Avery Weigh-Tronix

ZM220
Signal Processor

User Manual

AWT35-100262
Issue AA

Table of Contents

Current Issue	Date Created	Details of Changes
AA	March 2026	New manual

1 General Information and Warnings

1.1 About this Manual

This manual is divided into sections by the section number and the large text at the top of a page. Subsections are labelled using the 1.1 and 1.1.1 convention. The page numbers appear at the bottom of the pages in the “Page x of y” format.

1.2 Special Messages

Special messages used in this manual are defined below. The heading words have specific meanings to alert users to additional information or the relative level of hazard.

ELECTRICAL WARNING!
THIS IS AN ELECTRICAL WARNING SYMBOL.
ELECTRICAL WARNINGS MEAN THAT FAILURE TO FOLLOW SPECIFIC PRACTICES OR PROCEDURES MAY RESULT IN ELECTROCUTION, ARC BURNS, EXPLOSIONS OR OTHER HAZARDS THAT MAY CAUSE INJURY OR DEATH.

WARNING!
This is a Warning symbol.
Warnings mean that failure to follow specific practices and procedures may have major consequences such as injury or death.

CAUSTION!
This is a Caution symbol.
Cautions give information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

Note: This is a Note symbol. Notes give additional information about the product.

1.3 Installation

THE ZM220 DOES NOT CONTAIN USER-REPAIRABLE PARTS. REQUEST REPAIRS FROM QUALIFIED PERSONNEL.

WARNING!
Signal processors with CLASS I construction must be connected to the electrical outlet with a protective ground connection.

WARNING!
Batteries (battery pack or installed batteries) should not be exposed to excessive heat, such as sunlight, fire, or similar sources.

The ZM220 must be powered by an external power source of 12VDC at 1.2 Amps to 28VDC at 400mA (14.4 Watts). These are the power requirements for a fully loaded unit (8 x 350 Ω load cells), 500mA at the terminal block of the 5V COM port, and a 500mA load at the USB Host port.
To turn on the ZM220 Signal Processor, wire the DC power cable to the ZM220 DC power connector and the other end to a 12VDC to 28VDC electrical outlet. The signal processor will turn on automatically.

1.3.1 Safe Handling of Equipment with Batteries

CAUTION: Danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

1.4 Routine Maintenance

This equipment must be routinely checked for proper operation and calibration. Application and usage will determine the frequency of calibration required for safe operation.
Always turn off the signal processor and isolate it from the power supply before starting any routine maintenance to avoid the possibility of electric shock.

1.5 Equipment Operation

The operation of this equipment is subject to the following two conditions:

1. This equipment or device may not cause harmful interference.
2. This equipment or device must accept any interference. Including the one that may cause unwanted operation.

La operación de este equipo está sujeta a las siguientes dos condiciones:

1. Es posible que este equipo o dispositivo no cause interferencia perjudicial.
2. Este equipo o dispositivo debe aceptar cualquier interferencia. Incluyendo la que pueda causar su operación no deseada.

1.6 Training

Users must not attempt to operate or complete any procedure on this signal processor unless they have received the appropriate training or read the instructions.

1.7 FCC and EMC Declarations of Compliance

United States

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

Canada

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.
Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe A prescrites dans le Règlement sur le brouillage radioélectrique edicté par le ministère des Communications du Canada.

European Countries

WARNING: This is a Class A product. In a domestic environment, this product may cause radio interference in which the user may be required to take adequate measures.

2 Introduction

The ZM220 is a fully programmable signal processor. It runs a General Weighing application out of the box.
The ZM220 is a robust yet easy-to-use signal processor ideal for mounting inside an electrical control box, either using the optional Din Rail mount or fixed in place with the four fixing holes on the signal processor.
The ZM220 offers all the weighing accuracy and performance of the ZM223 indicator without the need of a display or keypad. The ZM220 can be connected directly to a PC, using the ZM220 Web Browser page or viewed remotely using the Avery Weigh-Tronix Remote Assist Mobile App.
The signal processor has one optional USB port, two RS232 serial COM ports, an Ethernet port, and Bluetooth connectivity. Using these options, the ZM220 can connect to USB flash drives, printers, remote displays, computers, PLCs, mobile devices, and other peripheral devices via USB, Ethernet, serial, or Bluetooth connections.
Full setup and configuration (or program customization) requires Avery Weigh-Tronix licensed Ztools along with Zedit prior to installation by a qualified technician.

2.1 Installation

The ZM220 must be installed by a qualified Scale Technician with a licensed copy of Ztools to properly set up the signal processor.

2.2 Powering up the ZM220

Always On (default)

Once the ZM220 signal processor is connected to a DC power supply it will automatically power up and remain on until the power source is removed.

Power Supply Required for the ZM220

- **External 12VDC** @ 1.2 Amps up to 28VDC @400mA (14.4 Watts). These are the power requirements for a fully loaded unit (8 x 350. load cell, 500mA out the 5V COM port terminal block).

2.3 Available Communication Ports

To allow the ZM220 to connect to a wide range of peripheral devices like printers, remote displays, remote bases, scanners, PLCs, PC, cloud servers, USB keyboards, phones, and tablets the signal processor comes standard with the following connection ports.

- 2 x RS232
- 1 x USB host (optional) loom required
- 1 x Bluetooth
- 1 x Ethernet port (with 10 independent connections)
  - Eth-net IP
  - ModbusTCP
  - FTP
  - HTTPS
  - MQTT

Note: All connections must be setup by a qualified Scale Technician during installation.

2.4 Base Switching Mode

One ZM220 signal processor can run two scale bases (one analog scale base and one digital BSQ scale base or two digital BSQ bases).
When a second scale base is configured to the ZM220 users can switch between base 1 and base 2 by using the base switching UDF field found in both the Web Browser Page and the Remote Assist mobile app.

2.5 UDF Fields

The following text UDF fields that can be called up from the signal processor for use on print tickets or labels.

- ID
- Part Number
- Description
- Lot location
- Name
- Address
- 10 Free UDF text fields

These extra UDF fields are designed to allow the operator to easily add text to a known print label or ticket. These fields are not Linked to a PLU number and can be turned on or off from within the Supervisor Menu (1793) under the Mobile Field.
The UDF fields can only be entered or edited using the Remote Assist app or the Web Browser page.
Any of the text UDF fields can only be viewed or changed using the ZM mobile app or the web browser page.

3 ZM220 Signal Processor Application

The ZM220 signal processor comes with the standard Avery Weigh-Tronix General Weighing Application installed and ready for use out of the box and can run all the existing ZM223 apps with limited supervisor functionality. Ideal for more convectional applications like: Acclamation, Counting, Batching, Checkweighing, Grading, Peak Hold, Animal Autoloc, or Truck In/out. Additionally, the ZM220 is a fully programmable signal processor allowing for custom applications.

ZM Mobile Connection: All current ZM220 applications listed below can also be used in conjunction with the Remote Assist App (see page 10).

ZM220 Web Browser Control: The ZM220 Web Browser page can also be used if the signal processor is connected to the same network as the PC viewing the web browser (see page 13).

SMA Commands: The Z220 can be fully controlled using SMA commands from a connected PC. For a full list of SMA Commands, see the ZM220 Service Manual.

ZPort: The current version of ZPort can be used with the ZM220 signal processor.

3.1 General Weighing Application

This section covers the ZM220's General Weighing application. All ZM220's come with the General Weighing application active.

The ZM220 signal processor does not have physical keys or a display. It relies on external devised like a PC or Bluetooth phone/tablets to view live weight or control set functions like Zero, Tare, Print, etc.

Note: If the ZM220 is loaded with any ZM223 apps, refer to the ZM223 User Manual for app functionality.

The basic General app functions can be accessed using a web browser.

1. Enter the signal processor's IP address into any PC's web browser that is connected to the same network as the ZM220.
2. You can now view live weights and carry out key functions like Zero, Select, Tare, Print, Unit switching, and Base Switching.

Zero Key: If the weight on the scale is not at Zero press the Zero key. The weight will now display 0.000 and the Zero annunciator will illuminate.

Select Key: This key toggles between Gross, NET, and Tare weights.

Tare Key: This key tares off the weight of an empty container prior to filling. The display will show a 0.00 NET weight.

Entering a Known Tare Weight: Click on the Tare Weight UDF field and enter in the tear weight and press enter. The web browser display weight will now deduct the known weight and show a NET Weight.

Clearing a Tare weight: With no weight on the scale and an active Tare, the Tare key will remove the active tare and will change from NET Weigh to Gross Weight.

Units Key: This key changes the units of measure.

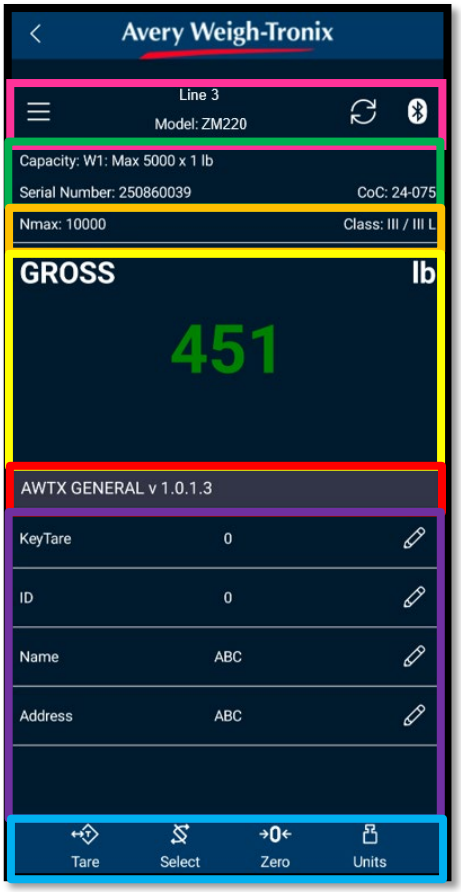
Print Key: This key prints or stores a weight transaction. If the weight is not stable when the print key is pressed the display may show **cant.** Depending on how the Print function is setup, weight may need to return to Zero before the next print transaction can take place. Please note that on most automated process, the print transaction functions are normally set to auto print.

Loss of Network Connection: In the event the network connection is lost, the web browser screen will black and show **No Conn.** When the connection comes back on the weight display will resume and once again show live weight. If the connection does not reconnect, users can force a reconnect by pressing the SCALE tab at the top of the web browser page.

4 Remote Assist Mobile App Walkthrough

This section covers the free Avery Weigh-Tronix Remote Assist mobile app that pairs with any ZM220 via Bluetooth. Remote Assist provides users with additional features to make the signal processor more flexible. Using the Remote Assist app uses can: remotely view live weights, use some of ZM223 Indicator keys, view and change a wide range of app defined weight data fields, change UDF printable text fields that can be used on a print ticket or label, and use operator prompts to aid in using the ZM220. Subject to the app running on the ZM220, special fields can be viewed and used in the Remote Assist mobile app. However, it is recommended to keep these active fields to around 6 to reduce the risk of slowing down the Remote Assist mobile app. The Remote Assist mobile app is available in Android, IOS, and Windows formats and can be downloaded using the QR code below or directly from the Google Play or Apple App Store.

4.1 Remote Assist Mobile App Breakdown



Menu button, Scale data, Refresh button, and Bluetooth icon.

Device Settings, Name, Model, Connection Type – (Firmware Driven)

Scale Device Info: Capacity, Serial Number, Etc. – (Firmware Driven)

Active Value, Weight, and Units – (Firmware Driven)

User Prompt - (App Driven)

UDF (User Defined Fields) + Custom App Buttons – (App Driven)

- Driven using LUA Variables
- Define which values you want displayed and their order.
- Variable description, value, and read/write status is show.
- Define custom buttons and colors.

Device Keys/Remote Keys – (Firmware Driven)

4.2 Downloading the Remote Assist Application

Download the Remote Assist app to any smartphone or tablet from either the Google Play Store or the Apple App Store by using the QR Code below.
Google Play Store: AWTX Remote Assist - Apps on Google Play
Apple App Store: AWTX Remote Assist on the App Store

OR

Search “AWTX Remote Assist” in either App Store and tap on the Remote Assist App Icon.
Once downloaded, tap the R-Assist icon to launch the application.

4.3 Connecting a Scale

1. Tap the R-Assist application icon.
2. Tap “Add Bluetooth Device”

   Choose Start scanning: Select the Serial Number that corresponds to the desired ZM220 Signal Processor.

   OR

   Use QR Code on the back of the signal processor. Be sure to scan the Bluetooth Connection sticker on the back right hand side of the signal processor.

3. Name the device, while being sure to maintain an easy to remember naming convention.

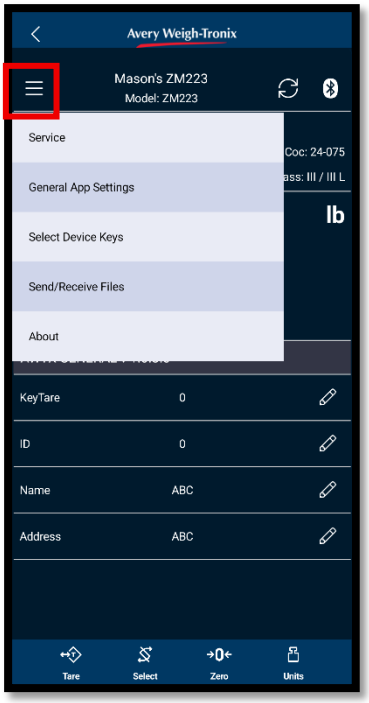
Note: We recommend that users maintain a reliable naming convention for all ZM220 units. For example, if there are four production lines (Named: Line A, Line B, Line C, and Line D) that are getting four ZM220 units, name each unit the same as the line it is installed on so when connecting to an signal processor through Remote Assist you will see Line A, Line B, Line C, and Line D.

4. Tap the **OK** button and the mobile device is connected to the ZM220 Signal Processor.

4.4 Mobile App Screen Navigation

To navigate between the menus of the Remote Assist application use the Navigation Popup menu.
To access the Navigation Popup menu, tap the Navigation Button on the upper left-hand side of the home screen.

Note: The Navigation Button will be in the same location on every page of the Remote Assist Mobile App. Subject to the app that is running in the ZM220, some fields, like reports, may not be available in the app.



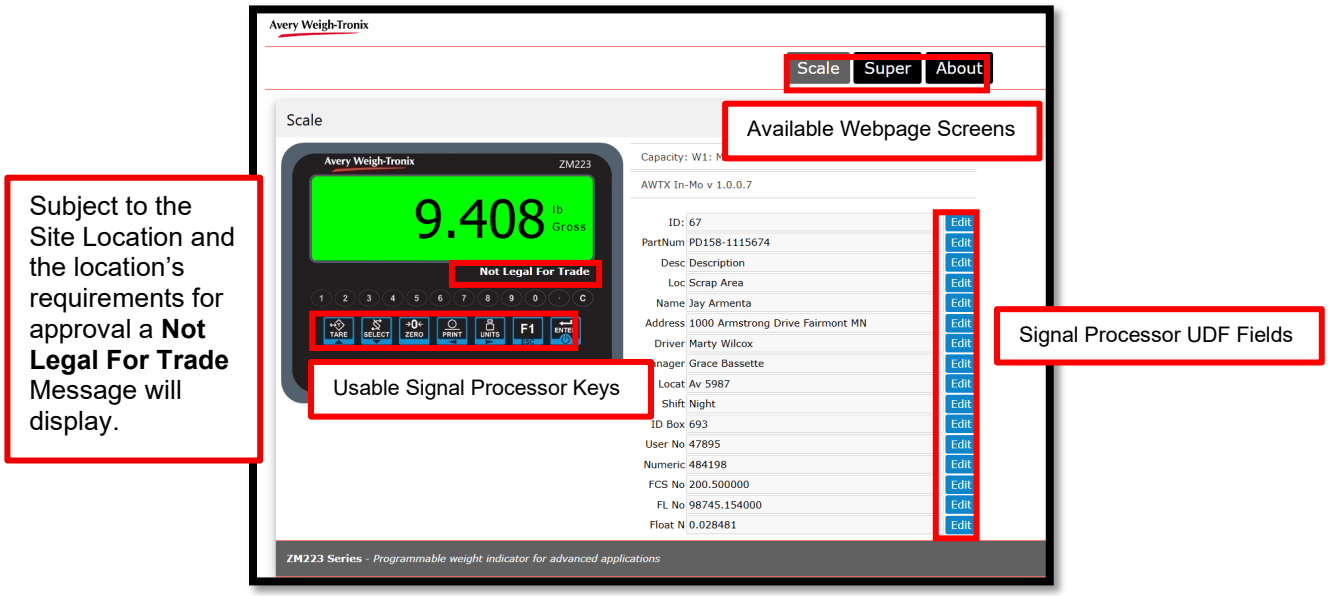
5 Web Browser Walkthrough

This section covers the ZM220's remote connectivity using the new Avery Weigh-Tronix web browser page. This web-based application allows operators to run the signal processor remotely like a normal indicator from any PC or tablet that is connected to the same network as the ZM220 through any search browser. Using the web browser app also provides the user with indicator features that cannot be done directly from the ZM220 signals processor.

Through the web browser app uses can: remotely view live weights, use all Signal Processor keys, view and change a wide range of app defined weight data fields, change UDF printable text fields that can be used on a print ticket or label, retrieve stored data from the ZM220 flash drive memory, store weight data to the mobile device, and use operator prompts to aid in using the ZM220.

- To navigate between the available webpage screens (Scale, Super, and About), click on the corresponding screen button in the upper right-hand corner of the screen shown below.
- Within the web browser page users can view, edit, and adjust UDF fields. Please note that the UDF fields varies depending on the Signal Processor Application the ZM220 is currently running.
- To use any of the ZM220 Signal Processor's keys, click on the desired key on the simulated signal processor display shown below.
- To edit any of the ZM220 Information Fields click on the "Edit" button to the right of the field that needs to be edited.

Note: IP address used in the web browser must match the signal processor's IP address. For example: 192.168.1.15



Note: If the connection is lost and the web browser page will not reconnect, click on the Scale Tab to refresh the screen. It is advised to do this after changing anything in the Supervisor Menu to ensure any new fields that have been turned on have fully activated and displaying on the web browser page.

5.1 Using the Web Browser

Follow the steps below to connect to and operate a ZM220 signal processor from a web browser page.

1. From a new web browser tab (Google Chrome, Microsoft Edge, Safari) type in the IP address of the ZM220 signal processor you wish to connect to.

Note: Remember that the ZM220 signal processor must be connected to the same network for the web browser page to connect properly.

UDF fields with an **Edit/Pencell icon next** to them are fields that can be changed or edited from the web browser screen.
Designed to provide an easy method to add text data to the transaction data or printed label data

- Currently there are several predefined UDF fields that can be easily turned on from the supervisor menu
  UDF 1: Part No **UDF 2: Description** **UDF 3: Loc**
  UDF 4: Name **UDF 5: Address**
- There are also 10 unnamed UDF fields that can be quickly turned on, edited & used.
  UDF 6 UDF 10 UDF 14
  UDF 7 UDF 11 UDF 15
  UDF 8 UDF 12
  UDF 9 UDF 13

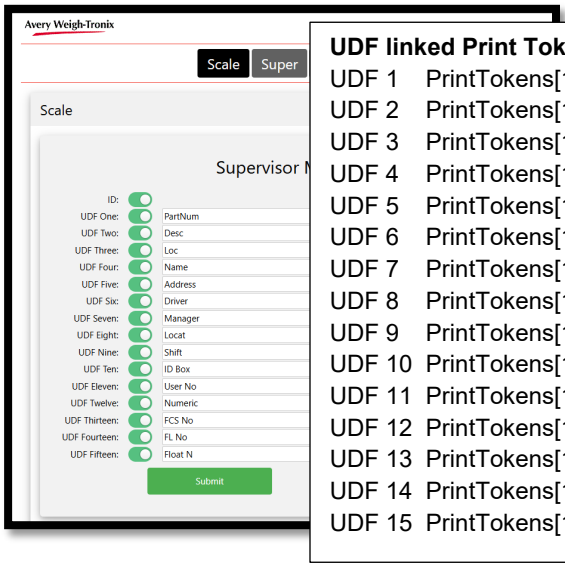
5.2 Live Weight

The web browser page will show the live weight from the signal processor. All keys on the web browser, like **TARE, SELECT, ZERO, PRINT, UNITS** and **F1** work.

5.3 Supervisor Tab

The Supervisor Tab is password protected with the same password as the signal processor's Supervisor Menu.
Any of the UDF fields can be modified/renamed from the Web Browser page (see screen capture below).
To gain access to the Supervisor Menu enter the Supervisor password (1793).
From the Supervisor Menu, managers can enable, disable, or edit any UDF field.

1. To activate or deactivate a UDF field, click or tap the switch button next to the desired UDF filed to toggle it on or off.
2. To edit a UDF field, click or tap on UDF field bar and select the desired UDF value from the popup menu.



UDF linked Print Tokens

UDF 1	PrintTokens[151]
UDF 2	PrintTokens[152]
UDF 3	PrintTokens[153]
UDF 4	PrintTokens[154]
UDF 5	PrintTokens[155]
UDF 6	PrintTokens[156]
UDF 7	PrintTokens[157]
UDF 8	PrintTokens[158]
UDF 9	PrintTokens[159]
UDF 10	PrintTokens[160]
UDF 11	PrintTokens[161]
UDF 12	PrintTokens[162]
UDF 13	PrintTokens[163]
UDF 14	PrintTokens[164]
UDF 15	PrintTokens[165]

5.4 Mobile and Web Browser Operator Prompts

The web browser screen and the mobile app screen both offer an additional text field area that allows additional operator prompts to be seen and viewed to aid the operator in carrying out the tasks in hand. These prompts will vary depending on the app.

5.5 Viewable Data Fields for Mobile and Web Browser Pages

The Remote Assist Mobile App and web browser pages will show other useful data fields that have been turned on depending on the app.

RPN secondarily key function in the ZM220 do not work on the web browser, however these same scale field function can be customized to work from a Scale Field in the web browser. Contact your service provider if you require custom programming

		Application											
		ZM220 General	ZM223 Accum	ZM223 Count	ZM223 Check			ZM223 Check Grade	ZM223 Check by %	ZM223 Truck In/Out	ZM223 Batch-ing	ZM22 3 P-Hold	ZM223 In-Motion
					Simp	Mid	Adv						
Available RPN Functions	Tare Weight	X	X	X		X	X	X	X	X	X	X	X
	ID	X	X	X	X	X	X	X	X	X	X	X	X
	I/O 4-6	X	X						X	X	X	X	X
	Accumulation Channel		X										
	Preact 4 – 6										X		
	Gross, Net, Tare									X			
	Description			X									
	Inbound WT									X			
	Outbound WT									X			
	PLU			X			X		X				
	Grade 1-11							X					
	Transaction									X			
	Target			X		X	X		X				
	Low			X	X	X	X		X				
	High			X	X	X	X		X				
	Piece Weight			X	X	X	X						
	Part Number			X	X	X	X		X				

5.6 UDF Printable Fields

The new web browser view also allows users to view and edit other UDF fields directly from any web browser.
The following UDF fields can be turned on from within the Supervisor menu are:

- Part Number
- Description
- Lot Location
- Name
- Address
- 10 UDF Text Fields

5.7 Communication Port Protocols

5.7.1 Level 1 and 2 Commands

Sent	Action	Response
<LF>W<CR>	Weight of the current scale is returned.	Standard response (displayed weight)
<LF>P<CR>	Indicator attempts to capture a stable weight on the current scale.	Standard response (displayed weight). Weight is returned as center dashes ←-----→ if a stable weight cannot be established.
<LF>Z<CR>	Indicator attempts to zero the current scale.	Standard response (displayed weight)
<LF>T<CR>	Indicator attempts to tare the current scale.	Standard response (displayed weight)
<LF>T<xxxxxx.xxx><CR>	The indicator attempts to set the current scale's tare weight to the value that was sent.	Standard response (displayed weight)
<LF>M<CR>	The indicator returns the current scale's Tare weight.	Standard response (tare weight)
<LF>C<CR>	The indicator sets the current scale's Tare weight to zero.	Standard response (gross weight)
<LF>U<CR>	The indicator will cycle the unit of measure on the current scale	Standard response (displayed weight)
<LF>U<uuu><CR>	The indicator will set the unit of measure to <uuu> on the current scale.	Standard response (displayed weight)
<LF>D<CR>	The indicator will return a diagnostic message.	<LF><r><e><c><m><CR> <r> = 'R' (RAM error) or ' ' (space) (RAM ok)
<LF>A<CR>	The indicator will respond with the first line of the About data.	See "About Command Response" (below)
<LF>B<CR>	The indicator will respond with the rest of the About data.	See "About Command Response" (below)
<LF>I<CR>	The indicator will respond with the first line of the scale Information data. (for the current scale)	See "Scale Information Command Response" (below)
<ESC>	The indicator will reboot itself	None

SMA protocol is maintained by an external organization. For definitive and current details on this protocol, go to www.scalemanufacturers.org.

5.7.2 Standard Scale Response Message

<LF><s><r><n><m><f><xxxxxx.xxx><uuu><CR>

<LF>	Line feed	Start of the response message.
<s>	Scale Status	‘Z’ Center of Zero
		‘O’ Over Capacity
		‘U’ Under Capacity
		‘E’ Zero Error
		‘T’ Tare Error
		<space> None of the above conditions.
<r>	range	Multi-interval range. Always ‘1’ if multi-interval is disabled.
<n>	gross/net status	G’ = Gross weight
		‘T’ = Tare weight
		‘N’ = Net weight
<m>	Motion status	‘M’ = scale is in motion
		<space> = scale is stable
<f>	Future use	<space> = always a space.

5.7.3 Unrecognized Command Response

<LF>?<CR>

5.7.4 About Command Response

The ‘A’ and ‘B’ commands are used together to get all of the scale about data. The ‘A’ command will always return the 1st response below. The ‘B’ command must be sent multiple times to get the 2nd, 3rd, and 4th responses. Once the 4th response is received, the next ‘B’ command will return an Unrecognized Command Response. At this point send another ‘A’ command to get the 1st response again.

<LF><xxx>:<yyyyy><CR>

1st response:	<xxx> = “SMA”
	<yyyyy> = compliance level/revision
2nd response:	<xxx> = “MFG”
	<yyyyy> = manufacturer
3rd response:	<xxx> = “MOD”
	<yyyyy> = software part number
4th response:	<xxx> = “REV”
	<yyyyy> = software revision

5.7.5 Scale Information Command Response

The ‘I’ and ‘N’ commands are used together to get all of the scale information data. The ‘I’ command will always return the 1st response below. The ‘N’ command must be sent multiple times to get the 2nd, 3rd, 4th, 5th, and 6th responses. Once the 6th response is received, the next ‘N’ command will return an Unrecognized Command Response. At this point send another ‘I’ command to get the 1st response again.

<LF><xxx>:<yyyyy><CR>

1st response: <xxx> = “SMA”

<yyyyy> = compliance level/revision

2nd response: <xxx> = “TYP”

<yyy> = ‘S’

3rd response: <xxx> = “CAP”

<yyyyy> = uuu:ccc:n:d where

uuu = unit of measure

ccc = capacity of the range lower range (capacity of the scale is multi-interval is disabled)

n = least significant count-by digit for this range d = decimal point position for this range

‘0’ = none

‘1’ = xxxx.x

‘2’ = xxx.xx etc.

4th response: <xxx> = “CAP”

<yyyyy> = uuu:ccc:n:d where

uuu = unit of measure

ccc = capacity of the range upper range (4th response will not be sent if multi-interval is disabled)

n = least significant count-by digit for this range d = decimal point position for this range

‘0’ = none

‘1’ = xxxx.x

‘2’ = xxx.xx etc.

5th response: <xxx> = “CMD”

<yyyyy> = “PTMCU” list of supported SMA commands.

Level 1 commands are not included in the list.

6th response: <xxx> = “END”

<yyyyy> = nothing

7th & more - responses: Subsequent N commands will return a ‘?’ response. Unrecognized Command Response

5.7.6 Avery Weigh-Tronix Extended SMA Commands

Note: AWT Extended SMA command/response protocol allows use of the same Network Tokens shown in ATTRIBUTE: 3 hex

<LF>XA<CR> This will initiate an Accumulate command. If the indicator is in ACCUM or COUNT app, it will perform an Accumulation transaction if all required conditions are met.

The command will also perform the same function as pressing the **PRINT** key on the front panel. Response will be to any communication ports that are bound to a Type = Print. The port that initiated the command will also receive an <LF>xa<CR> response.

<LF>XB<CR> This will initiate a **PRINT** command. The command will also perform the same function as pressing the **PRINT** key on the front panel.

No response.

<LF>XK<CR> This will return a list of up to the last twenty keys pressed. The buffer is cleared after this command.

<LF>xk:Y<CR> where Y is:

T for TARE key

S for SELECT key

Z for ZERO key

P for PRINT key

U for UNITS key

F for F1 key

G for START key

H for STOP key

I for ID key

L for TARGET key

J for SAMPLE key

K for SETUP key

C for CLEAR

R for REPORT key

Q for IN/OUT key

Note: The list above includes all the keys for all the various models of Z indicators. If the indicator model does not have one of these keys, that key will not be included in the returned list.

Note: XD, XZ and XS commands, below, only work if the indicator is unsealed.

<LF>XC<CR>	This will return the audit counters in this format: <LF>Calib:xxx:Config:yyy:<CR>
<LF>XD<n><CR>	This will initiate the resetting of the calibration and/or configuration parameters depending on the format chosen from the list below: If n=1, reset config only If n=2, reset calibration only If n=3, reset both The response will be in the form of: <LF>xd<n><CR>
<LF>XZ<CR>	This will initiate a Cal Zero command. The scale responds with a standard scale response message, with one additional custom status response added. If the “Set Zero” operation fails then the scale responds with the <s> field = “0”
<LF>XS<wwww><CR>	This will initiate a Cal Span command where <wwww> is the weight used to calibrate with. The scale responds with a standard scale response message, with one additional custom status response added. If the “Set Span” operation fails, then the scale responds with the <s> field = “s”
<LF>XVS<n>:<value><CR>	The indicator will set the <value> of the variable specified by the Network token. A valid XVS command will receive a response of <LF>xvs<CR>. To verify an XVS command was successful requires sending the XVG command to confirm the value of the variable.

Note: To set I/O 4 value to 10.5 lb, send <LF>XVS1004:10.5<CR>
To tell the indicator to use Tare register 2, send <LF>XVS1002:2<CR>

<LF>XVG<n><CR>	The indicator will get or return the value of the variable specified by the network token. A valid response is in the form of <LF><value><CR>.

Note: To get the I/O 4 value, send <LF>XVG1004<CR> 10.500000 will be returned. Integer type variables will return integer values.

Note: When used with weight-based values, the XVS command uses the active unit of measure. The XVG command returns the value that was entered or sent using an XVS command regardless of the current active unit of measure.

Note: If the protocol is configured with an address attribute that is not zero, the address is added. If multiple indicators are connected on an RS232 multi-drop network, each will have a unique address. The network device can use SMA protocol to communicate to individual indicators by adding the indicator address <addr> following the initial <LF> character to any of the SMA commands. As an example, the standard weight command would be <LF><addr>W<CR>. The response will also include the indicator address value following the initial <LF><addr>.

5.7.7 ENQ & B-Cast Commands

A	ACCUM Command	"If ACCUM APP is active, this command will generate an accumulation transaction, but it does not perform the print function"
P	PRINT Command	"Performs same function as pressing the **PRINT** key. All Ports that are bound with **PRINT** type will transmit the assigned print format"
S	SELECT Command	Performs the same function as pressing the **SELECT** key
T	TARE Command	Performs the same function as pressing the **TARE** key
U	UNITS Command	Performs the same function as pressing the **UNITS** key
Z	ZERO Command	Performs the same function as pressing the **ZERO** key
F	F1 Command	Performs the same function as pressing the **F1** key
G	START Command	Performs the same function as pressing the **START** key
H	STOP Command	Performs the same function as pressing the **STOP** key
I	ID Command	Performs the same function as pressing the **ID** key
J	SAMPLE Command	Performs the same function as pressing the **SAMPLE** or **FLEET** key
K	SETUP Command	Performs the same function as pressing the **SETUP** key
L	TARGET Command	Performs the same function as pressing the **TARGET** or **REPORT** key
Enter	ENTER Command	Performs the same function as pressing the **ENTER** key.
	Base Switching	Performs the base switching function.
	PLU Activation	Performs the PLU activation key function.

Note: Upper or lower case characters will perform the same function.

5.7.8 NCI Commands (legacy protocols before SMA)

W <Cr>	Weight request	Returns decimal weight, units and status
S <Cr>	Status request	Returns status.
Z <Cr>	Zero request	Scale is Zeroed and returns scale status.
H <Cr>	High Resolution Weight request	Returns decimal wt in 10x or 100x resolution with units and status. For x100 resolution set the associated PROT > ATTR > ENQ menu value to 100. For all other values, the H command will return x10 resolution
U <Cr>	Units request	Changes unit of measure and then returns decimal weight in the new units with status.
M <Cr>	Metrology Raw Counts request	Returns normalized raw counts and scale status.
T <Cr>	Tare request	Scale is Tared and returns scale status.
all else	Unrecognized command	Returns <Cr> ? <Lf>

Note: If the PROT > ATTR > ENQ menu value is set to 100, to increase resolution by 100, users may add a 2 or 3 to the command to return a 2 or 3 character status byte. For example: 102 will increase resolution by 100 and return a 2 character status byte.

6 Communications

The ZM223 can communicate through these ports:

- Serial
- Ethernet
- USB
- Bluetooth

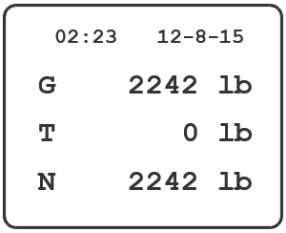
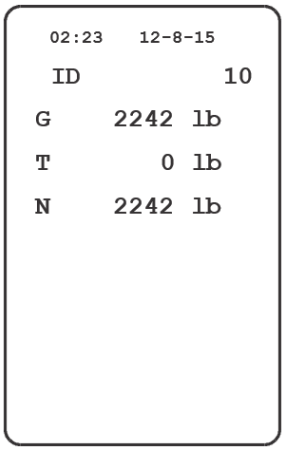
6.1 Default Print Formats

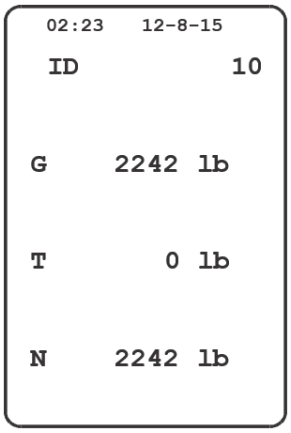
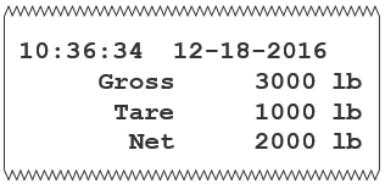
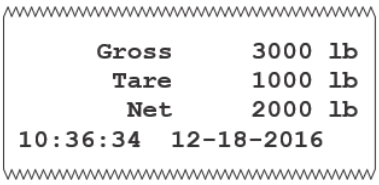
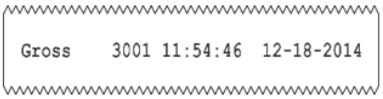
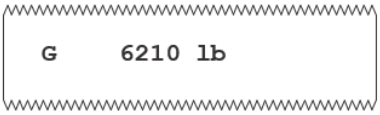
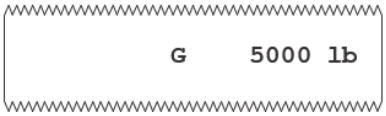
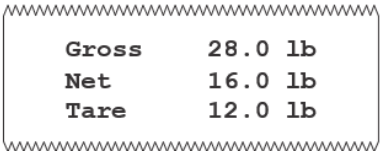
Users can quick select a Print Format by using the keypad. For example, key in 1 9 and press the **PRINT** key to print a ticket using Print Format 19, 3 5 to get Print Format 35, etc.

Note: The below ticket examples are close approximations of how the different print formats look when used. There may be small differences in font, size, and formatting when printing in the field.

Print Format Number	Description	Example Ticket
1	General App. Default	Gross 3000 lb Tare 1000 lb Net 2000 lb
2	Accumulate App. Default (see PF 8 for Totals)	Acc # 1 Trans # 3 Gross 3000 lb Tare 1000 lb Net 2000 lb
3	Count App. Default (see PF 31 for Totals)	Count 150
4	Net Weight	Net 2000 lb
5	Displayed Weight	G 2000 lb
6	Peak App. Default	Peak 6000 lb

Print Format Number	Description	Example Ticket
7	Remote App. Default (broadcast this format to remote)	1000 lb G
8	Accummulate Totals App. Default (see PF 2 for print out)	Acc # 1 Trans # 3 Gross Total 9000 lb Tare Total 2000 lb Net Total 7000 lb
9	CONDEC clone format	1000LG
10	Displayed Weight with Tare Register number	1 G 1000 lb
11	Displayed Weight with Status (3- bytes)	G 2000 lb 822
12	Displayed Weight with Status (Alphanumeric)	G 5000 lb S
13	Basic Weight Ticket with Time, Date, and Site ID number	02:21:28 04-23-2015 ID 141414 Gross 5000 lb Tare 1000 lb Net 4000 lb
14	Basic Weight Ticket with Time, Date, and Tare Register number	02:21:28 04-23-2015 G 5000 lb 1 T 1000 lb N 4000 lb
15	Accumulated Gross Weight (Used with Accumulate or Count Apps.)	Gross Total 5000 lb

Print Format Number	Description	Example Ticket
16	Accumulated Net Weight (Used with Accumulate or Count Apps.)	Net Total 8002 lb
17	Basic Accumulate Ticket for GTN values (Used with Accumulate or Count Apps.)	Gross Total 20002 lb Tare Total 12000 lb Net Total 8002 lb
18	Minimum Peak Weight Value/ Peak Min Max	N/A
19	2.5 in. X 4.0 in. Barcode Ticket with Site ID, Time and Date	
20	1.25 in. X 1.0 in. Thermal Label Ticket with Time and Date	
21	2.50 in. X 4.0 in. Thermal Label Ticket with ID, Time and Date	

Print Format Number	Description	Example Ticket
22	4.0 in. X 6.0 in. Thermal Label Ticket with ID, Time and Date	
23	Same as PF1 with Time and Date first	
24	Same as PF1 with Time and Date last	
25	Gross Weight & Time & Date	
26	Brecknell RD- 65 (Setup RD for Data Format #3)	
27	In-Motion App. Default	
28	In_Motion App. (Alternate)	

Print Format Number	Description	Example Ticket
29	Data Stream for (UK) Legacy PC application	3327 0 00M99 9
30	Bind Forward	Gross 3000 lb Tare 1000 lb Net 2000 lb
31	Count Totals App. Default (see PF 3 for print out)	Count Total 250
32	Used for Analog Output Option Card (Gross Cal Weight)	120032
33	XR4500TL Remote Display setup for Command Mode #3	1000 G1
34	GSE Remote HUB interface format.	0.000000
35	Single transaction of accumulated GTN data (see PF 8 or PF 9 for Totals Mode dependant)	PLU # 1 Trans # 3 Gross 3000 lb Tare 1000 lb Net 2000 lb
36	Accumulate Totals for PLU # (see PF 2 for print out) Advanced Mode only	PLU # 3 Trans # 2 Gross Total 26.5 lb Net Total 26.5 lb
37	Accumulate Totals (see PF 2 for print out) **Mid375 Mode only**	Trans # 2 Gross Total 26.5 lb Net Total 26.5 lb

Print Format Number	Description	Example Ticket
38	ZM223 Checkweigher Under/Accept/ Over Band	OVER : 0.378 lb
39	ZM223 Checkweigher Accept/Reject Band	REJECT : 0.542 lb
40	ZM223 Net Weighment with Band	1.176 lb OVER

41	ZM223
	Standard Deviation Stats.
		Tol Hi = 0.550 lb
		Tol Lo = 0.240 lb
		Target = 16.000 lb
		# Over = 5
		# Under = 4
		#Accept = 5
		Mean = 16.504 lb
		Max Wt = 17.504 lb
		Min Wt = 15.003 lb
		Std Dev = 1.370
		C of V = 1.202 PCT
		# Smpl = 14

42	ZM223 X-Bar/R Stats. with Trend Message if a trend condition exists.	Tol Hi = 3.100 lb Tol Lo = 2.900 lb Target = 3.000 lb Ave Wt = 3.526 lb Range = 1.200 lb
43	ZM223 Grading	Grad3 6.005 lb
45	Scale 1	Gross 1 0 lb Tare 1 0 lb Net 1 0 lb
46	Scale 2	Gross 2 0 lb Tare 2 0 lb Net 2 0 lb

Print Format Number	Description	Example Ticket
47	Scale 1 and 2 Total	Gross 1 0 lb Tare 1 0 lb Net 1 0 lb Gross 2 0 lb Tare 2 0 lb Net 2 0 lb Gross Total 0 lb Tare Total 0 lb Net Total 0 lb
48	Inbound Ticket	In Date 2015-03-25 In Time 10:50:45 ID 38577 In Weight 14300 lb
49	Inbound Report Header	Inbound Vehicle Report 10:36:41 03-25-2015 ID Time Date Weight
50	Inbound Report Body of Data	966558 20:17 3-9-2015 49300 lb 561152 22:41 3-11-2015 6800 lb 443216 13:05 3-18-2015 59000 lb 606912 5:53 3-18-2015 11620 lb 394736 1:05 3-18-2015 13380 lb
51	Inbound Report Footer	Gross 0 lb Tare 0 lb Net 0 lb End of Fleet Report End of Inbound Report
52	Outbound Ticket	In Date 2015-03-25 In Time 10:50:45 Out Date 2015-03-25 Out Time 10:56:04 ID 38577 Transaction 51 Gross 51040 lb Tare 14300 lb Net 36740 lb
53	Outbound Report Header	Outbound Vehicle Report 10:39:32 03-25-2015 ID # Trans Total Net Wt
54	Outbound Report Body of Data	674758 2 130400 lb 806039 2 99200 lb 961564 6 250100 lb 735023 5 317900 lb 495520 10 361200 lb

Print Format Number	Description	Example Ticket
55	Outbound Report Footer	End of Outbound Report
56	Fleet Ticket	Date 2015-03-25 Time 10:51:24 Fleet ID 759111 Transaction 192 Gross 69080 lb Tare 14100 lb PT Net 54980 lb
57	Fleet Report Header	Fleet Vehicle Report 10:43:40 03-25-2015 Fleet ID Tare Wt # Trans Total Net Wt -------- --------- ------- ------------
58	Fleet Report Body of Data	759109 20500 lb 14 1148000 lb 8262677 12280 lb 32 1571840 lb 8262686 11880 lb 41 1948320 lb 8262691 11940 lb 54 2579040 lb 8262671 11880 lb 56 2661120 lb
59	Fleet Report Footer	End of Fleet Report
60	Reprinted Data Identifier	******** REPRINT *******
61	GTN Boca	01:45:26 04-15-2026 Gross 0 lb Tare 0 lb Net 0 lb
62	Inbound Ticket Label Boca	In Date 0 In Time 0 TRUCK ID 0 In Weight 0 0
63	Inbound Rpt Header Label Boca	Inbound Vehicle Report 14:29:24 04-15-2026 TRUCK Time Date Weight -------- ----- --------- -----------
64	Inbound Rpt Body Label Boca	0 0 0 0 0
65	Inbound Rpt Footer Label Boca	End of Inbound Report

Print Format Number	Description	Example Ticket
66	Outbound Ticket Label Boca	In Date 0 In Time 0 Out Date 0 Out Time 0 TRUCK ID 0 Trans# 0 Gross 0 0 Tare 0 0 Net 0 0
67	Outbound Rpt Header Label Boca	Outbound Vehicle Report 14:44:42 04-15-2026 TRUCK # Trans Total Net Wt -------- ------- ------------
68	Outbound Rpt Body Label Boca	0 0 0 0
69	Outbound Rpt Footer Label Boca	End of Outbound Report
70	Fleet Ticket Label Boca	Date 0 Time 0 Fleet ID 0 Trans# 0 Gross 0 0 Tare 0 0 Net 0 0
71	Fleet Rpt Header Label Boca	Fleet Vehicle Report 15:29:00 04-15-2026 TRUCK Tare Wt # Trans Total Net Wt -------- --------- ------- ------------
72	Fleet Rpt Body Label Boca	0 0 0 0 0 0 0
73	Fleet Rpt Footer Label Boca	Gross 0 lb Tare 0 lb Net 0 lb End of Fleet Report
74	Normal Print Identifier Boca	Gross 0 lb Tare 0 lb Net 0 lb End of Fleet Report
75	RePrint Identifier Boca	***** REPRINT *****
76	Inbound Rpt Header	Inbound Vehicle Report 15:32:28 04-15-2026 ID Time Date Weight ----- ------ ---------- ----------
77	Inbound Rpt Body	0, 0, 0, 0 0
78	Inbound Rpt Footer	End of Inbound Report

Print Format Number	Description	Example Ticket
79	Outbound Rpt Header	Outbound Vehicle Report 15:33:42 04-15-2026 ID # Trans Total Net Wt -------- ------- ------------
80	Outbound Rpt Body	0, 0, 0 0
81	Outbound Rpt Footer	End of Outbound Report
82	Fleet Rpt Header	Fleet Vehicle Report 15:34:25 04-15-2026 Fleet ID Tare Wt # Trans Total Net Wt -------- --------- ------- ---------
83	Fleet Rpt Body	0, 0 0, 0,
84	Fleet Rpt Footer	End of Fleet Report
85	Inbound Ticket Label Boca with barcode	In Date 0 In Time 0 TRUCK ID 0 In Weight 0 0 * 0*
86	GTN ID T&D 1.25x1 Zebra	12:25:51 04-21-2026 ID 0 G 0 lb T 0 lb N 0 lb
87	GTN ID T&D 2.25x4 Zebra	12:25:51 04-21-2026 ID 0 G 0 lb T 0 lb N 0 lb

Print Format Number	Description	Example Ticket
88	GTN ID T&D 4x6 Zebra	12:25:51 04-21-2026 ID 0 G 0 lb T 0 lb N 0 lb
89	GTN ID T&D 2.25x4 Zebra Ticket Roll Paper	12:25:51 04-21-2026 ID 0 G 0 lb T 0 lb N 0 lb
90	GTN T&D 4x6 Zebra Ticket Roll Paper	12:25:51 04-21-2026 G 0 lb T 0 lb N 0 lb

Print Format Number	Description	Example Ticket
91	GTN ID T&D Customer 2.25x3 r270 Zebra	04-21-2026 12:25:51 ID 0 G 0 lb T 0 lb N 0 lb Customer Name
92	GTN ID T&D NtBC 4x3 Zebra	**12:29:58 04** **G 0** **T 0** **N 0** *0*
93	GWT lb/kg ID T&D 4x3 Zebra	0 4-21-2026 12:30:30 GROSS WT: 0 lb 0.0 kg
94	DSPWT T&D 4x6 r270 Zebra	0 lb 12:31:24 4/21/2026

Print Format Number	Description	Example Ticket
95	GTN T&D 4x6 w UDF 1-5 Ticket Roll Paper Zebra	12:29:58 04-21-2026 G 0 lb T 0 lb N 0 lb PartNum ABC Desc ABC Loc ABC Name ABC Address ABC
96	GTN T&D 4x6 UDFs Ticket Roll Paper w_Cutter Zebra	12:29:58 04-21-2026 G 0 lb T 0 lb N 0 lb PartNum ABC Desc ABC Loc ABC Name ABC Address ABC
97	2.25x4 GTN T&D GoDex	11:03:34 4-24-2026 G 0 lb T 0 lb N 0 lb

Print Format Number	Description	Example Ticket
98	4x6 GTN ID T&D GoDex	11:03:34 4-24-2026 ID 0 G 0 lb T 0 lb N 0 lb
99	Peak Net w T+D	Peak Max 0 lb 03:37:21 pm 04-15-2026
100	Peak Net w T+D CSV	Peak Max, 0,lb,03:37:04 pm,04-15-2026

6.2 Error Messages

The following error messages may be displayed during use of the indicator:

Message	Display
Overload	
Can't fit on display or load cell not properly connected	- - - - - - -
Underload	_ _ _ _ _ _ _
Can't	cAnt
Entry not in valid range	boundS
Lost Connection	Conn

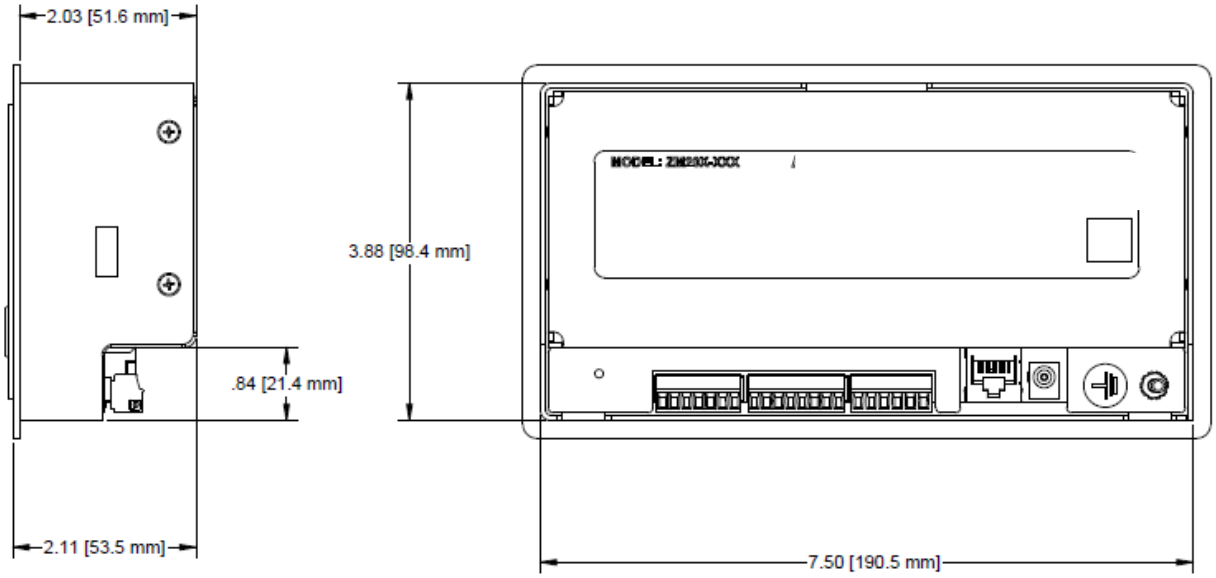
7 Supervisor Menu

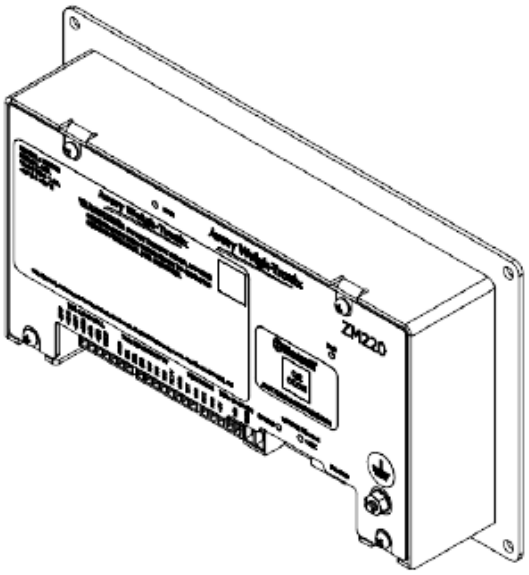
7.1 Supervisor Menu Basics

The Supervisor Menu is password protected menu. From the Supervisor Menu, managers can enable, disable, or edit any UDF field.

Supervisor Password: Use the 1793 passwords to access the Supervisor Menu on the web browser page.

8 Technical Illustrations





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