

FEATURES

- Single or two-speed inputs
- Bright 0.56" LED display
- Small size
- 47 to 3000Hz frequency range
- 0.01° resolution
- 0.01° accuracy, two speed
- 0.03° accuracy, single speed
- Single +5V power supply
- Binary and BCD outputs
- Bipolar and unipolar operation
- Diagnostic signals
- Optional DC output

APPLICATIONS

- Antenna Range instrumentation
- System Test
- Portable Test Equipment

GENERAL DATA

The DPM-501 and DPM-502 are small lightweight synchro or resolver panel meters. The DPM-501 accepts single-speed inputs, while the DPM-502 accepts two-speed inputs. Both meters operate over the frequency range of 47 to 3000Hz. Signal voltages may be specified from 2.5 to 230V line-to-line. The meters can be pin programmed to read in decimal degrees from 0° to 359.99° or 0° to ±180.00°. A 3-state binary and BCD interface is available at the rear panel. The meters also feature diagnostic fault signals indicating loss of reference, loss of signal, and excessive error. All fault signals are displayed on the front panel.

The heart of the meter is a synchro/resolver to digital converter. Single-speed meters incorporate a "reference synthesizer" required to maintain high accuracies even with large rotor to stator phase shifts. All meters employ ratiometric conversion techniques to provide signal amplitude insensitivity. A "Type II" servo loop is employed to ensure high-noise immunity and jitter-free operation.

Two-speed meters contain the two-speed combining, cross-over network and stick-off circuits required to produce a single unambiguous binary output angle. Coarse/fine misalignments up to ±2.5° can be tolerated before ambiguous output angles are encountered.

DIAGNOSTIC SIGNALS

The meter has its own built-in diagnostic circuitry and continuously monitors for the following faults:

1. Excessive converter error (FLT)
2. Loss of reference excitation (LOR)
3. Loss of single-speed signal (LOS)
4. Loss of multi-speed signal (LOM)

If a fault is detected, the decimal display is blanked and is replaced by fault designators; see figure 1. Certain fault conditions can cause multiple fault designators to be displayed. In that event, the probable fault is indicated by the left-most fault designator. Once the source of the fault is removed, the fault designators will automatically be replaced by the decimal display.

SYNCHRO/RESOLVER INTERFACE

In the case of synchro meters, the following conventions are used:

$$E_{S1-S3} = E_{RL-RH} \sin \theta$$

$$E_{S3-S2} = E_{RL-RH} \sin(\theta + 120^\circ)$$

$$E_{S2-S1} = E_{RL-RH} \sin(\theta + 240^\circ)$$

For resolver meters, the following conventions are used:

$$E_{S1-S3} = E_{RL-RH} \sin \theta$$

$$E_{S4-S2} = E_{RL-RH} \cos \theta$$

SPECIFICATIONS

Parameter	Value
Accuracy	
Single Speed	
BCD/Display	$\pm 0.030^\circ$
Binary	$\pm 0.022^\circ$
Two Speed	
BCD/Display	$\pm 0.01^\circ$ ratios > 1:30 $\pm 0.02^\circ$ ratios < 1:30
Binary	$\pm 0.006^\circ$ ratios > 1:30 $\pm 0.011^\circ$ ratios < 1:30
Angular Ranges	
Unipolar	0° to 359.99°
Bipolar	0° to $\pm 180.00^\circ$
Display	
Type	0.56" 7-segment red LED
Sampling Rate	16 samples/second
Reference Input	
Type	Solid state differential
Voltage	2.5 to 230Vrms (See Ordering Info
Frequency	47 to 3000Hz and Notes)
Impedance	220K Ω
Harmonic Content	10% max.
Signal Inputs	
Type	Synchro or resolver
Voltage L-L	2.5 to 230Vrms (See Ordering Info
Impedance	$9(V_{L-L})K\Omega$ and Notes)
Dynamic Characteristics	
Single Speed	
Tracking Rate	900 $^\circ$ /second
Ka	1000
Two Speed	
Tracking Rate	250 $^\circ$ /second
Ka	4500
Digital Inputs	
Loading	0.5 std TTL loads
Inhibit	"0"=freeze "1"=track
Mode	"0"=unipolar "1"=bipolar
Select	"0"=BCD "1"=binary
Output Control 1	"0"=D00-D07 "1"=hi-Z
Output Control 2	"0"=D08-D15 "1"=hi-Z
Output Control 3	"0"=D16-D23 "1"=hi-Z
Digital Outputs	
Drive Capability	5 std TTL loads
Binary Angle	16 bit positive logic
BCD Angle	5 decade positive logic plus sign
Sign	"0"=(+) "1"=(-)
Converter Busy	1-7 μ sec positive pulse
Fault	"0"= normal "1"=excessive error
Loss of Reference	"0"=present "1"=absent
Loss of Stator Signals	"0"=present "1"=absent
DC Output (optional)	
Range	0 to +4.9988V for 0° to 359.912°
Resolution	0.088 $^\circ$
Accuracy	$\pm 0.15^\circ$
Power Input	
Voltage	+4.75V to +5.25V
Current	0.5A max.
Operating Temp. Range	
Physical	
Dimensions	1.88" x 3.76" x 4.08"
Weight	13 oz.

DIGITAL INPUTS

Inhibit

The Inhibit (INH) input is used to freeze the display, binary and BCD outputs. When INH is at logic "1" or open, the display and digital outputs track, when at logic "0" they are latched.

Mode

The Mode (MODE) input is used to set the display and BCD output range. A logic "0" sets the unipolar range, 0° to 359.99° . A logic "1" or open sets the bipolar range, 0° to $\pm 180.00^\circ$.

Select

The Select (SEL) input places either binary or BCD data on the D00-D23 lines; see Truth Table. A logic "0" selects BCD data and a logic "1" or open selects binary data.

Output Control

The input lines (OC1, OC2 and OC3) are used to control the three byte outputs. A logic "0" enables the corresponding output and a logic "1" or open places the outputs in the high-impedance state.

DIGITAL OUTPUTS

The meter provides 24 output data lines, D00-D23. See the Truth Table, figure 2, for configuration.

Binary/BCD Outputs

Either a 16 bit parallel binary angle or a 5 decade BCD angle plus sign can be presented at the J2 rear panel connector. The binary angle is a real time word and may be transferred reliably at synchro/resolver rotational rates up to specified tracking rates. A simple method of synchronously transferring data is to: a) set INH to logic "0", b) wait 7 μ sec, c) transfer binary data and d) set INH to logic "1". Asynchronous loading is accomplished by transferring data on the trailing edge of the CB pulse.

The BCD angle output has a sampling rate of 16 samples per second. This output is only useful for static readings or for driving remote displays.

Converter Busy

The Converter Busy (CB) is a positive pulse to indicate that the binary data is changing state. This pulse brackets the binary code change.

Fault

The synchro/resolver to digital converter is continuously monitored for proper operation. If a converter failure is detected, the Fault output (FLT) is set to logic "1".

Loss of Reference Excitation

The reference excitation input is also monitored. When the reference excitation is present, the LOR output is at logic "0". If the reference excitation is not present, the LOR output will be a logic "1".

Loss of Single-Speed Signal

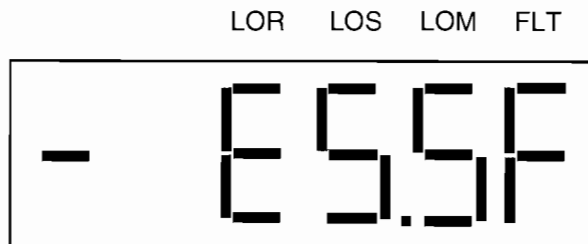
The one-speed stator inputs are monitored and when the signals are present, the LOS output is at logic "0". If these signals are not present, then the LOS output will be at logic "1".

Loss of Multi-speed Signal

The multi-speed stator inputs are also monitored and when the signals are present, the LOM output is at logic "0". If these signals are not present, the LOM output will be at logic "1". This output will always be at logic "0" on the DPM-501.

DISPLAY FAULT DESIGNATORS

FIGURE 1



TRUTH TABLE

FIGURE 2

OUTPUT	SELECT		OC1		OC2		OC3	
	L	H	L	H	L	H	L	H
D00	0.01°	0.005°	EN	Z	X	X	X	X
D01	0.02°	0.011°	EN	Z	X	X	X	X
D02	0.04°	0.022°	EN	Z	X	X	X	X
D03	0.08°	0.044°	EN	Z	X	X	X	X
D04	0.1°	0.088°	EN	Z	X	X	X	X
D05	0.2°	0.176°	EN	Z	X	X	X	X
D06	0.4°	0.352°	EN	Z	X	X	X	X
D07	0.8°	0.703°	EN	Z	X	X	X	X
D08	1°	1.406°	X	X	EN	Z	X	X
D09	2°	2.812°	X	X	EN	Z	X	X
D10	4°	5.625°	X	X	EN	Z	X	X
D11	8°	11.25°	X	X	EN	Z	X	X
D12	10°	22.50°	X	X	EN	Z	X	X
D13	20°	45.00°	X	X	EN	Z	X	X
D14	40°	90.00°	X	X	EN	Z	X	X
D15	80°	180.0°	X	X	EN	Z	X	X
D16	100°	"0"	X	X	X	X	EN	Z
D17	200°	"0"	X	X	X	X	EN	Z
D18	SIGN	CB	X	X	X	X	EN	Z
D19	FLT	FLT	X	X	X	X	EN	Z
D20	LOR	LOR	X	X	X	X	EN	Z
D21	LOS	LOS	X	X	X	X	EN	Z
D22	LOM	LOM	X	X	X	X	EN	Z
D23	"0"	"0"	X	X	X	X	EN	Z

H=high level
L= low level
X=irrelevant
Z=hi-impedance
EN=enabled
"0"=logic 0

PIN ASSIGNMENTS

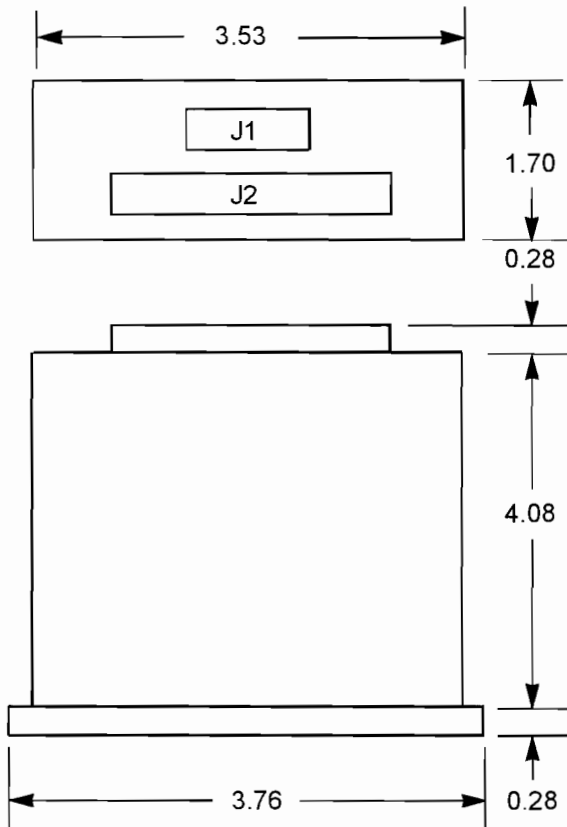
SIGNAL INPUTS J1 SINGLE SPEED	
PIN#	FUNCTION
1	S1 Synchro
2	S2 11.8V
3	S3 Resolver
4	S4 3.0V
5	Ref Hi
6	Ref Lo
14	S1 Synchro
15	S2 90V
7	S3 Resolver
8	S4 XX

SIGNAL INPUTS J1 TWO SPEED	
PIN#	FUNCTION
1	S1
2	S2 Single
3	S3 Speed
4	S4
5	Ref Hi
6	Ref Lo
9	S1
10	S2 Multi-
11	S3 Speed
12	S4

DIGITAL INTERFACE J2			
PIN#	FUNCTION	PIN#	FUNCTION
1	+5VDC	20	DC Out
2	GND	21	GND
3	GND	22	D00
4	D01	23	D02
5	D03	24	MODE
6	D04	25	SEL
7	D05	26	D06
8	D07	27	OC1
9	D08	28	D09
10	D10	29	D11
11	D12	30	D13
12	D14	31	D15
13	OC2	32	D18
14	D19	33	OC3
15	D17	34	D16
16	D22	35	D23
17	D21	36	GND
18	D20	37	GND
19	INH		

NOTE: For synchro inputs jumper S1-S4 only on active input.

MECHANICAL OUTLINE



NOTES:

- All dimensions are in inches.
- Panel cutout should be 3.560" x 1.720" allowing 4.03" x 2.20" for mounting hardware, included.
- J1 is a DA15P with jacknuts, mating connector supplied.
- J2 is a DC37P with jacknuts, mating connector supplied.

ORDERING INFORMATION

SINGLE-SPEED SYNCHRO METERS

DPM-501S

SINGLE SPEED RESOLVER METERS

DPM-501R - XX

Customer specified stator voltage

TWO-SPEED METERS

DPM-502X - XX - XX

Speed Ratio
 01 = 26Vref/11.8Vstator
 02 = 115Vref/90Vstator
 S = Synchro Input
 R = Resolver Input

NOTES:

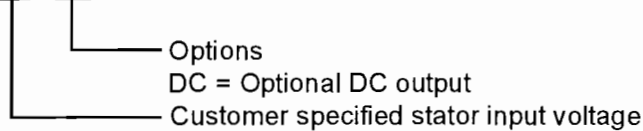
- The DPM-501S can be wired to accept 11.8 or 90V stator inputs. The reference voltage range is 10V to 130Vrms.
- The DPM-501R has one fixed 3.0V input and a customer specified input of anywhere between 3.0V and 32Vrms. The reference voltage range is 3.0V to 32Vrms.
- For voltage connection information, see PIN ASSIGNMENT section.
- On single speed meters, only connect to one set of stator inputs at a time.
- Available speed ratios for two-speed converters are: 1:8, 1:16, 1:32, 1:36, and 1:64.
- Available options (consult factory):
 - Non-standard reference and stator voltages.
 - DC voltage output proportional to shaft angle.
 - Optional display colors.

SINGLE-SPEED RESOLVER METERS

When ordering DPM-501R resolver panel meters use the following revised ordering information.

ORDERING INFORMATION

DPM - 501R - XX - XX



SIGNAL INPUTS J1	
PIN#	FUNCTION
1	S1
2	S2
3	S3
4	S4
5	Ref Hi
6	Ref Lo
14	S1
15	S2
7	S3
8	S4

NOTES:

1. Pins 1-4 is a fixed 3.0V stator input.
2. Pins 7, 8, 14 and 15 is the customer specified input stator voltage.
3. Only connect to one set of stator inputs.
4. Customer specified input can be anywhere between 3.0V and 32V.
5. The reference voltage range is 3.0V to 32V.