



# ACW109D

## Proportional Rotary Position Controller

BLN-95-8928-4

Issued: March 1992

### DESCRIPTION

The ACW109D Proportional Rotary Position Controller provides a means of steering a mobile machine. The Controller senses 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 servovalve 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 for external bias or remote centering

### ORDERING 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.

**TABLE B.**

MODEL	PROPORTIONAL △ <sup>1</sup> GAIN	RATED △ <sup>2</sup> TRAVEL
ACW109D1000	1.75°	±15°
ACW109D1018	7.0°	±57°
ACW109D1026	14.0°	±114°

△<sup>1</sup> Shaft angle change required for full valve drive when set at maximum gain.

△<sup>2</sup> Shaft angle change 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 stops.

## SHAFT OPERATING TORQUE

No more than 50 inch grams throughout the range of travel.

## NULL POINT

Null point of the Controller is located by a roll pin and two molded 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 equipment 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 a period of 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). Cycling test performed on each of the three major axes.
2. Resonance dwell 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)

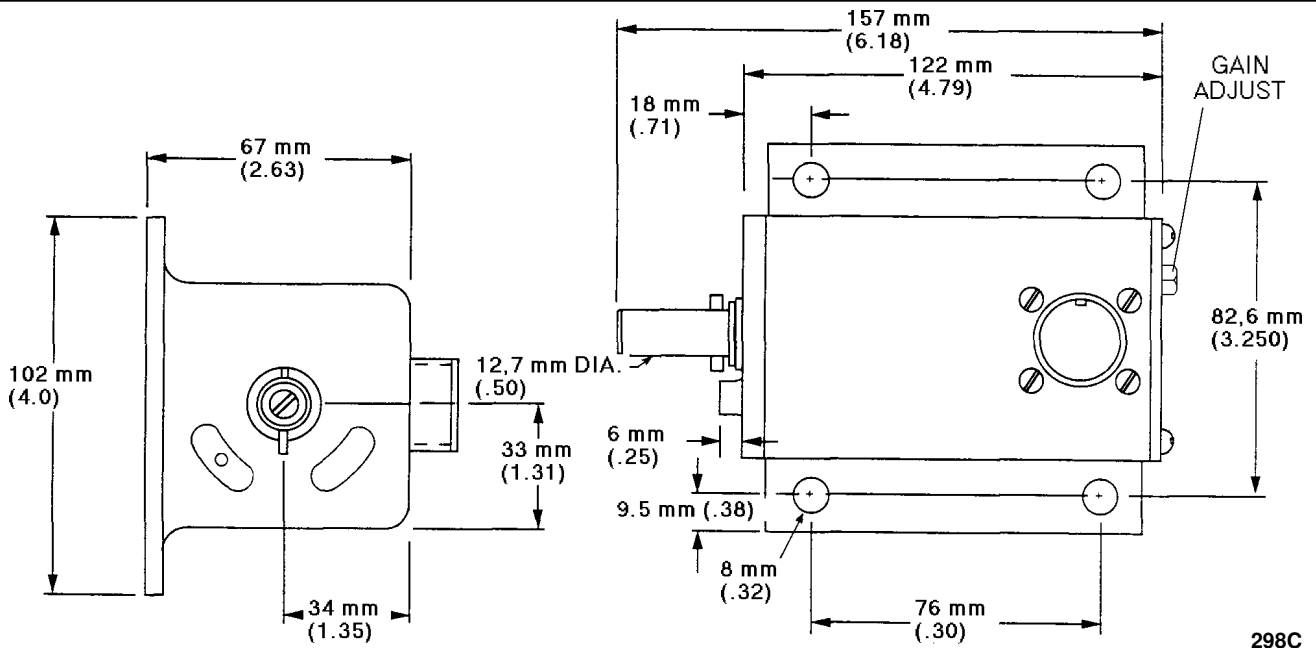
## DIMENSIONS

Refer to the Dimensions diagram.

## WEIGHT

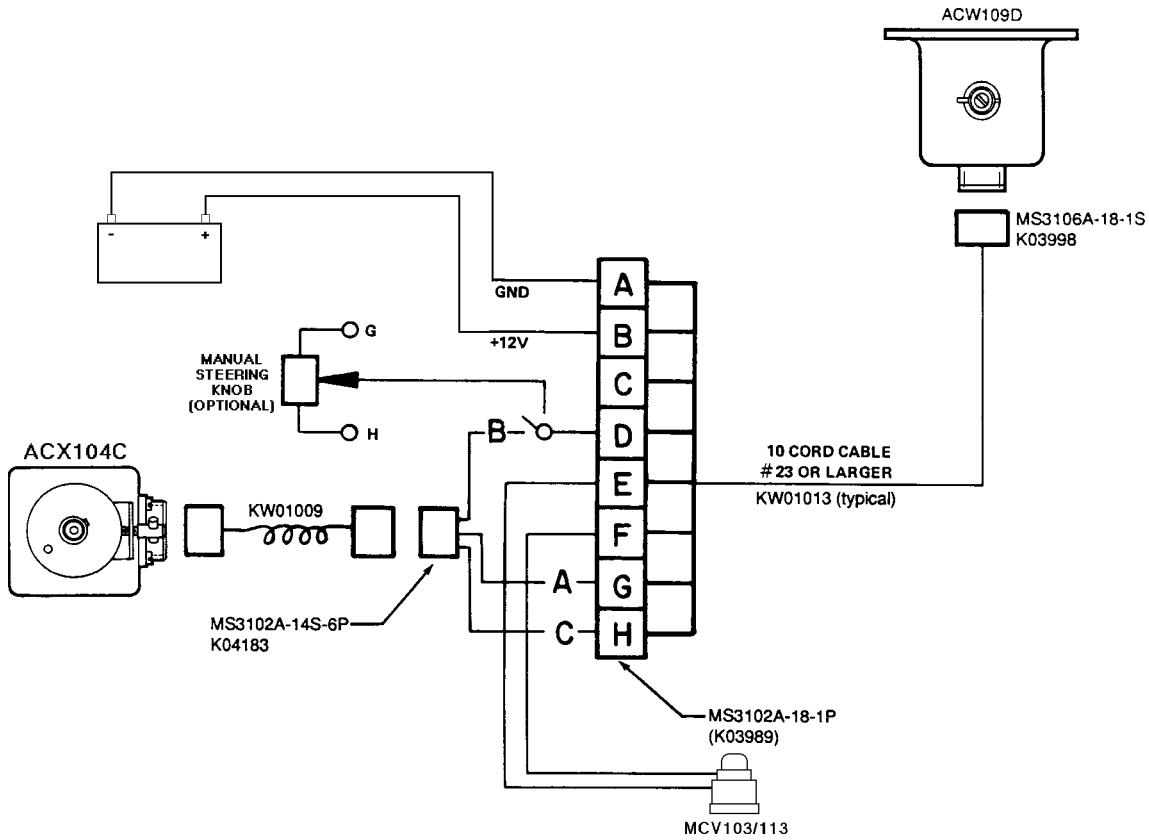
0.8 kilograms (1 pound, 12 ounces)

# DIMENSIONS



**Mounting Dimensions of the ACW109D in Millimeters (Inches).**

# CONNECTION DIAGRAM (Typical)



370D

Wiring Diagram for the ACW109D Used as Electronic Tie Rod.

## THEORY OF OPERATION

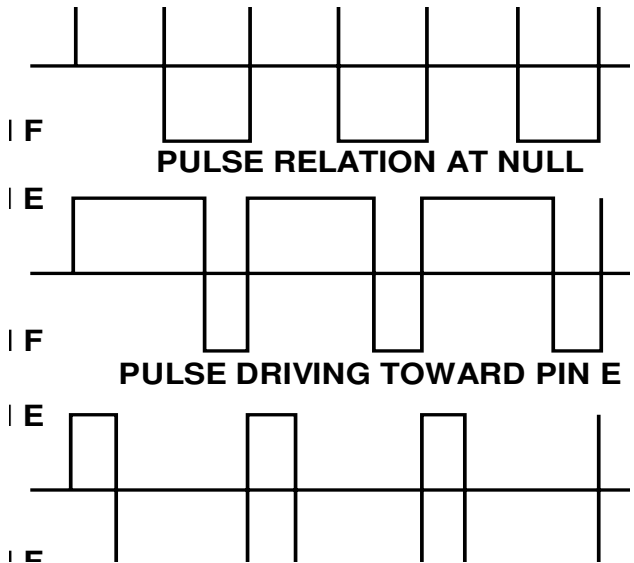
The output of the ACW109D is a square wave signal used to operate the MCV103/113 Flow Control Servovalve. This signal alternately puts a positive 6 Volts on Pin F of the MS connector, then on Pin E of the connector. See the Typical Output Signal diagram. Valve control is obtained by increasing the duration 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 centered.

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 servovalve will center.

## TYPICAL OUTPUT SIGNAL



966

## CUSTOMER SERVICE

### **NORTH AMERICA**

---

#### **ORDER FROM**

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