

# Pneumatic Tension Control System

## MCS-166/MCS-207/MCS-208

P-276  
819-9045

### Installation & Operating Instructions



An Altra Industrial Motion Company

## Contents

Introduction .....	2
System Components .....	3
Specifications .....	3
Installation	
Control Housings .....	5
Sensor .....	8
Air Disc Tension Brake .....	9
T-6000 Transducer .....	10
System Wiring	
MCS-166/MCS-207 .....	9
MCS-166/MCS-208 .....	10
System Start-Up and Adjustments	
MCS-166/MCS-207/Transducer .....	12
MCS-166/MCS-208/Transducer .....	18
System Troubleshooting	
Dancer Tension Control System .....	23
Remote/Analog Control System .....	25
Replacement Parts Listing .....	25
Listing of Figures and Illustrations .....	25

**⚠ WARNING** Failure to follow these instructions may result in product damage, equipment damage, and serious or fatal injury to personnel.

**NOTES:** Installation must be made in accordance with the instructions found in this manual. Failure to do so may damage the controls and void their warranty.

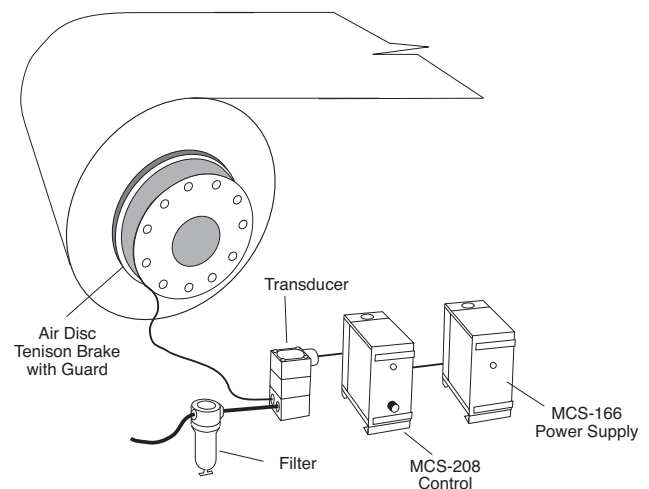
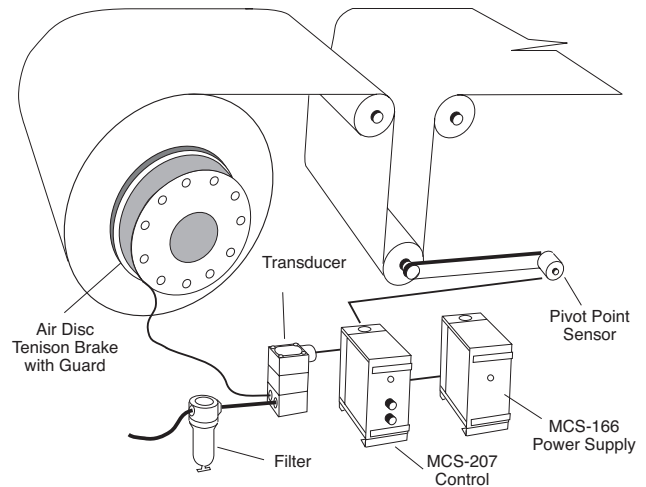
**⚠ WARNING** Contact with the electrical voltages present in the controls covered in this manual can cause injury or death. To avoid these consequences, make sure all power is off during installation.

## Introduction

Warner Electric offers two pneumatic tension control systems. The Dancer Tension Control System consists of: an Air Disc pneumatic tension brake, an electro-pneumatic transducer, an oil removal filter, an MCS-166 power supply, an MCS-207 control module, and a pivot point sensor. Figure 1 shows the system diagram for these components.

The Remote/Analog Control System consists of: an Air Disc pneumatic tension brake, an electro-pneumatic transducer, an oil removal filter, an MCS-166 power supply, an MCS-208 Remote Analog control module, and an input control device. (Figure 2 shows these components in a local torque adjust operating mode.) Consult Warner Electric if assistance is required in selecting an input control device.

This manual has been designed to cover the full range of installation, startup, operation, and maintenance procedures for your tension control system. System selection information can be found in Warner Electric's Tension Control Systems Catalog, P-771.



# System Components

## Brake

The Air Disc brake develops braking torque that is proportional to the air pressure applied to the brake's air chambers. The pressure required to control tension is supplied by the electro-pneumatic transducer.

The Pneumatic Tension Control System can be used to drive two Air Disc brakes in a dual brake application. However, it may be necessary to add a volume booster. Consult Warner Electric if other assistance is required.

## Electro-Pneumatic Transducer Kit

The transducer receives a signal from the control module and outputs the correct air pressure to the brake. Filtered air must be supplied to the transducer. This kit contains the recommended filter and transducer. Consult Warner Electric if other transducers or filters are selected.

## Power Supply

The MCS-166 Power Supply Module is designed to operate either the MCS-207 Dancer Control or the MCS-208 Remote/Analog Control. The MCS-166 accepts either 120 VAC or 220/240 VAC input power and provides 26-28 VDC output power for operation of the control modules.

## Controls

The MCS-207 Dancer Control Module is a solid state electronic control that receives a signal from a dancer pivot-point sensor and outputs the appropriate electrical signal to the electro-pneumatic transducer. The transducer produces the correct air pressure at the brake to maintain a stable dancer position. The MCS-207 is a closed loop control.

The MCS-208 Remote/Analog Module is a solid state electronic control that will accept a variety of input signals and provide an output signal that is proportion to the input signal. This output signal is converted to brake air pressure through the electro-pneumatic transducer. This system is open loop and any change in air pressure to the brake must come from input to the control from the signal source.

The MCS-208 can be operated by the local torque knob on its face or remotely by an external potentiometer, voltage input, or current loop input.

## Pivot Point Sensor

The MCS-605-1 or TCS-605-5 Pivot Point Sensors provide the dancer position signal to the MCS-207 Dancer Control. The MCS-605-1 is coupled to the dancer pivot when rotation is no more than 60 degrees, while the TCS-605-5 covers rotation up to 300 degrees.

# Specifications

## MCS-166 Power Supply Module

Part Number: 6910-448-013

**Input Power:** 120 VAC or 220/240 VAC  $\pm 10\%$ , switch selectable

### Ambient

**Temperature:** +32°F to +120°F (0°C to +49°C)

**Output:** 26  $\pm$  4 VDC, unregulated, 1.5amps maximum. over voltage protected

**Fusing:** 1/2 amp, 250V fast acting, type 3AG, AC input

## MCS-207 Dancer Control Module

Part Number: 6910-448-066

**Input Powers:** 26  $\pm$  4 VDC, 0.5 amps maximum  
MCS-166 power supply recommended

### Ambient

**Temperature:** +32°F to +120°F (0°C to +49°C)

**Outputs:** 1-5 ma  
4-20 ma\*  
10-50 ma  
1-9 VDC

**\*NOTE:** The standard transducer accepts a 4-20 ma output.

**Fuses:** 1/2 amp, fast acting, 250 V

**Protection:** Reverse voltage protection on the DC power connections

**Control Input:** From MCS-605-1 or TCS-605-5 pivot point sensor

### Auxiliary

**Inputs:** **Brake-On** — Applies full output (current or voltage). Active low.

**Brake-Off** — Applies minimum output (current or voltage). Active low.

**Anti-Drift** — Provides integrator reset function. Active low.

Switch Inputs can be controlled by switch closure between input and

DC common or open collector,  
NPN transistor to DC common .  
Switch or transistor rating — 20  
VDC minimum, 0.02 amps maximum  
rating

Torque Adjust/Span — Provides for  
manual adjust when in the manual  
mode. Provides for span adjust when in  
other modes of operation.

**Adjustments: Front panel**

Dancer Position — Sets dancer  
operating position.

Gain — Controls overall system  
response based on change of  
dancer input signal.

**MCS-208 Remote/Analog Control Module**

**Part Number:** 6910-448-067

**Input Power:** 26 ± 4 VDC, 0.5 amps maximum

**Ambient**

**Temperature:** +32°F to +120°F (0°C to +49°C)

**Outputs:** 1-5 ma  
4-20 ma\*  
10-50 ma  
1-9 VDC

**\*NOTE:** The standard transducer accepts a 4-20 ma  
output.

**Fuses:** 1/2 amp, fast acting, 250 V

**Protection:** Reverse voltage protection on the  
DC power connections

**Auxiliary**

**Inputs:** **Brake-On** — Applies maximum  
output signal (current or voltage)  
to the transducer.

**Brake-Off** — Applies minimum  
output signal (current or voltage).  
to the transducer.

Switch Inputs can be controlled by  
switch closure between input and  
DC common or open collector,  
NPN transistor to DC common

Switch or transistor rating — 20 VDC  
minimum, 0.02 amps maximum rating

**Adjustments: Front panel**

Zero Adjust — Provides for  
adjustment of minimum input to  
correspond to minimum output level

**Operating**

**Modes:** Local Torque Adjust — Knob on front  
panel

Remote Torque Adjust — Via a remote  
potentiometer

Roll Follower — Using an external  
potentiometer

Current Loop — 1-5 ma, 4-20 ma,  
10-50 ma

Voltage Inputs — 1-9 VDC

**Pivot Point Sensors**

**MCS-605-1, TCS-605-5**

**Part**

**Numbers:** MCS-605-1 (single turn): 7330-448-002  
TCS-605-5 (5-turn): 7330-448-003

**Control**

**Element:** Precision potentiometer, 1000 ohms  
± 5%, 2 watts

**Cable:** 15 ft. long, shielded, with connector

**General:** The tension sensor should be kept  
free from foreign material, dust, grease,  
and oil.

**Electro-Pneumatic Transducer**

**Part Number:** 6910-101-066 (includes filter)

**Input Signal:** 4-20 ma

**Output**

**Range:** 0-120 Psig

**Supply**

**Pressure:** 20-150 Psig

**\*NOTE:** Supply pressure to the transducer must always  
be at least 5 Psig above the maximum output pressure  
required for the brake.

**Temperature**

**Range:** -20° F to 150° F

**Maximum Air**

**Consumption:** 6.0 (SCFH) at 15 Psig

## Supply Pressure

Effect: 1.5 Psig for 25 Psig supply change

Pipe Size: 1/4" NPT (transducer and filter)

For a more detailed list of specifications, see the information supplied with the transducer and filter.

## Tension Brakes

Data and technical specifications for the Pneumatic style tension brakes can be found in the Warner Electric Tension Control Systems catalog, P-771.

## General Information

Control chassis must be considered NEMA 1 and should be kept clear of all areas where foreign material, dust, grease, or oil might affect the operation of the control. Control chassis should be electrically grounded. Neither sensor nor sensor wires are at ground potential and should be considered "floating" unless both sides of the AC input power to the MCS-166 are disconnected.

## Installation Instructions

This Installation and Operating Manual has been arranged for the systematic installation and start-up of your Pneumatic Tension Control System. Please check off each step in the space provided before proceeding to the next step.

### Sample

- Check box after completion of each step.
- Remove control logic assembly by loosening two (2) captive screws on the face plate and slide the assembly out of its housing.

## Installation

### Control Housings

#### A. Wall/Shelf Mounting

The tongue and groove joints on the sides of each housing module allow any number of them to be joined together to form one housing.

#### 1. Connecting the Housings

- a. If the PC Board assemblies have been installed, it will be necessary to remove them. Simply loosen the captive screws which are located on the front panels and slide the assemblies out.
- b. Loosen the latches holding the two part housings together and separate the two pieces. The latches are located on the inside tops and bottoms of the housing.
- c. Working from right to left, join the rear sections of each housing by sliding them together repeat the process for the front

sections, but do not fasten them together yet.

#### 2. Wall Mounting

- a. If bottom-entry conduit entrance is required, remove the L-shaped bracket and discard it. Reinsert the screws into the control after the bracket has been removed.
- b. Using the dimensions shown in Figure 3, page 6, drill four (4) 13/64" mounting holes for each housing to provide clearance for #10 bolts.
- c. Apply the terminal strip label supplied with the control logic module to the PC Board as shown in Figure 4, page 6.

**▲CAUTION** Be sure to apply the label in the proper position with the transducer (+) terminal at the top.

- d. Mount the rear sections loosely to the mounting surface. Do not connect the front sections yet.

The controls are now ready to be wired. Proceed to the wiring section of this manual for the appropriate wiring instructions.

#### 3. Shelf Mounting

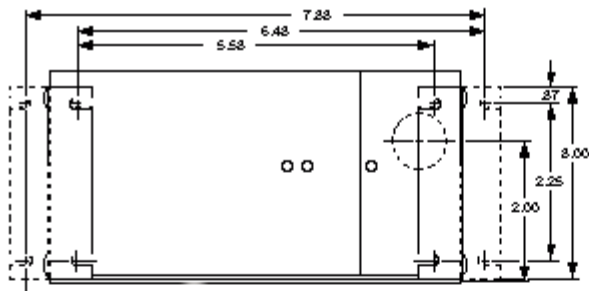
- a. If bottom conduit entrance is required remove the two (2) screws attaching the brackets to the housing. Rotate the brackets to face away from the housings and reinsert and tighten the screws.
- b. Using the dimensions shown in Figure 3, page 6, drill four (4) 13/64" mounting holes for each housing to provide clearance for #10 bolts.
- c. Apply the terminal strip label supplied with the control logic module to the PC Board as shown in Figure 4, page 6.

**▲CAUTION** Be sure to apply the label in the proper position with the transducer (+) terminal at the top.

- d. Mount the rear sections loosely to the mounting surface. Do not connect the front sections yet.

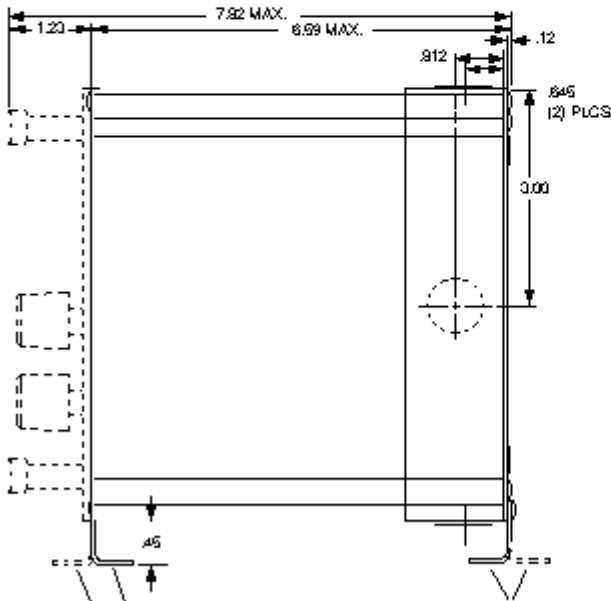
The controls are now ready to be wired. Proceed to the wiring section of this manual for the appropriate wiring instructions.

# Dimensions



BOTTOM VIEW

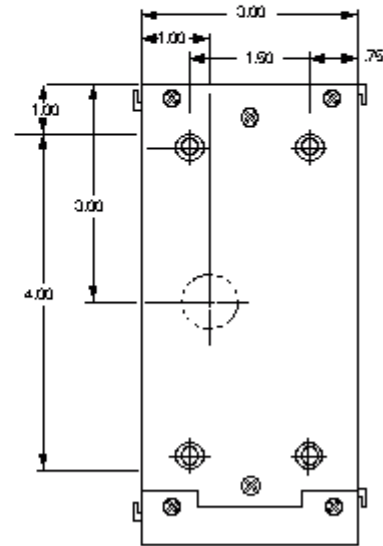
NOTE: All dimensions are nominal



Front bracket may be mounted either way as shown.

Bracket base mount may be mounted either way as shown for shelf mount. Remove entirely for wall mount.

SIDE VIEW



BACK VIEW

Figure 3. Wall/Shelf enclosure dimensions

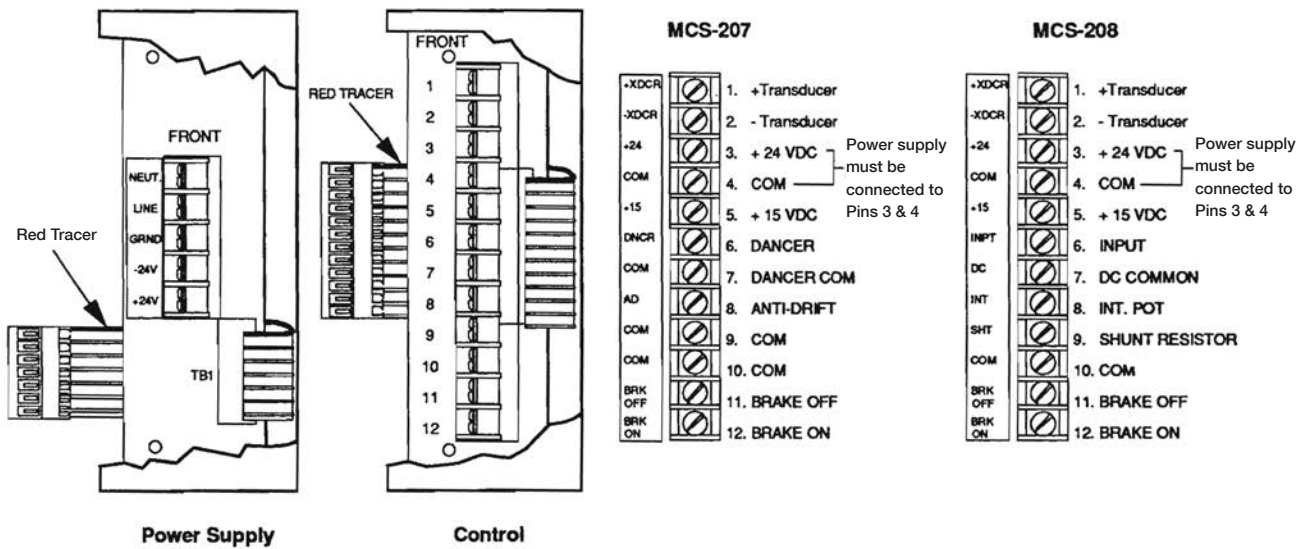


Figure 4. Terminal strip label orientation for Wall/Shelf Mount

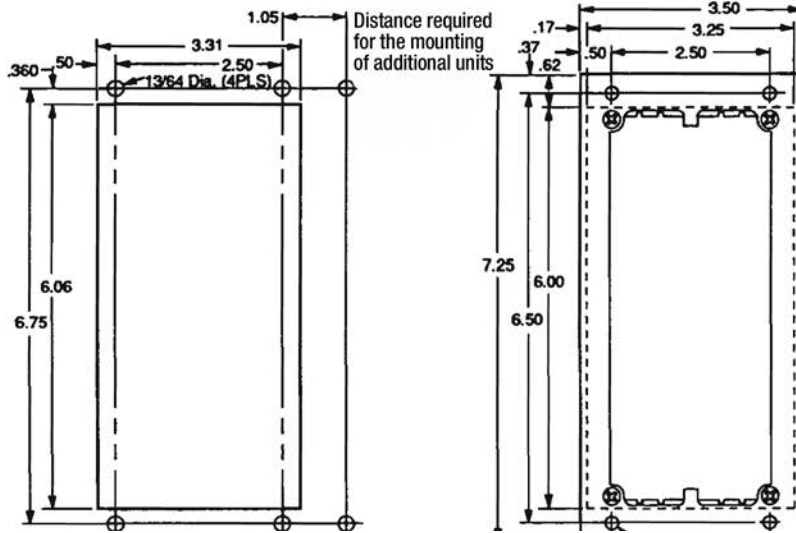


Figure 5. Panel mount cut-out dimensions

NOTE: All dimensions are nominal

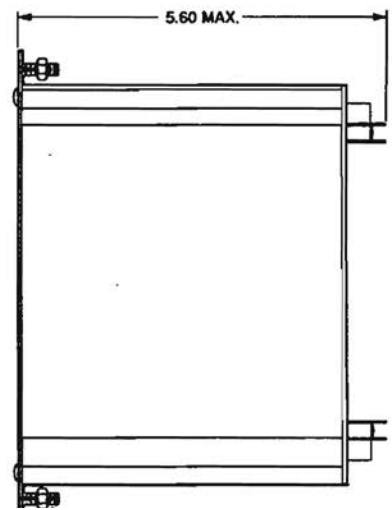


Figure 6. Panel mount housing dimensions

## B. Panel Mounting

**NOTE:** Panel mount housings cannot be joined together.

- 1. If the PC Board assemblies have been installed, it will be necessary to remove them. Simply loosen the captive screws which are located on the front panels and slide the assemblies out.
- 2. Using the dimensions shown in Figure 5, cut an opening 3-5/16 x 6-1/16" into the mounting panel for each housing assembly.
- 3. Using the dimensions shown in Figure 5, drill four (4) 13/64" mounting holes for each housing to provide clearance for the #10 mounting studs.

- 4. Slide the housing assemblies into the mounting panel cutouts. Securely fasten the housings to the mounting panel with the four nuts on each housing.
- 5. Apply the terminal strip label to the housing panel near the terminal block as shown in Figure 7.

**CAUTION** Be sure to apply the label in the proper position with the transducer (+) terminal at the top.

The controls are now ready to be wired. Proceed to the wiring section of this manual for the appropriate wiring instructions.

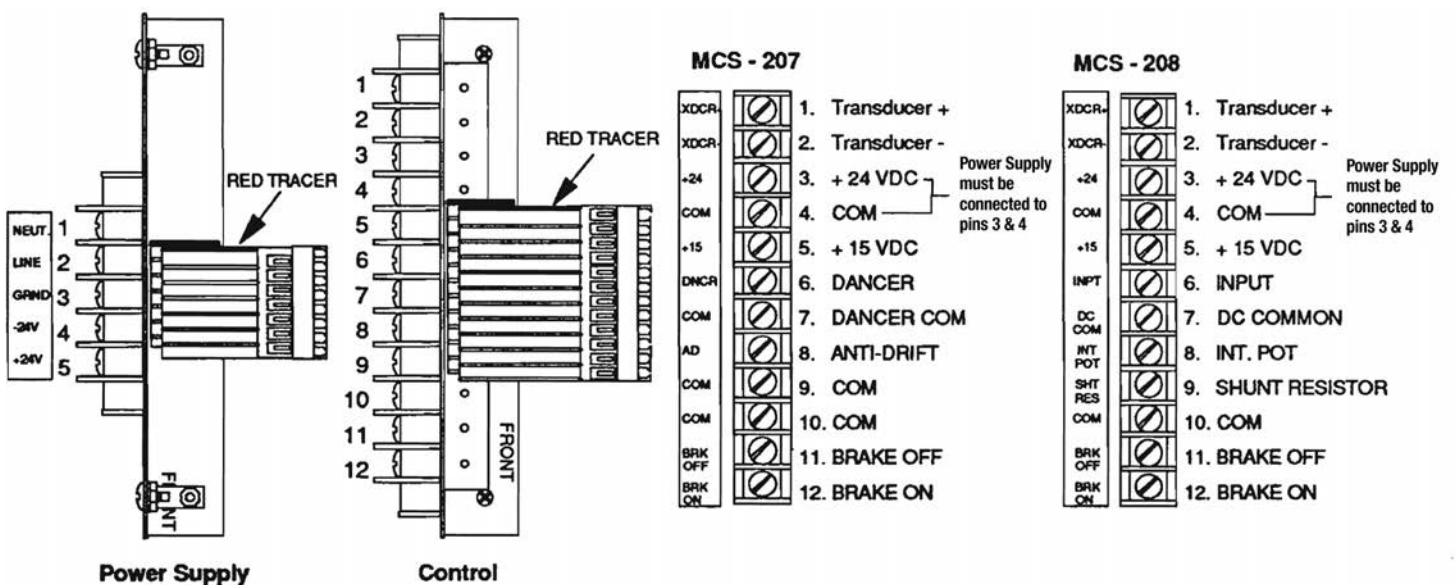
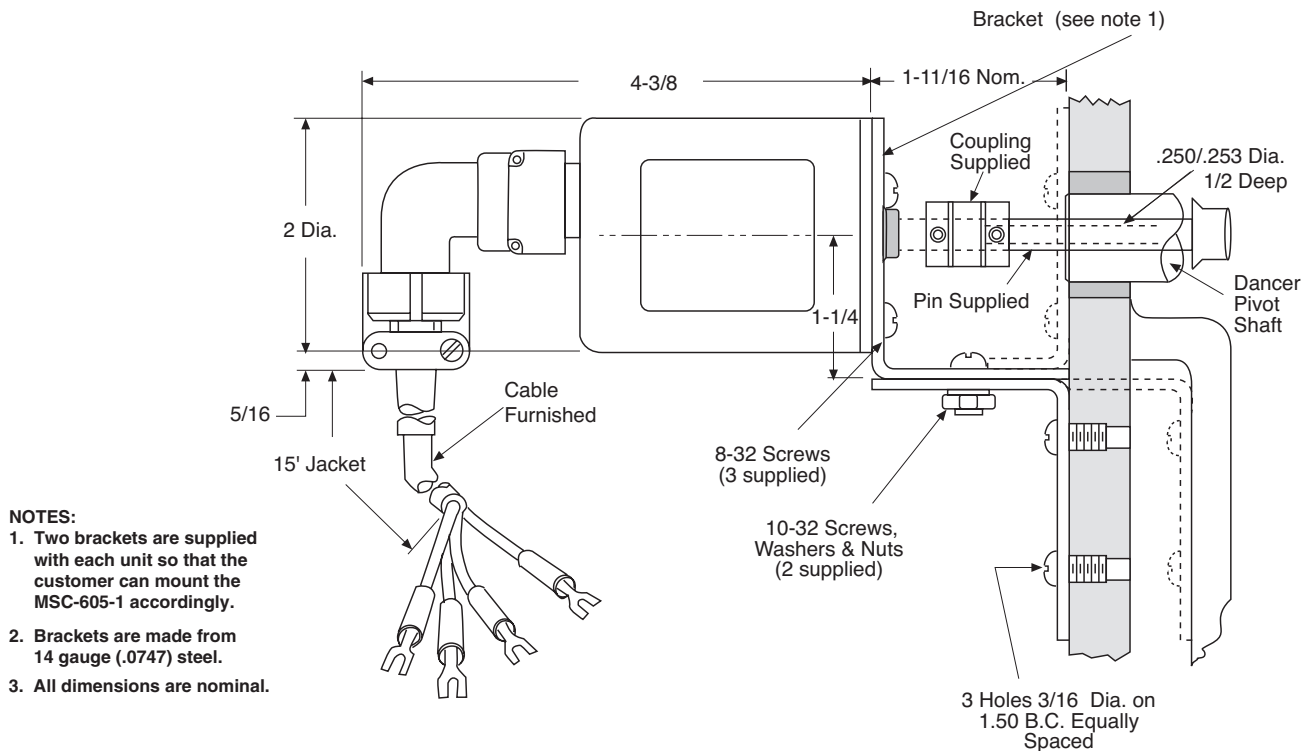


Figure 7. Terminal strip label orientation for Panel Mount

## Installation - MCS-605-1 Sensing Potentiometer

1. Using a No. 2 drill, drill a 1/2" deep hole in the center of the dancer pivot shaft.
2. Drive the supplied pin into the hole in the shaft until half its length remains exposed.
3. Assemble the two brackets with the two (2) 10-32 screws.
4. Mount the sensor to the brackets using the three (3) 8-32 screws.
5. Position the sensor and bracket so that the sensor shaft and pin are aligned and separated by 5/16".
6. While holding the sensor and bracket in this position, mark the centers of the bracket holes on the machine.
7. Drill and tap three (3) holes for 8-32 screws in the machine.
8. Connect the sensor shaft to the pin with the universal coupling. The index mark on the sensor shaft must be aligned with the index mark on the sensor face when the dancer arm is at the midpoint position.
9. Mount the sensor and bracket to the machine with three (3) 8-32 screws.
10. The sensor is now ready to be wired. Refer to the wiring section starting on page 9 of this manual for complete wiring instructions.

☒



**Figure 8. MCS-605-1 & TCS-605-5 Mounting Details**



## Installation - Air Disc Tension Brake

For brake installation, refer to the pneumatic tension brake installation instructions, WC-68.

### Installation - Transducer

- 1. Mount the transducer as described in the transducer installation manual. The transducer should be mounted where vibration is minimal and as close to the brake as possible.
- 2. Mount the filter on the inlet side of the transducer.
- 3. A 1/4" teflon air line and the proper fittings will be required to connect the output of the transducer to the input of the brake. Install the air line, but do not make the connection to the output of the transducer. The connection will be made after the transducer has been calibrated.

**NOTE:** If the air line is longer than 6 feet, a volume booster may be required. Consult factory.

- 4. Connect the output of the filter to the input of the transducer.
- 5. Assemble the proper fillings to connect the air supply line to the filter. However, do not connect the air line at this point.

**NOTE:** Apply a minimum amount of pipe compound to male threads of the air line. Start with the third thread back and work away from the end of the line to avoid getting compound into the air lines.

## SYSTEM WIRING

### **⚠ WARNING** System Wiring Precautions

**Contact with the electrical voltages present in the controls covered in this manual can cause injury or death. To avoid these consequences, make sure all power is off during installation.**

These wiring precautions will help you properly install and wire a trouble-free system.

1. Use proper gauge wire for all circuits.
2. If possible, segregate AC and DC power lines, transducer output lines, signal lines, and switch wiring.

3. Shielded cable is recommended for sensor connections and external switching circuits.
4. Do not operate external accessories from the MCS-166, MCS-207, or MCS-208 controls.
5. Do not use controls for purposes other than those intended. Such use could damage the control and void the warranty.

### MCS-166/MCS-207

Refer to connection diagrams, Figure 9, page 10, for wiring connections.

- 1. Wire AC input power to terminals 1, 2, and 3 of the MCS-166 terminal block: Terminal 1 neutral, Terminal 2 hot, Terminal 3 ground.
- 2. Wire DC output from MCS-166 Terminal Block to Input Power Terminals on MCS-207 as follows:
  - MCS-166 DC Common Terminal 4 to MCS-207 DC Common Terminal 4
  - MCS-166 (+) DC Terminal 5 of MCS-166 to (+) Terminal 3 of MCS-207
- 3. Connect wiring from the transducer to Terminals 1 and 2 of the MCS-207 terminal block.
- 4. Sensor Wiring  
Determine the direction of potentiometer shaft rotation as viewed from the connector end of the pivot-point sensor.
  - CW  a. For CW rotation, connect sensor wires as follows: Black to Terminal 5, green to Terminal 6, red to Terminal 7. Shield lead should be connected to Terminal 7.
  - CCW  b. For CCW rotation, connect sensor wires as follows: Red to Terminal 5, green to Terminal 6, black to Terminal 7. Shield lead should be connected to Terminal 7.
- 5. External Switch Connections (optional)
  - a. Anti-Drift or Integrator Switch  
Connect switching circuit between terminals 8 and 9 of MCS-207 terminal strip.

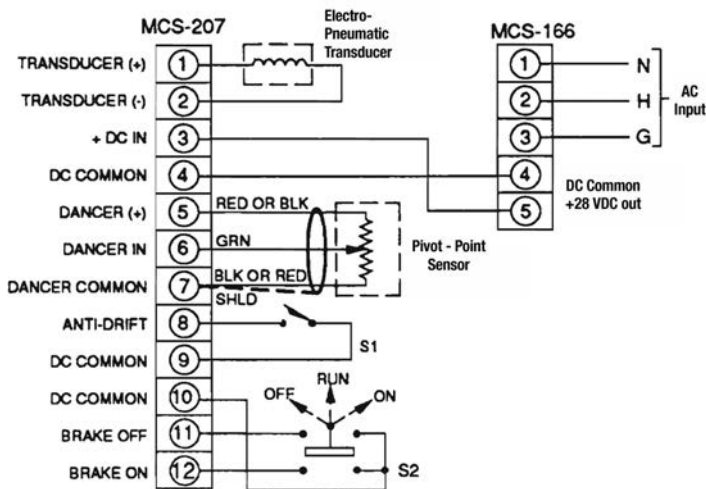
**NOTE:** The anti-drift input can be a limit switch which closes based on dancer arm position or it can be a relay circuit activated by the machine start cycle.

**⚠ CAUTION** The switch or relay used for the anti-drift input should be open during normal running operation to prevent unpredictable reactions.

- b. **Brake-Off Switch**  
Connect switch contacts between Terminals 10 and 11 of MCS-207 terminal strip.
- c. **Brake-On Switch**  
Connect switch contacts between Terminals 10 and 12 of MCS-207 terminal strip.

**NOTE:** For single brake off function only, use a Single Pole-Single Throw, maintained contact switch. For both functions, a three position switch as shown in Figure 9, page 10, is recommended.

- 6. Double check all wiring connections per Figure 9. Insure all terminals are tight.
- 7. Reconnect the front housing of either wall or shelf mounting and secure the latches. If shelf mounting is used, secure the housing with the four (4) bolts for each section.



**Figure 9. MCS-166/MCS-207 Wiring Single or Dual Brake**

- 8. Do not insert the control modules at this time. Proceed to the MCS-166/MCS-207 start-up section of this manual.

### MCS-166/MCS-208

Refer to all Figures on pages 11 for actual wiring connections.

- 1. Wire AC input to terminals 1, 2 and 3 of the MCS-166 terminal block: terminal 1 to be AC neutral, terminal 2 AC hot, and terminal 3 earth ground.
- 2. Wire MCS-166 DC output to MCS-208 input: MCS-166 DC common terminal 4 to MCS-208 DC common terminal 4. MCS-166 (+) DC terminal 5 to MCS-208 (+) input terminal 3.
- 3. Connect transducer wires to terminals 1 and 2 of MCS-208 Terminal Block.
- 4. External Switch Connections (optional)
  - a. **Brake-Off Switch**  
Connect switch contacts between terminals 10 and 11 of MCS-208 terminal strip.
  - b. **Brake-On Switch**  
Connect switch contacts between terminals 10 and 12 of MCS-208 terminal strip.

**NOTE:** If only a single brake-off function is used, an SPST maintained contact switch may be used. If both functions are used, a three position switch is recommended, as shown in Figure 10, page 11.

### 5. Control Input Connections

Follow the procedure below (a, b, c, or d) which applies to the control input mode selected.

Refer to Figure 11, page 12 for various input connection configurations.

- a. **Local Torque Adjust Mode**  
Connect jumper between MCS-208 terminals 6 and 8, per Figure 11B, page 12.
- b. **Remote Torque Adjust/Roll Follower Pot**  
Connect remote potentiometer or roll follower potentiometer to MCS-208 terminals 5, 6, and 7, per Figure 11C, page 12.

**NOTE:** Wiper will always be connected to terminal 6. End points should be connected so that turning the remote pot CCW or moving the roll follower pot toward the core will decrease voltage at terminal 6.

- c. **Voltage Source Input**  
Connect (+) side of external voltage source

to terminal 6 and (-) side (or common) of external voltage source to MCS-208 terminal 7, per Figure 11D, page 12.

**CAUTION** The input level from an external voltage source must not exceed 14.5 VDC. Voltage levels higher than 14.5 VDC will damage the control's input circuits.

d. Current Source Input

- 1. Determine the current range from the external current source and select a shunt resistor from the chart in Figure 11E, page 12. Connect the shunt resistor between MCS-208 terminals 7 and 9.

- 2. Connect the (+) side of the external current source to MCS-208 terminal 6 and the (-) side (common) to terminal 7, per Figure 11E, page 12.

**NOTE:** To prevent pick-up stray electrical noise, connect the shield wire to terminal 7 only. Use of shielded cable is strongly recommended for sensor pot, voltage source input, and current source input.

- 6. Double check all wiring connections per Figures 10 & 11 for accuracy and tightness.

- 7. Reconnect the front housings if either wall or shelf mounting is used. Secure the latches. If shelf mounting is used, secure the housings with the four (4) bolts for each section.

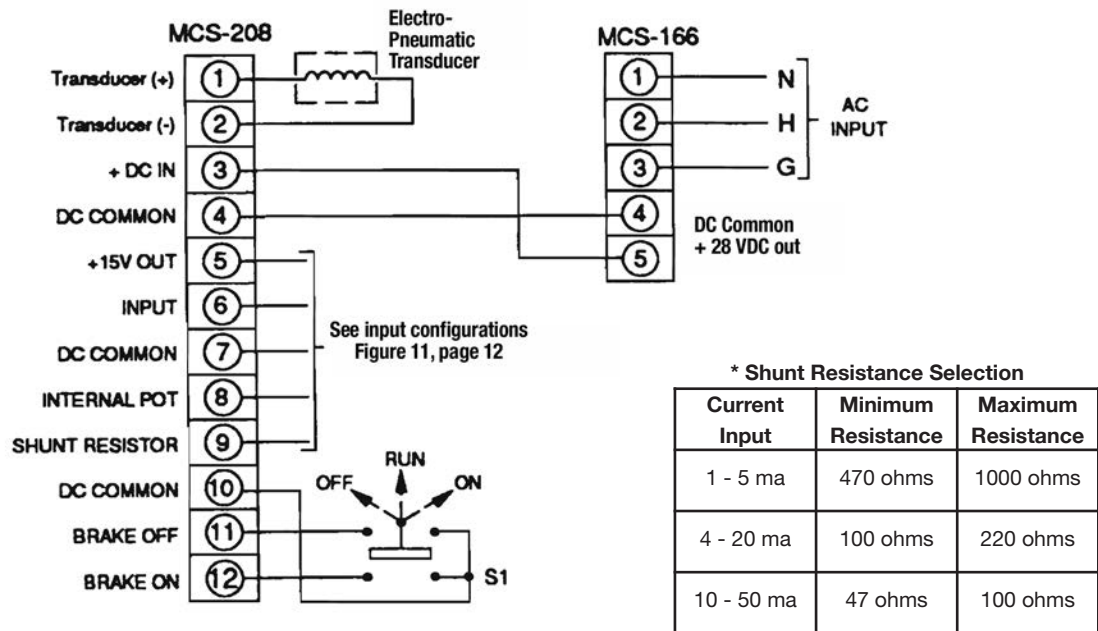


Figure 10. MCS 166/MCS-208 Wiring - Single or Dual Brake

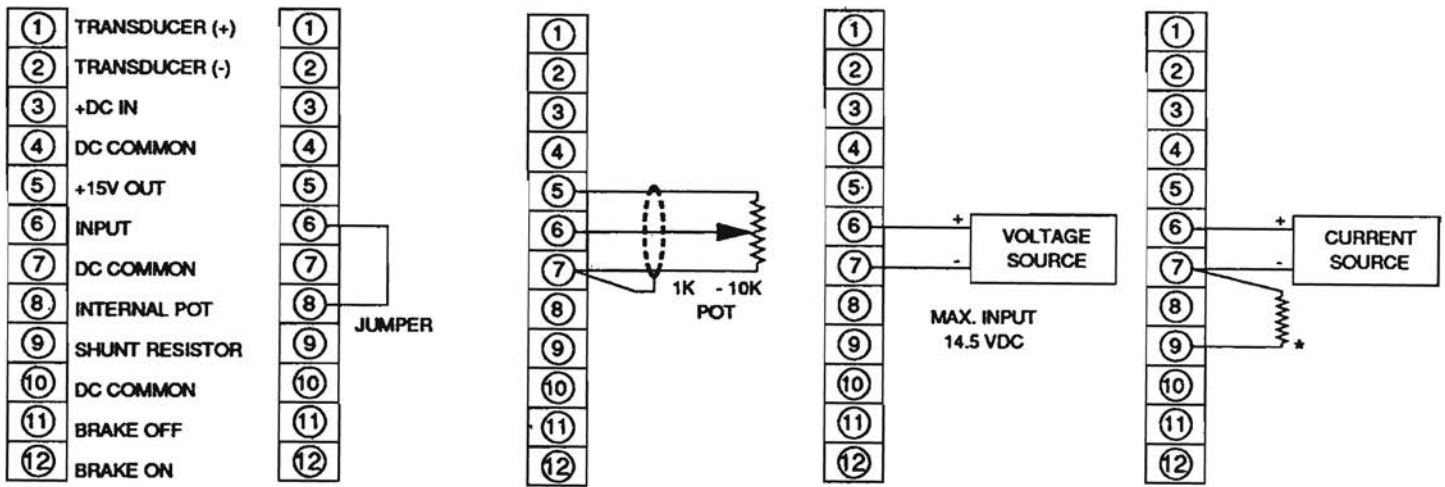


Figure 11. MCS-208 Input Configuration

- 8. Do not insert the control modules at this time. Proceed to the MCS-166/MCS-208 start-up section of this manual.

- a. For 120 VAC, set to High Position
- b. For 240 VAC, set to High Position
- c. For 220 VAC, set to Low Position

## System Start-Up and Adjustment

### MCS-166/MCS-207/Transducer

The MCS-207 is factory calibrated for a 4-20 ma output to drive the transducer. However, other DC current ranges or DC voltages ranges can be selected for output. Consult factory if a transducer with a different input range has been selected.

Generally, the only MCS-207 adjustments necessary are the Dancer Position and the Gain controls found on the front panel. On the transducer, the zero and span may also have to be adjusted.

The start-up and adjustment procedure which follows will provide a stable operating system.

Refer to Figure 12, page 17, for exact location of internal adjustment potentiometers.

#### A. Preliminary Set-Up

- 1. Set voltage selector switch on MCS-166 for proper input voltage range. This will be either 120 VAC or 220/240 VAC.

**NOTE:** An additional switch has been added to the MCS-166 for selecting 220 or 240 VAC operation. This switch is labeled Low-High.

- 2. Set the Low-High Switch as follows:

**NOTE:** The Low-High switch is used primarily for selecting 220 or 240 VAC operation when the line selector switch is set for 240 VAC, but it can also be used when low line voltage exists.

- 3. Low line input: For 108 VAC input when set on 120 VAC or for 198 VAC input when set on 240 VAC, set the Low-High switch to the Low Position.
- 4. High line input: For 132 VAC input when set on 120 VAC or for 268 VAC input when set for 240 VAC, set the Low - High switch to the High Position.

**CAUTION** Improperly setting the 120/240 VAC Selector Switch and the High-Low Selector Switch can damage the power supply and/or control Module and void their warranties.

- 5. Slide the power module into the housing and secure with the two captive fasteners on the faceplate.

**CAUTION** Pull the ribbon cable forward so that the connector end is in front of the housing assembly. Fasten the ribbon cable connector to the pin connector on the control module. Pin 1 (red tracer) on the ribbon cable must connect to pin 1 on the control module as shown. This "Red Tracer" will ALWAYS be toward the top of the control.

- 6. Set the “Dancer Position” to its midpoint range and the “Gain” to “5” on the MCS-207 faceplate.
- 7. Set the internal adjustments on the dancer logic board per Figure 12, page 17, as follows:
  - a. Proportional gain, “R32” fully clock wise (CW)
  - b. Integrator gain, “R24” at 60% clockwise
  - c. Differentiator gain, “R16” at 75% clockwise
  - d. Differentiator response switch 1 “on” and switches 2 and “3” off.
- 8. Set the output type and range per figure 12, page 17, as follows:

**NOTE:** The MCS-207 is factory set to provide a 4-20 ma signal to the transducer. If a standard transducer is being used, proceed to step 9. For a transducer that operates with a different input signal, the proper output must be selected. It will then be necessary to follow the MCS-207 Brake Off/Brake On calibration procedure outlined in the static adjustment section, page 13.

- a. Set the voltage/current selector switch, SW1 on the output/driver board, for the proper output. Select IP for a current to pressure transducer or select EP for a voltage to pressure transducer.
- b. For a current to pressure transducer, it is also necessary to select the proper range. The output current ranges of 10-50 ma, 4-20 ma and 1-5 ma are available and can be selected with switch, SW2. This switch is located on the output/driver board.
- 9. Slide the control module into the housing and secure with the two captive fasteners on the faceplate.

**▲CAUTION** Pull the ribbon cable forward so that the connector end is in front of the housing assembly. Fasten the ribbon cable connector to the pin connector on the control module. Pin 1 (Red Tracer) on the ribbon cable must connect to pin 1 on the control module as shown. This “Red Tracer” will ALWAYS be toward the top of the control.

## B. Static Adjustment and Check Out

- 1. Install a pressure gage into the output of the transducer.
- 2. Apply air pressure to the system.
- 3. Apply power to the tension control system with the machine in a non-running or off mode. Check that the “power” indicators on both the MCS-166 and MCS-207 are illuminated.
- 4. Move the dancer arm to the shortest web-loop position and note that the transducer output pressure decreases. Then move the dancer to the longest web-loop position and note that the transducer output pressure increases.

**NOTE:** If the brake pressure is the reverse of this, the Pivot-Point Sensor is wired backwards or the transducer wiring is reversed. Refer to the MCS-166/MCS-207 wiring section for correct connections.

- 5. Brake-On/Brake-Off Switch Check
  - a. Set the Brake-On switch to its normal run mode.
  - b. Place Brake-Off switch in brake-off mode and note the transducer output pressure.
  - c. Return the Brake-Off switch to its normal run mode.
  - d. Turn on the Brake-On switch and note that the transducer output pressure increases.
  - e. Return Brake-On switch to its normal running position.

**NOTE:** If the transducer pressure decreases when the Brake-On is activated, the wiring is reversed. Refer to the MCS-166/MCS-207 wiring section for the proper connections.

- 6. Brake-Off/Brake-On Calibration

**NOTE:** The MCS-207 is factory calibrated for a 4-20 ma output. Proceed to Step 7, Transducer Calibration, if the MCS-207 need not be adjusted. If adjustment is required, refer to Table 1 for the correct values called out in the adjustment procedure. An accurate voltmeter is required to set up the system.

Adjustment Variable	Transducer Range				
	1-5(ma-DC)	4-20(ma-DC)	10-50(ma DC)	1-5(VDC)	1-9(VDC)
Y min*	1	4	10	1	1
Y max*	5	20	50	5	9
P max**(Psi)	75	75	75	75	75
P sup**(Psi)	80	80	80	80	80

**Table 1**

Y min (Min. transducer input).

Y max. (Max. transducer input).

P max (max. pressure, brake-on mode)

P sup (supply pressure)

\* For current transducers this value is given in maDC.  
For voltage transducers this value is given in VDC.

\*\* If shop air does not maintain 80 psi minimum, then P max should be set lower. P max should be at least 5 psi lower than the minimum supply pressure, P sup.

- a. With control power off, set the meter to measure MCS-207 control output to the transducer.
- b. Apply power to the system.
- c. Place the Brake-Off switch in the brake-off mode.
- d. Set the zero potentiometer on the control output/driver board to Y min. (Refer to Table 1). Rotate the zero potentiometer CW to increase and CCW to decrease the output.
- e. Return the Brake-Off switch to the normal run mode.
- f. Set the Brake-On switch to the brake-on mode.
- g. Using the span potentiometer on the control output/driver board to equal Y max. Rotate the span pot CW to increase and CCW to decrease the output.
- h. Return the Brake-On switch to the normal run mode.
- i. Repeat steps c-h to make sure the zero and span potentiometers are properly set. There is some interaction between these two potentiometers.

7. Transducer Calibration

**NOTE:** For transducers that are pre-calibrated for 0-75 psi, calibration is not generally required. If the transducer is labeled as calibrated for 0-75 psi and is mounted vertically, proceed to Step 8. Otherwise proceed with the following calibration procedure. The zero and span potentiometers are identified on the

outside of the transducer. Use care when adjusting these potentiometers.

- a. Place the Brake-Off switch in the brake-off mode.
- b. If the pressure reads above 0 psig, turn the zero pot on the transducer CCW until the pressure just reaches zero.
- c. If the pressure reads 0 psig, turn the zero pot CW until the pressure rises above zero. Then slowly turn the pot CCW until the pressure just reaches zero.
- d. Return the Brake-Off switch to its normal run mode.
- e. Turn on the Brake-On switch and adjust the pressure to 75 psi. Turn the span CW to increase pressure and CCW to decrease pressure.
- f. Repeat steps a through e to make sure the span and zero pots are properly set.

8. Remove air pressure from the system.

9. Disconnect the pressure gage.

10. Connect the brake line to the transducer output.

**NOTE:** If it is preferred to leave the pressure gage in the system, a "T" fitting can be used.

11. Apply air pressure to the system.

**C. Start-Up and Dynamic Adjustments**

1. Verify that power is on.

2. Start the machine and draw material.

3. After the Dancer has stabilized, adjust the front panel "Dancer Position" potentiometer for the desired dancer running position.

4. If the system is providing stable dancer operation, increase the "Gain" until the dancer hunts or oscillates. Note the gain position number where this occurs.

5. Reduce the "gain" setting from Step 4 above one or two digits from where instability or oscillation occurs.

6. If dancer instability is apparent from initial start, reduce the gain until it becomes stable.

**NOTE:** This is only a preliminary gain setting. A final gain setting is required at core diameter for optimum system performance.

- 7. Run the system until the unwind roll is within two to four inches of core diameter.
- 8. If the system has been stable, reset the front panel gain until the dancer hunting or oscillation occurs, noting the gain setting number, then reduce the setting one or two digits.

**NOTE:** This is the optimum gain setting. No further adjustments are necessary.

- 9. If system stability cannot be achieved through front panel gain adjustment, it may be necessary to adjust gain factors internally.

**⚠CAUTION** Internal P-I-D gain adjustments should be made only after all other attempts to achieve system stability have failed. These adjustments should be made by qualified personnel only.

**NOTE:** Internal access is required for the set-up adjustments which follow. This can be accomplished by sliding the control module partially out of the housing.

**⚠CAUTION** If side panel plate on the control housing is to be removed, insure the power is off before removing the control module from the housing. Failure to disengage power before removing the module will result in damage to the control and/or power module.

**IMPORTANT:** Follow the sequence outlined below to properly adjust the P-I-D circuit gains.

#### D. P-I-D Gain Adjustments

- 1. "P" - Proportional gain adjustment, RS32
  - a. Jumper the anti-drift input (terminal 8) to DC common (terminal 9) on the MCS-207 terminal block to disable the integrator circuit.
  - b. Inject a transient into the system by rapidly changing the dancer position. Suddenly changing dancer air

pressure or rapidly depressing the web or dancer arm will provide the transient. Observe the dancer's response.

- c. The dancer should stabilize within one to two cycles. If oscillations do not subside, reduce the "P" gain potentiometer, R32, CCW in small increments, observing the effects.
- d. Repeat steps b and c above as necessary until desired response is obtained.

**NOTE:** "P" gain settings are a function of brake size. R32 is factory set at 100% CW. Generally, the larger the brake, the lower the R32 setting.

**NOTE:** If response is not obtained with "P" gain adjustment, it may be necessary to make "D" gain adjustments as well.

- 2. "D" - Differentiator gain adjustment, R16
  - a. Insure anti-drift (terminal 8) is still jumpered to DC common.
  - b. Inject a transient into the web as described in step 1b above.
  - c. If dancer stability is achieved within one or two cycles, make no further adjustments.
  - d. If stability is not achieved, adjust R16 as follows:
    - 1. If response is erratic and dancer is extremely jerky, rotate R16 CCW.
    - 2. If response is sluggish and dancer hunts, rotate R16 CW.

**NOTE:** If proper response is not achieved with R16 at maximum CW setting, the next higher differentiator response range should be used.

**⚠CAUTION** When switching to higher response ranges, R16 should be set full CCW.

- e. Repeat steps b through c above to insure optimum response.

**NOTE:** To insure optimum performance, the system should be checked at or near full roll diameter.

- f. Remove jumper on anti-drift input (connecting terminal to DC common terminal 9).
- 3. "I" Integrator gain adjustment, R24.

**⚠CAUTION** The "I" gain adjustment controls how far the dancer must move to compensate for unwind roll diameter changes. Any adjustment must be made strictly in accordance with the instructions below.

- a. With the system running and stabilized, observe the amount of dancer movement.
- b. If the dancer arc is less than five degrees and movement is smooth, do not make any adjustments.
- c. If dancer arc is greater than 10 degrees, but movement is smooth, adjust the "I" gain potentiometer CW in small increments, observing the results, until stability is achieved.
- d. If dancer arc is within 5 to 10 degrees, but movement is choppy and rough, adjust the "I" gain potentiometer CCW in small increments, observing the results, until stability is obtained.
- 4. After completing P-I-D- adjustments, recheck main gain adjustments per steps C4 through C8.

This completes the start-stop and adjustment of the MCS-166/MCS-207 Dancer Control System. If difficulties are encountered which cannot be resolved using this manual, contact your Warner Electric Representative or the factory.



NOTES: 1. INTERCONNECT PIN NUMBERING DOES NOT CORRESPOND TO TERMINAL BLOCK NUMBERING.  
 2. ALL DIMENSIONS ARE NOMINAL.

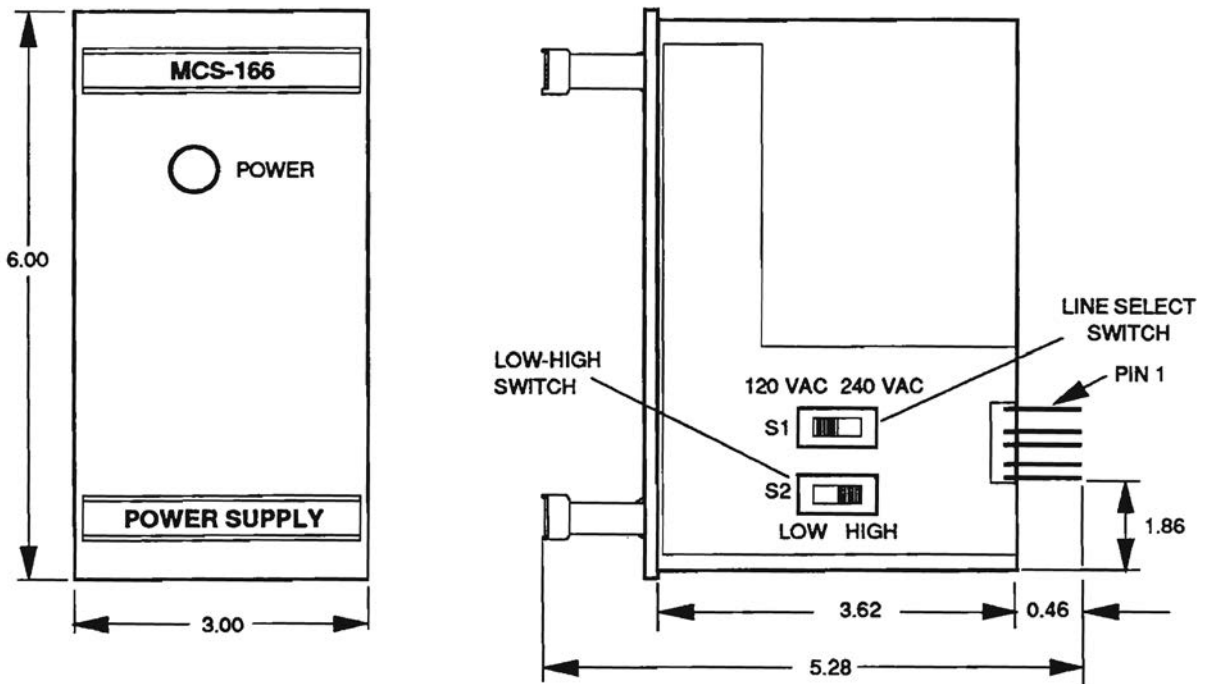
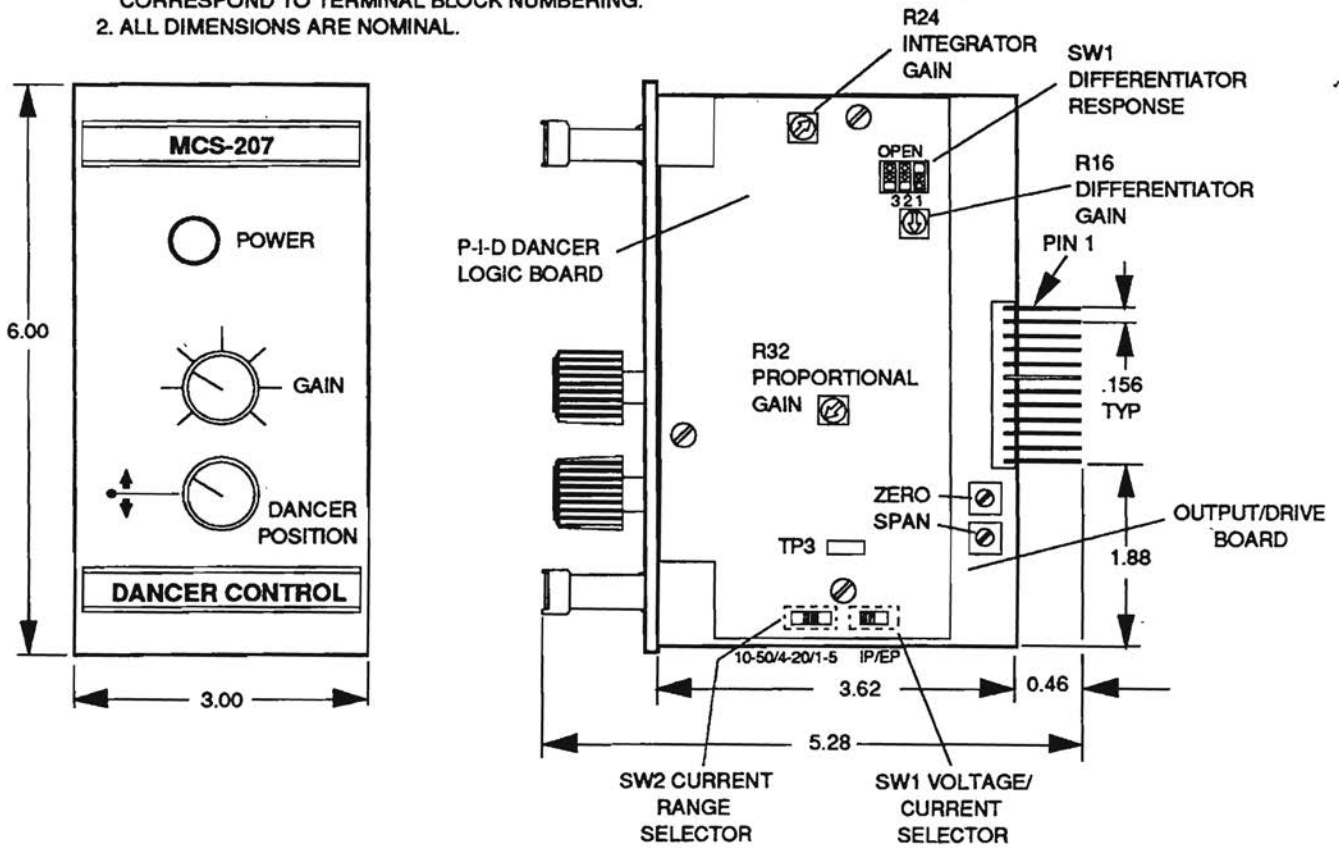


Figure 12. Control Adjustment Locations, MCS-166/MCS-207

# System Start-Up and Adjustment

## MCS-166/MCS-208 Transducer

The MSC-208 is factory set and calibrated for a 4-20 ma output. This output signal is intended to drive the transducer supplied by Warner Electric. However, other DC current ranges or DC voltage ranges can be selected for output from the MCS-208. Consult factory if a transducer with a different input range has been selected.

Most control adjustments should require no further setting. The exception is the torque/span adjust which sets the maximum output limit. Please follow the setup and adjustment procedure below to assure a trouble-free start-up.

Refer to Figure 13, page 21, for exact location of adjustments and indicators.

### A. Preliminary Set-Up

- 1. Set voltage selector switch on MCS-166 for proper input voltage range, either 120 VAC or 220/240 VAC.

**NOTE:** An additional switch has been added to the MCS-166 for selecting 200 or 240 VAC operation. This switch is labeled Low-High.

- 2. Set the Low-High switch as follows:
  - a. For 120 VAC, set to High position
  - b. For 240 VAC, set to High position
  - c. For 220 VAC, set to Low position

**NOTE:** The Low-High switch is used primarily for selecting 220 or 240 VAC operation when the line selector switch is set for 240 VAC, but it can also be used if low line input voltage exists.

- 3. Low line input: For 108 VAC input when set on 120 VAC or 198 VAC input when set on 240 VAC, set the Low-High switch to the Low position.
- 4. High line input: For 132 VAC input when set on 120 VAC or 198 VAC input when set on 240 VAC, set the Low-High switch to the High position.

**CAUTION** Improperly setting the 120/240 VAC selector switch and the high-low selector switch can damage the power supply and/or control module and void their warranties.

- 5. Slide the power module into its housing and secure with the two captive fasteners on the faceplate.

**CAUTION** Pull the ribbon cable forward so that the connector is in front of the housing assembly. Fasten the ribbon cable connector to the pin connector on the control module. Pin 1 (red tracer) on the ribbon cable must connect to Pin 1 on the control module as shown. This “red tracer” will ALWAYS be toward the top of the control.

- 6. Set the output type and range per figure 13, page 21, as follows:

**NOTE:** The MCS-208 is factory set to provide a 4-20 ma signal to the transducer. If a standard transducer is being used, proceed to Step 7. For a transducer that operates with a different input signal, the proper output must be selected. It will then be necessary to follow the MCS-208 calibration procedure outlined in the static adjustment section.

- a. Set the voltage/current selector switch, SW1 for the proper output. Select IP for a current to pressure transducer or select EP for a voltage to pressure transducer.
- b. For a current to pressure transducer it is also necessary to select the proper range. The output current ranges of 10-50 ma, 4-20 ma, and 1-5 ma are available, and can be selected with SW2.

- 7. Slide the MCS-208 Control Module into its housing and secure with the two captive fasteners on the faceplate.

**CAUTION** Pull the ribbon cable forward so that the connector end is in front of the housing assembly. Fasten the ribbon cable connector to the pin connector on the control module. Pin 1 (red tracer) on the ribbon cable must connect to Pin 1 on the control module as shown. This “red tracer” will ALWAYS be toward the top of the control.

### B. Static Adjustments and Check Out

- 1. Install a pressure gage into the output of the transducer.
- 2. Apply air pressure to the system.
- 3. Apply power to the Tension Control System

with the machine stationary. Check that the “Power” indicators on both the MCS-166 and MCS-208 are illuminated.

- 4. Set the front panel “Torque/Span Adjust” potentiometer to its full CCW positioning.
- 5. Brake-off/brake-on switch checks
  - a. Set the brake-on switch to its normal run mode.
  - b. Set brake-off switch to off position and note the transducer pressure.
  - c. Return the brake-off switch to its normal running position.
  - d. Place the brake-on switch (if used) in the brake-on position and note that the transducer pressure output increases.
  - e. Return the brake-on switch to its normal running position.

**NOTE:** If the transducer pressure decreases when brake-on is activated, the wiring is reversed. Refer to the MCS-208 wiring section for the proper connections.

- 6. Brake Off/Brake On Calibration

**NOTE:** The MCS-208 is factory calibrated for a 4-20ma output. Proceed to Step 7, Transducer Calibration, if the MCS-208 need not be adjusted. If adjustment is required, refer to Table 2 for the correct values called out in the adjustment procedure. An accurate voltmeter is required to set up the system.

Adjustment Variable	Transducer Range				
	1-5 (ma DC)	4-20 (ma DC)	10-50 (ma DC)	1-5 (VDC)	1-9 (VDC)
Y min*	1	4	10	1	1
Y max*	5	20	50	5	9
P sup** (psi)	80	80	80	80	80
P max** (psi)	75	75	75	75	75
P cal** (psi)	70	70	70	70	70

**Table 2**

- Y min (Min transducer input)
- Y max (Max transducer input)
- P sup (supply pressure)
- P max (max pressure - brake-on mode)
- P cal (max pressure - run mode)

\* For current transducers, this value is given in maDC. For voltage transducers, this value is given in VDC.

\*\* If shop air does not maintain 80 psi minimum, the P max and P cal should be set lower. P max should be at least 5 psi lower than the minimum supply pressure. P sup and P cal should be at least 5 psi less than P max.

- a. With the control power off, set the meter to measure MCS-208 control output to the transducer.
- b. Apply power to the system.
- c. Place the brake-off switch in the brake-off mode.
- d. Set the zero potentiometer on the control output driver board to Y min. (Refer to Table 2). Rotate the zero potentiometer CW to increase and CCW to decrease the output.
- e. Return the brake-off switch to normal run mode.
- f. Set the brake-on switch to the brake on mode.
- g. Set the span potentiometer on the control output driver board to equal Y max. Rotate the span pot CW to increase and CCW to decrease the output.
- h. Return the brake-on switch to the normal run mode.
- i. Repeat Steps c-h to make sure the zero and span potentiometers are properly set. There is some interaction between these two potentiometers.

- 7. Transducer Calibration

**NOTE:** For transducers that are precalibrated for 0-75 psi, calibration is not generally required. If the transducer is labeled as calibrated for 0-75 psi and is mounted vertically, proceed to Section C, Input Calibration. Otherwise proceed with the following adjustment procedure. The zero and span potentiometers are identified on the outside of the transducer. Use care when adjusting these potentiometers.

- a. Place the brake-off switch in the brake-off mode.
- b. If the pressure reads above 0 psig, turn the zero pot on the transducer CCW until the pressure just reaches zero.

- c. If the pressure reads 0 psig, turn the zero pot CW until the pressure rises above zero. Then slowly turn the pot CCW until the pressure just reaches zero.
- d. Return the Brake-Off switch to its normal run mode.
- e. Turn on the Brake-On switch and adjust the pressure to Pmax. Turn the span CW to increase pressure and CCW to decrease pressure.

### C. Input Calibration

**NOTE:** The following calibration procedures assume that the minimum input corresponds to zero output pressure to the brake, and that the maximum input corresponds to an output pressure of P cal to the brake. See Table 2, for the values of P cal.

Follow the procedure below (1, 2, 3, 4 or 5) that applies to the input mode selected: These adjustments should be made with the Brake-Off and Brake-On switches in the run mode.

- 1. Local torque adjust mode
  - a. Insure power is on and torque adjust/span is set fully CCW.
  - b. Set the “zero adjust” potentiometer through the front panel so the transducer output pressure is zero.
  - c. Now rotate the front panel torque/span potentiometer toward its maximum setting. As the pot is turned CW toward its maximum position the control output will reach P cal.

The output pressure should not exceed P max. If it does, recheck Brake-Off/Brake-On calibration, Step 6.

**NOTE:** Steps a through c, above, may have to be repeated to achieve full range adjustment of the torque/span potentiometer.

- 2. Remote torque adjust
  - a. Insure that system power is on.

- b. Set the remote torque adjust potentiometer to maximum.
- c. Set the front panel torque span adjust for a transducer pressure output of P cal.
- d. Set the remote torque adjust potentiometer to minimum.
- e. Set the zero adjust potentiometer through the front panel to obtain a transducer pressure output of zero.
- f. Repeat steps b through e above as these two adjustments will interact with each other.

- g. After the proper span adjustment is obtained, remove the torque span knob and insert the cap plug into the hole to prevent tampering.

### 3. Current source adjust

- a. Insure that system power is on.
- b. Adjust the external current source for minimum input current, based on the operating range selected.
- c. Adjust the zero adjust potentiometer through the front panel to obtain a transducer output pressure of zero. Do not turn potentiometer further CCW than necessary to reach zero pressure.
- d. Set the external current source to maximum input based on the operating range selected.
- e. Adjust the front panel torque span potentiometer for a transducer output pressure of P cal. Do not turn potentiometer further CW than necessary to reach P cal.
- f. Repeat steps b through e to insure there is no interaction between adjustments.
- g. After set-up has been completed, the torque span knob should be removed and the hole plugged with the insert provided.

### 4. Voltage source adjust

- a. Insure that the system power is on.

- b. Adjust the external voltage source for the minimum input level to be used.
- c. Set the zero adjust potentiometer through the front panel to obtain a transducer pressure output of zero. Do not turn the potentiometer further CCW than necessary to reach zero pressure.
- d. Set the external voltage source for maximum input level.
- e. Adjust the torque span potentiometer to provide the estimated pressure required to the brake.
- f. Set the roll follower arm back to its true zero position.
- g. Set the zero adjust potentiometer for a transducer output pressure of zero.
- h. Repeat steps e through h until no interaction is evident between the two adjustments.

**▲CAUTION** Maximum input level must not exceed 14.5 VDC. If exceeded, damage to control may result and the warranty will be void.

- e. Adjust the front panel torque span potentiometer for a transducer output of P cal. Do not turn the potentiometer further than necessary to reach P cal.
- f. Repeat steps b through e until no interaction is seen between the two adjustments.
- g. After set-up adjustment have been completed, the torque span knob should be removed and the hole plugged with the insert provided.

5. Roll follower adjustment

**NOTE:** For this procedure it will be necessary to know the torque requirement for the full roll of material. Then use the torque versus pressure performance curves given in the Air Disc Catalog, P-1015, to determine the estimated pressure required at full roll.

- a. Insure the system power is on.
- b. Connect a DC voltmeter between the wiper and DC common on the follower potentiometer.
- c. Adjust the roll follower arm for a true zero position which corresponds to the exact center of the roll shaft. Adjust the roll follower potentiometer to provide a DC input reading of 1.5 VDC±0.1 VDC.
- d. Set the roll follower arm to correspond to maximum roll diameter.

**NOTE:** A final tension adjustment may be required when material is drawn. This adjustment should be made at maximum roll diameter using the torque span potentiometer.

**D. Dynamic adjustments**

- 1. Remove air pressure from the system.
- 2. Disconnect the pressure gage.
- 3. Connect the brake line to the transducer output.

**NOTE:** If it is preferred to leave the pressure gage in the system, a “T” fitting can be used. However, a liquid filled gage should be used.

- 4. Remove any meter connections, etc., that were made during set-up adjustments.
- 5. Apply air pressure to the system.
- 6. Start system and draw web through the machine.
- 7. Make any adjustment necessary to provide the required tensions based on the type of input used.

This completes the start-up and adjustment of the MCS-166/MCS-208 Remote/Analog Control System.

If any difficulties are encountered that cannot be resolved through this manual, contact your local Warner Electric Representative or the factory.

NOTE: 1. INTERCONNECT PIN NUMBERING DOES NOT CORRESPOND TO TERMINAL BLOCK NUMBERING.  
 2. ALL DIMENSIONS ARE NOMINAL.

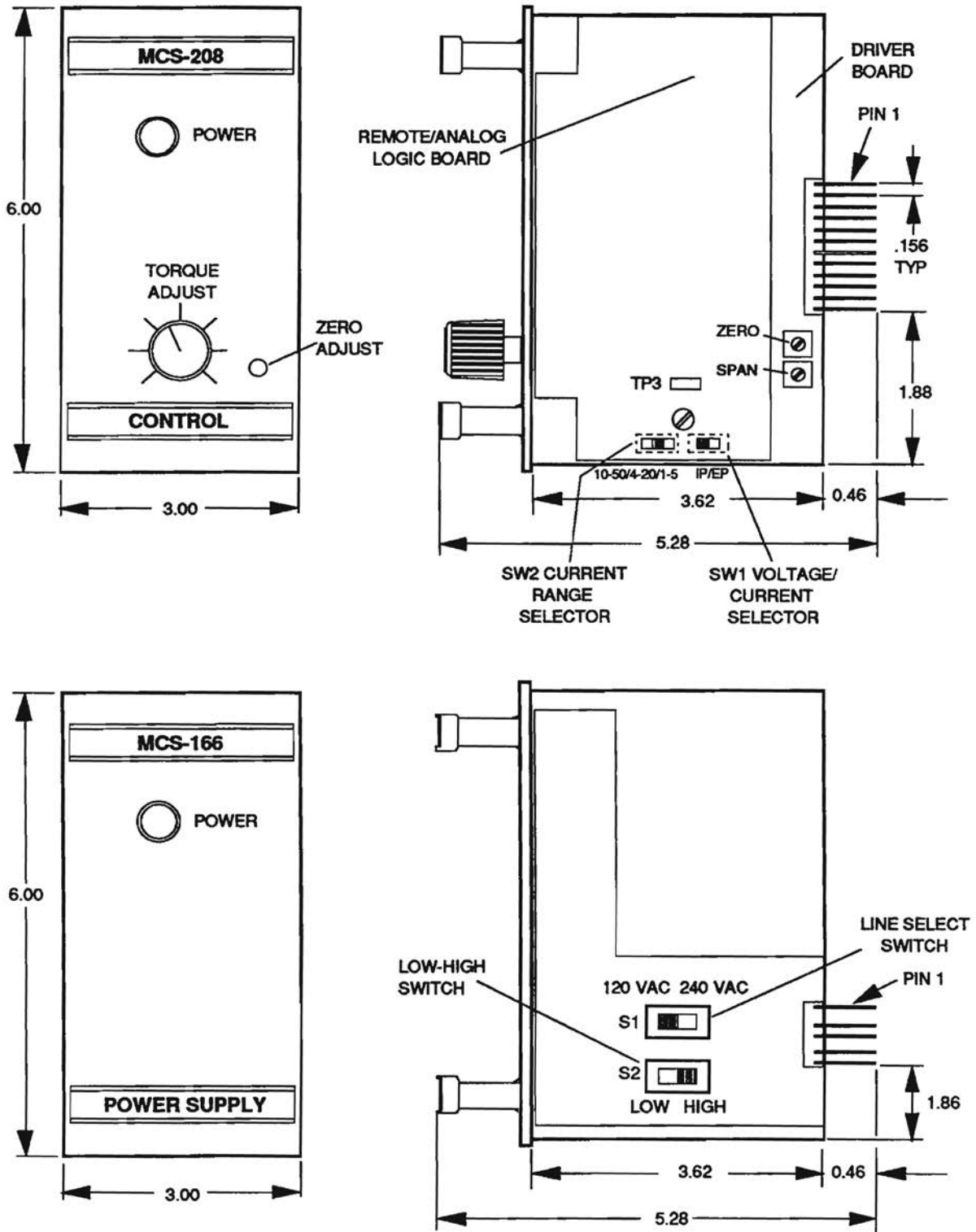


Figure 13. Control Adjustment Locations, MCS-166/MCS-208

**TROUBLESHOOTING**  
**Applies to the Dancer Control System**

General: The chart below will be helpful when isolating exact problems which may occur in the control system. The chart will also prove helpful when encountering problems with the initial start-up of the system.

**Symptom A. Dancer will not raise from bottom position.**

<b>Probably Cause</b>	<b>Suggested Solution</b>
Incorrect Dancer Position Setting	<ul style="list-style-type: none"> <li>• Adjust dancer position setting until dancer moves to normal running position.</li> </ul>
Dancer is not free to move because of obstruction.	<ul style="list-style-type: none"> <li>• Remove obstruction, release any holding devices or safety locks.</li> </ul>
No DC power to the control.	<ul style="list-style-type: none"> <li>• Check for power LED illumination on MCS-207.</li> <li>• Check for power LED illumination on MCS-166.</li> <li>• Check fuses.</li> <li>• Check proper DC input connections to control (refer to tension control hookup instructions).</li> <li>• Check AC power input to MCS-166 if used.</li> </ul>
Brake is not engaging.	<ul style="list-style-type: none"> <li>• Check to be sure the lead wires to the transducer are connected to terminal 1 and 2 of the control.</li> <li>• Check to make sure sensor is connected.</li> <li>• Check to see that the air supply is connected to the input of the transducer.</li> <li>• Also confirm that the air output on the transducer is connected to the brake input.</li> <li>• Using a voltmeter, check for output to the transducer. The dancer should be in the bottom position. If the control is within the range of the transducer, recalibrate the transducer per the calibration procedure. If the transducer cannot be calibrated, replace the transducer. If the output is not within the range of the transducer, recalibrate the control. If the control cannot be calibrated, replace the printed circuit board assembly.</li> <li>• Check for proper pivot sensor alignment. Terminals 6 and 7 on MCS-207 = 7.5 VDC±0.1 VDC with dancer centered: 6.1 VDC - shortest web loop. 8.9 VDC - longest web loop.</li> <li>• Check to see that the brake-off input is not activated.</li> </ul>
Brake does not have the torque capacity required for the application.	<ul style="list-style-type: none"> <li>• Verify that the correct brake was selected by repeating the selection procedure.</li> </ul>

**Symptom B: Dancer moves to and remains at upper limit during initial systems start-up.**

**Note:** Refer to Symptom C if dancer moved to upper limit after it had been running normally at the proper position.

<b>Probable Cause</b>	<b>Suggested Solution</b>
Incorrect dancer position setting	<ul style="list-style-type: none"> <li>• Adjust dancer position setting until dancer moves to normal running position.</li> </ul>
Roll shaft not free to rotate with control off Sensor incorrectly connected to control	<ul style="list-style-type: none"> <li>• Brake and shaft must be free to rotate with control off.</li> <li>• Verify sensor connections. Using a voltmeter, check the output of the control as follows: Slowly raise the dancer and observe that the control output decreases. Then slowly lower the dancer and observe that the output increases. If the output indications are the opposite, reverse the sensor leads at terminals 5 and 7 of the control (see sensor wiring). If not output change occurs, check the sensor cable connections (check pivot point coupling connection if MCS-605-1 or TCS-605-5 sensor is used). If no output change occurs, be sure that the transducer wires are not grounded to the machine.</li> </ul>

Brake is not releasing as dancer is raised (even though voltage decreases)

- Check the mechanical parts of the brake to assure they are in good operating condition and properly installed. Check to see if brake-on input is activated.

---

**Symptom C: Dancer moves to and remains at upper limit after operating in a normal running position for a period of time.**

---

Probable Cause	Suggested Solution
Incorrect dancer position setting	<ul style="list-style-type: none"> <li>• Adjust dancer position setting until dancer moved to normal running position.</li> </ul>
Dancer pivot point sensor coupling has slipped	<ul style="list-style-type: none"> <li>• If dancer position adjustment lowers the arm near its normal running position, realign pivot point sensor (see sensor mounting).</li> </ul>
Faulty PC Board	<ul style="list-style-type: none"> <li>• With dancer position potentiometer and gain potentiometer at minimum setting, (full CCW), check that the output to the transducers approaches the minimum transducer input as the dancer arm is raised. If input does not reduce, replace printed circuit board assembly.</li> </ul>
Drag torque of unwind stand and/or inertia of rotating parts exceeds the minimum torque allowable for the application. (This problem recurs near roll core only.)	<ul style="list-style-type: none"> <li>• With dancer position potentiometer and gain potentiometer at minimum setting (full CCW), check that the output to the transducer goes to minimum as the dancer is slowly raised. If the output goes to minimum, check to make sure the transducer is calibrated. Also, check to be sure the unwind stand friction or inertia is not excessive for the application. Check the brake selection procedure to be sure the brake being used does not exceed the minimum allowable torques.</li> </ul>

---

**Symptom D: Dancer moves erratically - appears to hunt or oscillate.**

---

Probable Cause	Suggested Solution
Incorrect dancer gain setting.	<ul style="list-style-type: none"> <li>• Adjust dancer gain setting CCW until dancer stops hunting.</li> </ul>
Non-uniform system friction.	<ul style="list-style-type: none"> <li>• If the hunting coincides with each revolution of the web parent roll, check faulty bearings or mis-mounted brake.</li> </ul>
Improperly installed sensor	<ul style="list-style-type: none"> <li>• When an MCS-605-1 sensor is being used, check to be sure the index mark on the sensor shaft is aligned with the index mark on the sensor body when the dancer is at the mid-travel position. Also, be sure there is no lag between the movement of the dancer pivot point and the shaft of the sensor - the sensor shaft must move when the dancer pivot moves. With dancer centered, voltage at terminal 6 and 7 should be 7.5 VDC <math>\pm</math>0.1 VDC (refer to the sensor mounting section).</li> </ul>
Loose or faulty sensor and cable assembly	<ul style="list-style-type: none"> <li>• Check to be sure that all connections to the control terminal block and the transducer wire connections are secure. Check electric connector at sensor to be sure it is not loose. Using a DC voltmeter connected between control terminals 6 and 7, check to be sure the voltage variation is smooth as the dancer is slowly moved through its travel limits. If the voltage variation is not relatively smooth, either the sensor or cable assembly is faulty. To isolate the fault to the cable or the sensor, turn off power and disconnect the cable from the sensor and connect an ohmmeter between the middle pin and one of the remaining pins on the sensor receptacle. The resistance indication should vary smoothly as the dancer is moved through its travel limits. If the indication is erratic, the sensor should be replaced; if the indication is not erratic, the cable assembly should be replaced. If above steps seem normal, recheck dancer arm length (most application require a dancer arm at least 12" long).</li> </ul>



**TROUBLESHOOTING**  
**Applies to the Remote/Analog Control System**

With the exception of the dancer input, general MCS-166/MCS-208 system troubleshooting is quite similar to troubleshooting the MCS-166/MCS-207. The chart below will be helpful in isolating problem causes.

<b>Probable Cause</b>	<b>Suggested Solution</b>
No DC power to the control.	<ul style="list-style-type: none"> <li>• Check for power LED illumination on MCS-208.</li> <li>• Check for power LED illumination on MC-166.</li> <li>• Check fuses.</li> <li>• Check proper DC input connections to control (refer to tension control hookup instructions).</li> <li>• Check AC power input to MCS-166, if used.</li> </ul>
Brake is not engaging.	<ul style="list-style-type: none"> <li>• Check to be sure lead wires to the transducer are connected to terminals 1 and 2 of the control.</li> <li>• Check to see that control input is properly connected.</li> <li>• Using a voltmeter, check for output to the transducer. If the output is in the range of the transducer, recalibrate the transducer per the calibration procedure. If the transducer cannot be calibrated, replace the transducer. If the output is not within the range of the transducer, recalibrate the control. If the control cannot be calibrated, replace the printed circuit board assembly.</li> <li>• Check for proper input signal.</li> <li>• Check to see that the transducer is wired properly.</li> <li>• Check to see that brake-off input is not activated.</li> </ul>
Brake does not have the torque capacity required for the application.	<ul style="list-style-type: none"> <li>• Verify that the correct brake was selected by repeating the selection procedure.</li> </ul>
Brake is not releasing as input level decreases.	<ul style="list-style-type: none"> <li>• Check the mechanical parts of the brake to insure that they are in good operation condition and properly installed. Check to see if brake-on input is activated.</li> </ul>
Roll shaft not free to rotate with control off.	<ul style="list-style-type: none"> <li>• Brake and shaft must be free to rotate with control off.</li> </ul>
Inputs incorrectly connected to control terminals.	<ul style="list-style-type: none"> <li>• Verify input connections.</li> </ul>
If brake LED is off.	<ul style="list-style-type: none"> <li>• Using a voltmeter, check the output at the transducer as follows. Slowly reduce the input level and observe that the output decreases, then slowly increase the input level and observe that the output increases.</li> </ul>
Drag torque of the unwind stand exceeds the minimum torque allowable for the application. (This problem may occur near roll core.)	<ul style="list-style-type: none"> <li>• With input level at minimum setting, check that the transducer input decreases to the low end of the range. If not, the control output must be recalibrated. If the transducer input is correct, verify that the brake pressure goes to zero. (The actuators should be loose.) If the actuators are not loose, but become loose after the supply pressure is removed, then recalibrate the transducer. If the actuators are still tight, check to be sure that the brake is in good operation condition and properly installed. If everything checks as correct, check to be sure the unwind stand friction is not excessive for the application. The inertia of the rotating parts may also be causing excess tension as the unwind shaft accelerates when unwind diameter decreases.</li> </ul>

# Warranty

Warner Electric LLC warrants that it will repair or replace (whichever it deems advisable) any product manufactured and sold by it which proves to be defective in material or workmanship within a period of one (1) year from the date of original purchase for consumer, commercial or industrial use.

This warranty extends only to the original purchaser and is not transferable or assignable without Warner Electric LLC's prior consent.

Warranty service can be obtained in the U.S.A. by returning any defective product, transportation charges prepaid, to the appropriate Warner Electric LLC factory. Additional warranty information may be obtained by writing the Customer Satisfaction Department, Warner Electric LLC, 449 Gardner Street, South Beloit, Illinois 61080, or by calling 815-389-3771.

A purchase receipt or other proof of original purchase will be required before warranty service is rendered. If found defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs. If found not to be defective, you will be notified and, with your consent, the item will be repaired or replaced and returned to you at your expense.

This warranty covers normal use and does not cover damage or defect which results from alteration, accident, neglect, or improper installation, operation, or maintenance.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

Warner Electric LLC's obligation under this warranty is limited to the repair or replacement of the defective product and in no event shall Warner Electric LLC be liable for consequential, indirect, or incidental damages of any kind incurred by reason of the manufacture, sale or use of any defective product. Warner Electric LLC neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

WITH RESPECT TO CONSUMER USE OF THE PRODUCT, ANY IMPLIED WARRANTIES WHICH THE CONSUMER MAY HAVE ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL CONSUMER PURCHASE. WITH RESPECT TO COMMERCIAL AND INDUSTRIAL USES OF THE PRODUCT, THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## **Changes in Dimensions and Specifications**

All dimensions and specifications shown in Warner Electric catalogs are subject to change without notice. Weights do not include weight of boxing for shipment. Certified prints will be furnished without charge on request to Warner Electric.



**Warner Electric LLC**  
31 Industrial Park Road • New Hartford, CT 06057  
815-389-3771 • Fax: 815-389-2582  
[www.warnerelectric.com](http://www.warnerelectric.com)