

V e r s i o n 2.1

4500.BAS

PROGRAM

USER'S MANUAL

DMD-480-S4 Series
AC POWERED BRIDGE SENSOR
RS485 INTERFACE

DMD-480-S4 Series

SPECIFICATIONS

Input	DMD-482-S4	DMD-483-S4	DMD-485-S4
Voltage, Full Scale	±25 mV	±30 mV	+50 mV
Resistance, Differential	> 100 megohm		
Current	100 pA		
Common Mode Voltage	0 to +5 Volts		

Analog to Digital Conversion	
Ratiometric w/r Bridge Excitation Single Channel Input	
Resolution	1 part in 41,000
Conversion Rate	5 times / second
Linearity - Referred to Input	±0.01% of Full Scale
Temperature Coefficient (0° to 55°C)	
Zero Drift - Typical	± 0.75 µV / °C
Span - Typical	±0.005% / °C

Bridge Excitation Supply	+10 Volts
Adjustment Range	±3%
Load Current	120 mA Maximum
Load Regulation	1 mV Typical
Temperature Coefficient	±0.006% / °C Typical

Isolation	
Analog & Microprocessor Common to Line	500 Volts RMS
Analog & Microprocessor Common to Serial Output	500 Volts RMS

Power Requirements	115 VAC ±10V Volts 50/60 Hz 6 VA (220 VAC ±20V Available)
---------------------------	--

DMD-480-S4 Series

USER'S MANUAL

PREOPERATION

A. DMD-480-S4 SERIES HOOK-UP

(REFER TO FIGURE 1 AND TABLE 1 FOR SCREW TERMINAL DESIGNATION)

1. CONNECT AC TO SCREW TERMINALS 14 AND 15 OF THE DMD-480-S4 SERIES TERMINAL BLOCK.
2. REFER TO FIGURE 3 FOR A SINGLE UNIT RS485 COMMUNICATION HOOK UP AND TO FIGURE 4 FOR MULTIPLE UNIT HOOK UP.
3. CONNECT THE STRAIN GAGE OUTPUT TO THE DMD-480-S4 ± INPUT, SCREW TERMINALS 10 AND 11 OF THE DMD-480-S4 TERMINAL BLOCK. SCREW TERMINAL 10 = +INPUT, SCREW TERMINAL 11 = -INPUT.
4. CONNECT THE STRAIN GAGE +EXCITATION INPUT TO +EXCITATION OF THE DMD-480-S4 TERMINAL BLOCK, SCREW TERMINAL 13, AND THE STRAIN GAGE -EXCITATION INPUT TO -EXCITATION OF THE DMD-480-S4, SCREW TERMINAL 12.

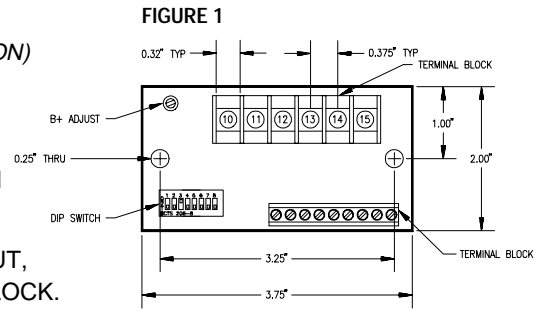


FIGURE 1

DMD-480-S4 Series BLOCK DIAGRAM

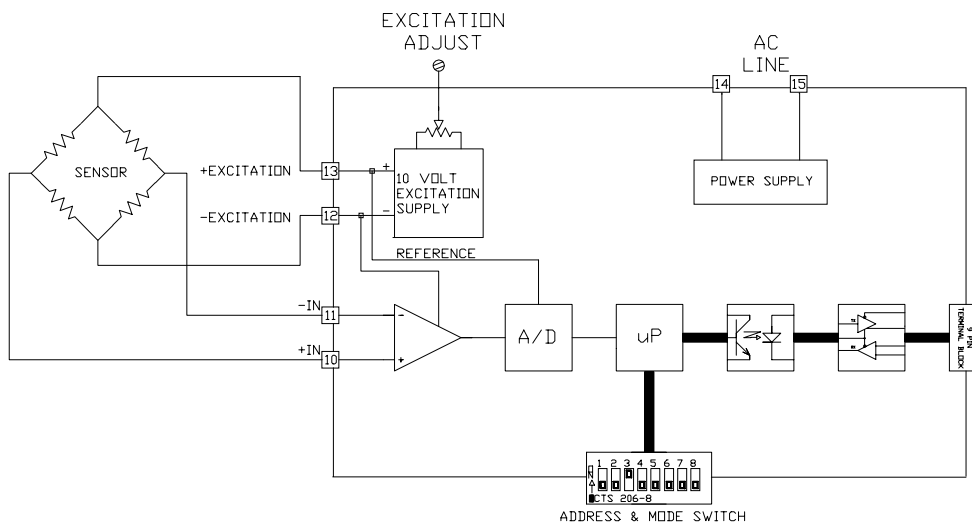


TABLE 1

TERMINAL	FUNCTION
1	COMMON
2	+ RX
3	- RX
4	+ TX
5	- TX
6	+ RX
7	- RX
8	+ TX
9	- TX

10	+ INPUT
11	- INPUT
12	- EXCITATION
13	+ EXCITATION
14	AC
15	AC

FIGURE 3.
SINGLE UNIT RS485 COMMUNICATIONS SETUP

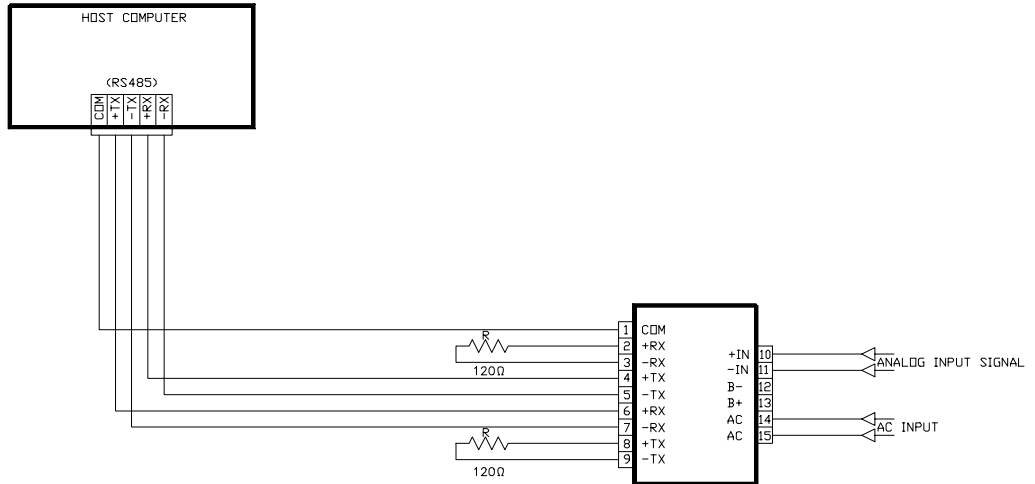


FIGURE 4.
MULTIPLE UNIT RS485 COMMUNICATIONS SETUP

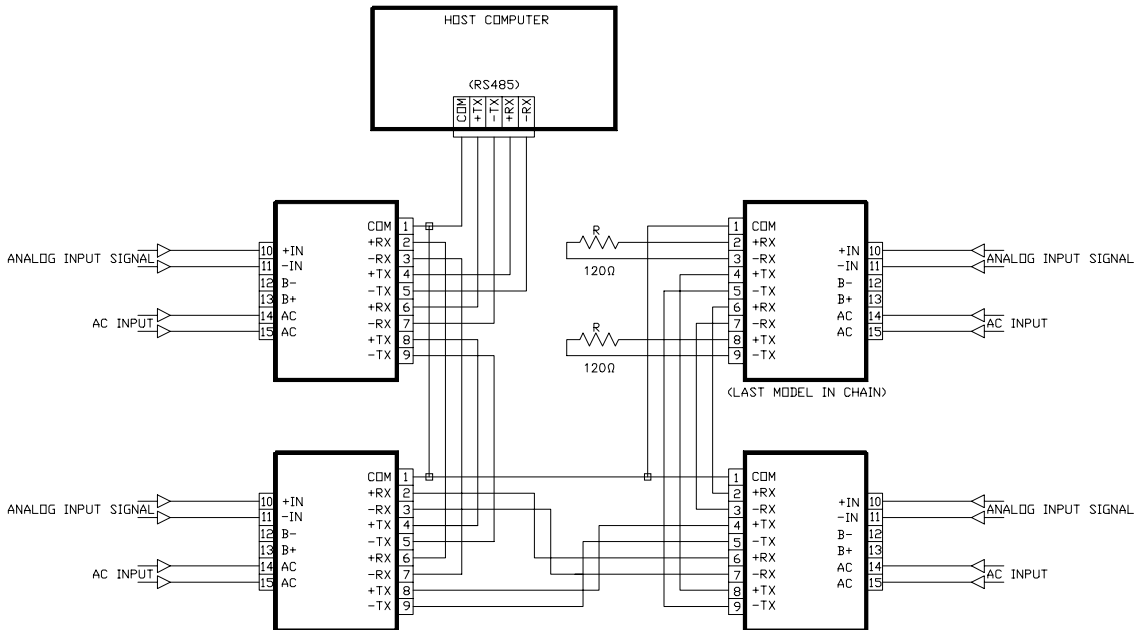
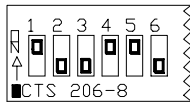
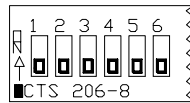


TABLE 3: ADDRESS EXAMPLES

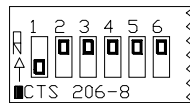


ADDRESS 63



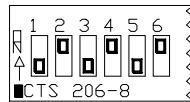
BINARY = 111111
DECIMAL = 1 + 2 + 4 + 8 + 16 + 32 = 63

ADDRESS 1



BINARY = 100000
DECIMAL = 1 + 0 + 0 + 0 + 0 + 0 = 1

ADDRESS 21



BINARY = 101010
DECIMAL = 1 + 0 + 4 + 0 + 16 + 0 = 21

SWITCH	DECIMAL VALUE
1	1
2	2
3	4
4	8
5	16
6	32

B. DMD-480-S4 SERIES DIP SWITCH SETTINGS

1. SET THE DESIRED ADDRESS FOR EACH UNIT BY SETTING SWITCHES 1-6.

BY SETTING THIS ADDRESS, THE UNIT IS GIVEN ITS OWN IDENTITY TO WHICH THE HOST COMPUTER WILL IDENTIFY WITH.

- THE ADDRESS RANGE IS FROM 0 - 63 (DECIMAL) OR 111111 (BINARY). (REFER TO EXAMPLES IN TABLE 3).
- SWITCH "ON" = 0; SWITCH "OFF" = 1

2. SET THE DESIRED MODE OF OPERATION FOR THE DMD-480-S4 SERIES USING SWITCHES 7 & 8. (REFER TO TABLE 2 FOR DEFINING MODES OF OPERATIONS) MODE 3 IS USED FOR DIAGNOSTIC PURPOSES.

TABLE 2:

SW 7	SW 8	MODE	DESCRIPTION
ON	ON	0	OPERATE MODE: Operate Mode: Unit Outputs a reading whenever it is addressed by the the host computer.
OFF	ON	1	TEST MODE: Unit outputs a reading every 0.33 seconds continuously without being addressed
ON	OFF	2	UNDEFINED:
OFF	OFF	3	TEST MODE: Unit outputs a message " MODE 3: Version: 941124 Address: 01" continuously.

C. SOFTWARE INSTALLATION

THE SUPPLIED OMEGA SOFTWARE, C4500.BAS, IS INTENDED FOR USER MODIFICATION. PLEASE FEEL FREE TO MAKE ANY CUSTOM MODIFICATIONS TO THE SOFTWARE AS NEEDED. IT IS RECOMMENDED THAT THE USER MAKE A BACKUP COPY OF THE ORIGINAL OMEGA SOFTWARE BEFORE MODIFYING.

1. TO EXECUTE THE OMEGA C4500 SOFTWARE, QBASIC OR GWBASIC MUST BE LOADED ON YOUR COMPUTER.
2. TO BEGIN THE SOFTWARE SETUP, YOU MUST LOAD AND EXECUTE THE SUPPLIED OMEGA PROGRAM, "C4500.BAS" WITHIN QBASIC OR GWBASIC.

D. SETUP MENU

THE FIRST MENU TO APPEAR IS THE "SETUP MENU"

IF YOU WANT TO SAVE ANY SETTINGS WHICH WILL BE ENTERED INTO THE PROGRAM, YOU WILL WANT TO ENTER THOSE SETTINGS DIRECTLY INTO THE SOFTWARE AND SAVE THE SOFTWARE WITH AN APPLICATION NAME (XXXXX.BAS). AFTER YOU QUIT THE OPERATION MENU OR TURN OFF THE HOST COMPUTER, ALL SETTINGS WILL RETURN TO THEIR DEFAULT VALUES UNLESS SAVED.

THE SETUP MENU ALLOWS THE USER TO SETUP THE CORRECT OPERATING PARAMETERS FOR THE DMD-480-S4 SERIES.

1. OPTION 0 [RETURN TO OPERATION MENU]:

SELECTING THIS OPTION WILL RETURN YOU TO THE OPERATION MENU.

2. OPTION 1 [SELECT COMMUNICATIONS PORT]:

THIS OPTION ALLOWS THE SELECTION OF EITHER COM1 OR COM2 AS THE COMMUNICATIONS PORT FOR THE DMD-480-S4 SERIES AND THE USERS COMPUTER. COM3 AND COM4 ARE NOT ALLOWED.

THE SETTING OF THE COMMUNICATIONS PORT IS ALWAYS NECESSARY FOR PROPER OPERATION OF THE DMD-480-S4 SERIES IN BOTH THE OPERATION AND TEST MODES.

3. OPTION 2 [SET SCALING EQUATION]:

THIS OPTION ALLOWS THE USER TO SELECT COEFFICIENTS OF A SCALING EQUATION. THE SCALING EQUATION PROVIDES FOR BOTH A SCALE FACTOR (A) AND A FIXED OFFSET (C).

THE SCALING EQUATION IS: **VALUE = C + (A x READING)**

THE SETTING OF THE SCALING EQUATION ONLY APPLIES TO THE "OPERATION MODE".

(REFER TO SECTION F FOR A DESCRIPTION ON SETTING THE SCALING EQUATION.)

4. OPTION 3 [SELECT DATA DESTINATION]:

THIS OPTION ALLOWS THE USER TO STORE DATA IN ONE OF 3 MODES. THE DATA MAY BE DISPLAYED ON THE COMPUTER SCREEN ONLY, SENT TO A FILE ONLY, OR BOTH.

THIS OPTION APPLIES ONLY TO THE "OPERATION MODE".

(REFER TO SECTION G FOR MORE INFORMATION ON STORING DATA.)

5. OPTION 4 [DATA COLLECTION METHOD]:

THIS OPTION ALLOWS THE USER TO COLLECT DATA IN 3 DIFFERENT WAYS AND ONLY APPLIES TO THE OPERATE MODE, NOT THE TEST MODE.

- 1) TAKE A READING EVERY "Y" SECONDS, WHERE "Y" IS ONE SECOND MINIMUM, FOR A TOTAL "A" MINUTES.
- 2) START TAKING DATA EVERY "Y" SECONDS AT TIME "A" UNTIL TIME "B".
- 3) TAKE DATA EVERY "Y" SECONDS STARTING NOW AND CONTINUE READING DATA FOREVER. THIS IS THE DEFAULT METHOD FOR THE OPERATE MODE.

BY DEFAULT, THE VALUE FOR "Y" MUST BE ≥ 1 SECOND.

6. OPTION 5 [SELECT UNITS TO MONITOR]:

THE LAST OPTION SELECTS THE ADDRESS OF THE MODULES TO BE MONITORED IN THE ORDER IN WHICH THEY ARE TO BE MONITORED. ADDRESSES FROM 0 TO 63 MAY BE SELECTED.

THE DEFAULT ADDRESS IS "1".

E. OPERATION MENU

THE "OPERATION MENU", ALLOWS 4 USER CHOICES.

1. OPTION 0 [QUIT]:

ALLOWS THE USER TO QUIT THE PROGRAM.

2. OPTION 1 [SETUP THE UNITS]:

EXECUTES THE "SETUP MENU", WHICH ALLOWS THE USER TO SET ADDRESSES TO INTERROGATE, MEASUREMENT RATE, ETC.

REGARDLESS OF WHETHER THE "TEST MODE" OR "OPERATION MODE" IS SELECTED, CERTAIN PARAMETERS MUST ALWAYS BE ENTERED IN THE SETUP UNITS OPTION IN ORDER FOR YOUR MEASUREMENT SYSTEM TO OPERATE PROPERLY.

(REFER TO SECTION D FOR SETUP MENU DESCRIPTION)

3. OPTION 2 [START OPERATE MODE]:

WILL EXECUTE THE OPERATE MODE IF THE DMD-480-S4 SERIES HAS BEEN SET FOR MODE 0 (SW7 AND SW8 "ON").

4. OPTION 3 [START TEST MODE]:

WILL EXECUTE THE TEST MODE IF THE DMD-480-S4 SERIES HAS BEEN SET FOR MODE 1 OR 3.

PRIOR TO ENTERING THE OPERATE MODE, IT WILL BE NECESSARY TO HAVE THE CORRECT UNIT ADDRESSED, AND IN MOST CASES IT WILL BE NECESSARY TO ENTER THE SETUP MENU AND SET THE SCALING EQUATION, DATA DESTINATION, AND DATA COLLECTION METHOD.

IT IS RECOMMENDED THAT THE USER OPERATE THE UNIT IN TEST MODE 3 PRIOR TO THE OPERATE MODE TO ENSURE THAT THE UNIT IS COMMUNICATING PROPERLY. THE USER CANNOT ADDRESS MULTIPLE UNITS IN THE TEST MODE, THEREFORE EACH UNIT MUST BE TESTED INDIVIDUALLY.

F. SETTING THE SCALING EQUATION

THE SCALING EQUATION IS SET BY WRITING THE EQUATION FOR THE TWO CONDITIONS OF ZERO AND SPAN, AND THEN SOLVING FOR THE CONSTANTS. THE DMD-480-S4 SERIES HAS AN OUTPUT OF APPROXIMATELY 41,750 COUNTS FULL SCALE. IF THE MODULE WERE TO BE USED AS A VOLTAGE OUTPUT UNIT AND THE SPAN WERE TO BE 30 mV, THEN THE FOLLOWING CALCULATION WOULD BE MADE.

1. APPLY 3 mV TO THE INPUT AND READ THE 10% DIGITAL COUNTS AS THE OUTPUT (K1).
2. APPLY 30 mV TO THE INPUT AND READ THE FULL SCALE DIGITAL COUNTS AS THE OUTPUT (K2)
3. WRITE TWO EQUATIONS:

A) $(K2 \times A) + C = 0.030 \text{ VOLTS}$

B) $(K1 \times A) + C = 0.003 \text{ VOLTS}$

SUBTRACTING EQUATION B FROM A:

$$(K2 - K1) \times A = 0.027 \text{ VOLTS}$$

THEREFORE $A = 0.027 \text{ VOLTS} \div (K2 - K1)$

SOLVING FOR $C, C = -K1 \times A$

EXAMPLE 1: WITH 3 mV APPLIED THE DMD-480-S4 SERIES OUTPUT READS 4185 COUNTS.

WITH 30 mV APPLIED THE DMD-480-S4 SERIES OUTPUT READS 41,745 COUNTS.

A) $(41,745 \times A) + C = 0.030 \text{ VOLTS}$

B) $(4185 \times A) + C = 0.003 \text{ VOLTS}$

SOLVING EQUATION A - EQUATION B

$$(37,560 \times A) = 0.027 \text{ VOLTS. THEREFORE}$$

$$A = (0.027 \div 37,560) = 7.1885 \times 10^{-7} = .00000071885$$

SOLVING FOR C, $C = .003 - (K1 \times A)$

$$C = -8.38 \times 10^{-6} = .00000838$$

VERIFY YOUR RESULTS BY PLACING YOUR SOLUTIONS BACK INTO EQUATIONS A AND B:

A) $(41,745 \times .00000071885) - .00000838 = 0.030 \text{ VOLTS}$

B) $(4185 \times .00000071885) - .00000838 = 0.003 \text{ VOLTS}$

IN A WEIGHING APPLICATION USING A LOAD CELL WITH A SENSITIVITY OF 3mV/V, THE CONSTANT C WOULD THEN CORRESPOND TO THE TARE WEIGHT OF THE SYSTEM.

EXAMPLE 2: WITH THE TARE WEIGHT ONLY APPLIED, READ 1,500 COUNTS.

WITH A FULL LOAD OF 100 POUNDS APPLIED, READ ABOUT 41,745 COUNTS.

A) $(41,745 \times A) + C = 100 \text{ POUNDS}$

B) $(1,500 \times A) + C = 0 \text{ POUNDS}$

SOLVING EQUATION A - EQUATION B

$$A = (100 \div 40,245) = .00248478$$

$$\text{SOLVING FOR C, } C = -1,500 \times .00248478, C = -3.727$$

VERIFY YOUR RESULTS BY PLACING YOUR SOLUTIONS BACK INTO EQUATIONS A AND B:

$$A) (41,745 \times 0.00248478) + (-3.727) = 100.000 \text{ LBS}$$

$$B) (1,500 \times 0.00248478) + (-3.727) = 0.000 \text{ LBS}$$

$$\text{ONE COUNT} = .00248 \text{ POUNDS}$$

G. WRITING DATA TO A FILE

UNDER OPTION 3 OF THE SETUP MENU, THE COLLECTED DATA MAY BE WRITTEN TO A FILE SELECTED BY THE USER. THE USER MUST GIVE A FILE NAME AND A PATH, (**DRIVE:\PATH\FILE**). THE DATA RECORDED IN THE FILE IS RECORDED IN THE FOLLOWING MANNER: UNIT NUMBER (ADDRESS), DATE, TIME, UNSCALED READING, AND THE SCALED READING. AN EXAMPLE OF A FILE'S CONTENTS IS SHOWN BELOW.

1 , "07-30-1993" , "09:30" , 30003 , 10.0000

2 , "07-30-1993" , "09:30" , 15000 , 5.00190

3 , "07-30-1993" , "09:30" , 00015 , 0.00999

1 , "07-30-1993" , "09:31" , 30003 , 10.0000

2 , "07-30-1993" , "09:31" , 10000 , 3.33633

3 , "07-30-1993" , "09:31" , 00100 , 0.03831

NOTICE THAT THE DATA IS DELIMITED BY COMMAS AND QUOTE MARKS, WHICH IS A STANDARD METHOD FOR WRITING TO FILES SO THAT ANY POPULAR SPREADSHEET AND DATABASE PROGRAM CAN READ THE COLLECTED DATA. A DISK THAT IS COLLECTING DATA INTO A FILE WILL CONTINUE TO COLLECT DATA UNTIL IT IS FILLED UP, AT WHICH TIME AN ERROR MESSAGE WILL APPEAR INDICATING THE DISK IS FULL.

