ADI310

Scoreboard

Installation and Service Manual

17153600A
(11/04).01

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METTLER TOLEDO

Publication Revision History

An overview of this manual's revision history is compiled below.

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Part Number	Date	Revisions
17153600A (.01)	11/04	Updated wiring connections to include IND310 terminal. Added information about multi-drop wiring connections.

INTRODUCTION

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

Information about METTLER TOLEDO Technical Training can be obtained by writing, calling, or faxing:

METTLER TOLEDO
1900 Polaris Parkway
Columbus, Ohio 43240 USA
Phone: (614) 438-4511
Fax: (614) 438-4958
www.mt.com

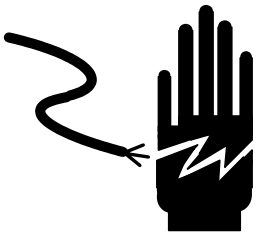
WARNING!

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used properly, i.e., in accordance with the instructions manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference to radio communications, in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

METTLER TOLEDO RESERVES THE RIGHT TO MAKE REFINEMENTS OR CHANGES WITHOUT NOTICE.

Precautions

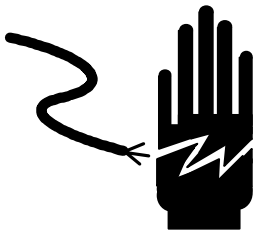
READ this manual BEFORE operating or servicing this equipment.



⚠ WARNING

PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

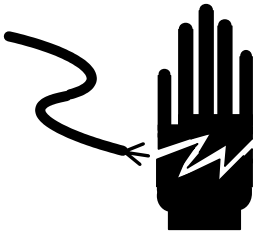
FOLLOW these instructions carefully.



⚠ WARNING

FOR CONTINUED PROTECTION AGAINST SHOCK HAZARD, CONNECT TO PROPERLY GROUNDED OUTLET ONLY. DO NOT REMOVE THE GROUND PRONG.

SAVE this manual for future reference.



⚠ WARNING

DISCONNECT ALL POWER TO THIS UNIT BEFORE INSTALLING, SERVICING, CLEANING, OR REMOVING THE FUSE. FAILURE TO DO SO COULD RESULT IN BODILY HARM AND/OR PROPERTY DAMAGE.

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

⚠ CAUTION

BEFORE CONNECTING/DISCONNECTING ANY INTERNAL ELECTRONIC COMPONENTS OR INTERCONNECTING WIRING BETWEEN ELECTRONIC EQUIPMENT, ALWAYS REMOVE POWER AND WAIT AT LEAST 30 SECONDS. FAILURE TO OBSERVE THESE PRECAUTIONS COULD RESULT IN BODILY HARM OR DAMAGE TO OR DESTRUCTION OF THE EQUIPMENT.

ALWAYS DISCONNECT this equipment from the power source before cleaning or performing maintenance.

⚠ CAUTION

OBSERVE PRECAUTIONS FOR HANDLING ELECTROSTATIC SENSITIVE DEVICES.

CALL METTLER TOLEDO for parts, information, and service.

Contents

1 Introduction

General

The METTLER TOLEDO ADI310 scoreboard is a highly visible weight display for use with vehicle scales and other industrial weighing applications. Using light-emitting diodes (LED), it displays up to six digits that are 4 inches (100 mm) tall. There are also two lines of two characters to display LB (pounds), KG (kilograms), GR (gross weight), and NT (net weight). The scoreboard is compatible with METTLER TOLEDO digital indicators that use continuous serial data output, as well as a variety of other indicators.

Specifications

Power Supply: 110/220 Switching Power Supply

90-264VAC, 40-440 Hz

1.5A/115VAC, 0.9A/230V

Interface: RS-232, RS-422, Current Loop Active/Passive

Protocol:

8 Data Bits, No Parity

7 Data Bits, Odd Parity

7 Data Bits, Even Parity

300 to 19,200 Baud

Environmental Protection: Type 4 (IP56)

Operating Temperature: -40°F to +130°F (-40°C to +55°C)

Storage Temperature: 0°F to +150°F (-18°C to +66°C)

Shipping Weight: 23 lb (10.4 Kg)

Dimensions

The scoreboard's enclosure is made of a tempered aluminum alloy with a polyester powder coating. The dimensions are shown in Figure 1-1.

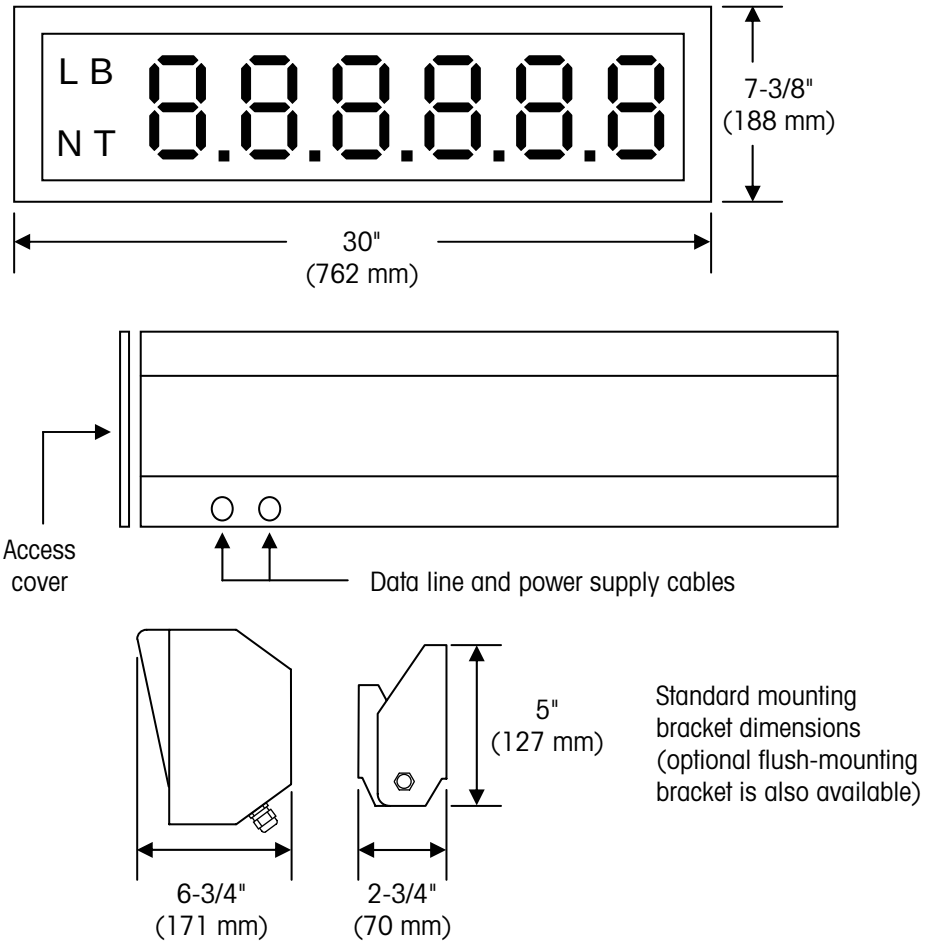


Figure 1-1: Scoreboard Dimensions

Standards Compliance

⚠ CAUTION

ALL APPROVALS AND CERTIFICATES ARE BASED ON CORRECT MOUNTING, GROUNDING, AND CONNECTIONS. ANY DEVIATION MAY RESULT IN UNEXPECTED PERFORMANCE OF THE SYSTEM.

The following compliance standards apply to the ADI310 scoreboard:

Control # 15FS Changing Message Screen

Catalog # UYFS

Approval # E243214

Replacement Parts

The following table lists the replacement parts that are available for the ADI310 scoreboard.

Part Number	Description	Quantity
MZ0302000123	4-inch Motherboard	1
MZ0302000124	4-inch Main Digit Board	1
MZ0302000125	4-inch Slave Digit Board	1
MZ0302000126	110/220 Switching Power Supply	1
MZ0302000127	Annunciator Board	1

2 Installation

Wiring

⚠ CAUTION

THE SCOREBOARD AND ITS ASSOCIATED EQUIPMENT MUST BE INSTALLED, ADJUSTED, AND MAINTAINED BY QUALIFIED PERSONNEL WHO ARE FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE SYSTEM AND WITH THE POTENTIAL HAZARDS INVOLVED. FAILURE TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY INJURY AND/OR PROPERTY DAMAGE.

The scoreboard can receive data via RS-232, 20 mA current loop, or RS-422 output. The maximum recommended cable lengths are 50 feet (15.24 meters) for RS-232, 1,000 feet (304.8 meters) for 20 mA CL, and 2,000 feet (609.6 meters) for RS-422. Connect the scoreboard to a scale indicator as follows:

1. Use a screwdriver to remove the access cover located at the end of the scoreboard closest to the power supply cable and data line cable (see Figure 1-1).
2. Wire one end of the data line cable to the terminal strip on the scoreboard's controller printed circuit board (PCB) and the other end to the scale indicator. See Table 2-1 for the correct wiring for each type of output.

Type of Indicator	Indicator	Scoreboard
IND310 Indicator, 20 mA output (use pin J12 on main PCB)	Pin 6: +12V Pin 4: +20mA Pin 5: -20mA ┐ Jump Pin 3: GND ┘	Pin 6: CL (+) Pin 5: CL (-)
Indicators with Active 20 mA output (for example, LYNX, JAGXTREME, and COUGAR)	+20 mA -20 mA	Pin 6: CL (+) Pin 5: CL (-)
Indicators with Passive 20 mA output	+20 mA -20 mA	Pin 1: VCC Pin 6: CL (+) Pin 5: CL (-) ┐ Jump Pin 2: GND ┘
Indicators with RS-232 output	TXD GND	Pin 3: 232 RXD Pin 2: GND
Indicators with RS-422 output	RS-422A (+) RS-422B (-)	Pin 7: RX 422A Pin 8: RX 422B

Table 2-1: Data Line Wiring Connections

3. Place the blue jumper on the pair of pins that is marked for the type of output being used (see Figure 2-1).

Configuration

1. Apply power to the scale indicator and scoreboard. The scale indicator must be transmitting data continuously. If all connections are correct, the green light-emitting diode (LED) on the scoreboard's PCB will be illuminated.
2. Press and release the RESET button on the PCB. Hold down the LEARN button while the scoreboard's display counts down from 9 to 0. At the end of the countdown, the scoreboard will flash the baud rate and then display the data stream.

NOTE: The scoreboard will display the weight units (LB or KG) and type of weight (GR or NT) if they are included in the data stream.

3. You might need to shift the data stream so that the weight is displayed properly. To shift the data stream, place a known amount of weight on the scale and then press the LEFT button until the scoreboard displays the weight properly.
4. Set the "Toledo" option to "On' (see Option 2 in Chapter 3).

Echo Output

The scoreboard has an echo feature that allows you to connect several scoreboards in a series so that they all display the weight reading from the scale indicator. The first scoreboard should transmit the signal and the second one should receive it. For example, wire a pair of scoreboards for 20 mA CL as shown in Table 2-2:

NOTE: By default, the scoreboard displays every other data stream that it receives. If that causes a problem when using echo output, enable Option 4 to display every data stream.

First Scoreboard	Second Scoreboard
TX CL(+)	CL(+)
TX CL(-)	CL(-)

Table 2-2: 20 mA CL Wiring for Echo Output

To transmit RS-422, remove the eight-pin DS 75176 from socket U5 and place it in socket U8 (see Figure 2-1).

Multi-Drop Output

You can connect as many as five scoreboards in a multi-drop arrangement so that each scoreboard displays a different weight reading. Wire the indicator to the first scoreboard, and wire each additional scoreboard to the one preceding it (as shown in Table 2-3). You must assign a separate address for each scoreboard (see setup option 11).

First Scoreboard	Second Scoreboard
RX 422A	RX 422A
RX 422B	RX 422B

Table 2-3: Wiring for Multi-Drop Output

Changing Intensity

The scoreboard has two light intensity settings. To change the intensity, press and release the RESET button, and then hold down the RIGHT button during countdown. At the end of the countdown, the RIGHT button will toggle between displaying "high" and "low" (seven-segment scoreboards will display "lo"). Select the desired intensity and press the LEARN button to save changes. The factory default is "low".

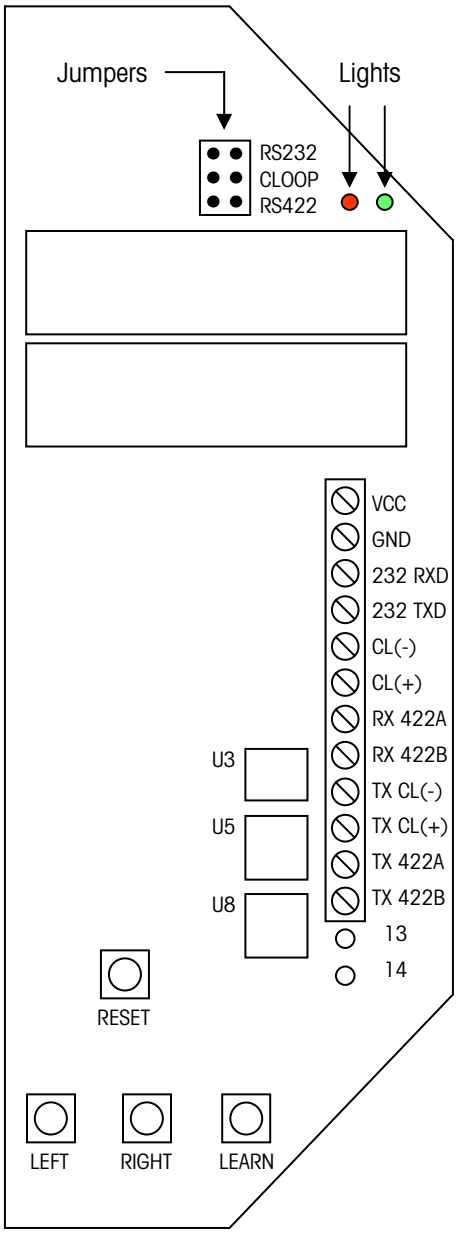
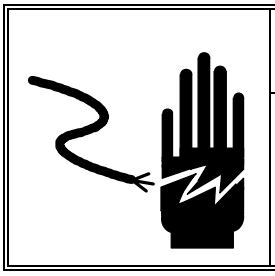


Figure 2-1: Scoreboard PCB

Troubleshooting



⚠ WARNING

PERMIT ONLY QUALIFIED PERSONNEL TO SERVICE THIS EQUIPMENT. EXERCISE CARE WHEN MAKING CHECKS, TESTS, AND ADJUSTMENTS THAT MUST BE MADE WITH POWER ON. FAILING TO OBSERVE THESE PRECAUTIONS CAN RESULT IN BODILY HARM.

Problem: The red LED is on and the display reads "NoData". Communication was lost.

Suggestions:

- Make sure the scoreboard has power.
- Make sure the indicator port is enabled.
- Make sure the wiring is correct.
- Make sure the blue jumper is in the correct position.

Problem: The scoreboard is displaying incorrect digits.

Suggestions:

- Try shifting the data to the right or left.
- Lower the baud rate.

General Purpose Solution:

Set the scale indicator to 1200 baud, 8 data bits, no parity. Make sure the data stream contains six weight characters followed by a carriage return, line feed, or end of text. Set the scoreboard to factory default and relearn the settings from the data stream.

NOTE: If the delay between data streams is greater than 2 seconds, turn on Option 4.

3 Setup Options

Quick Setup

Use the table shown below for quick reference. Detailed explanations of the setup options are provided on the following pages.

#	Name	Description for "ON" Value
0	Reset	Resets all settings to factory defaults
1	Future Op	—
2	Toledo	Decodes METTLER TOLEDO status bytes
3	Time-out Length	Maximum time allowed between data transmissions (Default = 5 seconds)
4	Demand	Updates display when a Print button is pressed (for use when transmissions are more than 2 seconds apart)
5	No Data	Set to display "nodata", to blank, or to display the last value when not receiving data
6	Fixed Decimal	Sets a fixed decimal point position
7	No Count Down	Does not count down on startup
8	No Zero Suppression	Does not suppress leading 0's
9	Alpha Characters	Will display alpha and numeric characters
10	Mirror	Displays data to be seen in a rearview mirror
11	Addressable	Makes the display addressable
12	Time	Enables display to be a clock (with additional hardware)
13	Fixed Shift Value	Sets a fixed shift amount
14	Fixed Baud Rate	Sets a fixed baud rate
15	Fixed End Character	Sets a fixed end character
16	Minimum Weight	Sets the minimum weight to display
17	Maximum Weight	Sets the maximum weight to display
18	Future Op	—
19	Test Mode	Used for testing the display's digits or for customer demo
20	Version	Displays the current software version

Option Details

To enter the Options Setup mode, hold down the LEFT button during power-up. After the scoreboard counts down from 9 to 0, it will display "OPTION". In Option Setup mode, press the LEFT button to cycle through the option numbers 0 to 20. The RIGHT button will toggle between On and Off for some options and will enter an advanced menu for more complicated options. Pressing the LEARN button at any time will save the settings and reset the display. Pressing both LEFT and RIGHT during power-up will activate Option 0 (will restore the factory default settings).

Option 0: Restore Factory Defaults

Option 0 resets all settings to factory defaults. It sets all options to off and erases all data stored in the non-volatile RAM, including shift amount, baud rate, and end character.

Option 1: Future Op

Option 1 is reserved for future use.

Option 2: Toledo

Option 2 is used to decode METTLER TOLEDO data streams. It decodes Status Bytes A and B to determine if the weight is negative or positive, in range or over capacity, and placement of the decimal point.

Status Byte A			
Decimal Position	**Bit 2**	**Bit 1**	**Bit 0**
X	0	1	0
0.X	0	1	1
0.0X	1	0	0
0.00X	1	0	1

Status Byte B	
Function	**Bit**
Gross / Net, Net = 1	0
Under Zero, Negative = 1	1
Over Capacity = 1	2
Motion = 1	3
Lb / Kg, kg = 1	4

Option 3: Time-out Length

Option 3 is used to set the time-out length (the maximum amount of time expected between data streams before communication is considered interrupted). The default (0/Off) acts as a 5-second time-out. All other values represent the number of seconds the scoreboard will wait for a new data stream. Press RIGHT to increase the time-out and LEFT to decrease it. The maximum time-out that can be set is 255 seconds.

Option 4: Demand

Option 4 sets the scoreboard to Demand mode. We recommend using Demand mode when the scoreboard is connected to the print button of an indicator or when data is sent at intervals of 2 seconds or more. In Demand mode, the scoreboard will wait for and display every data stream. With the default setting (Off), the scoreboard uses every other data stream to ensure data integrity.

Option 5: No Data

Option 5 sets the scoreboard's response after a data stream time-out. The default is to display "NoData". The other two choices are "Clear" (blank the display) and "Hold" (keep the last weight sent). Press RIGHT to cycle through the three choices. Use Option 3 to set the time-out length.

Option 6: Fixed Decimal

Option 6 sets the scoreboard to illuminate a decimal point when it is not present in the data stream. Default (Off) will show a decimal point only where it is located in the data stream. All other values represent the fixed position of the decimal point, starting from right to left.

Value	Decimal Placement
0	Default
1	######
2	#####.#
3	####.##
4	###.###
5	##.####
6	#.#####

Option 7: No Count Down

Option 7 disables the scoreboard from counting down from 9 to 0 when powered up.

Option 8: No Zero Suppression

Option 8 disables the scoreboard's ability to suppress leading 0's. The default (Off) will display a space for all leading 0's except the final two or the one immediately in front of a decimal point. For example, when the option is off, "000000" will be displayed as " 00" and "0000.00" will be displayed as " 0.00".

Option 9: Alpha Characters

Option 9 enables the scoreboard to display both alpha and numeric characters. The default (Off) will replace all non-numeric characters with spaces. A seven-segment display cannot display some alpha characters, for example, "x", "q", "k", "!" or "?".

Option 10: Mirror

Option 10 enables the scoreboard to be read in a rearview mirror. The default (Off) is for direct viewing.

Option 11: Addressable

Option 11 sets the scoreboard to Addressable mode. The scoreboard will ignore all characters until it receives the addressable character, and then it will display the data immediately following that character. The scoreboard can be addressed to any character from 1 to 255. Press RIGHT to increase the value and LEFT to decrease it. The number selected represents the decimal equivalent of the desired character. For example, set the address to 65 to recognize an "A" at the beginning of the data stream. See Chapter 4 for a list of ASCII character values. If the indicator is sending 7 data bits even or odd parity, then the parity bit can change the decimal value of the character by adding 128 to it. We recommend setting the indicator to 8 data bits no parity for convenience. The default (Off) uses a standard data stream.

Option 12: Time

Option 12 enables the scoreboard to function as a clock, but it is available only with additional hardware purchase. Press LEFT to increase the hours and RIGHT to increase the minutes.

Option 13: Fixed Shift Value

Option 13 sets a fixed shift amount. Turning this option on will prevent the scoreboard from resetting the shift value when the LEARN button is pressed. It will also disable the LEFT and RIGHT buttons from shifting the data stream. The shift value can be set to any amount between 1 and 255; however, because the length of the data stream is limited, any number over 50 is saved as 50. Press RIGHT to increase the value and LEFT to decrease it.

Option 14: Fixed Baud Rate

Option 14 sets a fixed baud rate. Press RIGHT to cycle through the available baud rates (300, 600, 1200, 2400, 4800, 9600, and 19200). Default (Off) allows the scoreboard to auto-learn the baud rate from the data stream. To auto-learn the baud rate, press LEARN at power-up.

Option 15: Fixed End Character

Option 15 sets a fixed end character. Set the scoreboard to the decimal equivalent of the desired character. Any character from 1 to 255 can be selected (see Chapter 4 for a list of ASCII character values). Press RIGHT to increase the value and LEFT to decrease it. If the indicator is sending 7 data bits even or odd parity, then the parity bit can change the decimal value of the character by adding 128 to it. We recommend setting the indicator to 8 data bits no parity for convenience. Default (Off) will allow the scoreboard to auto-learn an end character from the data stream. To auto-learn the end character, press LEARN at power-up. Possible end characters accepted in default mode include end of text (ETX, decimal value of 03), line feed (LF, decimal value of 10), and carriage return (CR, decimal value of 13).

Option 16: Minimum Weight

Option 16 sets the minimum weight that the scoreboard will display. Press RIGHT to select the position of a character, and then press LEFT to select the number to be entered in that position. For example, if you set the minimum weight to "000030", then the display will go blank for any weight under that threshold value.

Option 17: Maximum Weight

Option 17 sets the maximum weight that the scoreboard will display. Press RIGHT to select the position of a character, and then press LEFT to select the number to be entered in that position. For example, if you set the maximum weight to "100000", then the display will go blank for any weight over that threshold value.

Option 18: Future Op

Option 18 is reserved for future use.

Option 19: Test Mode

Option 19 sets the scoreboard to Test mode. In Test mode, the display will cycle through several weights and output those weights through the serial ports. Test mode can be used to test the digits, to test the scoreboard's ability to output data, and to demonstrate the appearance of different characters to an end user.

Option 20: Version

Option 20 displays the software version of the scoreboard. It will display the month, followed by the year. This option is used only for troubleshooting purposes.

4 Reference

ASCII Table

The following tables list the ASCII characters used for some the setup options described in Chapter 3.

Dec	Hex	Char
0	0	NUL (null)
1	1	SOH (start of heading)
2	2	STX (start of text)
3	3	ETX (end of text)
4	4	EOT (end of transmission)
5	5	ENQ (enquiry)
6	6	ACK (acknowledge)
7	7	BEL (bell)
8	8	BS (backspace)
9	9	TAB (horizontal tab)
10	A	LF (line feed, new line)
11	B	VT (vertical tab)
12	C	FF (form feed, new page)
13	D	CR (carriage return)
14	E	SO (shift out)
15	F	SI (shift in)
16	10	DLE (data link escape)
17	11	DC1 (device control 1)
18	12	DC2 (device control 2)
19	13	DC3 (device control 3)
20	14	DC4 (device control 4)
21	15	NAK (negative acknowledge)
22	16	SYN (synchronous idle)
23	17	ETB (end of trans. block)
24	18	CAN (cancel)
25	19	EM (end of medium)
26	1A	SUB (substitute)
27	1B	ESC (escape)
28	1C	FS (file separator)
29	1D	GS (group separator)
30	1E	RS (record separator)
31	1F	US (unit separator)

Dec	Hex	Char
32	20	Space
33	21	!
34	22	"
35	23	#
36	24	$
37	25	%
38	26	&
39	27	'
40	28	(
41	29	)
42	2A	*
43	2B	+
44	2C	,
45	2D	-
46	2E	.
47	2F	/
48	30	0
49	31	1
50	32	2
51	33	3
52	34	4
53	35	5
54	36	6
55	37	7
56	38	8
57	39	9
58	3A	:
59	3B	;
60	3C	<
61	3D	=
62	3E	>
63	3F	?

Dec	Hex	Char
64	40	@
65	41	A
66	42	B
67	43	C
68	44	D
69	45	E
70	46	F
71	47	G
72	48	H
73	49	I
74	4A	J
75	4B	K
76	4C	L
77	4D	M
78	4E	N
79	4F	O
80	50	P
81	51	Q
82	52	R
83	53	S
84	54	T
85	55	U
86	56	V
87	57	W
88	58	X
89	59	Y
90	5A	Z
91	5B	[
92	5C	\
93	5D	]
94	5E	^
95	5F	_

Dec	Hex	Char
96	60	`
97	61	a
98	62	b
99	63	c
100	64	d
101	65	e
102	66	f
103	67	g
104	68	h
105	69	i
106	6A	j
107	6B	k
108	6C	l
109	6D	m
110	6E	n
111	6F	o
112	70	p
113	71	q
114	72	r
115	73	s
116	74	t
117	75	u
118	76	v
119	77	w
120	78	x
121	79	y
122	7A	z
123	7B	{
124	7C	|
125	7D	}
126	7E	~
127	7F	DEL

METTLER TOLEDO

Publication Suggestion Report

If you have suggestions concerning this publication, please complete this form and fax it to (614) 841-7295

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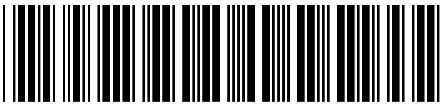

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