TECHNICAL MANUAL

Z4 HMI

Controller Interface (part number 11000851)

Version 1.1 / Publication Date 03/04/2019

Table of Contents

1.1 Overview

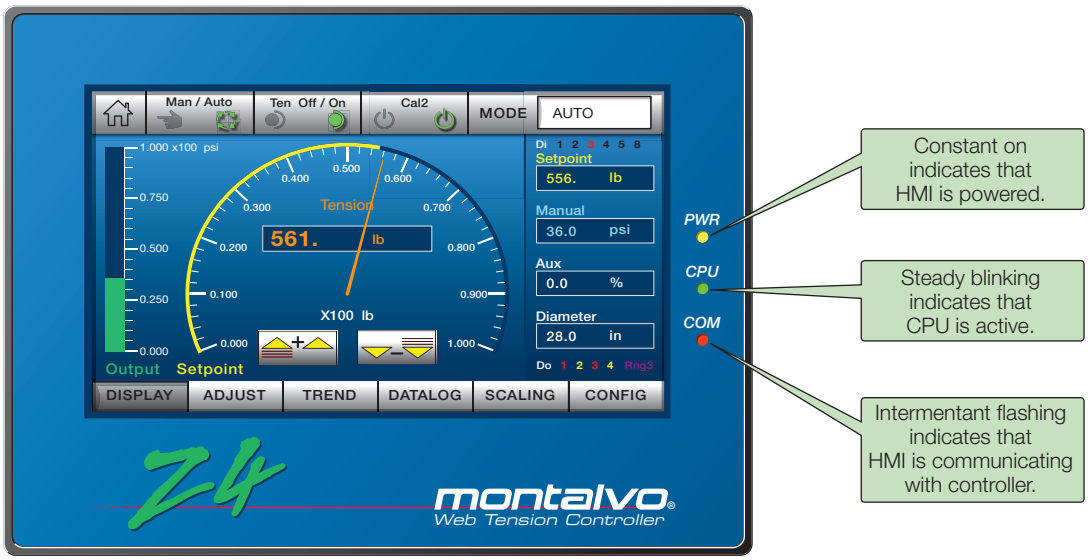
Montalvo's Z4 HMI Controller Interface provides easy operation and feedback of all controller functions. A large central color coded meter combined with intuitive interface make navigation to and display of all vital and routine operations simple and effective.

To properly set up and/or operate the Z4-HMI and to take advantage of all its available features, it is important to have a general understanding of the interface and its place in the tensioning system.

Full Control of All Functions
The Z4 HMI allows an operator to fully control all available functions when enabled by mainboard configuration. Additionally, the interface allows display of mutiple parameters in a number of configurations..

Mode Display
At all times, the Z4-HMI will display the current operating mode. The operator will always know the state of control being applied to the machine.

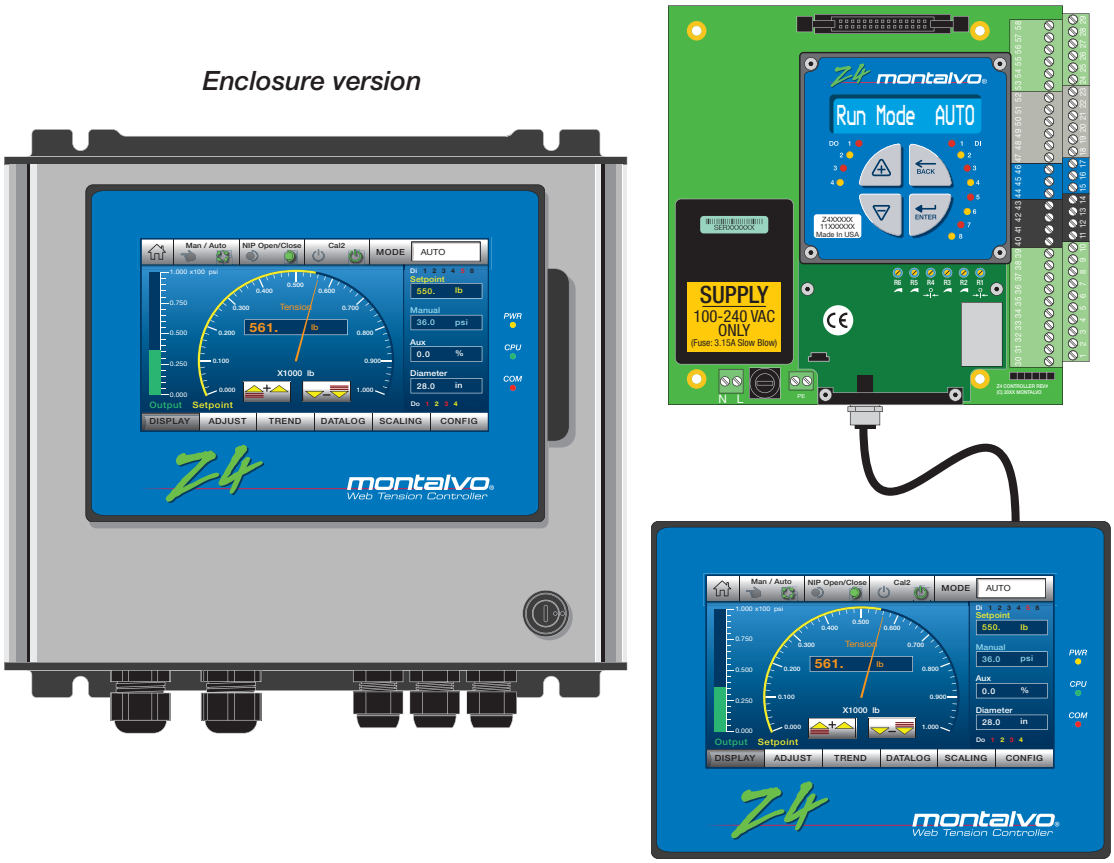
Remote Operation
The Z4-HMI offers operator convenience and safety with its ability to be located remote from the controller circuit board. This is a benefit for critical or frequent operations.



1.2 Controller Version Types

Remote version

Enclosure version

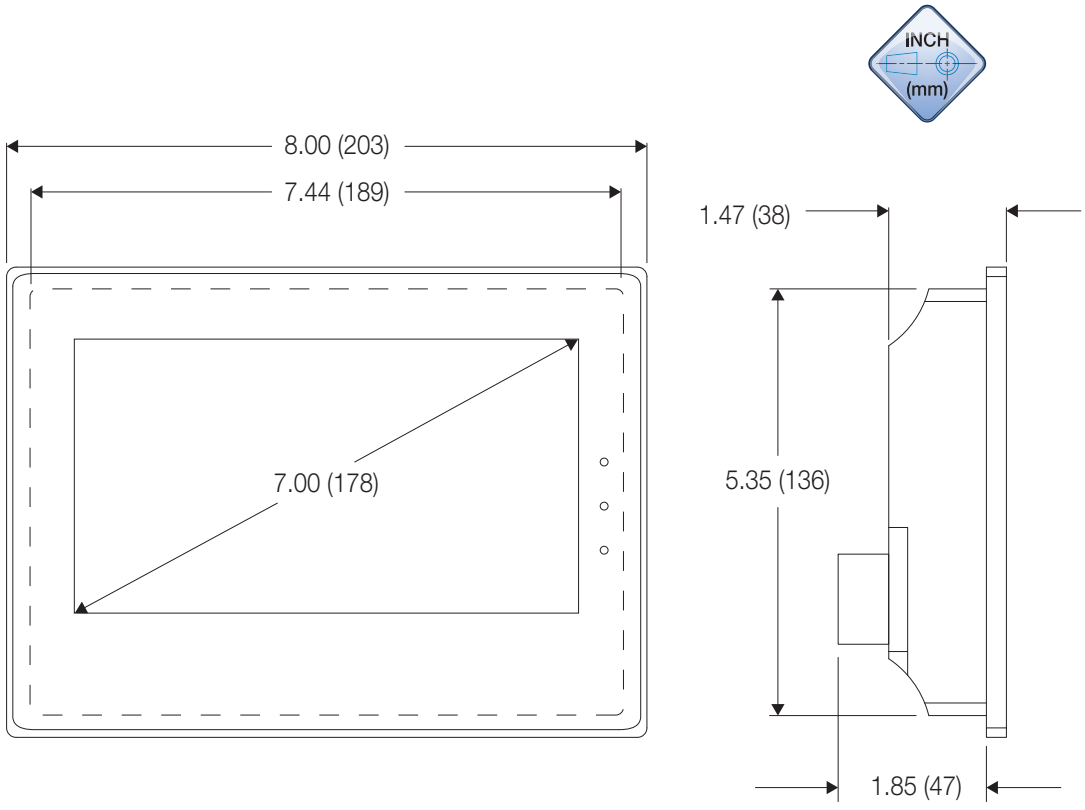


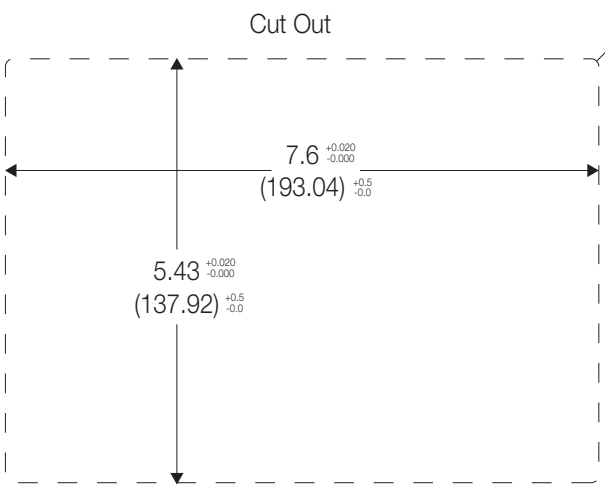
The HMI is available in two controller configurations:

Enclosure Version
A rugged IP54 rated aluminum enclosure houses the controller and HMI. A hinged door allows easy access to the controller keypad and terminal strip.

Remote Version
This configurations allows mounting of the controller in a safe, secure location with the ability to locate the HMI up to 50 feet away, providing convenient operator access.

2.1 Mounting





Mounting clips are provided with the REMOTE version.

2.2 Electrical Safety

Warning: Electrical installation must be done by skilled personnel. Wiring must meet all applicable codes and standards.

Refer to the appropriate wiring and terminal descriptions for external connections.

Note: Double-check the accuracy of all wiring connections before applying power to the controller. Damage caused by improper wiring is not covered under warranty.

EMC Requirements: Connect the protective ground wire to the terminal marked PE. Ground wires should be as short as possible. Connect the controller GND terminal and enclosure to a common ground.

Keep signal cables away from supply cables or any wires that conduct high current. For the best noise immunity, run signal cables close to the machine frame, mounting plates, or other grounded structures.

SAFETY INFORMATION

The following safety symbols appear in this manual.

Caution

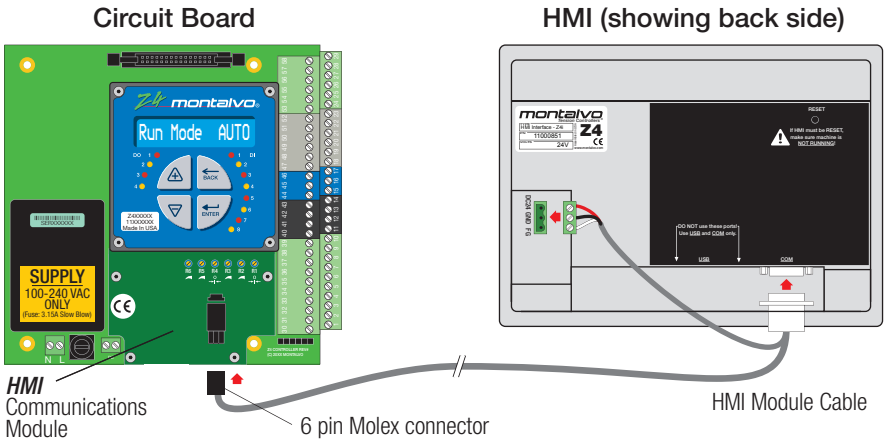
Failure to follow installation and setup instructions in this manual may result in equipment damage or personal injury.

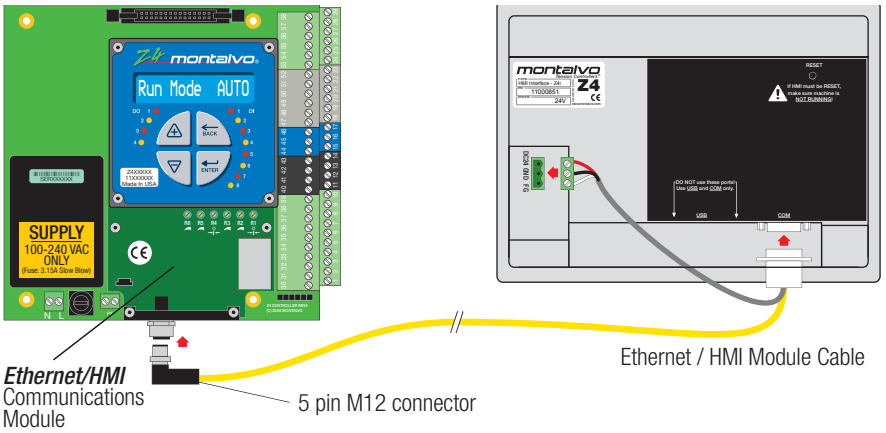
Electrical Hazard

Failure to follow wiring instructions in this manual may result in equipment damage, personal injury, or death.

2.3 Wiring

The Montalvo Z4-HMI is available as a remote interface that must be field wired to the Z4 controller. Wiring requires just one cable provided by Montalvo.





Standard HMI Cables

Part#	Module Type	Length (m)
19000618	HMI	0.6
19000619	HMI	5
19000620	HMI	10
19000621	HMI	15
19000652	Ethernet/HMI	0.6
19000669	Ethernet/HMI	5
19000670	Ethernet/HMI	10
19000671	Ethernet/HMI	15

Max. Cable Length

Montalvo recommends that the max. cable length from connector to connector not to exceed 50' (15m).

3.1 Enabling HMI

Setup Menu
- Config Menu
- Options Menu
- Regulator Menu
- Roll Change Menu
- Start Menu
- Stop Menu
- Hold Menu
- Diameter Menu
- Taper Menu
- Digital Out Menu
- Splice Menu
- Range Exp Menu
- Aux1 Input Menu
- Aux2 Input Menu
- Aux1 Output Menu
- Wrap Angle Menu
- Com Menu
  - Connect USB
  - Remote Menu
    - Enable Menu
      - **Manual**
      - **Setpoint**
      - **Aux In 1**
      - **Aux In 2**
      - **Aux In 3**
      - **Aux Out 1**
      - **DI-1**
      - **DI-2**
      - **DI-3**
      - **DI-4**
      - **DI-5**
      - **DI-8**
    - Value Menu

NOTE: Not all menus / items display all the time. Relevant menus / items display when correct password is entered.

Enabling HMI (remote) parameter management

When the Z4 controller (circuit board) is initially set up or its controller mode is changed, the remote configuration will need to be reset. Basically, this determines whether a parameter is managed by the HMI, or, simply monitored. Although, most of the time, the parameter will want to be managed by the HMI, there may be occasions where the application requires direct input to the terminal strip instead.

Factory Configurations (see chart below)

- **Non-HMI** circuit boards (drop-in **replacement** of CB64, CB63 or DRT6 and non-HMI controlled Z4) will have **NO** parameters factory configured for HMI control.
- **HMI** controlled circuit boards will have **SOME** parameters factory configured.

Field Configuration Procedure

The configuration is available at password 5 and above. Navigate to the ***Setup Menu / COM Menu / Remote Menu / Enable Menu***. The following entries are available; setting [YES] will put the HMI in control, setting to [NO] will leave the main board in control.

Parameter	Description	Default Settings		HMI Options
		HMI Boards	Non-HMI Boards	
[Manual]	Manual Setpoint Adjustment	[YES]	[NO]	
[Setpoint]	Automatic Setpoint Adjustment	[YES]	[NO]	
[Aux In 1]	Aux1 Input Adjustment	[NO]	[NO]	[YES]
[Aux In 2]	n/a			
[Aux In 3]	n/a			
[Aux Out 1]	n/a			
[DI-1]	Auto / Manual Button	[YES]	[NO]	
[DI-2]	Nip Open / Close (available to Z4NL only)	[NO]	[NO]	[YES]
[DI-3]	Determined by DI-3 option on mainboard	[YES]	[NO]	
[DI-4]	Determined by DI-4 option on mainboard	[NO]	[NO]	[YES]
[DI-5]	n/a			
[DI-8]	n/a			

Persistence

If any of the parameters [Manual], [Setpoint], or [Aux In 1] are configured for HMI control, it is also recommended to turn on the Persistence feature by navigating to ***Setup Menu / COM Menu / Remote Menu***, scroll to Persistent and make sure it is set to [YES] (this is the factory default for Z4 controllers delivered with an HMI).

In the case of power-on restart or a power interruption, the HMI takes significantly longer to boot up and begin communicating (> 30 seconds) than the Z4. During this time, the Persistence feature ensures that the last known values stored in non-volatile memory are used for parameters configured for HMI control until the HMI has completed boot up and started communicating with the Z4 again.

3.2 Password

To access the configuration and scaling menus, it is necessary to enter the password.

1 Tap **HOME** button to enter Password window.

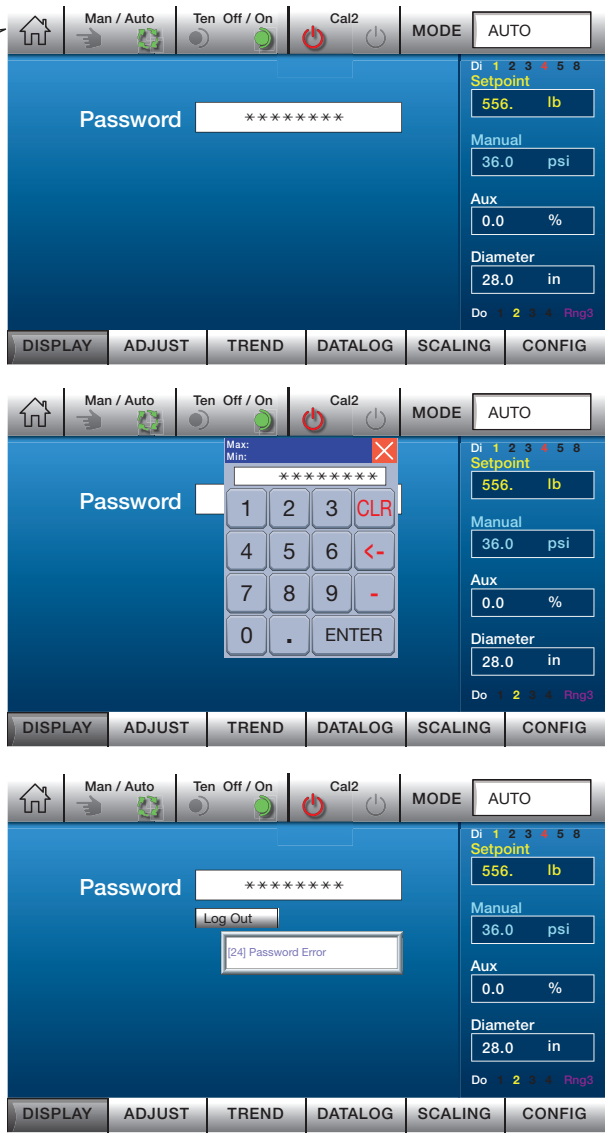
2 Tap databox to bring up keypad.

3 Enter password: **8562501**, then hit ENTER key.

4 A valid password displays a Log Out button.

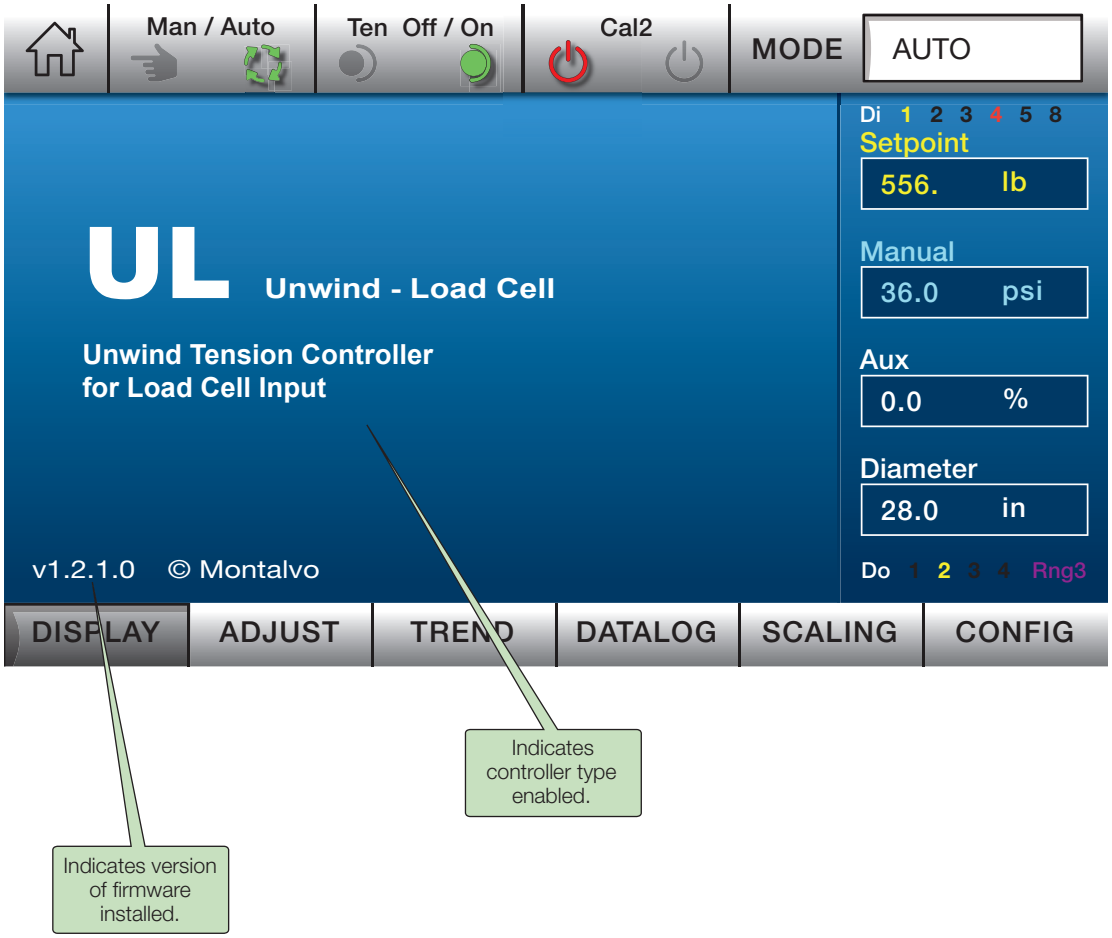
Notes

- Password is persistent until Log Out, HMI power interrupt or Control Type change.
- Invalid password creates a momentary error message. If so, repeat steps 2 and 3.
- Tap CLR key to clear entry.

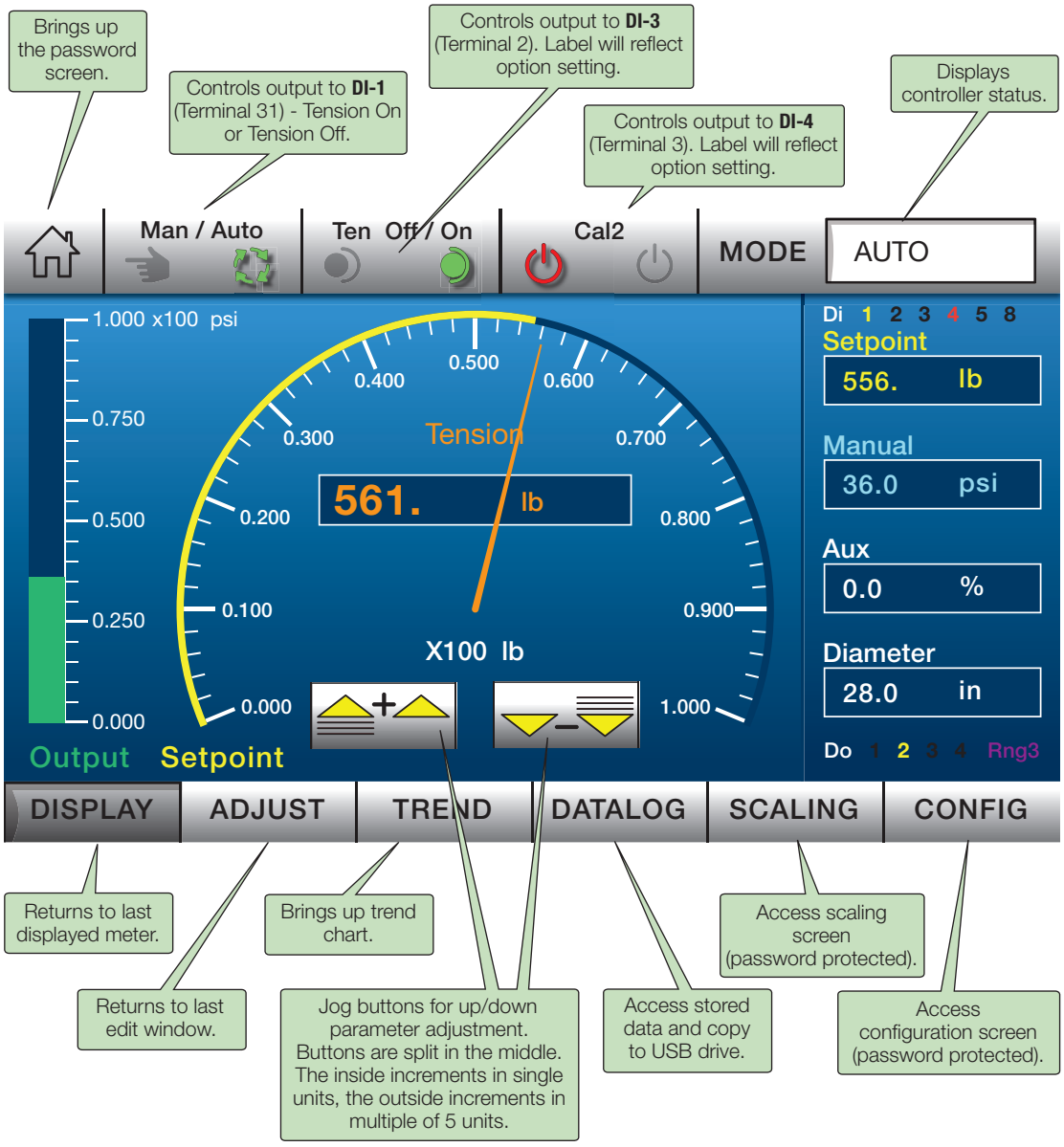


3.3 Splash

During the initial startup of the Z4, the HMI will enter a loading state while the internal systems are booting up. The Splash screen shows the relevant version of the HMI as well as the current controller type.



3.4 Overview



Color key for various parameters:

Color	Description
Green	Output
Orange	Tension
Yellow	Auto Setpoint
Light Blue	Manual
Pink	Dancer Position
Tan	Linespeed (Cntrl Type NIP)
Purple	Range
Alternating Red/Yellow	DI (inputs) and DO (outputs)

3.4 Overview - continued

Note: Displays are full scale. Units are user configurable in SCALING window.

3.5 Mode

During normal operation the Z4 controller can be in anyone of several modes. The window in the upper right corner will always denote the current mode, depending upon the configuration of the Z4 there are several possible states.

The following modes will display on the HMI where shown above. They will also display on the controller circuit board if [Run Mode] is selected to display. See descriptions below:

HMI Display	Controller Display	Controller Type					Description
		UL	RL	UD	UI	NL	
AUTO	[*AUTO]	•	•	•	•	•	System is entering automatic regulation (combined with AUTO when displayed on HMI).
	[AUTO]	•	•	•	•	•	Automatic regulation based on automatic setpoint and dynamic regulation.
MANUAL	[MANUAL]	•	•	•	•	•	Manual operation based on manual setpoint.
WAIT	[WAIT]	•	•	•	•		Waiting before going into regulation, standby or hold.
HOLD	[HOLD]	•	•	•	•		Holding output level at constant level, typically to allow for settling time before changing modes.
START	[START]	•		•	•		Soft start is active **(if option is enabled)**.
FSTOP	[FSTOP]	•		•	•		Fast stop, aggressive stop using slightly elevated output to stop in shorter than normal time period based on mass of material on roll.
QSTOP	[QSTOP]	•		•	•		Quick stop, somewhat aggressive stop using slightly elevated output to stop in shorter than normal time period based on mass of material on roll.
SPLICE	[SPLICE]	•	•	•	•		Splice is active **(if option is enabled)**.
TENOFF	[TENOFF]		•				Tension off, output is set to zero.
STDBY	[STDBY]	•	•	•	•		Standby state.
PWRUP	[PWRUP]					•	System is powering up.
OPEN	[OPEN]					•	The nip is open (when controlled by system).
MOPEN	[MOPEN]					•	The nip is open (when controlled by user input).
STOP	[STOP]					•	Machine is stopped (zero linespeed).
FILL	[FILL]		•				Shaft fill feature is filling air shaft **(if option is enabled)**.

3.6 Display for Z4UL (unwind with load cell input)

Display Selection
Tapping the upper half of the meter will cycle through a series of displays.

Tension - Default
Tension is displayed using the analog meter portion. Output is shown on the bar graph to the left. The Setpoint is shown as a ***yellow*** bar wrapped around the meter scale.

Output - Alternate
Tension is displayed using the bar graph. Output is shown using the analog meter scale. The Manual value of output will be shown as a ***light blue*** bar wrapped around the meter scale.

Possible Uses for FUNCTION Switches (switch labels change accordingly)

Input Source	DI-1 (Terminal 31)	DI-3 (Terminal 32)	DI-4 (Terminal 3)
Switch Label	Man / Auto	Ten Off / On	Core2
			Cal2
		Standby	Quick Stop
			Standby
Switch Graphic			

3.7 Display for Z4RL (rewind with load cell input)

Display Selection
Tapping the upper half of the meter will cycle through a series of displays.

Tension - Default
Tension is displayed using the analog meter portion. Output is shown on the bar graph to the left. The Setpoint is shown as a ***yellow*** bar wrapped around the meter scale.

Output - Alternate
Tension is displayed using the bar graph. Output is shown using the analog meter scale. The Manual value of output will be shown as a ***light blue*** bar wrapped around the meter scale.

Possible Uses for FUNCTION Switches (switch labels change accordingly)

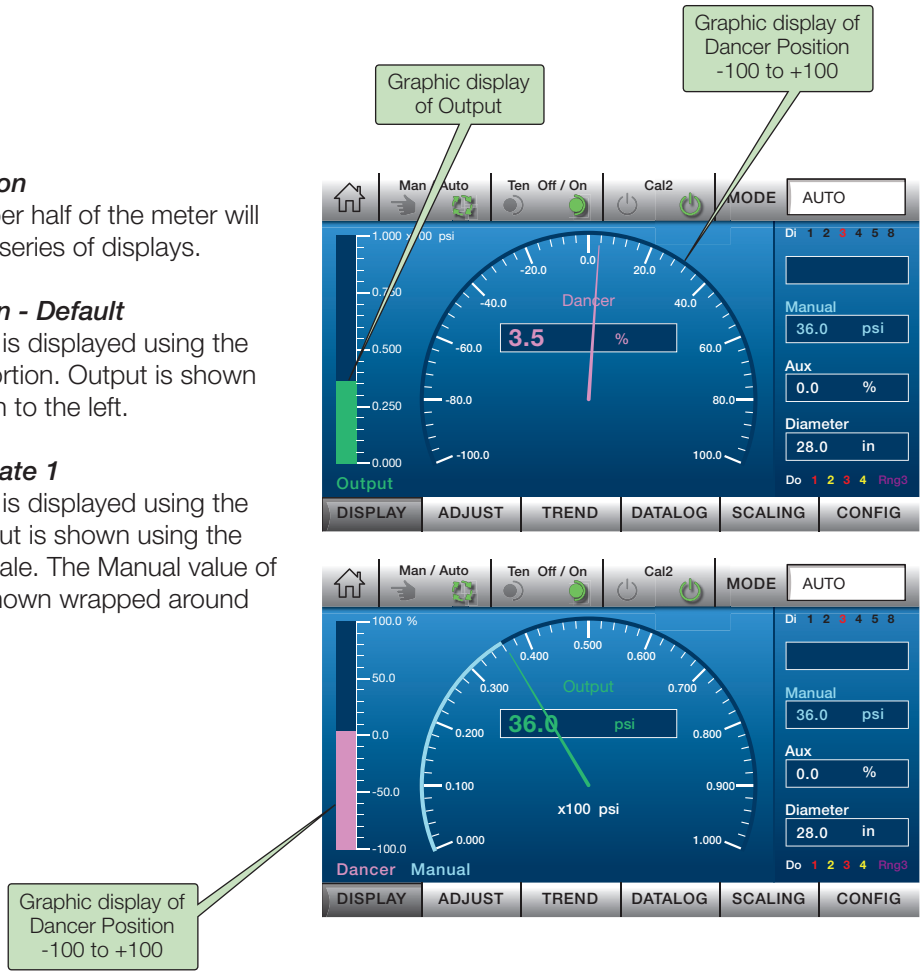
Input Source	DI-1 (Terminal 31)	DI-3 (Terminal 32)	DI-4 (Terminal 3)
Switch Label	Man / Auto	Ten Off / On	Core2
			Cal2
		Standby	Standby
Switch Graphic			

3.8 Display for Z4UD (unwind with dancer input)

Display Selection
Tapping the upper half of the meter will cycle through a series of displays.

Dancer Position - Default
Dancer position is displayed using the analog meter portion. Output is shown on the bar graph to the left.

Output - Alternate 1
Dancer position is displayed using the bar graph. Output is shown using the analog meter scale. The Manual value of output will be shown wrapped around the meter scale.



Possible Uses for FUNCTION Switches (switch labels change accordingly)

Input Source	DI-1 (Terminal 31)	DI-3 (Terminal 32)	DI-4 (Terminal 3)
Switch Label	Man / Auto	Ten Off / On	Core2
			Cal2
		Standby	Quick Stop
			Standby
Switch Graphic			

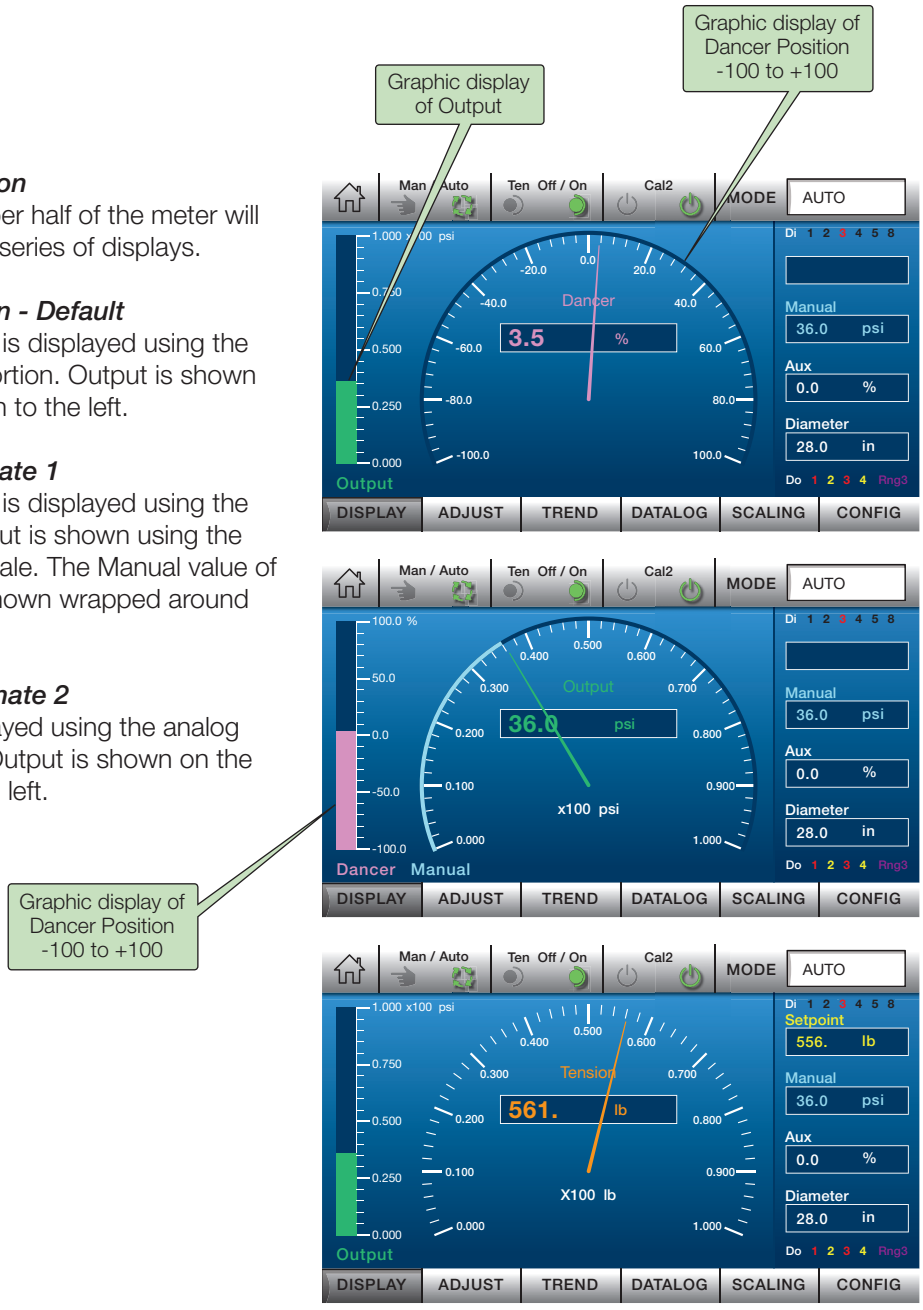
3.9 Display for Z4UI (unwind with dancer input and tension indication)

Display Selection
Tapping the upper half of the meter will cycle through a series of displays.

Dancer Position - Default
Dancer position is displayed using the analog meter portion. Output is shown on the bar graph to the left.

Output - Alternate 1
Dancer position is displayed using the bar graph. Output is shown using the analog meter scale. The Manual value of output will be shown wrapped around the meter scale.

Tension - Alternate 2
Tension is displayed using the analog meter portion. Output is shown on the bar graph to the left.



Possible Uses for FUNCTION Switches (switch labels change accordingly)

Input Source	DI-1 (Terminal 31)	DI-3 (Terminal 32)	DI-4 (Terminal 3)
Switch Label	Man / Auto	Ten Off / On	Core2
			Cal2
		Standby	Quick Stop
			Standby
Switch Graphic			

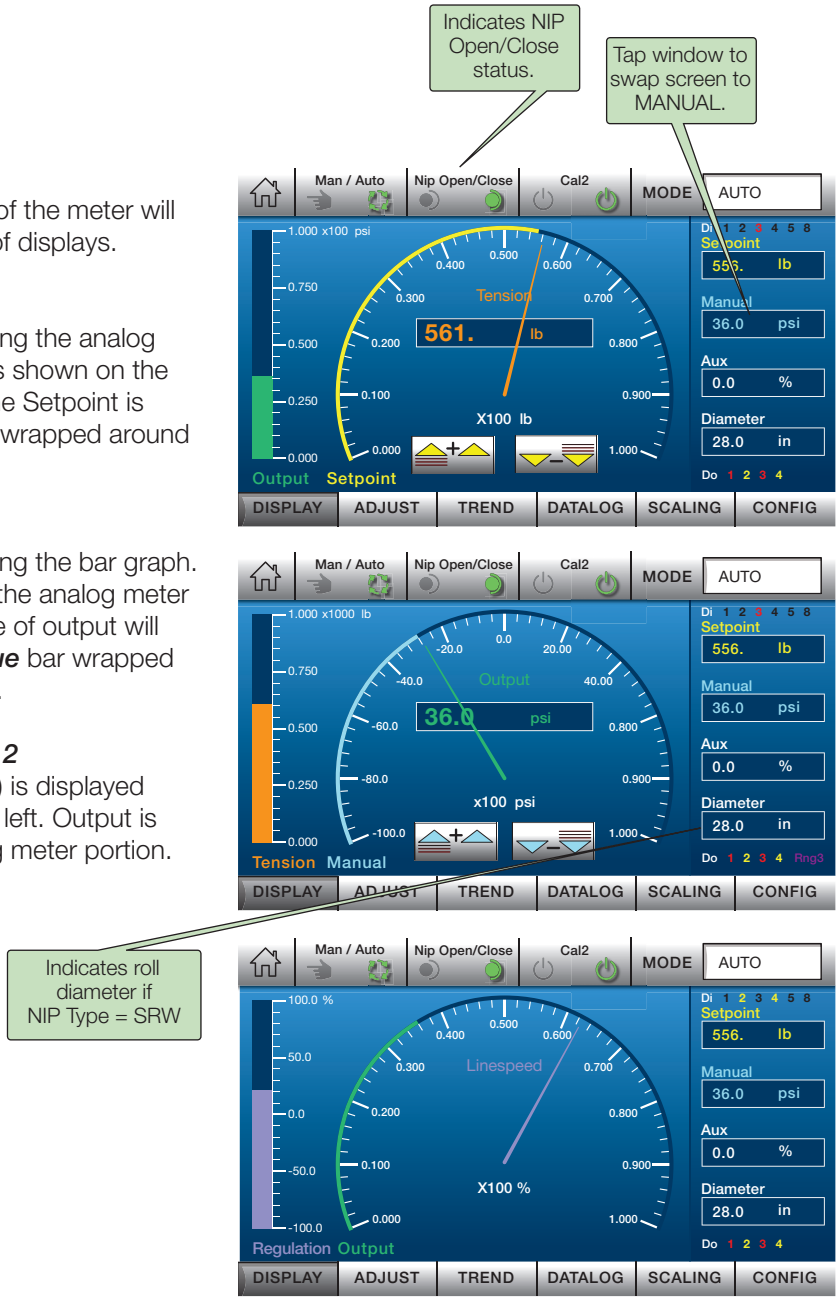
3.10 Display for Z4NL (NIP with load cell input)

Display Selection
Tapping the upper half of the meter will cycle through a series of displays.

Tension - Default
Tension is displayed using the analog meter portion. Output is shown on the bar graph to the left. The Setpoint is shown as a ***yellow*** bar wrapped around the meter scale.

Output - Alternate 1
Tension is displayed using the bar graph. Output is shown using the analog meter scale. The Manual value of output will be shown as a ***light blue*** bar wrapped around the meter scale.

Linespeed - Alternate 2
Regulation (Line Speed) is displayed on the bar graph to the left. Output is shown using the analog meter portion.



Possible Uses for FUNCTION Switches (switch labels change accordingly)

Input Source	DI-1 (Terminal 31)	DI-3 (Terminal 2)	DI-4 (Terminal 3)
Switch Label	Man / Auto	Nip Open / Close	Cal2
Switch Graphic			

3.11 Adjust

Parameter Adjustment
Control parameters can be set by simply clicking on them. This pulls up the **ADJUST** window, which allows for simple input. Alternatively, if **ADJUST** is pressed from a main screen it will return to the most recently adjusted parameter.

1 Tap **ADJUST** button to enter Adjust window.

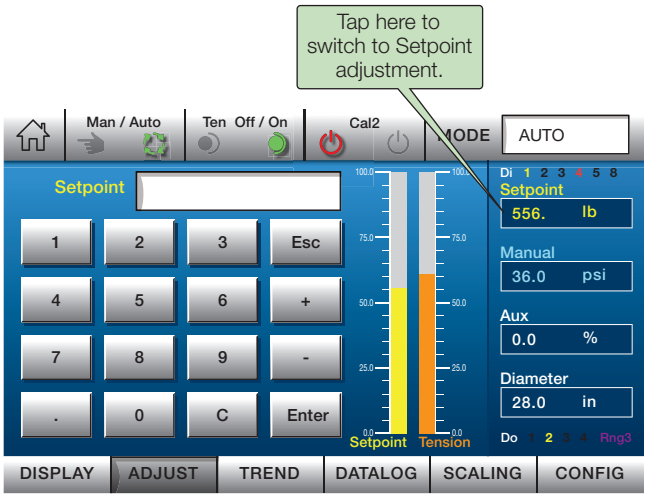
2 Switch between Setpoint, Manual and Aux adjustments windows as necessary.

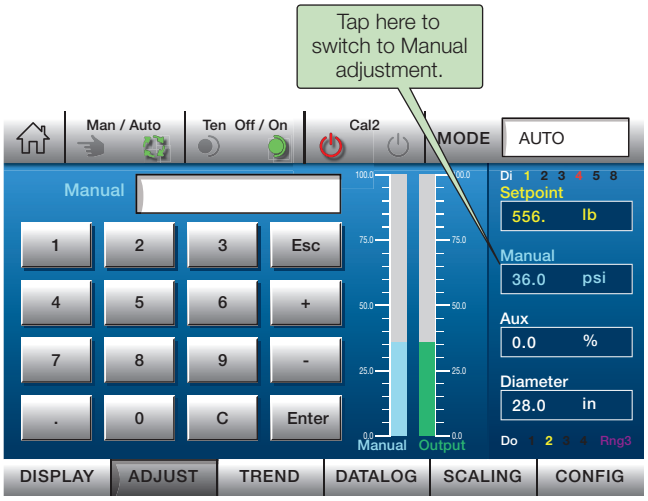
3 Enter desired value for parameter. To edit or clear value tap ***Esc*** button.

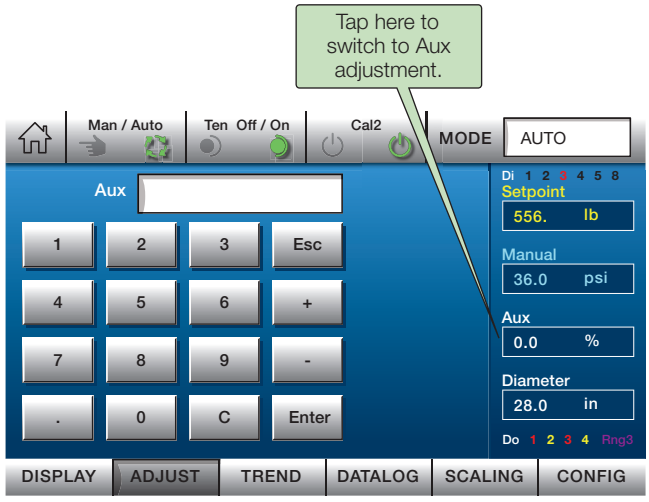
4 If no entry is made, tapping **Enter** key will return to **DISPLAY** screen.

4 Tap ***Enter*** button to accept value and return to **DISPLAY** screen.

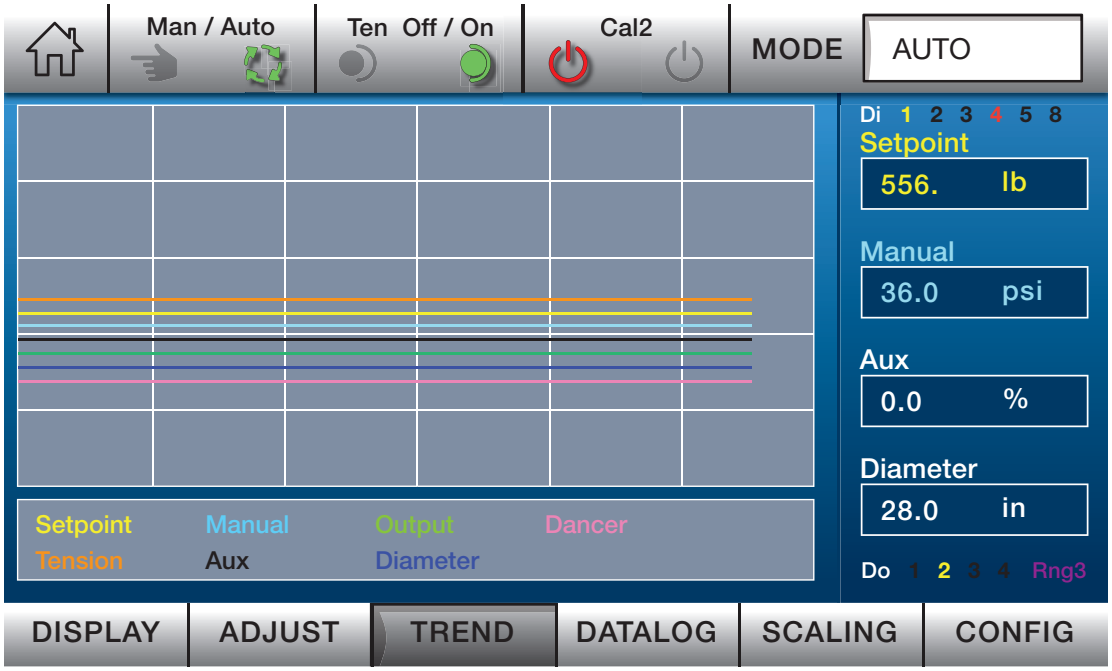
Note: Only one parameter at a time can be adjusted. Must tap **Enter** to accept value of current parameter before adjusting another parameter.







3.12 Trend



- Each line indicates the state of each parameter.
- The lines are color coded to correspond with the legend at the bottom of the window.
- The plot is updated every 2 seconds.
- The window displays trend information for the last 4 minutes of operation.
- All waveforms are normalized to 100% of full scale value (units not shown).
- In the case of bipolar parameters such as dancer position, the zero position is at vertical center.

3.13 Datalog

1 Tap ***DATALOG*** button to enter DATA LOG window. Note that time and date appear for reference.

2 Tap ***File Name*** field to bring up keypad.

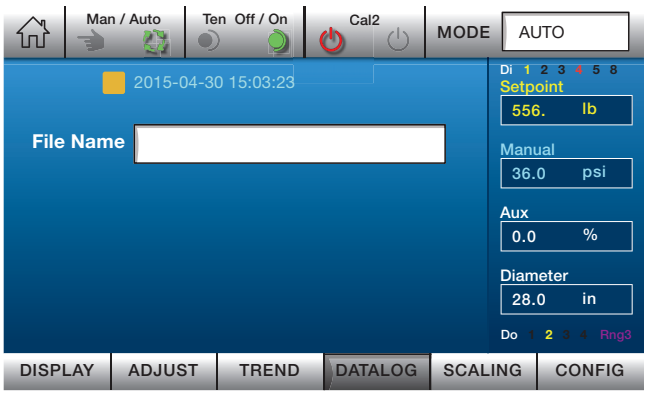
3 Enter desired File Name, then tap ***ENT*** button. To edit File Name tap field again.

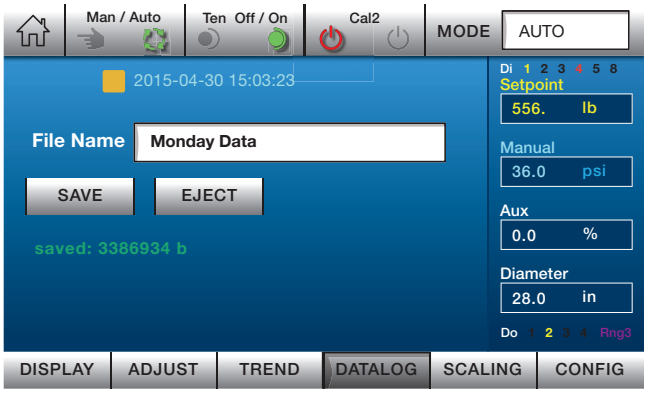
4 When ready to save a file, insert a ***USB*** drive into USB connector on backside of HMI. SAVE and EJECT buttons will appear.

5 Hit ***SAVE***. When a successful save is complete, a green "saved" indication will appear.

6 Hit ***EJECT*** before removing USB drive. *Failure to do so may corrupt file.*

7 Tap DISPLAY, ADJUST or TREND to ***exit*** DATALOG window.





Notes:

- The datalog option runs continuously and is always enabled.
- The sample rate is one sample every 5 seconds (the yellow button changes state to indicate sample interval).
- The datalog holds 5 days worth of samples.
- Each sample is "time stamped" with the date and time indicated.
- Once saved to a thumb drive, the file can be processed into a CSV with each parameter in a specific column with the timestamp in the leading column.

3.14 Scaling

SCALING window is Password Protected (See Section 2.4 Password).

1 Tap **SCALING** button to enter Scaling window.

2 Tap desired parameter numeric field to bring up keypad.

3 Enter desired scale.

- **Clr** Clears any entered text to start from scratch.
- **<-** Backspace.
- **Esc** Abandons editing, leaving existing value unchanged.

4 Tap **Enter** button to save entry. Keypad goes away. Repeat steps 2 and 3 to make additional edits for other parameters.

5 Tap **U** keys to select desired units of measure. See choices below.

6 Tap any bottom button or Setpoint or Manual displays to escape **SCALING** window.

Parameter	Available Units
Tension	% | oz | lb | n | kgf | gf | kg
Output	% | psi | mv | ma | v | kpa | bar | mpa
Diameter	% | mil | in | ft | mm | cm | m

Notes:

Parameters are assigned to data that corresponds with parameter's general definition.

Tension - SETPOINT, TENSION ....
Output - MANUAL, OUTPUT ....
Diameter - DIAMETER

Unscaled parameters are always shown in percent of full value:
0% to 100% or -100% to 100%)

Unipolar - LINESPEED, AUX1, OUTPUT (Nip only), REGULATION (Nip only), MANUAL (Nip only)
Bipolar - DANCER

3.15 Config

CONFIG window is Password Protected (See Section 2.4 Password).

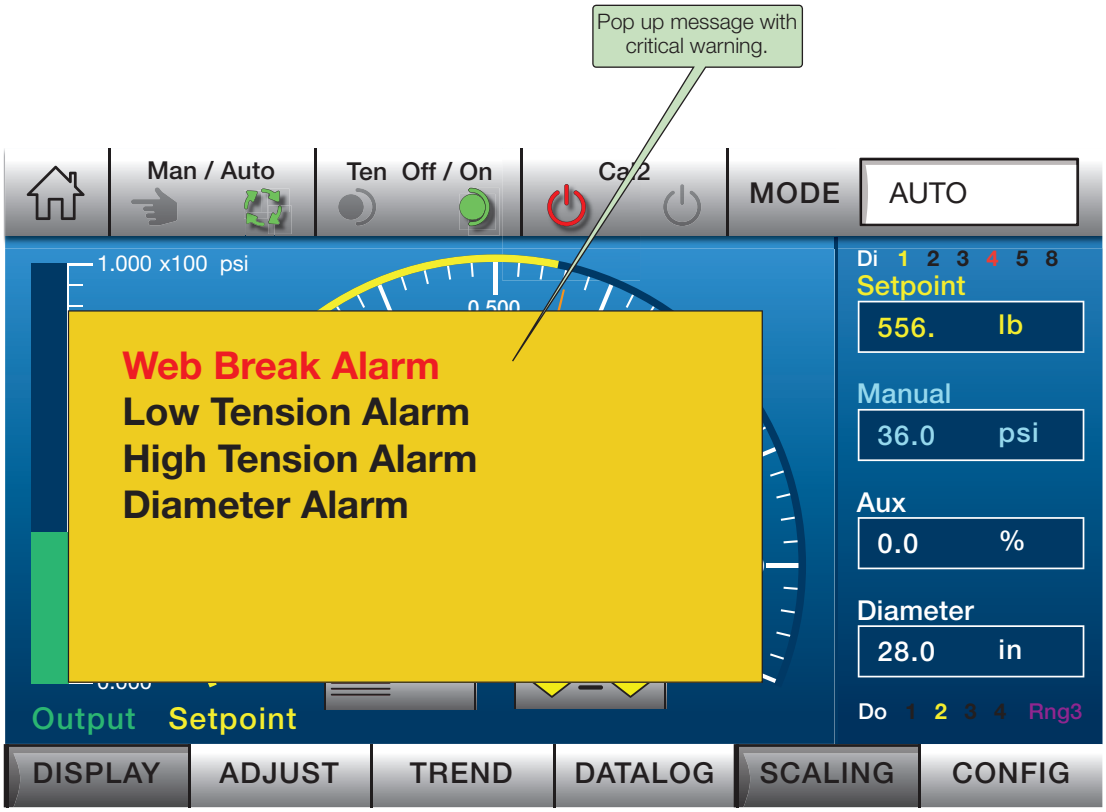
1 Tap **CONFIG** button to enter configuration window.

2 Adjust DATE and TIME as necessary. Tap Set to accept edits.

3 Select LANGUAGE as needed from list.
Note: A language must be selected for HMI to function properly.

4 Tap any bottom button or Setpoint or Manual displays to escape CONFIG window.

3.16 WARNINGS



- Displays all active alarms whenever it pops up, even those previously acknowledged.
- Tapping on the form acknowledges any active alarms not previously acknowledged. This does not clear any alarms, the condition causing the alarm needs to be addressed before the alarm is cleared.
- Once acknowledged an existing alarm will not cause the pop-up to appear again. If the cause of the alarm is resolved (subsequently clearing the alarm condition), then re-signals, this pop-up will re-appear and require another acknowledge.
- Pop up can appear on any screen at any time.
- Refer to controller technical manual for corrective action.
- Alarm may trip again if further action needed.

4.1 Symptom / Cause

Symptom	Cause
Missing Text	Language not selected.
Values reverted to default.	HMI had power interrupt.
Switches not responding.	Tapping two buttons at the same time.

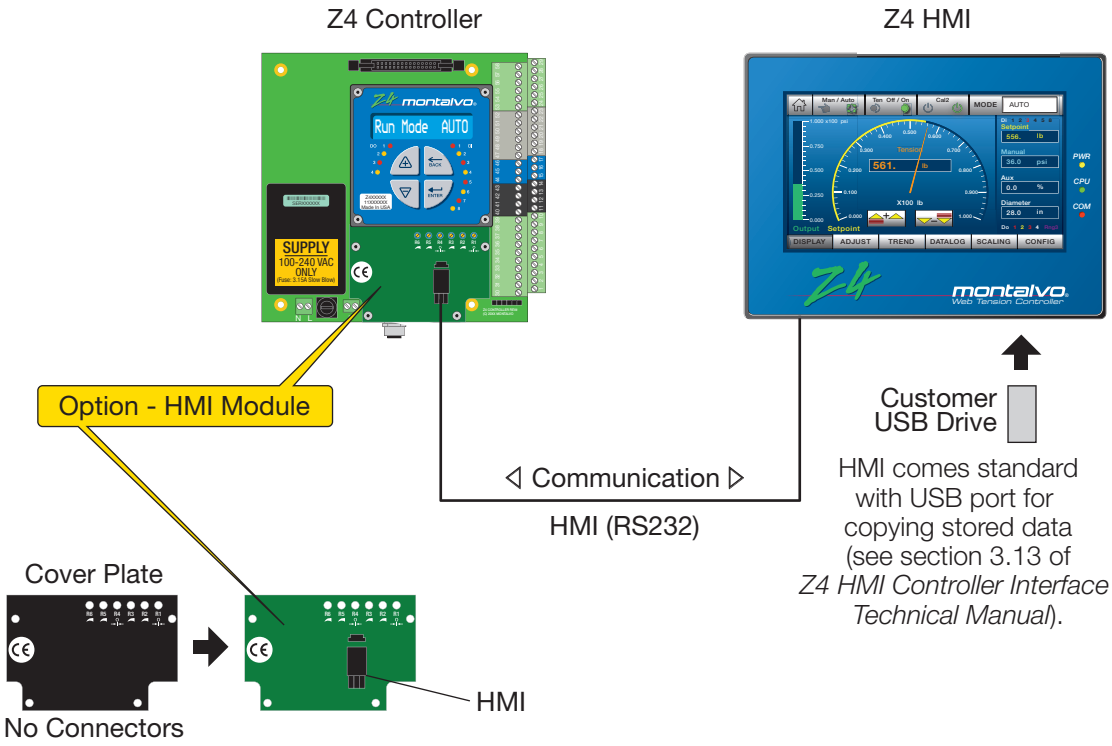
Notes:

- The time and date are battery backed up on Real Time Clock, they are always being updated.
- The language is stored in flash (by the HMI firmware) and should survive power failure.

5.1 Specifications

Parameter	Unit
HMI - Supply	12-28VDC
HMI - Fuse	2.5A Digital - Self Resetting
Noise Immunity	EN 50082-2 industrial
Noise Emission	EN 50081-1
Standards	Designed to meet UL 508 and EN 60204
Temperature Range - Operating	32 to 122° F (0 to 50° C)
Temperature Range - Storage	14 to 176° F (-10 to 80° C)
Degree of Protection - Enclosure	IP54
Degree of Protection - HMI	IP65

6.1 HMI (option)



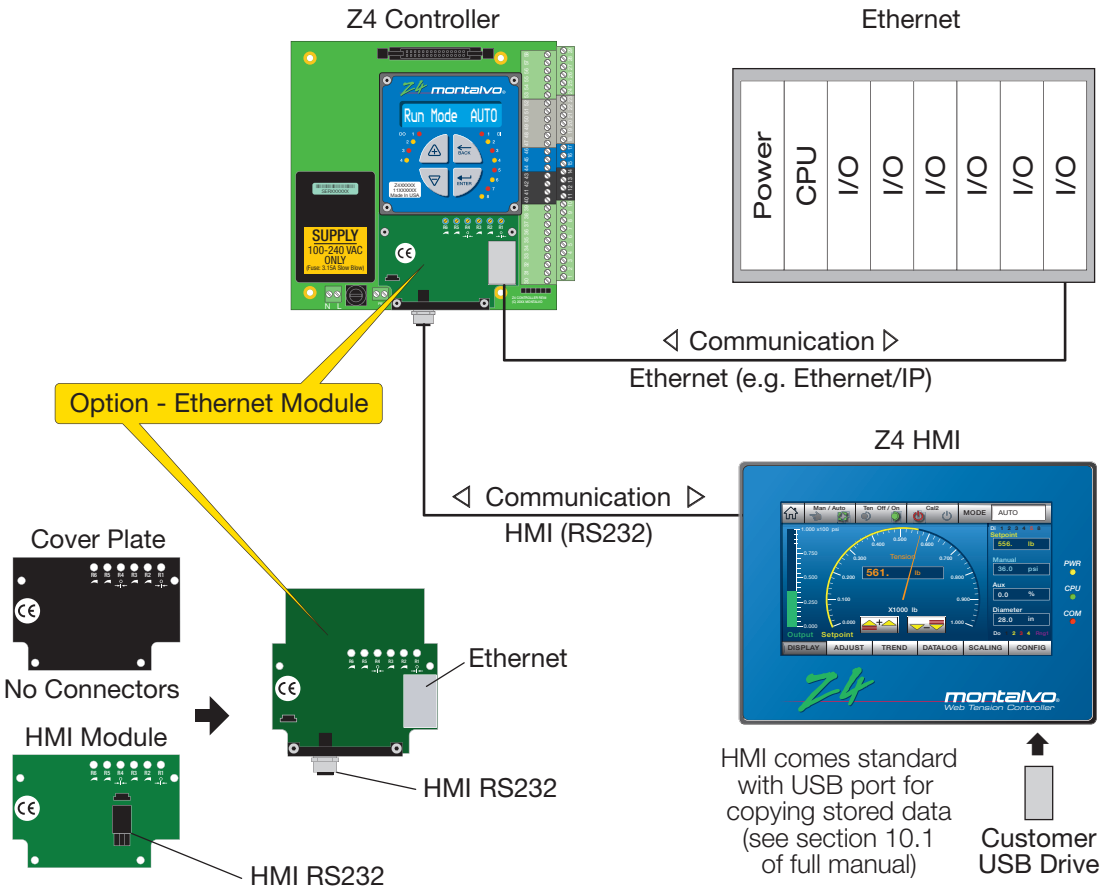
The Montalvo Z4 Controller, with **HMI Option,** provides remote communication capability between the operator and controller. This option comes factory installed on new controllers. Existing controllers without the option can be upgraded by replacing the cover plate with the HMI Module. Factory replacement highly recommended.

> ***Note: The HMI Module or Ethernet Module is necessary for connection to the HMI.*** New controllers with HMI option get HMI module (standard) or Ethernet module (optional).

The HMI communications option consists of the following:

- HMI Module - factory installed on the controller board
- *Z4 HMI Controller Interface Technical Manual* (hard copy). Also available as a pdf: https://www.montalvo.com/document-libraries/product-manual-library/tension-controller-manuals/

6.2 Ethernet (option)



The Montalvo Z4 Controller, with **Ethernet Option,** can provide communication capability within an industrial Ethernet network (e.g. Ethernet/IP). The module for this option is factory installed. Existing controllers without the option can be upgraded by replacing the HMI Module (or cover plate) with the Ethernet Module. Factory replacement highly recommended.

> ***Note: The HMI Module or Ethernet Module is necessary for connection to the HMI.***
> New controllers with HMI get HMI module (standard) or Ethernet module (optional).

The Ethernet communications option consists of the following:

- Ethernet Module - factory installed on the controller board
- *Ethernet Technical Manual* (hard copy). Also available as a pdf download: https://www.montalvo.com/document-libraries/product-manual-library/tension-controller-manuals/

Technical Specifications for Ethernet interface

- Support for all required administration protocols (DHCP, ICMP, IGMP)
- Support for TCP and UDP application protocols per ODVA Ethernet/IP requirements

  EtherNet/IP™ ODVA
- Future support for additional Ethernet based protocols

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