Danfoss ACW109D Proportional Rotary Position Controller Instructions

Contents

Danfoss ACW109D Proportional Rotary Position Controller

Specifications

- **Model:** ACW109D Proportional Rotary Position Controller
- **Input Voltage:** 10 to 15 Vdc, 0.5 ampere maximum
- **Shaft Rotation:** Full 360 angular degrees without stops
- **Shaft Operating Torque:** Not more than 50-inch grams throughout the range of travel
- **Null Point:** Located by a roll pin and two moulded stops on the bearing block
- **Vibration Resistance:** Withstands vibration test designed for mobile equipment controllers
- **Shock Resistance:** Withstands shock test designed for mobile equipment devices
- **Weight:** 0.8 kilograms (1 pound, 12 ounces)

Product Usage Instructions

1. **Installation**
   Follow the Mounting Dimensions diagram to correctly position the ACW109D on your mobile machine.
2. **Wiring**
   Refer to the Connection Diagram for the appropriate wiring setup. Ensure proper connection for smooth operation.
3. **Operation**
   The ACW109D provides steering control by comparing input from a remote sensor to the rotational position of the input shaft. The output signal drives the MCV103/113 Flow Control SServicefor corrective action.
4. **Maintenance**
   Regularly check for any loose connections or signs of wear on the Controller. Clean any dust or debris that may affect performance.

FAQs

- **Q: What should I do if the Controller is not responding?**
  A: Check the wiring connections and power supply to ensure proper functioning.
- **Q: Can I use a different sensor with the ACW109D?**
  A: It is recommended to use the specified sensor ACX104 for optimal performance.
- **Q: How do I adjust the gain on the ACW109D?**

A: The gain can be adjusted by referring to Table B and selecting the appropriate model based on your steering application.

DESCRIPTION

The ACW109D Proportional Rotary Position Controller provides a means of steering a mobile machine. The Controller senses the direction of a wheel or track, compares that direction to an error signal generated by a remote sensor and supplies an output for corrective action. In most installations, the ACW109D will occupy the same location assigned to a feedback transducer in automatic steering control applications.

- In a typical application, the ACW109D will obtain direction information from a remote sensor such as the ACX104.
- The signal will be compared to the rotational position of the Controller input shaft. A pulse width modulated output signal drives an MCV103/113 Flow Control Servovalve, which moves a cylinder to reposition the wheels or tracks.
- Steering alignment is a common application.

FEATURES

- Capable of driving a service directly, without additional signal amplification
- Adjustable sensitivity
- Solid state circuitry
- Reverse polarity and short circuit protection
- Wiring connections made through MS-type connector
- Designed to withstand the vibration associated with mobile equipment
- Can be connected fotoxternal bias or remote-centeringRDERING INFORMATION

SPECIFY

1. Model Number ACW109D
2. Sensor; ACX104
3. Servovalve; MCV103/113
4. Cables; KW01013, KW01009

TABLE A. INFORMATION NECESSARY TO SPECIFY THE CONTROLLER.

ORDER NUMBER	KILOHM	POTENTIOMETER
ACW109D1000	10	90°
ACW109D1018	10	342°
ACW109D1026	20	342°

TECHNICAL DATA

MODELS

Three models are available, dependent upon the mobile machine's steering application. See Table B.

MODEL	PROPORTIONAL 1 GAIN	RATED 2 TRAVEL
ACW109D1000	1.75°	±15°
ACW109D1018	7.0°	±57°
ACW109D1026	14.0°	±114°

1. Shaft angle change is required for full valve drive when set at maximum gain.
2. Shaft angle change is required to match the ±3V rated output of the ACX104.

- **INPUT VOLTAGE**
  10 to 15 Vdc, 0.5-ampere maximum
- **OUTPUT VOLTAGE**
  0 to ±6 Vdc with 12 Vdc supply voltage.
- **SHAFT ROTATION**
  The shaft rotates the full 360 angular degrees without stopping.
- **SHAFT OPERATING TORQUE**
  No more than 50-inch grams throughout the range of travel.
- **NULL POINT**
  The null point of the Controller is located by a rolling pin and two moulded stops on the bearing block. At null, the longer end of the roll pin is centered between the stops, and parallel to the case. The short roll pin permits 360° shaft rotation.

VIBRATION
Withstands a vibration test designed for mobile equip-ment controllers that includes two parts:

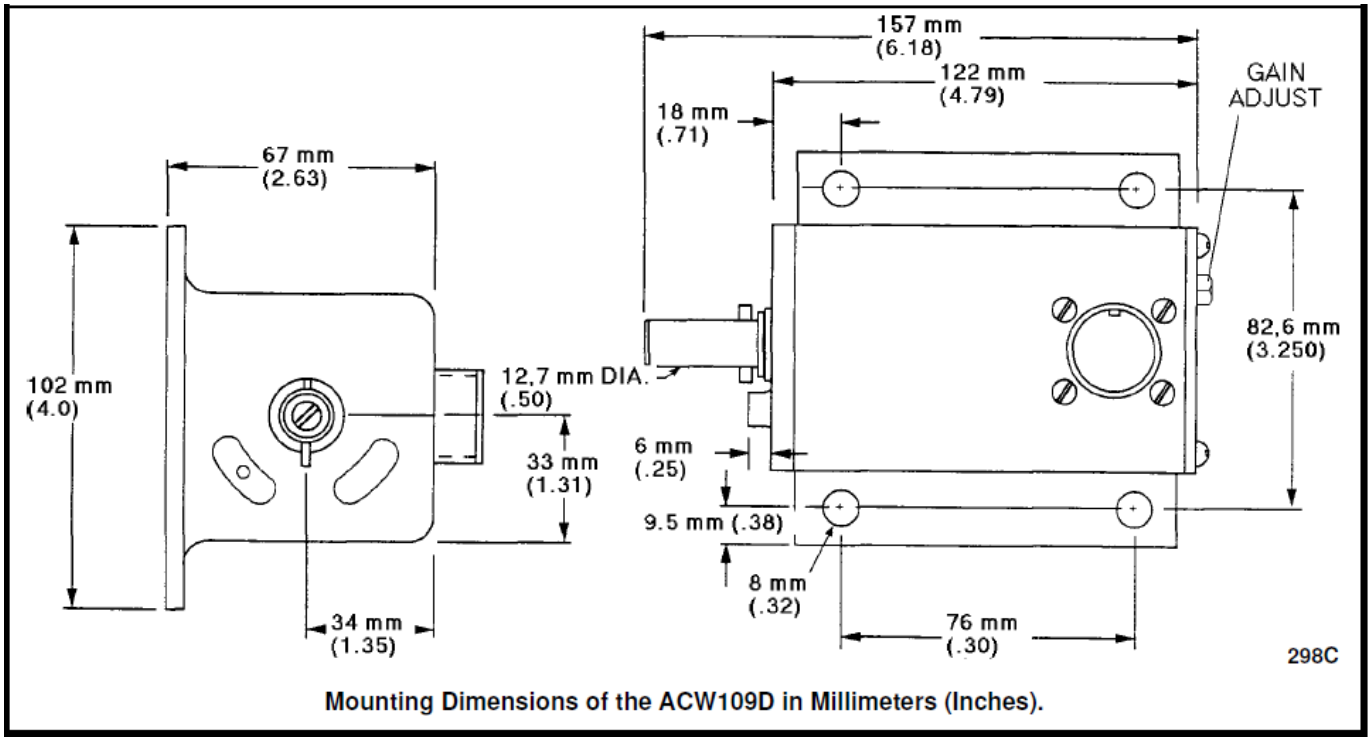
1. Cycling from 5 to 2000 Hz over a range of ±1.5 g's to ± 8.0 g's for one hour (if there are four resonant points), for two hours (if there are two or three resonant points), or for three hours (if there is one or no resonant point). A cycling test was performed on each of the three major axes.
2. Resonance dwells for one million cycles over a range of ±1.5 g's to ±8.0 g's for each of the four most severe resonant points on each of the three major axes.

- **SHOCK**
  Withstands a shock test designed for mobile equipment devices that consists of three shocks of 50 g's and 11 milliseconds duration in both directions of the three major axes for a total of 18.
- **OPERATING TEMPERATURE**
  -18° to +77° C (0° to +170° F)
  STORAGE TEMPERATURE
  -40° to +77° C (-40° to +170° F)
- **DIMENSIONS**
  Refer to the Dimensions diagram.

- **WEIGHT**

  0.8 kilograms (1 pound, 12 ounces)

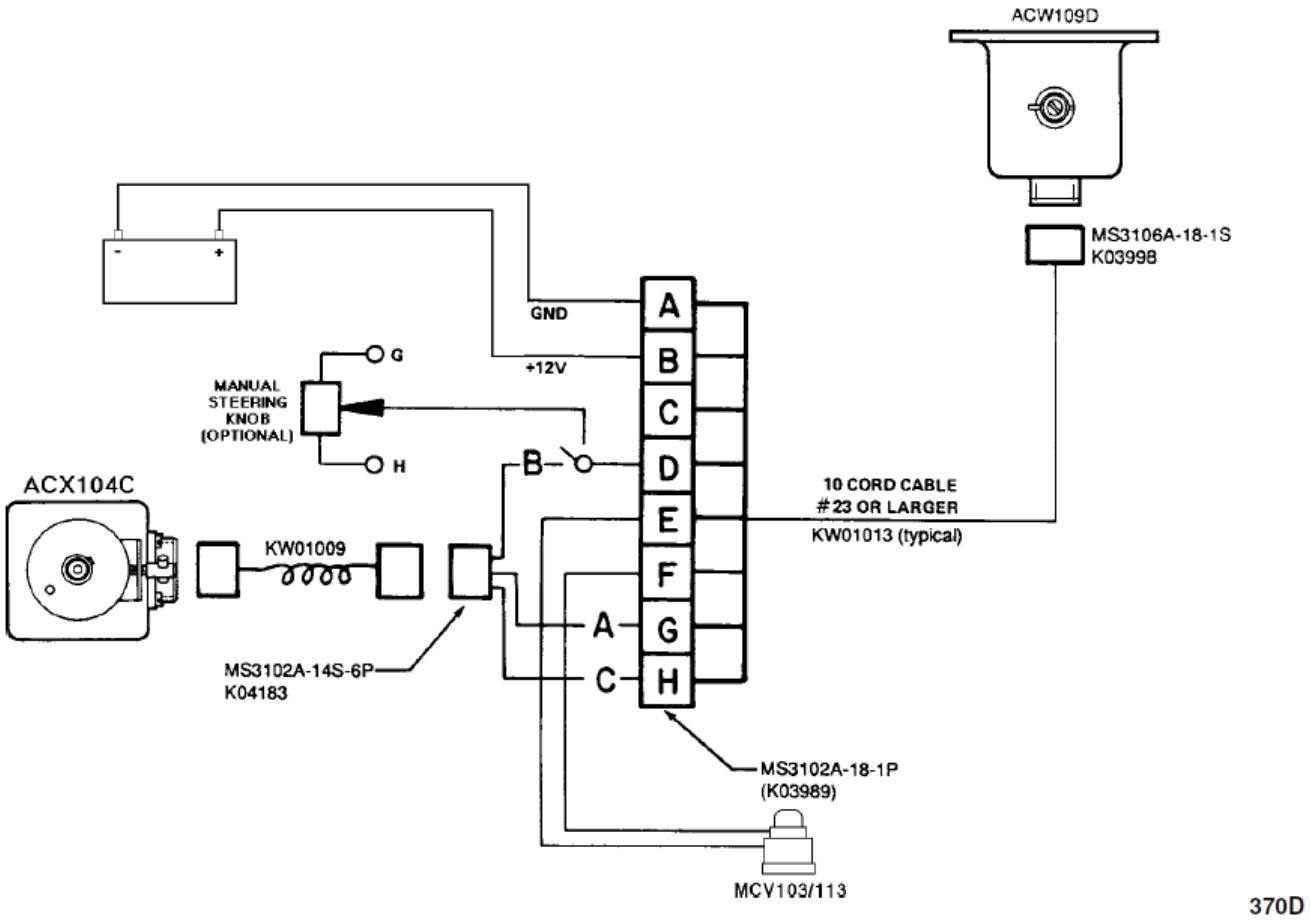
DIMENSIONS



Mounting Dimensions of the ACW109D in Millimeters (Inches).

CONNECTION DIAGRAM

CONNECTION DIAGRAM (Typical)



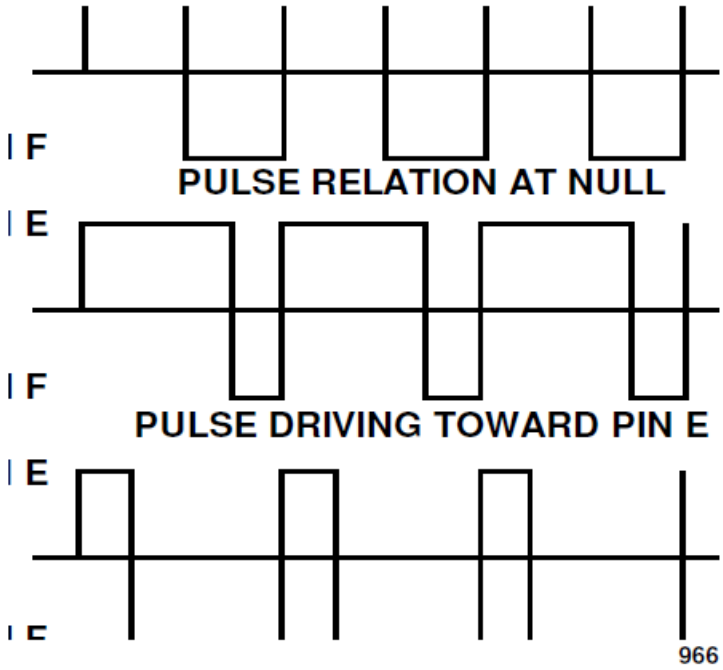
Wiring Diagram for the ACW109D Used as Electronic Tie Rod.

THEORY OF OPERATION

The output of the ACW109D is a square wave signal used to operate the MCV103/113 Flow Control Servovalve. This signal alternately puts a positive 6 Volts on Pin F of the MS connector, then on Pin E of the connector. See the Typical Output Signal diagram. Valve control is obtained by increasing the duration of the signal on one pin while decreasing the duration of the signal on the other. When at null (neutral) control position, the duration of the 6 Volt output on one pin equals the duration of the 6 Volt output on the other pin. Because of the frequency of the cycling (250 to 600 Hz), the valve remains centred.

As the shaft is turned clockwise from its null position, the duration of the signal from Pin F becomes longer and the duration of the signal from Pin E becomes shorter, the opposite being true when the shaft is turned counterclockwise. As the correction in control is made and the steering position aligns with the sensor, the signals will become balanced and the servo valve will centre.

TYPICAL OUTPUT SIGNAL



CUSTOMER SERVICE

NORTH AMERICA

- **Danfoss (US) Company**
- Customer Service Department 3500 Annapolis Lane North Minneapolis, Minnesota 55447
- **Phone:** (763) 509-2084
- **Fax:** (763) 559-0108

DEVICE REPAIR
For devices in need of repair or evaluation, include a description of the problem and what work you believe needs to be done, along with your name, address and telephone number.

RETURN TO
Danfoss (US) Company Return Goods Department 3500 Annapolis Lane North Minneapolis, Minnesota 55447

EUROPE

ORDER FROM

- Danfoss (Neumünster) GmbH & Co. Order Entry Department Krokamp 35 Postfach 2460 D-24531 Neumünster Germany
- **Phone:** 49-4321-8710
- **Fax:** 49-4321-871-184

Documents / Resources

Danfoss ACW109D Proportional Rotary Position Controller [pdf] Instructions
ACW109D1000, ACW109D1018, ACW109D1026, ACW109D, ACW109D Proportional Rotary Position Controller, Proportional Rotary Position Controller, Rotary Position Controller, Position Controller, Controller

References

- **User Manual**