3021

INTRODUCTION

This publication is provided solely as a guide for individuals who have received METTLER TOLEDO Technical Training in servicing the METTLER TOLEDO product.

Information regarding METTLER TOLEDO Technical Training may be obtained by writing to:

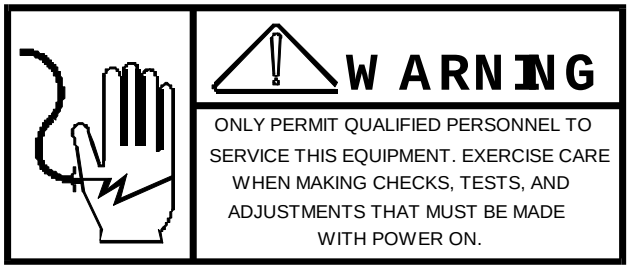
METTLER TOLEDO
Training Center
P.O. Box 1705
Columbus, Ohio 43216
(614) 438-4400

PRECAUTIONS

- **READ** this manual before operating or servicing this equipment.

- **ALWAYS REMOVE POWER** and wait at least 30 seconds **BEFORE** connecting or disconnecting any internal harnesses. Failure to observe these precautions may result in damage to, or destruction of the equipment.

- **ALWAYS** take proper precautions when handling static sensitive devices.



- **DO NOT** connect or disconnect a load cell scale base to the equipment with power connected or damage will result.

- **SAVE** this manual for future reference.

- **DO NOT** allow untrained personnel to operate, clean, inspect, maintain, service, or tamper with this equipment.

- **ALWAYS DISCONNECT** this equipment from the power source before servicing.

- **CALL** METTLER TOLEDO for parts, information, and service.

CONTENTS

3.1.5 INTERFACE TO REMOTE DEVICE

Figure 3.2 shows the I/O connections for the 37 pin connector of the MD3021 when installed in a M5000 or SM200 instrument. The address lines are for applications where the MD3021 is being used in conjunction with a switching module to allow the MD3021 to be calibrated differently for each scale. Figure 3.4 shows the I/O connections for the wall mount version. Figure 3.5, 3.6 and 3.7 shows typical interface connections to a remote device.

1	+5 VDC
2	5 V Com
8	Address A8
9	Address A9
10	Address A10
17	Receive Sink (Passive)
18	Receive Source (Passive)
19	Analog Return (Gnd)
20	Analog Voltage Output
21	4-20 mA Analog Current Sink
22	4-20 mA Analog Current Source

Figure 3.3 I/O connection for 10/M5000

TB1	
+R	Receive Source (Passive)
-R	Receive Sink (Passive)
+5 V	+5 VDC Supply
GND	5 V Common
Return	Analog Return (GND)
V Out	Analog Voltage Output
I Sink	4-20 mA Analog Current Sink
I Source	4-20 mA Analog Current Source

Figure 3.4 I/O Connections for MD3021-WM/WS

When connecting the MD3021 to a remote device using the 4 to 20 mA mode, a well regulates current supply must be connected in the current loop. A 5 VDC supply is provided, or the user may provide the current source. To determine the supply required, use the following formula:

Supply Voltage > .025 x (50 + input resistance of remote device) Current Loop supply should not exceed 24 VDC.

MD3021	
WM/WS	-10/M5000
V Out	20
Ret	19

Figure 3.5 MD3021 Interface To User Device In Voltage Mode

MD3021	
WM/WS	-10/M5000
I Sink	21
I Source	22

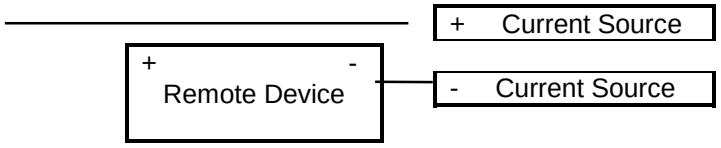


Figure 3.6 MD3021 Interface to User Device In Passive 4-20 mA Current Loop Mode

MD3021
-10/M5000
22
21

Figure 3.7 MD3021 Interface To User Device 4-20 mA Active Current Loop Mode

3.1.6 SELECTION OF ANALOG OUTPUT

SW2 Selects the type of analog output for the MD3021. The switch settings are as follows:

SW2	1	2	3	4	
	O	O	O	C	0 to 10 V Output
	O	C	O	O	0 to 5 V Output
	O	O	C	O	-10V to +10 V Output
	O	O	C	C	-5V to +5 V Output
	C	C	O	C	4 or 20 mA Output

O= Open or Off
C= Closed or On

NOTE(S): The closed position is toward the connector edge of the PC Board.

3.1.7 SELECTION OF OPERATING MODE

MODE SELECTION FOR M5000, SM100 AND TOLEDO INDICATORS. THE SWITCH SWTTINGS ARE AS FOLLOWS:

SW1-1	OPEN	=	OPERATING MODE
	CLOSED	=	CALIBRATE MODE
SW1-2	NOT USED		
SW1-3	OPEN	=	OPERATING MODE
	CLOSED	=	TAKE ZERO (CALIBRATE MODE)
SW1-4	OPEN	=	OPERATING MODE
	CLOSED	=	TAKE SPAN (CALIBRATE MODE)
SW1-5	OPEN		
SW1-6	OPEN	=	OUTPUT DISPLAYED WEIGHT
SW1-5	CLOSED		
SW1-6	OPEN	=	OUTPUT GROSS WEIGHT
SW1-5	OPEN		
SW1-6	CLOSED	=	OUTPUT NET WEIGHT
SW1-5	CLOSED		

SW1-6	CLOSED	=	SELF TEST

MODE SELECTION FOR THE SM200 ARE AS FOLLOWS:

SW1-1	OPEN	=	OPERATING MODE
	CLOSED	=	CALIBRATE MODE
SW1-2	NOT USED		
SW1-3	OPEN	=	OPERATING MODE
	CLOSED	=	TAKE ZERO (CALIBRATE MODE)
SW1-4	OPEN	=	OPERATING MODE
	CLOSED	=	TAKE SPAN (CALIBRATE MODE)
SW1-5	OPEN		
SW1-6	OPEN	=	OUTPUT RATE CONTROL FUNCTION
SW1-5	CLOSED		
SW1-6	OPEN	=	OUTPUT DISPLAYED WEIGHT
SW1-5	OPEN		
SW1-6	CLOSED	=	OUTPUT DISPLAYED RATE
SW1-5	CLOSED		
SW1-6	CLOSED	=	SELF TEST

3.2 CALIBRATION

The calibration for the MS3021 Analog Output Option is performed using SW1 on the Analog output PC board. To calibrate the MD3021, proceed as follows:

1. Set the analog output module to output the displayed weight (SW1-2 and SW1-6 open).
2. Using a simulator or by adding or removing weights from the scale, get the main display of the instrument to display the weight corresponding to the zero output of the analog output option.
3. Turn tSw1-3 to the closed position. Turn SW1-1 to the closed position for 2 seconds, then return it to the open position. Now return SW1-3 to the open position. The analog output is now zeroed.
4. Using the simulator or by adding weights to the scale, get the main display of the instrument to display the weight which corresponds to the fill scale output of the analog output option.
5. Turn SW1-4 to the closed position. Turn SW1-1 to the closed position of 2 seconds, then return it to the open position. Return SW1-4 to the open position. The analog output option is now spanned.
6. Bring the scale instrument back to the zero reading. Adjust the zero potentiometer (R33) on the analog option PC board to acquire a zero output.
7. Bring the scale instrument back to full scale and adjust the span potentiometer (R32) on the analog option OC board to acquire a full scale output.
8. Return the scale instrument to the zero reading and check the zero output of the analog output option. Repeat steps 6 and 7 if necessary.
9. Reconfigure SW1-5 and SW1-6 for the required output.

Calibration is now complete.

3.3 CALIBRATION TECHNIQUES

FI the MD3021 is being used in the 0 - 5 V, 0 - 10 V or 4 - 20mA output mode, then the following technique may be used:

Zero the analog output option in the same manner as described previously. Now key in a tare weight or take an auto tare so that the main weight display of the instrument displays a negative reading equal to the full scale reading. Perform the spanning procedure as previously outlined.

Another calibration method that may be used is to zero the analog output option with the weight indication at full scale, and span the analog output option with the weight indication at zero. When calibrated in this manner, the analog output will be at zero when the scale indication is at full scale and the analog will be at full scale when the instrument indication is at zero.

4.0 TROUBLESHOOTING

1. Check and make sure 5 VDC is present at connector J1 of the analog option PC board. Position 1 is +5VDC, position 2 is digital ground. On -10/M5000 versions check to make sure that 24 VDC is present at connector J1. Position 5 is +24 VDC, position 6 is ground.
2. Observe LED D5. Is should be lit and will flicker when data is being transmitted by the instrument. If it is not lit, check the interface wiring between the instrument and the MD3021. If it is lit, but does not flicker, there may be a problem in the scale instrument.
3. Observe LED D6. If D6 is turned on, there is a communications error. Either the D to A is not receiving data from the scale instrument, or the data received is not valid. Check to be sure that Ju1 is in the proper baud rate position for the instrument being used. Also check to be sure that JU2 is in the 20 mA position.
4. Observe LED D7. If D7 is on, then there is an instrument scale error (over capacity, A/D conversation error, digital check error, etc.)
5. If both D6 and D7 are on, then there is either a RAM error, and EAROM error or an overflow error. An overflow error will occur if the sale weight is greater than the weight at which the analog output option was spanned.
6. Select the self test mode by turning SW1-5 and SW1-6 to the on position.
7. Observe LED D6. If D6 is on and there is an EAROM checksum error. If an EAROM error occurs, rezero and span the analog output option. If the EAROM error still occurs, replace the MD3021 PCB.
8. Observe LED D7. If D7 is on, there is an internal RAM error. Replace the MD3021 PCB/
9. If D6 and D7 are on and blinking, there are no EAROM or internal RAM errors.
10. If D6 and D7 do not light or blink, then the MD3021 PCB is probably faulty.
11. If the MD3021 passes the above tests, disconnect the output device connected to the MD3021. Using a volt meter, check the voltage output of the MD3021 for proper operation. If it does not function properly, then replace the MD3021 PCB. If the MD3021 works properly without a remote device connected to it, but does not function when the remote device is connected, there may be a problem in the remote device.
12. If after performing the above checks, the problem cannot be determined, it is possible that the MD3021 PCB is probably faulty.

5.0 PARTS LIST

Part Number	Description
A900476 00A	MD 3021
KT665013 DAL	5VDC Power Supply
095920 00A	1/4 AMP Slo-Blo Fuse