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MAINTENANCE SCHEDULE

Metal Valve Assembly

Every 120 hours or weekly.

- Remove the valve assembly from the die and check for vacuum tightness with the vacuum leakdown tool. A leakdown test greater than 1" Hg/second will require lapping of the valve in the valve seat, or replacement of the valve and seat, plus final lapping.
- Check the free play of the valve stem in the valve guide. A light slip fit is desirable. Replace the valve guide if there is too much freeplay. Remove the debris and burrs if the fit is too tight.
- Check the integrity of the valve guide seal. If it is worn or cracked, replace it.
- For reassembly, use a thin film of oil resistant sealant between the valve block halves to provide the final seal in the block.

Actuator

Every 120 hours or weekly.

- Remove the actuator assembly from the die and tighten the cap screws, clean the unit and check the adjustments (.005-.010 inches at rest; .002 inches max when bottomed out). Alter as needed and re-tighten the jam-nuts.
- Check the dampers for wear and replace as needed.
- Check the electrical connections for wear and tightness. Repair or replace as needed.

Metal Valve Filter

Every 24 hours or daily.

- Remove the bottom from the filter canister and clean the aluminum deposits and other debris from the screen and inside the container. The clogged screens must be replaced.
- Check the gasket on the lid. Cracked or worn gaskets must be replaced. Reassemble the canister with care to ensure a good seal.
- If the canister fills up with excessive spray it should be emptied more frequently. Die spray can wash debris into the vacuum control solenoids. Spray heads or hand spray methods should be redirected or altered to reduce the buildup of die spray in the canister.

Pump Filter

Every 120 hours or weekly.

- Remove the bottom from the filter canister, clean the debris from inside the container and filter element. Clogged filters must be replaced.
- Check the gasket on the lid. Cracked or worn gaskets must be replaced.
- Reassembly the canister with care to ensure a good seal.

Vacuum Pump and Motor

Pump service information is included in the Component Information section of the users binder.

**Refer to Squire-Cogswell or
Thomas Industries
Operation & Maintenance
Manual**

Control Cabinets

**Every 1,000 hours or
six months.**

- Check the control relays for tightness.
- Check that the doors are tightly sealed.

TROUBLESHOOTING SECTION

Problem	Solution
Vacuum runner is stuck on valve head	1. Remove the runner with a brass chisel. 2. Check the head of the poppet valve to verify that it has a five degree chamfer around the head. A. If there is no chamfer, withdraw the valve body from the die and remove the poppet valve. Turn the poppet valve with the correct chamfer. Reassemble the valve body and replace it in the die. B. If the valve is OK, go to No. 3. 3. Check for metal around the valve seat. If the valve seat is clogged withdraw the valve body from the die, dismantle and clean. Remove and clean the metal from the filter canister. Clean and replace the process piping as needed. With the system on JOG, test for vacuum using the test tool provided. Check for the origin of the failure. See section on Valve Clogging.
No purge at cycle start OR the metal valve doesn't open or will not stay open	1. Start the die casting machine cycle to run another purge cycle and observe the valve opening. If it does not open, or opens briefly, press the manual purge button and check for an output on the Triac output card. If there is an output at the controller, go to A. If not, refer to electrical drawings. When the purge signal is activated, check that there is power to the solenoids. Press the manual purge button and check for 108 volts DC between the solenoid output terminals. If there is power, check the large solenoid coil for continuity. If an open circuit is found remove the actuator assembly from the die and replace the faulty solenoid. If there is no power to the terminals check for a faulty rectifier circuit. If all checks out OK, go to No. 2. A. Remove the actuator from the die and check the spacing between the large solenoid core-rod and the small solenoid core. This spacing should be .005 inches. Correct the spacing and retest. NOTE: When the large solenoid is energized the small solenoid core must be bottomed out. This clearance is .002-.003 inches. 2. Remove the valve body from the die. Disassembly and check for free movement of the valve. If the movement is restricted remove the debris from the valve stem or guide and replace. Check the valve seat and re-lap or replace as needed. Reassembly the valve. Testing it with the leak test tool. Replace and restart the die casting machine to run another blow off cycle. See that the valve opens and closes during the purge cycle.
No vacuum at metal valve at cycle start	1. Check for vacuum at the receiver and valve manifold. Switch the system into JOG and manually pump down the system. Check the vacuum level on the gauge at the filter canister. If OK, then check for the pressure sensor connections and an input signal at the controller. If not, go to No. 2.

OMC VDC TEST TOOL

The test tool included with the OMC Vacuum Die Casting System can be used to help diagnose problems when the system indicates fault at purge but the valve is operating normally. This situation could indicate a clogged or leaking line or filter and could even be caused by a partial failure of the vacuum pump (i.e. belt slippage, stuck or broken vanes). To use:

1. Remove tank truck hose from filter canister and attach test tool.
2. Switch unit into JOG mode and start the test mode.
3. Watch vacuum gauge on test tool. Normal levels will indicate 22 to 26 "Hg.
4. If leak is detected, check at other locations moving down the line towards the pump. This action will isolate the failure.

OMC VDC VACUUM VALVE TEST TOOL

The vacuum valve test tool should be used to help diagnose leakage problems in the vacuum valve assembly. The following steps should be used after each valve rebuild or if the VDC system senses insufficient vacuum levels.

1. Remove valve assembly from die, if attached, and remove nipple and filter canister.
2. Insert Parker fitting into valve body and hand tighten.
3. Run surgical tubing between hand pump and the Parker fitting.
4. Use the hand pump to obtain between 15 to 20 "Hg in the valve. If the valve spring is not yet in place, apply light pressure to the face of the poppet valve to simulate spring force while using the hand pump to create a vacuum in the valve body.
5. Watch the vacuum gauge on the hand pump, if the leakdown rate is 1 "Hg per second or less the seal is sufficient to achieve proper vacuum.

VACUUM SYSTEM OPERATING PROCEDURE

We advise warming up the die with the vacuum system in manual mode.

When the die reaches proper operating temperature or after 2-3 shots (vacuum cycle and purge in MANUAL mode) switch the vacuum system to automatic. The vacuum pump will evacuate the reservoir to a predetermined level. If the fault light comes on the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the die casting machine cycle is initiated the vacuum system will be purged, then evacuated and tested for pressure rise. This process may be observed on the gauge on the valve body or on the DTAM panel. If the purge is NOT successful the fault light will come on. REFER to the Troubleshooting section to determine the fault.

During the spray cycle the vacuum system will be evacuated and tested for pressure decay in preparation for the next shot. If this test fails a fault light will come on and the cycle will be aborted. REFER to the Troubleshooting section to determine the fault.

When the pour hole is sealed off with the plunger head the vacuum valve will open to evacuate the shot sleeve and die cavity. This process may be observed on the vacuum gauge on the valve body or on the DTAM panel screen.

During the shot cycle:

There is a test for die vacuum just before the vacuum valve closes. If the vacuum does not reach the preset level, the cycle may be aborted and the fault light will come on. REFER to the Troubleshooting section to determine the fault.

NOTE: Failure of vacuum to drop during shot cycle indicates a plugged line.

The valve will close at the position set in the DTAM. Initially the closing position should be one inch before shot sleeve full or start of fast shot. Use whichever number is smaller.

Proceed with the die casting cycle.

VACUUM CONTROLLER SET-UP THROUGH DTAM PLUS OPERATOR INTERFACE

MAIN MENU...Enter one of the numbers below to access this information

1. Current Vacuum Levels
2. Control Status
3. Set Points
4. Process Monitor

SUB MENUS

1. Pressure Levels, PSIA (bar graph)
next Vacuum During Last Shot, PSIA
2. Valve Status:
next Receiver Valve ON/OFF, Line Valve ON/OFF, Vacuum Valve ON/OFF
next Plunger Position, IN.
- *3. Restricted access: enter code

Valve Open Position (Position at which the vacuum valve will open should be set to coincide with the position the pour hole is covered by the plunger tip.).

Vacuum Test mode

(continued on following page).....

* NOTE: To change Position Set Points, the jog push button and the run push button must be pressed in succession.

VACUUM CONTROLLER SET-UP THROUGH DTAM PLUS OPERATOR INTERFACE

(continued)

next Valve Closed Position (position at which the vacuum valve will close). Set initially at sleeve full or one inch before fast shot (whichever number is smaller). *Vacuum close - inch*

next Leakdown Test Setpoint (amount vacuum valve is allowed to leak down in three second period) to be set based on capability of valve to hold vacuum.

next Purge Pressure (pressure setting for fault during the purge to ensure the valve is functioning properly - set PSIA 7.00 - 5.00).

next Minimum vacuum for fast shot (vacuum level required for fast shot to occur without setting fault alarm). *1.4 3.0 in*

4. Process Monitor:

next Purge

next Die opened
Die closed

next Leakdown

next Shot completed (momentarily)

VACUUM SYSTEM CYCLE SEQUENCE OF EVENTS

1. Ejector Pins Forward or Automatic Extractor Signal

Purge vacuum valve
Test for successful purge
If OK, go to No. 2
If NG, fault light activated and fault signal set to die cast machine

2. Lubricate Die

Evacuate system
Test for vacuum decay
If OK, go to No. 3
If NG, fault light activated and fault signal set to die cast machine

3. Return Ejector Pins -- Close Moveable Cores (if applicable)

4. Close Die -- Die Lock Up

Evacuate system up to vacuum valve body and hold for next shot

5. Pour Metal -- Creep Plunger Forward Past Pour or Fill Hole

Energize the actuator solenoid to open valve
Evacuate shot sleeve and cavity

6. Start Intermediate Speed or Continue Slow Shot

Test vacuum level continuously
If OK, continue
If NG, fault light activated and fault signal sent to die cast machine
At predetermined point, de-energize solenoid to close valve

7. Start Fast Shot -- Fill Die Cavity -- Dwell Time -- Open Die -- Pull Moveable Cores (if equipped)

8. Eject Casting

Return to Step 1

DIE CASTING MACHINE SET-UP RECOMMENDATIONS

Shot pressure and intensification pressures should be set so that the pressure within the die cavity is between 6,000 and 10,000 psi.

Move the plunger at 3 - 4 in/sec to cover the pour hole, then go into intermediate shot velocity and fast shot.

The gate velocities should be kept at the low end of the North American Die Casting Association guidelines, if possible. These velocities are between 900 and 1,200 in/sec.

While observing the gate velocity limits, the cavity fill time should be as fast as possible.

OPERATION GUIDELINES FOR - OMC VACUUM DIE CASTING SYSTEM

1. Start-Up of Vacuum System

- A. Power up vacuum unit, pull start switch, push jog mode, vac test and purge test valve.
- B. Make first few castings with die cast machine and discard.
- C. Check set-points through DTAM interface.
- D. Push run mode, machine will be on auto cycle from die cast machine signal.
- E. Castings will now be made with OMC vacuum cycle.
- F. Monitor mechanical gauges and interface for proper operation of system.
- G. Provide routine system maintenance, as needed.

2. Set-points

- A. Follow item 3, DTAM main menu, enter access code.
 - 1. Adjust purge and vac test die close, set points to minimum safe operating range limits, as recommended.
 - 2. Adjust valve open and close set points to settings determined by calculations and measurement of die casting process.
 - a. Valve open: Set the valve to open one inch after the pour hole is closed.
 - b. Valve close: Close valve either one inch before sleeve full or one inch before start of fast shot, whichever is first.
 - 3. Adjust plunger stroke reset-point to stroke of plunger in shot sleeve without follow through.
- B. Run unit in autcycle, if valve fails and fault light does not light or fault light comes on during purge, re-adjust max purge pressure test. Retest by autcycle.
- C. If fault light comes on and die will not close, re-adjust vac test set-point.

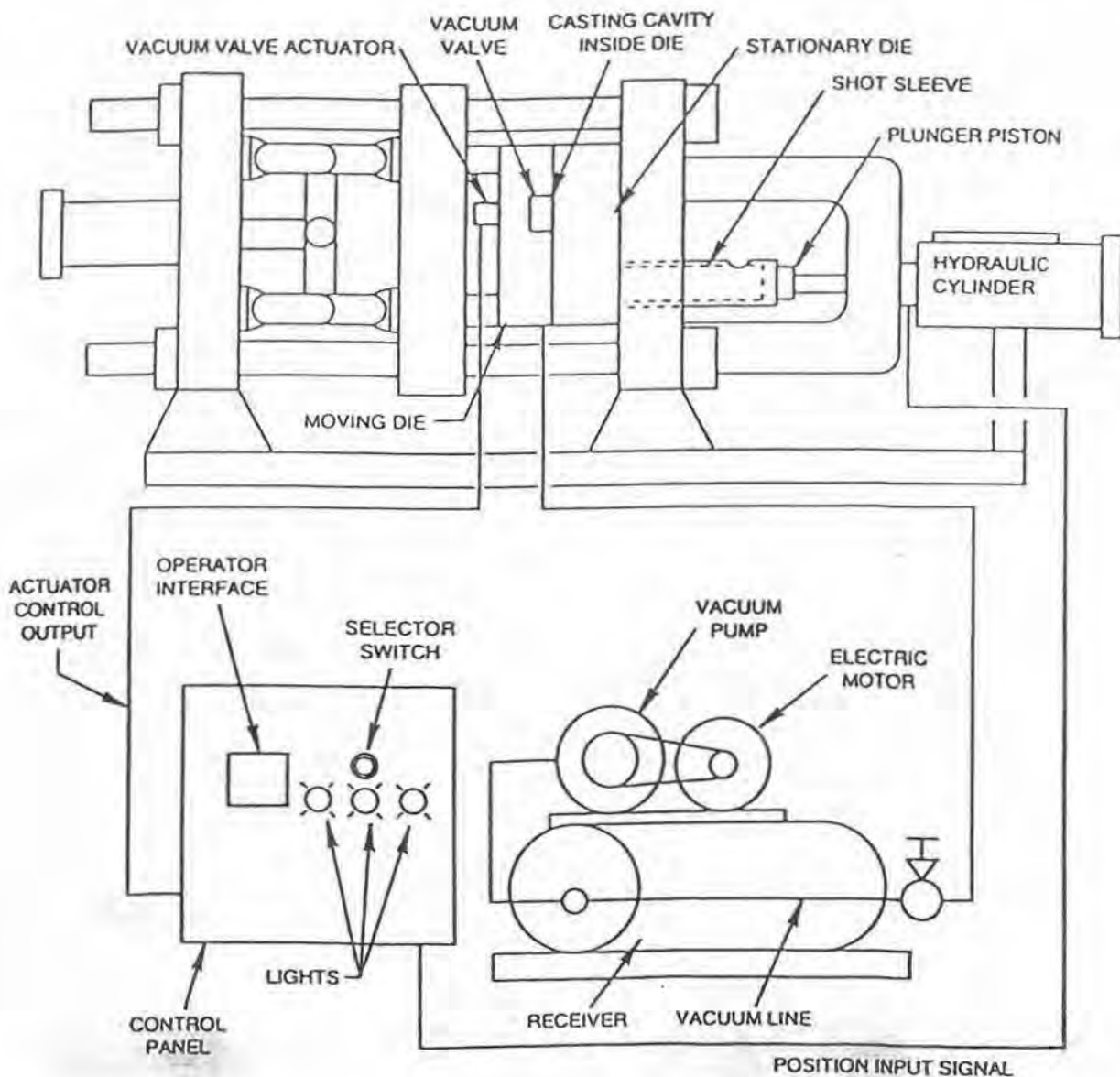
3. Maintenance

- A. Provide pump maintenance as described in pump operating and service instructions.
- B. Provide vacuum system components with maintenance as described in vacuum system operating instructions.
- C. Keep spare parts including valves and seats on hand.

INTRODUCTION

The Outboard Marine Corporation Vacuum Die Casting System is an automated system for evacuating air from a die casting cavity and shot sleeve prior to metal injection. This system may be used on cold or hot chamber machines without any alterations to the metal injection system or shot end.

A digital plunger position is required to the Allen Bradley programmable controller. The valve opening height and vacuum runner system are sized according to the amount of external parting line using a patented relationship. The pump and system process piping are sized with respect to the die cavity, shot sleeve and production rate.





Replacement Coils for Use with Class 8910 Type DPA Contactors
Bobinas de repuesto para uso con contactores clase 8910 tipo DPA
Bobines de remplacement à utiliser avec des contacteurs
de classe 8910, type DPA

Class Clase Classe	Type Tipo Type
9998	DA1V*, DA2V*

* = 2 digit voltage code
código de tensión de 2 dígitos code de
tension à 2 chiffres

! DANGER / PELIGRO / DANGER

HAZARDOUS VOLTAGE

Disconnect all voltage supplies before installing or removing the device.

Failure to follow this instruction will result in death or serious injury.

TENSION PELIGROSA

Desconecte todas las fuentes de tensión antes de instalar o retirar este dispositivo.

El incumplimiento de esta precaución, podrá causar la muerte o lesiones serias.

TENSION DANGEREUSE

Coupez l'alimentation avant d'installer ou d'enlever le dispositif.

Si cette précaution n'est pas respectée, cela entraînera la mort ou des blessures graves.

INSTALLATION

Coil replacement instructions: (see illustration)

1. Push the magnet clip (A) tabs in and slide the clip out.
2. Remove the magnet (B) and the coil (C).
3. Place the new coil in the device with coil terminal through the single wide slot.
4. Replace the magnet with the shading coil on the same side as the coil terminals. (The shading coil on the armature, not shown, and magnet shading coil should not be aligned.)
5. Snap the magnet clip firmly in place.
6. If the contactor buzzes or chatters when energized after reassembly, check for proper orientation of the magnet (B).

INSTALACION

Instrucciones para el reemplazo de la bobina: (vea la ilustración)

1. Presione hacia adentro las lengüetas del clip del imán (A) y deslice el clip hacia afuera.
2. Retire el imán (B) y la bobina (C).
3. Coloque la nueva bobina en el dispositivo de tal manera que sus terminales pasen a través de la ranura amplia.
4. Reemplace el imán con la bobina de sombra en el mismo lado que las terminales de la bobina. (La bobina de sombra en la armadura, no se muestra, y la bobina de sombra del imán no deben estar alineadas.)
5. Encaje el clip del imán firmemente en su lugar.
6. Si el contactor zumba o vibra al ser energizado después del montaje, asegúrese de que el imán (B) esté orientado correctamente.

INSTALLATION

Directives de remplacement de la bobine : (voir l'illustration)

1. Pousser les languettes de l'attache (A) de l'aimant vers l'intérieur et l'enlever en la faisant glisser.
2. Enlever l'aimant (B) et la bobine (C).
3. Placer la nouvelle bobine dans le dispositif avec la borne de la bobine passant par la fente large.
4. Replacer l'aimant avec la bobine de déphasage du même côté que les bornes de la bobine. (La bobine de déphasage sur l'armature, non montrée, et la bobine de déphasage de l'aimant ne doivent pas être alignées.)
5. Enclencher l'attache de l'aimant fermement en place.
6. Si le contacteur bourdonne ou vibre lorsqu'il est mis sous tension, vérifier si l'aimant (B) est orienté correctement.



TROUBLESHOOTING SECTION

No vacuum at metal valve at cycle start (continued)

2. Visually check for flash at the valve seat.
 - A. If there is flash, rerun purge cycle
 - B. If the system still leaks, go to No. 3.
3. Check for valve leakage using the valve leakdown test tool provided.
 - A. If the valve leaks, withdraw the valve from the die, rebuild, retest and replace in die.
 - B. If the valve is OK, go to No. 4.
4. Check the lines and the pump-connections for leakage using the vacuum system test tool provided.
 - A. Install the test tool on a line where the metal valve would be attached. Switch the unit into JOG mode and start the test mode.
 - B. If a leak is detected, go through the lines starting from the metal valve and move toward the pump. This is done to isolate the source.
 - C. Correct the leak or repair the pump.
 - D. If there is no leak detected, go to No. 5.
5. Check that the vacuum control solenoid valves are opening.
 - A. Check that the vacuum control solenoids (both line and receiver) are energized by checking for voltage output at the control panel terminals. If no output check the related fuses and connections. If electrically OK, go to B.
 - B. Check the mechanical operation of the solenoids.

No die vacuum before the fast shot

1. Remove all flash from the face of both the die halves and recheck for die vacuum. If die face is OK, go to No. 2.
2. Check for the specified valve opening stroke per specifications.

Valve is clogging

1. Check the set-point for valve closure and compare it to the position for runner full. Adjust the position if the valve is closing beyond the runner full position. If OK, go to No. 2.
 2. Check the biscuit size. It should be within 10% of the size it was for the initial calculations of sleeve and runner full.
 - A. Adjust ladle.
 - B. Adjust the valve closing position.
-

TROUBLESHOOTING SECTION

Problem	Solution
Vacuum runner is stuck on valve head	1. Remove the runner with a brass chisel. 2. Check the head of the poppet valve to verify that it has a five degree chamfer around the head. A. If there is no chamfer, withdraw the valve body from the die and remove the poppet valve. Turn the poppet valve with the correct chamfer. Reassemble the valve body and replace it in the die. B. If the valve is OK, go to No. 3. 3. Check for metal around the valve seat. If the valve seat is clogged withdraw the valve body from the die, dismantle and clean. Remove and clean the metal from the filter canister. Clean and replace the process piping as needed. With the system on JOG, test for vacuum using the test tool provided. Check for the origin of the failure. See section on Valve Clogging.
No purge at cycle start OR the metal valve doesn't open or will not stay open	1. Start the die casting machine cycle to run another purge cycle and observe the valve opening. If it does not open, or opens briefly, press the manual purge button and check for an output on the Triac output card. If there is an output at the controller, go to A. If not, refer to electrical drawings. When the purge signal is activated, check that there is power to the solenoids. Press the manual purge button and check for 108 volts DC between the solenoid output terminals. If there is power, check the large solenoid coil for continuity. If an open circuit is found remove the actuator assembly from the die and replace the faulty solenoid. If there is no power to the terminals check for a faulty rectifier circuit. If all checks out OK, go to No. 2. A. Remove the actuator from the die and check the spacing between the large solenoid core-rod and the small solenoid core. This spacing should be .005 inches. Correct the spacing and retest. NOTE: When the large solenoid is energized the small solenoid core must be bottomed out. This clearance is .002-.003 inches. 2. Remove the valve body from the die. Disassembly and check for free movement of the valve. If the movement is restricted remove the debris from the valve stem or guide and replace. Check the valve seat and re-lap or replace as needed. Reassembly the valve. Testing it with the leak test tool. Replace and restart the die casting machine to run another blow off cycle. See that the valve opens and closes during the purge cycle.
No vacuum at metal valve at cycle start	1. Check for vacuum at the receiver and valve manifold. Switch the system into JOG and manually pump down the system. Check the vacuum level on the gauge at the filter canister. If OK, then check for the pressure sensor connections and an input signal at the controller. If not, go to No. 2.

TROUBLESHOOTING SECTION

No vacuum at
metal valve at
cycle start
(continued)

2. Visually check for flash at the valve seat.
 - A. If there is flash, rerun purge cycle
 - B. If the system still leaks, go to No. 3.
3. Check for valve leakage using the valve leakdown test tool provided.
 - A. If the valve leaks, withdraw the valve from the die, rebuild, retest and replace in die.
 - B. If the valve is OK, go to No. 4.
4. Check the lines and the pump-connections for leakage using the vacuum system test tool provided.
 - A. Install the test tool on a line where the metal valve would be attached. Switch the unit into JOG mode and start the test mode.
 - B. If a leak is detected, go through the lines starting from the metal valve and move toward the pump. This is done to isolate the source.
 - C. Correct the leak or repair the pump.
 - D. If there is no leak detected, go to No. 5.
5. Check that the vacuum control solenoid valves are opening.
 - A. Check that the vacuum control solenoids (both line and receiver) are energized by checking for voltage output at the control panel terminals. If no output check the related fuses and connections. If electrically OK, go to B.
 - B. Check the mechanical operation of the solenoids.

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before the fast
shot

1. Remove all flash from the face of both the die halves and recheck for die vacuum. If die face is OK, go to No. 2.
2. Check for the specified valve opening stroke per specifications.

Valve is clogging

1. Check the set-point for valve closure and compare it to the position for runner full. Adjust the position if the valve is closing beyond the runner full position. If OK, go to No. 2.
2. Check the biscuit size. It should be within 10% of the size it was for the initial calculations of sleeve and runner full.
 - A. Adjust ladle.
 - B. Adjust the valve closing position. (inch close data)

"NOTICE"
It is mounted on the small old vacuum.

Instruction
Bulletin

Boletín de
instrucciones

Directives
d'utilisation



Ref. / réf. 312AS
30072-013-19B
Raleigh, NC, USA 5/98

Replaces / Reemplaza / Remplace 30072-013-19A (9/95)

Manual Starters Arrancadores manuales Démarreurs manuels

**MOTOR Starter
Overload
Protection
unit.**

Class Clase Classe	Type Tipo Type	Series Serie Série	Size Tamaño Taille
2510	M & T	A	M-0, M-1 & M-1P

INTRODUCTION

This bulletin provides assembly, modification, and parts ordering instructions.

INTRODUCCION

Este boletín incluye instrucciones de montaje y modificación del arrancador y de solicitud de piezas de repuesto.

INTRODUCTION

Ce bulletin contient des directives pour assembler et modifier le démarreur et pour commander des pièces de rechange.

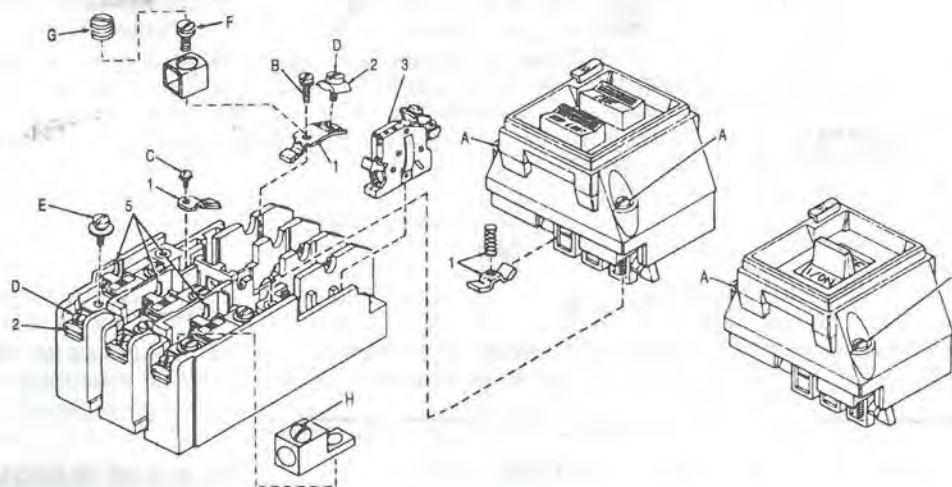


Figure / Figura / Figure 1 : Manual Starter Assembly / Montaje del arrancador manual / Assemblage du démarreur manuel

⚠ DANGER / PELIGRO / DANGER

HAZARDOUS VOLTAGE

Disconnect all power before working on equipment.

Failure to follow this instruction will result in death or serious injury.

TENSION PELIGROSA

Desconecte toda la alimentación antes de efectuar cualquier trabajo en el equipo.

El incumplimiento de esta precaución podrá causar la muerte o lesiones serias.

TENSION DANGEREUSE

Coupez l'alimentation avant de travailler sur cet appareil.

Si cette précaution n'est pas respectée, cela entraînera la mort ou des blessures graves.

CONTACT ACTUATOR

Movable contacts are operated by a push button or toggle operator.

ACTUADOR DE CONTACTOS

Los contactos móviles son activados por un operador, tipo botón pulsador o articulado.

ACTIONNEUR DE CONTACTS

Les contacts mobiles sont activés par un opérateur de type bouton-poussoir ou à bascule.

CONTACT INSPECTION

Loosen the two captive screws (A) holding the contact actuator mechanism to the contact block. Lift the contact actuator to expose the contacts.

INSPECCION DE CONTACTOS

Aloje los dos tornillos cautivos (A) sujetando el mecanismo del actuador de contactos contra el bloque de contactos. Levante el actuador de contactos para mostrar los contactos.

INSPECTION DES CONTACTS

Desserrer les deux vis imperdables (A) retenant le mécanisme de l'actionneur de contacts contre le bloc de contacts. Soulever l'actionneur pour exposer les contacts.



Discoloration and slight pitting do not harm silver alloy contacts. **Do not file contacts;** this wastes contact material. Replace contacts only when worn thin. Table 5 lists replacement parts.

CONTACT REPLACEMENTS

See Figure 1. To replace the contacts, loosen the two captive screws (A) and remove the contact actuator. Remove the movable contacts (1) from the yoke bar by compressing the contact spring and sliding the contact sideways. Change the contact springs before inserting new movable contacts. Remove the stationary contacts by loosening the contact mounting screws (B and C). Reassemble in reverse order.

WIRING

Use only copper wire on device power and control terminals

OVERLOAD RELAYS

Standard: Melting alloy thermal overload relays: incorporate one or three thermal units. (Three-phase manual starters manufactured before mid-1972 had a shorting strap installed in the center leg of the overload relay. To convert these devices from two to three thermal units, remove the shorting strap and install a third thermal unit.)

NOTE: Thermal units must be installed and the device reset before starter contacts will operate. Install thermal units so the type designation can be read and with the pawl (item 5) above the ratchet wheel as shown in Figure 1.

Continued overcurrent through the thermal unit raises its temperature,

La decoloración y picaduras moderadas no dañan los contactos de aleación de plata. **No lime los contactos;** esto desgasta el material del contacto. Reemplace los contactos sólo una vez que estén desgastados. La tabla 5 lista las piezas de repuesto.

REEMPLAZO DE CONTACTOS

Vea la figura 1. Para reemplazar los contactos, afloje los dos tornillos cautivos (A) y retire el actuador de contactos. Para retirar los contactos móviles (1) del yugo, comprima el resorte del contacto y deslice el contacto lateralmente. Cambie los resortes de los contactos antes de insertar los nuevos contactos móviles. Para retirar los contactos fijos, afloje los tornillos de montaje (B y C) de los contactos. Vuelva a montarlos en el orden inverso al de su instalación.

CABLEADO

Utilice conductores de cobre solamente en las terminales de alimentación y control del dispositivo.

RELEVADORES DE SOBRECARGA

Estándar: Relevadores de sobrecarga térmica de aleación fusible: incorporan uno ó tres elementos térmicos. (Los arrancadores manuales de tres fases fabricados en la primera mitad de 1972 tenían una cinta cortocircuitadora instalada en la parte central del revelador de sobrecarga. Para convertir estos dispositivos de dos a tres elementos térmicos, retire la cinta cortocircuitadora e instale un tercer elemento térmico.)

NOTA: Es necesario instalar los elementos térmicos y restablecer el dispositivo antes de que los contactos del arrancador funcionen. Instale los elementos térmicos para que se pueda leer la designación de tipo y para que el trinquete (artículo 5) quede sobre la rueda dentada como se muestra en la figura 1.

La presencia de sobrecorriente continua en los elementos térmicos

La décoloration ou les légères piqures de surface n'altèrent en rien les contacts à alliage d'argent. **Ne pas limer les contacts;** cela abîme le matériau des contacts. Remplacer les contacts seulement lorsqu'ils sont usés. Le tableau 5 donne la liste des pièces de rechange.

REPLACEMENT DES CONTACTS

Voir la figure 1. Pour remplacer les contacts, desserrer les deux vis imperdables (A) et enlever l'actionneur de contacts. Retirer les contacts mobiles (1) de la barre de l'étrier en serrant le ressort du contact et en faisant glisser ce dernier latéralement. Remplacer les ressorts des contacts avant d'insérer les contacts mobiles neufs. Retirer les contacts fixes en desserrant les vis de montage (B et C). Les remonter dans l'ordre inverse.

CÂBLAGE

Utiliser seulement des fils en cuivre avec les bornes d'alimentation et de commande du dispositif.

RELAIS DE SURCHARGE

Standard: Relais de surcharge thermique à fusion d'alliage: comprennent de une ou trois unités thermiques. (Les démarreurs manuels triphasés fabriqués avant la mi-1972 avaient une bande de court-circuit installée dans la branche centrale du relais de surcharge. Pour convertir les dispositifs à deux unités thermiques en dispositifs à trois unités, retirer la bande de court-circuit et installer une troisième unité thermique.)

REMARQUE: Pour que les contacts du démarreur soient fonctionnels les unités thermiques doivent être installées et le dispositif doit être réinitialisé. Installer les unités thermiques en s'assurant que l'indication du type est lisible et que le crochet (article 5) reste sur la roue à rochet conformément à la figure 1.

Une surintensité continue dans l'unité thermique élève la température et

melting the alloy in its solder pot, allowing the ratchet wheel to rotate. This releases the overload relay pawl assembly, allowing the toggle spring to retract the contacts. This action also centers the push button or toggle operator, indicating the starter is tripped.

NOTE: Before resetting the relay, allow one to two minutes for the alloy to solidify. **Do not** disassemble the overload relay block because motor protection could be disabled, possibly damaging equipment.

ELECTRICAL INTERLOCKS (FORM X)

One internal interlock (item 3), either normally open (N.O.) or normally closed (N.C.), can be added to all manual starters. It occupies either the upper right-hand or left-hand corner of the device, and is field installable. Table 1 lists location and replacement part numbers for Class 2510 starter interlocks. Table 5 lists replacement parts.

eleva su temperatura lo cual funde la aleación en su depósito para soldadura y permite la rotación de la rueda dentada. Esto libera el ensamble del trinquete del relevador de sobrecarga y permite que el resorte articulado retire los contactos. Esta acción también centra el botón pulsador u operador articulado, lo cual indica que se ha disparado el arrancador.

NOTA: Antes de restablecer el relevador, deje pasar de uno a dos minutos para que se solidifique la aleación. **No** desmonte el bloque del relevador de sobrecarga ya que puede inhabilitar la protección del motor y posiblemente dañar el equipo.

ENTRELACES ELECTRICOS (FORMA X)

Es posible agregar un entrelace interno (artículo 3), o normalmente abierto (N.A.) o normalmente cerrado (N.C.) a todos los arrancadores manuales. Este se coloca en la esquina superior derecha o izquierda del dispositivo y puede ser instalado en campo. La tabla 1 lista la ubicación y los números de las piezas de repuesto de los entrelaces de los arrancadores clase 2510. La tabla 5 lista las piezas de repuesto.

provoque la fusión de l'alliage dans le pot à souder, entraînant la rotation de la roue à rochet. Ceci libère l'assemblage du crochet du relais de surcharge, permettant au ressort de la bascule de retirer les contacts. Cette action centre également le bouton-poussoir ou l'opérateur à bascule, indiquant que le démarreur est déclenché.

REMARQUE: Avant de réarmer le relais, attendre une ou deux minutes que l'alliage se solidifie. **Ne pas** démonter le bloc de relais de surcharge car la protection du moteur serait désactivée et l'appareil pourrait être endommagé.

INTERVERROUILLAGES ÉLECTRIQUES (FORME X)

Un interverrouillage interne (article 3), soit normalement ouvert (N.O.) ou normalement fermé (N.F.) peut être ajouté à tous les démarreurs manuels. Il est situé sur le coin supérieur droit ou gauche du dispositif et s'installe sur place. Le tableau 1 donne la liste des emplacements et des numéros des pièces de rechange des interverrouillages pour démarreurs de classe 2510. Le tableau 5 contient les pièces de rechange.

Table / Tableau / Tabla1 Electrical Interlocks for Class 2510 Starters / Entrelaces eléctricos para arrancadores clase 2510
Interverrouillages électriques pour démarreurs classe 2510

Form Forma Forme [1]	Interlock Location / Ubicación del entrelace Emplacement de l'interverrouillage		Class 9999 Replacement Interlocks / Entrelaces de repuesto clase 9999 / Interverrouillages de rechange classe 9999	
	Left-hand / Izquierdo / Gauche	Right-hand / Derecho / Droite	Type / Tipo / Type SX11	Type / Tipo / Type SX12
X1	N.O. / N.A.	—	1	—
X2	—	N.C. / N.F.	—	1

[1] Consult sales office for form designations for Class 2511 reversing and 2512 two-speed starters.

Comuníquese con la oficina de ventas para obtener las designaciones de forma para los arrancadores reversibles clase 2511 y de dos velocidades clase 2512.
Consulter le centre de ventes pour les désignations des formes des démarreurs inversibles classe 2511 et à deux vitesses classe 2512.

LOCK OFF MECHANISM

The starter can be locked only in the OFF position, by lifting the metal tab with the lock symbol on the contact actuator and placing a padlock through the hole in this tab. In the ON position, withdrawing the lock tab opens the contacts of the device.

MECANISMO DE BLOQUEO

El arrancador puede ser bloqueado solamente en la posición de desconectado (O), levantando la lengüeta de metal con el símbolo de candado en el actuador de contactos y colocando un candado a través del agujero en esta lengüeta. En la posición de conectado (I), se abren los contactos del dispositivo al retirar la lengüeta de bloqueo.

MÉCANISME DE VERROUILLAGE

Le démarreur ne peut être verrouillé que dans la position d'arrêt (O), en soulevant la languette métallique avec le symbole de cadenas sur l'actionneur de contacts et en faisant passer un cadenas par le trou de cette languette. Dans la position de marche (I), le retrait de la languette de blocage ouvre les contacts du dispositif.

PILOT LIGHT KIT (FORM P11)

A red pilot light usable on any voltage (110-600 V) may be factory installed. Kits may be field installed in the cover of Type 1 surface- and flush-mounting enclosures. Table 2 lists kits for field modification.

ACCESORIO DE LAMPARA PILOTO (FORMA P11)

Una lámpara piloto roja utilizable bajo cualquier tensión (110-600 V ~) puede haber sido instalada en la fábrica. Los accesorios pueden ser instalados en campo en la cubierta de los gabinetes de montaje para sobreponer o empotrar tipo 1. La tabla 2 lista los accesorios para la modificación en campo.

KIT DE LAMPE TÉMOIN (FORME P11)

Une lampe témoin rouge utilisable à toutes les tensions (110 à 600 V) peut avoir été installée en usine. Les kits peuvent être installés sur place dans le couvercle des coffrets type 1 montés en surface ou encastrés. Le tableau 2 contient la liste des kits à installer sur place.

Table / Table / Tableau 2 : Pilot Light Kits / Accesorios de lámpara piloto / Kits de lampe témoin

Class 9999 Kit / Accesorio clase 9999 / Kit de classe 9999		Voltage Range / Gama de tensión / Gamme de tension	
Type	MP1	110 - 120 V	
Tipo	MP2	208 - 240 V	
Type	MP3	440 - 600 V	

REPLACEMENT INTERIORS

Replacement interiors for Class 2510 NEMA 1 surface- and flush-mounted enclosures are available with either push button or toggle operation. Catalog 2510CT9701 and the Square D Digest list open-type replacement starters.

INTERIORES DE REPUESTO

Las interiores de repuesto se encuentran disponibles para gabinetes sobrepuestos y empotrados NEMA tipo 1 clase 2510 con un operador articulado o de botón pulsador. El catálogo 2510CT9701 y el compendio de Square D listan los arrancadores de repuesto de tipo abierto.

INTÉRIEURS DE RECHANGE

Les intérieurs de rechange pour les coffrets NEMA type 1 classe 2510 montés en surface et encastrés sont disponibles avec un opérateur à bouton-poussoir ou à bascule. Le catalogue 2510CT9701 et le Digest Square D contiennent la liste des démarreurs de rechange de type ouvert.

Table / Table / Tableau 3 : Replacement Device Styles / Estilos de dispositivos de repuesto
Styles des dispositifs de rechange

Operator Type Tipo de operador Type d'opérateur			Type 1 Tipo 1 Type 1	Type 4 S. Steel Tipo 4 Acero inox. Type 4 Acier inox.	Type 4X Polyester Tipo 4X Poliéster Type 4X Polyester	Type 7 & 9 Cast Iron Tipo 7 y 9 Hierro Fundido Type 7 et 9 Fonte	Type 4X, 7 & 9 Cast Aluminum Tipo 4X, 7 y 9 Aluminio Fundido Type 4X, 7 et 9 Fonte d'aluminium	Type 12 Tipo 12 Type 12
Push Button	Botón pulsador	Bouton-poussoir	X	X	X	X	—	X
Toggle	Articulado	À bascule	X	—	—	—	X	—

MANUAL STARTERS CLASS 2511/2512

Class 2511 (reversing) and 2512 (two-speed) manual starters are mechanically interlocked through an interference-type mechanism, part number 31085-070-01. It mounts between the starters and engages the movable contact carriers. Since Classes 2511 and 2512 use a special contact actuator, the standard Class 2510 starter cannot be used for replacement. If either unit (right-hand or left-hand) needs replacement, order a complete starter (see Table 4).

ARRANCADORES MANUALES CLASE 2511/2512

Los arrancadores manuales clase 2511 (reversibles) y 2512 (de dos velocidades) están entrelazados mecánicamente a través de un mecanismo de interposición, número de pieza 31085-070-01 que se monta entre los arrancadores y engancha los portacontactos móviles. Puesto que las clases 2511 y 2512 utilizan un actuador especial de contactos, el arrancador clase 2510 no se puede utilizar como repuesto. Si cualquiera de las unidades (derecha o izquierda) tiene que ser reemplazada, solicite un arrancador completo (vea la tabla 4).

DÉMARREURS MANUELS CLASSE 2511/2512

Les démarreurs manuels classe 2511 (inversibles) et ceux de classe 2512 (à deux vitesses) sont mécaniquement interverrouillés par un mécanisme de serrage, n° de pièce 31085-070-01. Il se monte entre les démarreurs et engage les porte-contacts mobiles. Comme les démarreurs classes 2511 et 2512 utilisent un actionneur de contacts spécial, le démarreur classe 2510 ne peut pas être utilisé comme démarreur de rechange. Pour remplacer une unité (de droite ou de gauche), commander un démarreur complet (voir le tableau 4).

Table / Table / Tableau 4 : Complete Right-hand and Left-hand Replacement Starters / Arrancadores de repuesto derechos e izquierdos completos / Démarreurs de rechange de droite et gauche complets

Operator Type Tipo de operador Type d'opérateur			NEMA Size Tamaño Taille	For Reversing Manual Starter Para arrancadores manuales reversibles Pour démarreur manuel inversible Class / clase / classe 2511			For Two-Speed Manual Starter Para arrancadores manuales de dos velocidades Pour démarreur manuel à deux vitesses Class / clase / classe 2512		
				Class / Clase Classe	Type / Tipo Type	Form / Forma Forme	Class / Clase Classe	Type / Tipo Type	Form / Forma Forme
Push Botón Bouton-poussoir			M-0	2510	MBO2	M3	2510	MBO2	M4
			M-1		MCO3			MCO3	
Toggle Articulado À bascule			M-0		TBO2			TBO2	
			M-1		TCO3			TCO3	

SHORT-CIRCUIT PROTECTION

Provide branch-circuit overcurrent protection for each contactor or starter. For contactors, provide branch circuit overcurrent protection in accordance with the National Electrical Code and local electrical codes. For starters, refer to instructions furnished with the thermal unit selection table.

ASSEMBLY

Table 6 and the device instruction sheet provide factory recommended tightening torques for mechanical, electrical and pressure wire connections. Follow these torques to ensure proper functioning of the device. If the contact actuator is removed for contact inspection or replacement, reset the device after reassembly.

PARTS ORDERING

Specify the quantity, part number and description of the part, giving complete nameplate data of the device; e.g., 1 contact kit Class 9998 Type ML2 for Class 2510 Type MCG3, Series A manual starter.

PROTECCION CONTRA CORTOCIRCUITO

Proporciona protección contra sobrecorriente en los circuitos en derivación a cada uno de los contactores o arrancadores. Proporciona la protección contra sobrecorriente en los circuitos en derivación a los contactores de acuerdo con el código nacional eléctrico de EUA (NEA) y/o con los códigos eléctricos locales. Para los arrancadores, consulte las instrucciones provistas con la tabla de selección del elemento térmico.

MONTAJE

La tabla 6 y la hoja de instrucciones del dispositivo proporcionan los pares de apriete recomendados de fábrica para las conexiones mecánicas, eléctricas y del conductor de presión. Utilice estos pares de apriete para asegurar el funcionamiento adecuado del dispositivo. Si se retira el actuador de contactos para realizar una inspección o reemplazo de los contactos, restablezca el dispositivo después de volverlo a montar.

SOLICITUD DE PIEZAS

Especifique la cantidad, número y descripción de la pieza, proporcionando los datos completos de la placa de identificación del dispositivo; por ejemplo, 1 accesorio de contactos clase 9998 tipo ML2 para arrancador manual serie A clase 2510 tipo MCG3.

PROTECTION CONTRE LES COURTS-CIRCUITS

Fournir une protection contre la surintensité des circuits d'artère pour chaque contacteur ou démarreur. Fournir aux contacteurs la protection contre la surintensité des circuits d'artère conformément au Code national de l'électricité (CNÉ) et aux normes locales de l'électricité. Pour les démarreurs, se reporter aux directives fournies avec le tableau de sélection de l'unité thermique.

ASSEMBLAGE

Le tableau 6 et la feuille de directives du dispositif donnent les couples de serrage recommandés pour les raccordements mécaniques, électriques et du fil à pression. Respecter ces couples de serrage pour assurer un fonctionnement correct du dispositif. Si l'actionneur de contacts est enlevé pour l'inspection ou le remplacement des contacts, réarmer le dispositif après le remontage.

COMMANDES DE PIÈCES

Spécifier la quantité, le numéro de pièce et la description de la pièce en donnant toutes les données de la plaque d'identification du dispositif (par ex., 1 kit de contact classe 9998 type ML2 pour démarreur manuel série A, classe 2510 type MCG3).

Table / Table / Tableau 5 : Parst List^[1] / Lista de piezas^[1] / Liste des pièces^[1]

Item Art.	Description / Descripción / Description	Part. No No. de pieza N° de pièce	Quantity / Contenido / Quantité				
			Size / Tamaño / Taille				
			M-0		M-1		M-1P
			2-P	3-P	2-P	3-P	2-P
1	Contact Kit Accesorio de contactos Kit the contacts	Class / Clase / Classe 9998 Type / Tipo / Type ML1 Type / Tipo / Type ML2	1	1	1	1	1
2	Wire clamp screw assy. / Ensamble del tornillo de la pinza del conductor / Assemblage de vis du serre-fils	30018-070-50	4	6	4	6	—
3 [1]	Internal interlock (N.O.) / Entrelace interno (N.A.) Interverrouillage interne (N.O.)	Class / Clase / Classe 9999 Type / Tipo / Type SX11 ^[2]	—	—	—	—	—
	Internal interlock (N.C.) / Entrelace interno (N.C.) Interverrouillage interne (N.F.)	Class / Clase / Classe 9999 Type / Tipo / Type SX12 ^[2]	—	—	—	—	—
E	Overload thermal unit fastening screw / Tornillo de fijación de unidad térmica de sobrecarga / Vis de fixation d'unité thermique de surcharge	21920-16160	4	6	4	6	4

[1] For reversing and two-speed starters, refer to "MANUAL STARTERS CLASS 2511/2512" on page 4.
Para los arrancadores reversibles y de dos velocidades, vea la sección "ARRANCADORES MANUALES CLASE 2511/2512" en la página 4.
Pour démarreurs inversibles et à deux vitesses, se reporter à «DÉMARREURS MANUELS CLASSE 2511/2512» à la page 4.

[2] A maximum of either 1 N.O. or 1 N.C. interlock may be added per starter. / Se puede agregar un máximo de 1 entrelace N.A. o 1 N.C. por arrancador.
Un seul interverrouillage N.O. ou 1 N.F. peut être ajouté par démarreur.

Table / Table / Tableau 6 : Factory Recommended Tightening Torques / Pares de apriete recomendados de fábrica
Couples de serrage recommandés par l'usine

Item Art.	Description / Descripción / Description			Tightening Torque / Par de apriete / Couple de serrage	
				lb-in / po / pulg	N•m
A	Contact actuator mechanism screws (2 per device)	Tornillos del mecanismo del actuador de contactos (2 por equipo)	Vis du mécanisme de l'actionneur de contacts (2 par dispositif)	18-21	2.0-2.4 2.0-2.4
B	Line side stationary contact fasteners (1 per pole)	Sujetadores de contactos fijos del lado de línea (1 por polo)	Attaches de contact fixe côté secteur (1 par pôle)	13-16	1.5-1.8 1.5-1.8
C	Load side stationary contact fasteners (1 per pole)	Sujetadores de contactos fijos de lado de carga (1 por polo)	Attaches de contact fixe côté charge (1 par pôle)	6-9	0.7-1.0 0.7-1.0
D	Pressure wire connector screw (2 per pole)	Tornillo conector del conductor de presión (2 por polo)	Vis connecteur du fil à pression (2 par pôle)	[1]	[1]
E	Overload thermal unit fastening screws (2 per element)	Tornillos sujetadores del elemento térmico de sobrecarga (2 por elemento)	Vis de fixation de l'unité thermique de surcharge (2 par élément)	18-21	2.0-2.4 2.0-2.4
F	Lug fastening screw (1 per pole)	Tornillo de sujeción de la zapata (1 por polo)	Vis de fixation de cosse (1 par pôle)	18-21	2.0-2.4 2.0-2.4
G	Wire pressure screw (1 per pole; line side)	Tornillo de presión del conductor (1 por polo, lado de línea)	Vis de pression de fils (1 par pôle, côté secteur)	[1]	[1]
H	Wire pressure screw (1 per pole; load side)	Tornillo de presión del conductor (1 por polo, lado de carga)	Vis de pression de fils (1 par pôle, côté charge)	[1]	[1]

[1] Torque as recommended on the device instruction sheet. / Par de apriete recomendado en la hoja de instrucciones del dispositivo.
Couple recommandé sur la fiche de directives du dispositif.

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VACUUM CONTROLLER SET-UP THROUGH DTAM PLUS OPERATOR INTERFACE

MAIN MENU...Enter one of the numbers below to access this information

1. Current Vacuum Levels
2. Control Status
3. Set Points
4. Process Monitor

SUB MENUS

1. Pressure Levels, PSIA (bar graph)
next Vacuum During Last Shot, PSIA

2. Valve Status:
next Receiver Valve ON/OFF, Line Valve ON/OFF, Vacuum Valve ON/OFF
next Plunger Position, IN.

- *3. Restricted access: enter code

Valve Open Position (Position at which the vacuum valve will
open should be set to coincide with the position the pour hole is covered
by the plunger tip.).

Vacuum Start Signal - (inches)

(continued on following page).....

* NOTE: To change Position Set Points, the jog push button and the run push button must be pressed in succession.

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The biggest movement

Auto

Light 7-1/2 hp. V-twin Motor

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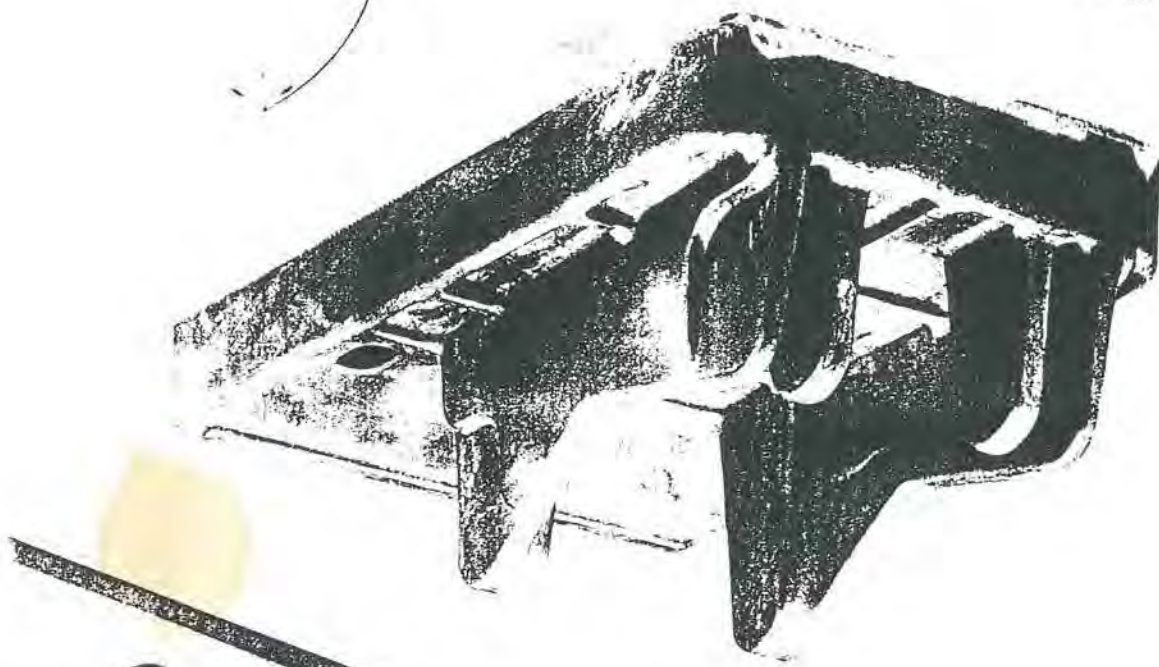
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VACUUM DIE CASTING SYSTEMS

CNC

Procedures

Set-up / startup



VACUUM CONTROLLER SET-UP THROUGH DTAM PLUS OPERATOR INTERFACE

(continued)

next Valve Closed Position (position at which the vacuum valve will close). Set initially at sleeve full or one inch before fast shot (whichever number is smaller).

next Leakdown Test Setpoint (amount vacuum valve is allowed to leak down in three second period) to be set based on capability of valve to hold vacuum. (PSIA)

next Purge Pressure (pressure setting for fault during the purge to ensure the valve is functioning properly - set PSIA 7.00 - 5.00).

next Minimum vacuum for fast shot (vacuum level required for fast shot to occur without setting fault alarm). (PSIA)

4. Process Monitor:

next Purge

```
next  Die opened
      Die closed
```

next Leakdown

next Shot completed (momentarily)

VACUUM SYSTEM CYCLE SEQUENCE OF EVENTS

1. Ejector Pins Forward or Automatic Extractor Signal

Purge vacuum valve

Test for successful purge

If OK, go to No. 2

If NG, fault light activated and fault signal set to die cast machine

2. Lubricate Die

Evacuate system

Test for vacuum decay

If OK, go to No. 3

If NG, fault light activated and fault signal set to die cast machine

3. Return Ejector Pins -- Close Moveable Cores (if applicable)

4. Close Die -- Die Lock Up

Evacuate system up to vacuum valve body and hold for next shot

5. Pour Metal -- Creep Plunger Forward Past Pour or Fill Hole

Energize the actuator solenoid to open valve

Evacuate shot sleeve and cavity

6. Start Intermediate Speed or Continue Slow Shot

Test vacuum level continuously

If OK, continue

If NG, fault light activated and fault signal sent to die cast machine

At predetermined point, de-energize solenoid to close valve

7. Start Fast Shot -- Fill Die Cavity -- Dwell Time -- Open Die -- Pull Moveable Cores (if equipped)

8. Eject Casting

Return to Step 1

DIE CASTING MACHINE SET-UP RECOMMENDATIONS

Shot pressure and intensification pressures should be set so that the pressure within the die cavity is between 6,000 and 10,000 psi.

Move the plunger at 3 - 4 in/sec to cover the pour hole, then go into intermediate shot velocity and fast shot.

The gate velocities should be kept at the low end of the North American Die Casting Association guidelines, if possible. These velocities are between 900 and 1,200 in/sec.

While observing the gate velocity limits, the cavity fill time should be as fast as possible.