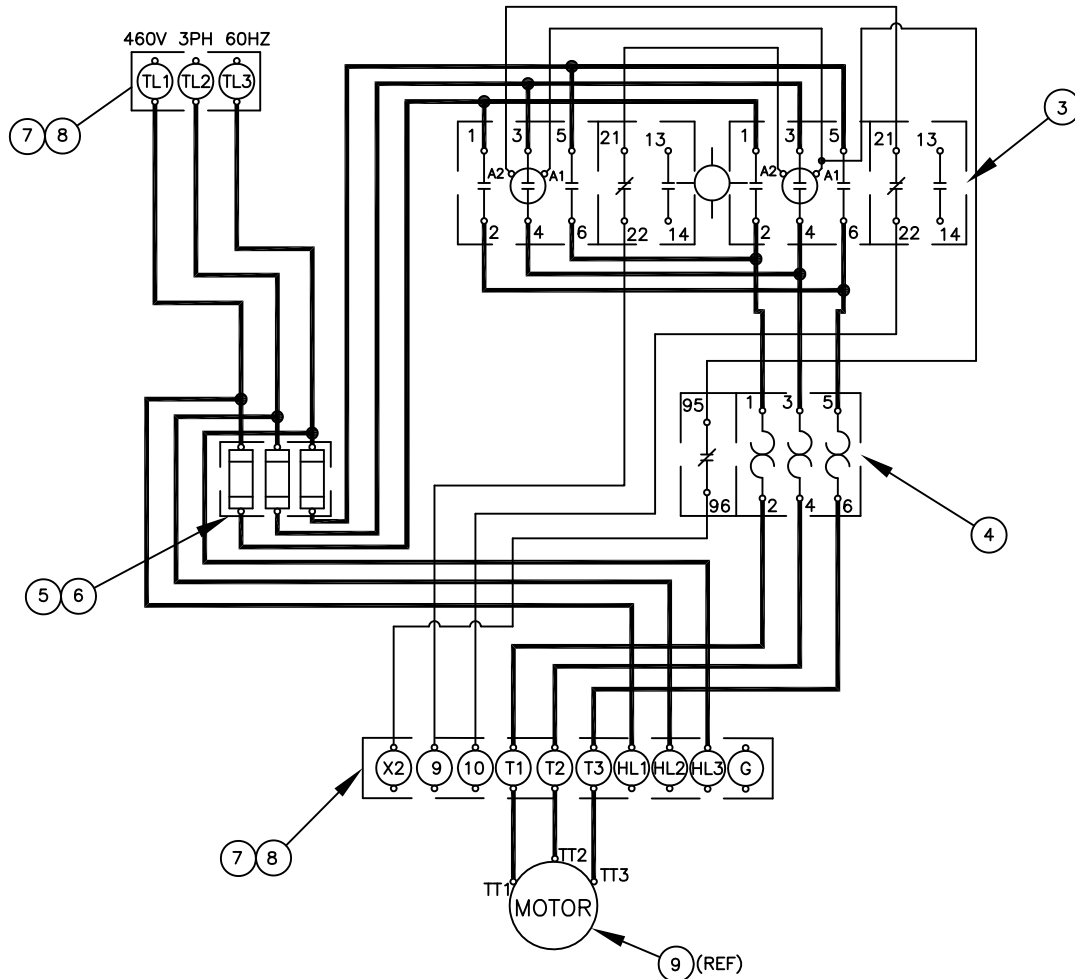
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L.	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 1 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	1 8/10 AMP FUSE	74-0038			FNQ-R-1 8/10
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 1/2HP 1725 RPM C56C	48-0002			230/460V 3PH 60HZ




DRN.: JJB	DATE: 10/29/07	 MORGANTOWN BUSINESS PARK, HEMLOCK ROAD, MORGANTOWN, PA. 19543	
CHKD.:	DATE:		
APPVD.:	DATE:		
SCALE: NTS			
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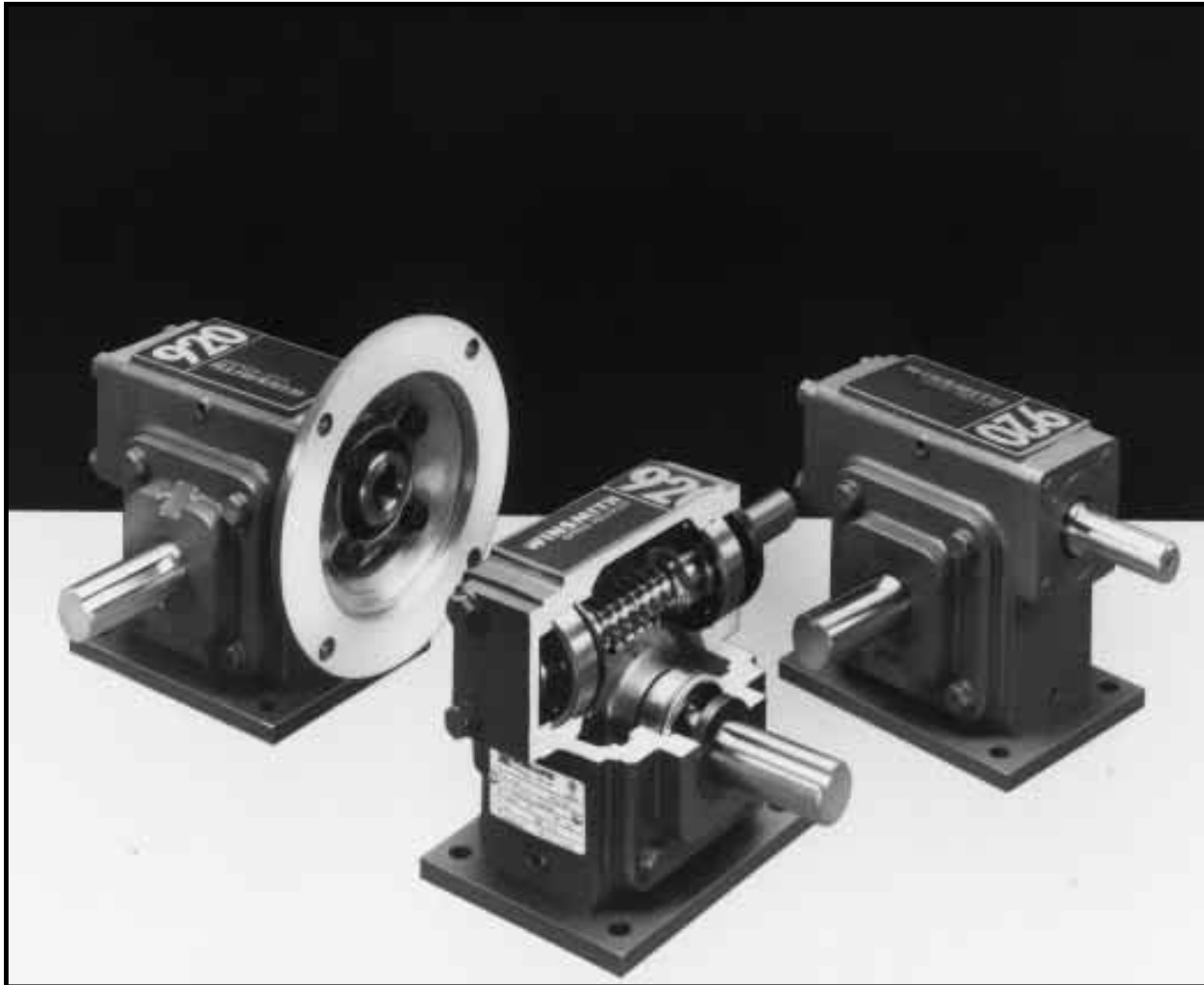
PLOT SCALE: 1=1

BILL OF MATERIALS						
ITEM NO.	QTY. REQD.	DESCRIPTION	PART NO.	WT.	MAT'L.	REMARKS
1	1	ENCLOSURE 10X8X6 NEMA 1	73-0090			A-10N86 (NOT SHOWN)
2	1	PANEL	73-0092			A-10N8P (NOT SHOWN)
3	1	REVERSING CONTACTOR	75-0004			104-C09D22
4	1	OVERLOAD (SET AT 1.4 AMPS)	76-0002			193-EECB
5	1	FUSE BLOCK	74-0029			BM6033B
6	3	2 1/2 AMP FUSE	74-0039			FNQ-R-2 1/2
7	13	TERMINAL BLOCKS	75-0005			0725
8	2	TERMINAL END	75-0006			0730
9	1	MOTOR 3/4HP 1725 RPM C56C	48-0003			230/460V 3PH 60HZ



DRN.: JJB	DATE: 10/29/07	 MORGANTOWN BUSINESS PARK, HEMLOCK ROAD, MORGANTOWN, PA. 19543		
CHKD.:	DATE:			
APPVD.:	DATE:	WIRING DIAGRAM FOR BEAM TRACTOR 460V 3PH 60HZ W/ 3/4HP NEMA 1		
SCALE: NTS				
PROJECT NO.: ELECT	PLOT DATE:	DWG. NO.	95-0115	
ACAD FILE: 95-0115	STATUS: FAB			
PLOT SCALE: 1=1			REV.	—

# *D -9 0* <sup>®</sup> *TYPE* *SE* <sup>®</sup> SPEED REDUCERS



## Installation, Operation, and Lubrication Instructions

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This Engineering Service Bulletin is designed to enable users to obtain the best possible performance from their WINSMITH® Speed Reducers.

## I. SELECTION

The selection of the appropriate speed reducer for a given application requires that all factors affecting the operation of the unit be given careful consideration. Service factors must be applied to catalog ratings depending on the type of prime mover used, severity of the application and duration of daily service. If you have any questions relative to the suitability of your WINSMITH® speed reducer for your particular application, refer to the selection section of the appropriate WINSMITH catalog, or contact your WINSMITH representative or distributor.

## II. INSTALLATION

### 1. Shaft Alignment

- A.** The various drive members (motor, speed reducer, couplings, sprockets, sheaves, gears, etc.) should be aligned as accurately as possible to guard against unusual stresses and overloads imposed by misalignment.
- B.** If a prime mover shaft is to be directly connected to the high speed (input) shaft or if the slow speed (output) shaft is to be directly connected to the driven shaft, flexible couplings should be used. It should be remembered that even flexible couplings have limited ability to accommodate misalignment. Care must be taken at installation to insure that shaft alignments are within the limits recommended by the coupling manufacturer. Use of a rigid coupling to connect speed reducer shafts to other drive components is not recommended as it is almost impossible to obtain exact alignment between two shafts.
- C.** A common base plate supporting the motor and reducer will help preserve the original alignment between reducer and motor shafts. If a structural steel base is used, the plate should be at least equal in thickness to the diameter of the bolts used to fasten the speed reducer to the base plate. Also, for sufficient rigidity, the design in general including angle or channel members should be substantial enough to prevent flexing under vibration. After the first week or two of operation all of the bolts and nuts used to fasten the reducer and motor, pedestal, etc., to the base plate should be retightened. Vibration tends to loosen the nuts even if tight initially. Dowelling the motor and speed reducer to the base plate will help insure that alignment is maintained.

### 2. Mounting Positions

- A.** Single reduction units are designed to accommodate most standard mounting positions. Figure

1 illustrates the utility plug locations for each based on model. All standard single reduction models are equipped with an internal splash shield located near the worm. This shield deflects the oil from the vent, preventing leakage when the vent plug is adjacent to the worm (as on the DT or DV standard mounting). When this location is used as a drain (as on the DV sidewall, worm under), drainage will be better facilitated if done at or near the operating temperature. Filling from this location is not recommended, as the shield will impede the oil flow rate. Bearings are splash lubricated provided the input speed is 1160 RPM or greater. Contact the factory when input speeds fall below this.

- B.** Double reduction models are built to accommodate one mounting position as specified during order entry. Standard mounting positions, furnished unless otherwise specified, are shown in Figure 2 which also illustrates the utility plug locations. Note that the mounting position relates to the main housing orientation. Standard units have an oil level common to both housings and do not use an intermediate oil seal. The vent plug is located in the main housing where the slower worm speed eliminates the need for a vent shield. Grease fittings (not shown in Figure 2) are used to lubricate bearings when oil splash does not serve this purpose (as with the DV or DL upper slow speed bearing).

### 3. Venting

During operation, the heat generated by the gearbox will cause the air and lubricant inside the unit to expand. A vent plug is used to equalize the resulting pressure, the location of which is dependent on the model and mounting position. Before putting the unit into service, review Figures 1 and 2 and relocate the vent plug (if necessary) as shown for the appropriate model and mounting position. Double reduction models (Figure 2) are vented in the main housing only. To prevent loss of oil during shipment, the vent plug includes a brass pin which must be removed prior to operation. If a speed reducer is installed in an atmosphere containing exceptional amounts of moisture or dust, a shielded or hooded vent plug should be used. For intermittent duty applications, where the operating temperature does not rise more than about 20 degrees F, internal pressure build-up is minimal and venting is not necessary. Some models are available with an optional internal expansion chamber allowing units to be totally sealed. Contact us for more details.

#### 4. C-Flange Motor Mounting Procedures

##### A. Mounting Motor to C-Flange Reducer With Hollow Input Shaft

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary.

Remove protective plastic plug from reducer input shaft. The bore has been coated with an anti-seize compound.

Align the motor shaft and key with keyway in bore and slide motor up to flange.

Position the motor conduit box as desired.

Using the fasteners supplied, secure the motor to the reducer. Draw down evenly so as not to bend the motor shaft. Tighten fasteners to 200 inch pounds.

##### B. Mounting Motor to C-Flange Reducer With Coupling Adaptor

Check motor and reducer mounting registers for nicks that would interfere with assembly. Remove if necessary.

When assembling the motor and coupling, the coupling halves should be equally spaced on each shaft to insure adequate engagement. The following describes a method for doing this.

First determine the assembled shaft clearance by measuring the distance from the C-Flange face to the reducer shaft end and subtracting the motor shaft length. Mount and secure the motor shaft coupling half with the spider end extending one half the clearance distance beyond the motor shaft. Mount the reducer coupling half and coupling spider on reducer shaft in its approximate position but do not secure.

Locate the motor conduit box in the desired position and secure the motor to the reducer flange using the fasteners provided. Tighten to about 200 inch pounds.

Using the access hole in the flange, slide the coupling together and tighten the set screw.

#### 5. Unit Assembly/Disassembly Instructions

Contact the factory for an instruction manual.

### III. LUBRICATION & MAINTENANCE

#### 1. Factory Filling

WINSMITH speed reducers are oil filled at the factory to the proper level for the standard mounting

position as shown in Figures 1 or 2. **The oil level should be checked and adjusted (if necessary) prior to operation, using the oil level plug provided and while the unit is oriented in its operating position.**

#### 2. Ambient Temperature

If the operating ambient temperature is other than 51-95°F, then refer to lubrication chart and refill the unit with the correct grade based on actual ambient temperatures and operating speed. See item 3 for additional information regarding oil changes.

#### 3. Oil Changing

When changing oil for any reason, it should be remembered that oils of various types may not be compatible. Therefore, when changing to a different oil, it is recommended that the housing be completely drained and thoroughly flushed with a light flushing oil prior to refilling with the appropriate lubricant. The oil level should be rechecked after a short period of operation and adjusted, if necessary. When changing double reduction models, each housing should be drained and filled independently, even though there may be a common level.

##### A. Initial Oil Change

The oil in a new speed reducer should be changed at the end of 250 hours of operation. (30 days for 8 hour per day service, 15 days for 16 hour service, 10 days for 24 hour service).

##### B. Subsequent Oil Changes

Under normal conditions, after the initial oil change, the oil should be changed after every 2500 hours of operation, or every six months, whichever occurs first. Under severe conditions (rapid temperature changes, moist, dirty or corrosive environment) it may be necessary to change oil at intervals of one to three months. Periodic examination of oil samples taken from the unit will help establish the appropriate interval.

##### C. Synthetic Oils

Synthetic lubricants can be advantageous over mineral oils in that they generally are more stable, have a longer life, and operate over a wider temperature range. These oils are appropriate for any application but are especially useful when units are subjected to low start-up temperatures or high operating temperatures. However, continuous operation above 225°F may cause damage to seals or other components. It is recommended that the initial oil be changed or filtered after the first 1500 hours of operation to remove metal particles that accumulate during break-in. Subsequent oil

# STANDARD MOUNTING POSITIONS *D-90*® TYPE SE®

BASIC MODEL	TRADITIONAL MOUNTING	INVERTED MOUNTING	ADDITIONAL MOUNTING POSITIONS			
			INPUT SHAFT HORIZONTAL		INPUT SHAFT VERTICAL	
DB DD DJ DN DT DU WB WT WU						
DV						
DL		SPECIAL Contact the Factory				
DSF			SPECIAL Contact the Factory			
DSN DSR DSU						

Note: Single Reduction 935 and 943 standard models are supplied with grease fittings on the input shaft to insure bearing lubrication for all mounting positions.

F = Fill Plug

V = Vent Plug

L = Level Plug

D = Drain Plug

GF = Grease Fitting

Figure 1. Single Reduction Models

DOUBLE REDUCTION* WORM/WORM				DOUBLE REDUCTION* HELICAL/WORM			
OTHER ATTACHMENT HOUSING POSITIONS				OTHER ATTACHMENT HOUSING POSITIONS			

Plug locations apply to motorized units also.

Contact the factory when input speeds are less than 1160 RPM to insure proper lubrication.

\*Double Reduction units are not universal mounting. Mountings other than standard require a special outline.

Figure 2. Double Reduction Models



changes should be made after 5000 hours operation if units are operating in a clean environment. This can be extended to 10,000 hours if using new reformulated Mobil SHC lubricants (orange in color) and the lubricant remains free of contamination over this period. See comments under 3B for more severe ambient conditions.

#### 4. Long Term Storage or Infrequent Operation

If a speed reducer is to stand idle for an extended period of time, either prior to installation or during use, it is recommended that the unit be filled completely with oil to protect interior parts from rust corrosion due to internal condensation. Be sure to drain the oil to the proper level before placing the speed reducer in service. A long term storage option is available on new units. Contact us for details.

#### 5. Grease Fittings

Some units are equipped with grease fittings to lubricate bearings not adequately lubricated by the oil splash. These fittings must be lubricated every 3-6 months depending on operating conditions. Bearing greases must be compatible with the type of gear lubricant being used (ie. mineral, synthetic, food grade, etc.) For mineral oils, use a high quality lithium base NLGI #2 bearing grease. For synthetic oils, use a synthetic bearing grease such as Mobil Synthetic Universal grease, Mobilith SHC 100 or a suitable equivalent. For food grade lubricants, use Chevron FM grease, NLGI 2, or equivalent.

#### 6. Low Input Speeds (Under 1160 RPM)

When input speeds are less than 1160 RPM, grease fittings will be required to lubricate any bearings not partially covered by the normal oil level. Such units are considered non-standard and necessitate factory modification. If this low speed operating condition exists and units are without the appropriate grease fittings, please contact the factory.

#### 7. Oil Temperature

Speed reducers in normal operation can generate temperatures up to 200°F depending on the type of reducer and the severity of the application (loading, duration of service, ambient temperatures). Excessive oil temperatures may be the result of one or more of the following factors:

##### A. Overloads

Overloads may be due to the original unit selection being too small for the application, or increased loads on the speed reducer to a point where its rating is exceeded after it has been in service for a period of time. Always check the speed reducer rating when increasing driven loads or increasing the horsepower rating of the motor or other prime mover.

##### B. Overfilling or Underfilling

If a speed reducer is overfilled with oil, the energy used in churning the excessive oil can result in overheating. If this occurs, shut down the drive, remove the oil level plug and allow oil to drain until oil ceases to drain from the level hole, reinstall the oil level plug and restart the drive. If the speed reducer is underfilled, the resultant friction can cause overheating and possible damage. If this occurs, fill the speed reducer to the oil level plug hole and check the gearing for excessive wear.

##### C. Inadequate Cooling

In order to dissipate internally generated heat, the speed reducer must be installed in such a way that air can circulate freely. Tightly confined areas (inside cabinets, etc.) should be avoided. If this is not possible, forced air cooling by means of a separate blower should be used.

#### 8. Oil Seals

Although WINSMITH uses high quality oil seals and precision ground shafts to provide a superior seal contact surface, it is possible that circumstances beyond WINSMITH's control can cause oil seal leakage (damage during shipment or installation, etc.). When replacing a shaft oil seal, using the following suggestions will help to insure leak-free operation and long seal life.

**A.** When installing a new seal, cover the keyway and any other surface discontinuity with smooth tape to protect the seal lip from being damaged.

**B.** A sealant should be used between the O.D. of the seal and the I.D. of the bore into which the seal is installed. The seal bore should also be free of any burrs, nicks, or scratches.

**C.** Be sure that the seal is not cocked in the seal bore. The outer face of the seal should be flush with the surface into which it is mounted.



# Lubricants

## Worm Gear Reducers

For special applications that involve severe ambient temperature extremes or a seasonal oil requirement, WINSMITH, based on extensive testing and field experience, recommends the use of Mobil SHC synthetic lubricants.

Ambient Temperature	-30 to 15°F	16 to 50°F	51 to 95°F	51 to 95°F	96 to 131°F	96 to 131°F
Final Stage Worm Speed*	up to 2000 FPM	up to 2000 FPM	up to 450 FPM	above 450 FPM	up to 450 FPM	above 450 FPM
ISO Viscosity Grade	220	460	680	460	680	460*
AGMA Lubricant No.	5S**	#7 Compounded**	#8 Compounded***	#7 Compounded***	8 S**	7S**

Mobil	SHC 630	600W Super Cylinder	Extra Hecla Super	600W Super Cylinder	SHC 636	SHC 634
American Lubricants	SHC-90W	AGMA #7 Gear Oil	AGMA #8 Gear Oil	AGMA #7 Gear Oil	N/A	N/A
Castrol	Tribol 800/220	Tribol 1105-7C	Tribol 1105-8C	Tribol 1105-7C	Tribol 800/680	Tribol 800/460
Chevron	Tegra 220	Cylinder Oil W460	Cylinder Oil W680	Cylinder Oil W460	Tegra 680	Tegra 460
Conoco	Syncon R & O 220	Inca Oil 460	Inca Oil 680	Inca Oil 460	N/A	Syncon R & O 460
Exxon (Esso)	Teresstic SHP 220	Spartan EP 460	Spartan EP 680	Spartan EP 460	Teresstic SHP 680	Teresstic SHP 460
Fiske Brothers	SPO-MG	SPO-277	SPO-288	SPO-277	N/A	N/A
Shell	Omala RL 220	Valvata J 460	Valvata J 680	Valvata J 460	Omala RL 680	Omala RL 460
Texaco	Pinnacle 220	Vanguard 460	Vanguard 680	Vanguard 460	Pinnacle 680	Pinnacle 460

\*\*synthetic oil

\*\*\*3% to 10% fatty or synthetic oils or mild EP additives

Lubricant selections are provided by the lubricant manufacturer based on AGMA recommended viscosity grades. Viscosity grades are based on Lubrication Standard ANSI/AGMA 9005-D94.

\*The sliding velocity in feet per minute (FPM) for standard ratios is determined by multiplying the speed of the worm in RPM by the factor from the following table. For selecting the proper lubricant, use the speed of the worm in the final stage (input RPM divided by the first stage ratio).

Nominal Ratio												
SIZE	5	7.5	10	15	20	25	30	40	50	60	80	100
910	0.153	—	0.137	0.133	0.122	0.116	0.132	0.121	0.115	—	—	—
913	0.231	0.189	0.183	0.179	0.171	0.165	0.178	0.169	0.164	0.161	—	—
917	0.303	0.229	0.201	0.193	0.180	0.172	0.189	0.176	0.170	0.166	0.161	0.133
920	0.347	0.263	0.225	0.216	0.202	0.191	0.215	0.200	0.188	0.182	0.164	0.161
924	0.412	0.312	0.261	0.256	0.236	0.223	0.249	0.231	0.216	0.210	0.201	0.196
926	0.455	0.345	0.283	0.276	0.254	0.238	0.269	0.249	0.234	0.225	0.215	0.210
930	0.520	0.395	0.327	0.317	0.291	0.273	0.307	0.285	0.269	0.258	0.246	0.241
935	0.607	0.461	0.427	0.412	0.373	0.349	0.403	0.367	0.345	0.330	0.311	0.299
943	0.633	0.588	0.568	0.553	0.507	0.558	0.544	0.501	0.475	0.457	0.435	0.422



**PEERLESS-WINSMITH, INC.**

SPRINGVILLE OPERATIONS • 172 EATON STREET, P.O. BOX 530, SPRINGVILLE, NY 14141-0530

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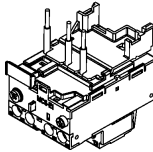
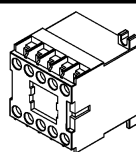
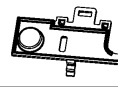
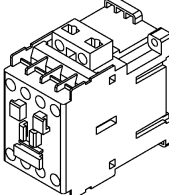

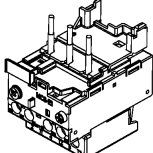
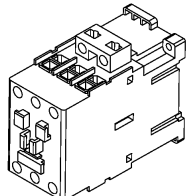
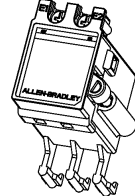
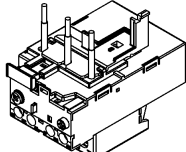
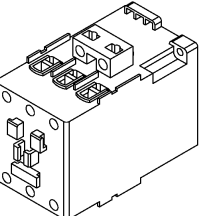
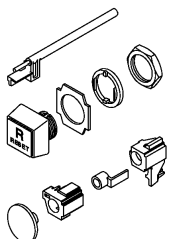
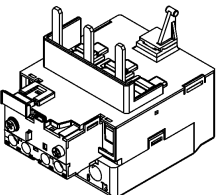
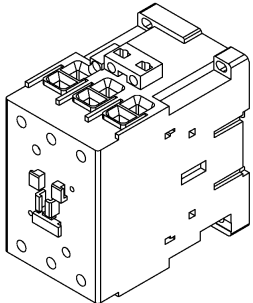
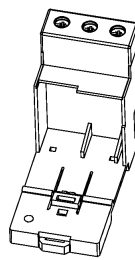
<http://www.winsmith.com> e-mail=[winsmith@winsmith.com](mailto:winsmith@winsmith.com)



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**Bulletin 193 MCS-E1 Overload Relay Application and Installation**  
**Application et installation du relais de surcharge Famille 193 MCS-E1**  
**Überlastrelais Bulletin 193 MCS-E1, Anwendung und Installation**  
**Aplicación e instalación del relé de sobrecarga, Boletín 193 MCS-E1**  
**Boletim 193 MCS-E1 Aplicação e Instalação do Relé de Sobrecarga**  
**Applicazione ed installazione dei relè termici Bollettino 193 MCS-E1**  
**ブレイティン193 MCS-E1 過負荷継電器の応用と取付け**  
**Bulletin 193 MCS-E1 过载继电器的使用与安装**  
 (Cat 193-EA\_\_ \_)

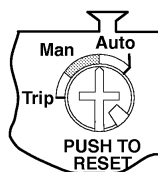
MCS-E1 CAT	CAT	3Ø ~ FLA	ACCESSORIES ACCESSOIRES ZUBEHÖR ACCESORIOS ACESSÓRIOS ACCESSORI 付属品 附件	CAT
 193-EA__B	 100-M05 100-M09	0.1 - 12A	 193-BC4	193-EA__ _
	 100-C09 100-C12 100-C16 100-C23	0.1 - 32A	 193-BC5	193-EA__ _
 193-EA__C	 300-AO_ 300-BO_	.01 - 37A	 193-ER1 193-ER1Z_	193-EA__ _
	100-C30 100-C37	12 - 37A		
 193-EA__D	 100-C43	5 - 45A	 198-MR3	193-EA__ _
 193-EA__E	 300-CO_	5.7 - 45A	 193-EPM1	193-EA__ _B 193-EA__ _C
	100-C60 100-C72 100-C85	26 - 85A	193-EPM2 193-EPM3	193-EA__ _D 193-EA__ _E

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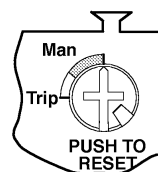
**Operating Modes**  
**Modes d'exploitation**  
**Betriebsarten**  
**Modos de operaci3n**

**Modos de opera33o**  
**Modalit3 di funzionamento**  
**操作モード**  
**操作模态**

193-EA4\_ \_  
 193-EA5\_ \_  
 193-EA6\_ \_



193-EA1\_ \_  
 193-EA2\_ \_  
 193-EA3\_ \_



● Anti-tamper shields, Cat 193-BC4 and 193-BC5 are available to inhibit unauthorized or accidental changes of mode or current setting.  
**Auto:** Push and turn reset button to Auto position. The relay resets automatically, (approximately 2 minutes after tripping.)  
**Man (Manual):** Reset by pushing button in.  
**Trip (Tripped):** Push and turn reset button counterclockwise to manually trip. This action causes N.O. and N.C. contacts to change state. Releasing button reverts device to manual mode.

● Des blindages contre modifications indésirables (réf. 193-BC4 et 193-BC5) sont disponibles pour empêcher tout changement de mode ou de réglage accidentel ou non autorisé.  
**Auto:** Enfoncez et tournez le bouton de remise à zéro sur la position Auto (automatique). Le relais se remet automatiquement à zéro (environ 2 minutes après le déclenchement).  
**Man (Manuel):** Remettez à zéro en enfonçant le bouton.  
**Trip (Déclenchement):** Enfoncez et tournez le bouton de remise à zéro vers la gauche pour effectuer un déclenchement manuel. Cette action entraîne le changement d'état des contacts N.O. (normalement ouvert) et N.C. (normalement fermé). Le relâchement du bouton remet le dispositif en mode manuel.

● Zum Schutz vor unbefugter oder versehentlicher Änderung der Betriebsart bzw. der derzeitigen Einstellung sind Schutzvorrichtungen (Best.-Nr. 193-BC4 und 193-BC5) lieferbar.  
**Auto:** Drücken Sie die Reset-Taste und drehen Sie sie in die Stellung Auto. Das Relais wird automatisch zurückgesetzt (etwa zwei Minuten nach dem Auslösen).  
**Man (Manuell):** Drücken Sie die Taste, um das Relais zurückzusetzen.  
**Trip (Ausgelöst):** Drücken Sie die Reset-Taste und drehen Sie sie im Gegenuhrzeigersinn, um eine manuelle Auslösung zu verursachen. Hierdurch wird der Status des Schließ- und Öffnerkontakts geändert. Nach dem Loslassen der Taste geht das Gerät in den manuellen Modus über.

● Están a su disposición los protectores, Cat 193-BC4 y 193-BC5, contra la alteraci3n no autorizada o accidental de cambios de modo o posicionamientos actuales.  
**Auto:** Presione y gire el botón de reseteo a la posici3n Auto. El relé se restablece automáticamente. (Aproximadamente 2 minutos después del disparo.)  
**Man (Manual):** Restablezca presionando el botón.  
**Trip (Disparo):** Presione y gire el botón de reseteo en sentido contrario al de las manecillas del reloj para disparar automáticamente. Esta acci3n causa que los contactos normalmente abiertos y los contactos normalmente cerrados cambien de estado. El soltar el botón invierte el dispositivo al modo manual.

● Est3o disponíveis blindagens antivola33o, Cat 193-BC4 e 193-BC5, para evitar mudanç3s não-autorizadas ou acidentais do modo ou do ajuste da corrente.  
**Auto:** empurre e gire o botão de ajuste até a posiç3o Auto. O relé se rearmar3 automaticamente (aproximadamente 2 minutos depois de disparado).  
**Man (Manual):** para rearmar, empurre o botão para dentro.  
**Trip (Acionado):** empurre e gire o botão de ajuste no sentido anti-hor3rio, para disparar manualmente. Com isto, os contatos N.A. e N.F mudam de estado. Soltando-se o botão, o dispositivo volta ao modo manual.

● Per evitare modifiche non autorizzate o accidentali della modalit3 o dell'impostazione di corrente, sono disponibili gli schermi anti-maneggiamento, Cat. 193-BC4 e 193-BC5.  
**Auto:** spingere e ruotare il pulsante sulla posizione Auto. Il relé si ripristina automaticamente dopo il raffreddamento (all'incirca 2 minuti dopo l'intervento).  
**Man (Manuale):** si ripristina spingendo il pulsante in dentro.  
**Trip (Scattato):** per provocare manualmente l'intervento spingere e ruotare il pulsante in senso antiorario. L'azione cambia lo stato dei contatti da N.O. (normalmente aperto) a N.C. (normalmente chiuso). Rilasciando il pulsante il dispositivo torna alla modalit3 manuale.

● 許可なしでの使用、あるいは現在の設定モードの偶発的な変更を制止するための不正使用防止シールド (Cat 193-BC4 および 193-BC5) も発売されています。  
**Auto:** リセットボタンを押しながら回して自動位置にセットします。  
 継電器が自動的にリセットされます (トリップ後およそ2分)。  
**Man (手動):** ボタンを押してリセットします。  
**Trip (トリップ):** リセットボタンを押しながら時計の針と反対方向に回して、手動でトリップを行います。これにより、N.O. 接触とN.C. 接触の状態が変化します。ボタンを元に戻すと装置は手動モードに変わります。

● 提供防篡改护罩(零件编号Cat 193-BC4和193-BC5)、可防止有人擅自或意外更改操作模态或电流设定。

**Auto:** 按下复原旋钮, 并转动至Auto(自动)档位。继电器在跳闸之后会自动复原。(在跳闸后2分钟左右复原。)

**Man(手动):** 按下复原旋钮, 可使继电器复原。

**Trip(跳闸):** 按下复原旋钮, 逆时针方向转动, 可使继电器跳闸。这个手操纵动作导致N.O.和N.C. 触点改变状态。如果放开旋钮, 则使继电器回复到手动操作模态。



**ATTENTION:** Do not use automatic reset mode in applications where unexpected automatic restart of the motor can cause injury to persons or damage to equipment.

**ATTENTION:** N'utilisez pas le mode Remise à zéro automatique dans les applications où un redémarrage automatique inattendu du moteur pourrait provoquer des blessures personnelles ou des dégâts matériels.

**ACHTUNG:** Der automatische Rücksetzmodus darf nicht in Anwendungen verwendet werden, in denen der unerwartete Neustart des Motors zu Personen- oder Sachschäden führen kann.

**ATENCIÓN:** No use el modo de reseteo automático en aplicaciones donde el rearmar repentino del motor pueda causar lesiones personales o daño al equipo.

**ATENÇÃO:** não utilize o modo de reajuste automático em aplicaç3es nas quais o reinício automático e inesperado do motor possa causar ferimentos às pessoas ou danos ao equipamento.

**ATTENZIONE:** non usare la modalit3 di ripristino automatico in applicazioni dove il riavviamento automatico improvviso del motore può provocare infortuni o danni all'apparecchiatura.

**注意:** モーターの予期しない自動再スタートによって負傷や機器の破損をまねく恐れのあるような応用では、自動リセット・モードを使用しないでください。

**注意:** 在马达突然自动再启动可能导致人员伤害或设备损坏的地方, 切勿采用自动复原模态。

**Contact Status**  
**Etat des contacts**  
**Kontaktstatus**  
**Estado del contacto**

**Situaç3o de contato**  
**Stato dei contatti**  
**接触状态**  
**接触状态**

Normal		Test	Tripped
95	96	Closed	Open
97	98	Open	Closed

Normal		Tripped	Test
97	95	97	95
98	96	98	96

## MCS-E1 Features

### Caractéristiques du MCS-E1

### Leistungsmerkmale des MCS-E1

### Características del MCS-E1

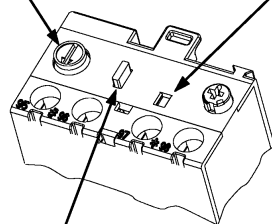
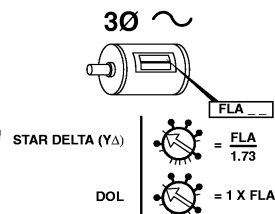
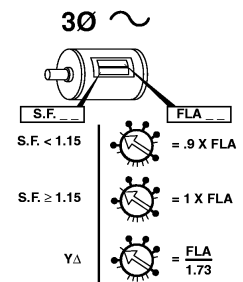
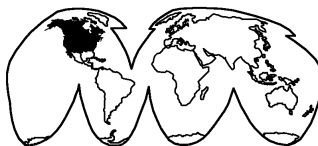
- To adjust trip current, turn dial until the desired current is aligned with the ▲ pointer. Trip rating is 120% of dial setting.
- Pour régler l'intensité de déclenchement, tournez le cadran jusqu'à ce que le pointeur ▲ soit sur l'intensité voulue. La valeur nominale de déclenchement est de 120% du réglage cadran.
- Zur Einstellung des Auslösestroms drehen Sie den Schalter, bis der Zeiger ▲ auf die gewünschte Stromstärke zeigt. Der zur Auslösung erforderliche Nennstrom beträgt 120% des eingestellten Wertes.
- Para ajustar la corriente del disparo, gire el dial hasta que la corriente deseada esté alineada con la marca ▲. La capacidad nominal del disparo es el 120% del posicionamiento del dial.
- Para regular a corrente de disparo, gire o disco mostrador até que a corrente desejada esteja alinhada com o indicador ▲. A classe de disparo corresponde a 120% da marcação no mostrador.
- Per regolare la corrente di intervento, ruotare il regolatore fin quando la corrente desiderata non è allineata con il puntatore ▲. Il valore nominale di intervento corrisponde al 120% dell'impostazione del regolatore.
- トリップ電流を調整するには、所定の電流の目盛りが▲印に来るまでダイヤルを回してください。トリップ定格は、ダイヤル設定値の120%です。
- 若欲调节跳闸电流设定，可转动刻度盘，使所需的设定值对准▲箭头。跳闸电流额定值是刻度盘显示值的120%。

## Características MCS-E1

### Funzioni dell'MCS-E1

### MCS-E1の特長

### MCS-E1继电器的特性



Push To Test  
Enfoncer pour tester  
Testschalter  
Presione para probar  
Pressione para testar  
Spingere per provare

押してテストします。  
按下按钮进行测试

- Trip Indicator Window  
Yellow indicator not visible: Not Tripped.  
Yellow indicator visible: Tripped.
- Fenêtre d'indicateur de déclenchement  
Indicateur jaune non visible : pas de déclenchement  
Indicateur jaune visible : déclenchement
- Auslösungsanzeigefenster  
Gelbe Anzeige nicht sichtbar: keine Auslösung  
Gelbe Anzeige sichtbar: Auslösung
- Ventana indicadora de disparo  
Indicador amarillo no visible: No disparado  
Indicador amarillo visible: Disparado
- Visor de disparo  
Se o indicador amarelo não estiver visível: não disparado  
Se o indicador amarelo estiver visível: disparado
- Finestra indicatrice di intervento.  
Indicatore giallo non visibile: non scattato.  
Indicatore giallo visibile: scattato.
- トリップ表示ウィンドウ  
黄色インジケータが表示されていない場合：トリップなし  
黄色インジケータが表示されている場合：トリップ済み
- 跳闸指示窗  
黄色标记未显示：没有跳闸  
黄色标记显示：已跳闸

# Installation Instalación Instalação Installazione

## 取付け方法 安裝



**ATTENTION:** To prevent electrical shock, disconnect from power source before installing or servicing. Install in suitable enclosure. Keep free from contaminants.

**ATTENTION:** Avant le montage et la mise en service, couper l'alimentation secteur pour éviter toute décharge. Prévoir une mise en coffret ou armoire appropriée. Protéger le produit contre les environnements agressifs.

**ACHTUNG:** Vor Installations- oder Servicearbeiten Stromversorgung zur Vermeidung von elektrischen Unfällen trennen. Die Geräte müssen in einem passenden Gehäuse eingebaut und gegen Verschmutzung geschützt werden.

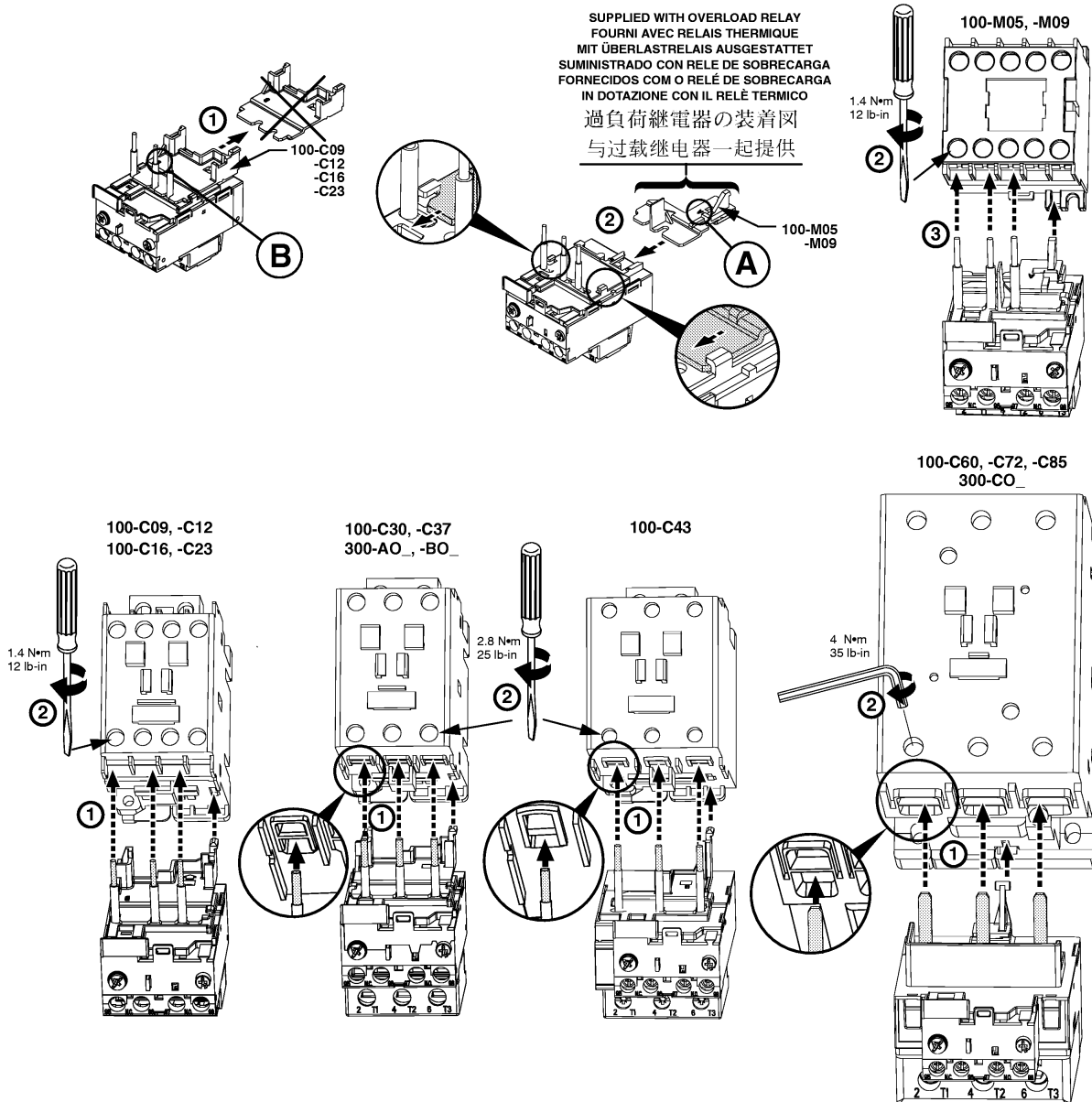
**ATENCION:** Desconéctese de la corriente eléctrica, antes de la instalación o del servicio, a fin de impedir sacudidas eléctricas. Instálelo en una caja apropiada. Manténgalo libre de contaminantes.

**ATENÇÃO:** Para evitar choques, desconectar da corrente elétrica antes de fazer a instalação ou a manutenção. Instalar em caixa apropriada. Manter livre de contaminantes.

**ATTENZIONE:** Per prevenire infortuni, togliere tensione prima dell'installazione o manutenzione. Installare in custodia idonea. Tenere lontano da contaminanti.

**注意：** 感電事故防止のため、取付けまたは修理の際は電源から取り外してください。適切なケース内に取付けてください。また、汚染物質がないことを確認してください。

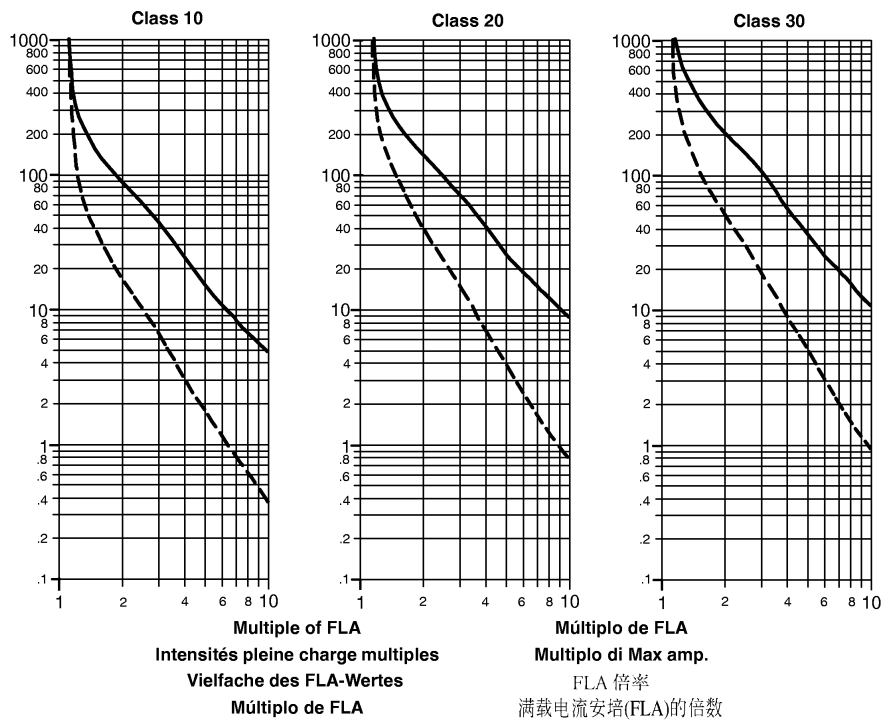
**注意：** 为了防止触电，在安装或维修之前必须先切断电源。安装在合适的设备箱内。防止接触污染物。



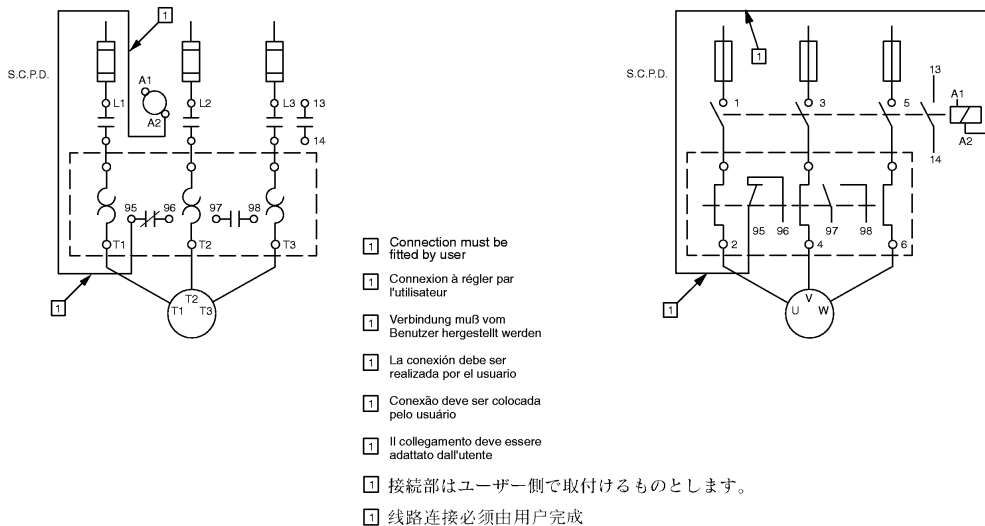
**Trip Curve**  
**Courbe de déclenchement**  
**Auslösekurve**  
**Curva del disparo**  
**Curva de disparo**  
**Curva di intervento**  
トリップ曲線  
跳閘曲線

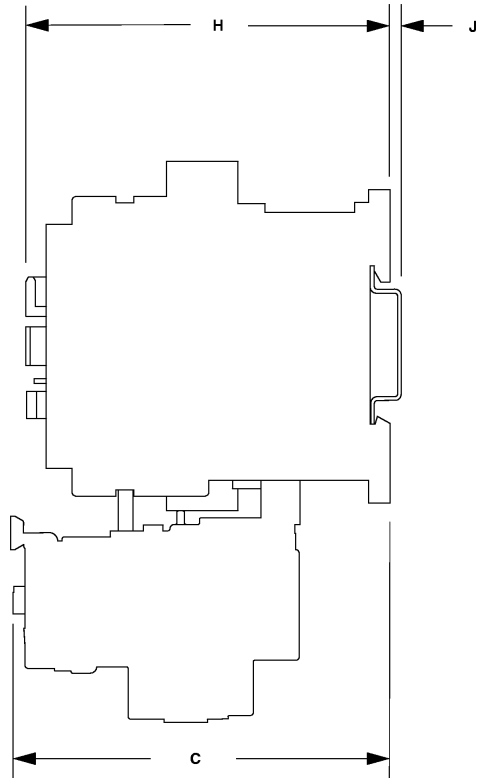
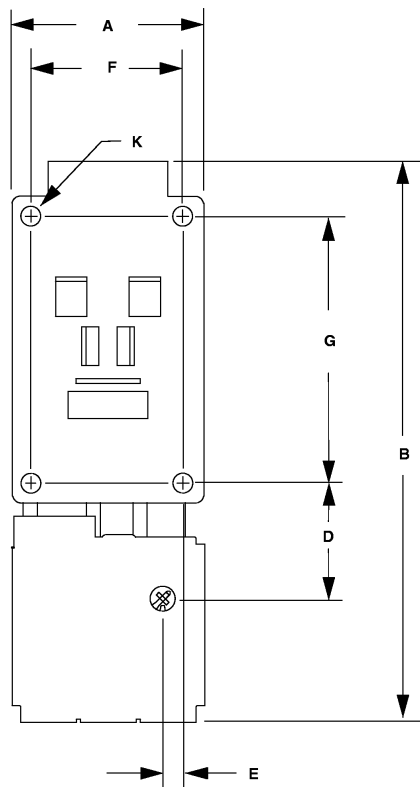
—————  
COLD START  
DEMARRAGE A FROID  
KALTSTART  
ARRANQUE EN FRIJO  
PARTIDA A FRIJO  
AVVIAMENTO A FREDDO  
冷始動  
冷态启动

-----  
HOT START  
DEMARRAGE A CHAUD  
WARMSTART  
ARRANQUE EN CALIENTE  
PARTIDA A QUENTE  
AVVIAMENTO A CALDO  
熱始動  
热态启动



**Wiring Diagram - 3 Phase Full Voltage DOL Starter**  
**Schéma de câblage - Pleine tension triphasée Démarreur DOL (direct en ligne)**  
**Verkabelungsschema - 3-phasiger Vollspannungs-DOL-Motoranlasser**  
**Diagrama de cableado - Arrancador DOL (directo en línea) trifásico de voltaje pleno**  
**Diagrama de circuito - Dispositivo de partida DOL, trifásico, de máxima tensão**  
**Schema elettrico - Avviatore diretto trifase a tensione piena**  
配線図 - 3 相全电压 DOL 始動器  
配线图 — 三相全电压DOL启动器





CAT	MCS-E1 CAT		A	B	C	D	E	F	G	H	J	K
100-M05, -M09	193-EA __ B	mm (in)	45 (1-49/64)	107 (4-13/64)	66.6 (2-5/8)	25 (63/64)	0 0	-- --	50 (1-61/64)	48.3 (1-29/32)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
100-C09, -C12, -C16, -C23	193-EA __ B	mm (in)	45 (1-49/64)	131 (5-5/32)	88.5 (3-27/32)	29 (1-9/64)	-0.8 (-1/32)	35 (1-3/8)	60 (2-23/64)	85.1 (3-11/32)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
100-C30, -C37	193-EA __ C	mm (in)	45 (1-49/64)	136.5 (5-3/8)	92 (3-5/8)	29 (1-9/64)	-0.8 (-1/32)	35 (1-3/8)	60 (2-23/64)	104.7 (4-1/8)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
100-C43	193-EA __ D	mm (in)	54 (2-1/8)	136.5 (5-3/8)	92 (3-5/8)	29 (1-9/64)	0.4 (1/64)	45 (1-49/64)	60 (2-23/64)	104.7 (4-1/8)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
100-C60, -C72, -C85	193-EA __ E	mm (in)	72 (2-53/64)	188.5 (7-27/64)	120 (4-23/32)	34.5 (1-23/64)	9.4 (3/8)	55 (2-11/64)	100 (3-15/16)	124 (4-7/8)	2 (5/64)	(4)-ø5.5 ((4)-7/32ø)
300-AO __ -BO __	193-EA __ HC 193-EA __ FC	mm (in)	45 (1-49/64)	136.5 (5-3/8)	92 (3-5/8)	29 (1-9/64)	-0.8 (-1/32)	35 (1-3/8)	60 (2-23/64)	104.7 (4-1/8)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
300-AO __ -BO __	ALL OTHER 193-EA __ C	mm (in)	45 (1-49/64)	131 (5-5/32)	92 (3-5/8)	29 (1-9/64)	-0.8 (-1/32)	35 (1-3/8)	60 (2-23/64)	104.7 (4-1/8)	2 (5/64)	(2)-ø4.2 ((2)-11/64ø)
300-CO __	193-EA __ E	mm (in)	72 (2-53/64)	188.5 (7-27/64)	120 (4-23/32)	34.5 (1-23/64)	9.4 (3/8)	55 (2-11/64)	100 (3-15/16)	124 (4-7/8)	2 (5/64)	(4)-ø5.5 ((4)-7/32ø)





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## ONE-YEAR EQUIPMENT WARRANTY

SPANCO offers this Equipment Warranty (the "Warranty") on the Beam Boss Beam Tractor Drive (the "Equipment"). SPANCO warrants the Equipment, to be free from defects in material and workmanship for a period of one (1) year, commencing on the date of shipment to the first retail purchaser ("Purchaser"). This Warranty does not extend to Equipment which has been subject to misuse, use in excess of rated capacity, negligent operation, use beyond SPANCO's published service factors, improper installation or maintenance, and does not apply to any Equipment which has been repaired or altered without SPANCO's written authorization. Written notice of any claimed defect must be given to SPANCO within thirty (30) days after such defect is discovered. SPANCO's obligation, and Purchaser's sole remedy under this Warranty is limited to, at SPANCO's discretion, the replacement or repair of the Equipment at SPANCO's factory or at a location approved by SPANCO. Purchaser is responsible for all freight and transportation costs relating to the repair or replacement of the Equipment. **THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER WHETHER EXPRESS, IMPLIED, OR STATUTORY. SELLER MAKES NO WARRANTY AS TO THE MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE EQUIPMENT AND MAKES NO OTHER WARRANTY, EITHER EXPRESS OR IMPLIED.** SPANCO shall not be liable, under any circumstances, for any indirect, special or consequential damages including, but not limited to, lost profits, increased operating costs or loss of production. This Warranty shall not extend to any components or accessories not manufactured by SPANCO, and Purchaser's remedy for such components and accessories shall be determined by the terms and conditions of any warranty provided by the manufacturer of such components and accessories.

## SERVICE POLICY

1. Obtain as much information as possible concerning the problem through personal observation by yourself or other authorized personnel familiar with the job and equipment: include model, serial and/or part numbers, voltages, speeds and any other special identifying features. Be prepared to discuss the situation in detail.
2. All authorized labor charges will be based on straight time. Hourly rates, estimated man hours, and not to exceed total dollar amount required for corrections are to be agreed upon before authorization is given. There will be no allowances for overtime except in dire emergencies and then only with prior approval.
3. A verbal agreement may be reached immediately on both the method of correction and the approximate cost. A warranty authorization number will be assigned for the specific incident. A confirming written authorization will be forwarded to the distributor.
4. The distributor must send an itemized invoice, showing our release number or invoice number and warranty authorization number after authorized corrections have been made. A credit memo will be issued by accounting after the invoice has been received and approved. Warranty charges ARE NOT to be deducted from outstanding open account invoices under any circumstances.
5. Any field corrections made prior to an authorization by SPANCO will not be accepted as a warranty charge or the responsibility of SPANCO. Any modification to the equipment made without the prior approval of the seller will void all warranties. A verbal authorization for modification may be obtained, in which event a warranty authorization number will be assigned for the specific modification. A confirming written authorization will be forwarded to the distributor.

This warranty and service policy will be incorporated as a permanent section of the current price book as issued by SPANCO.