

DEMA XT

Touch Screen Controller



Product Manual

Important Safety Instructions

Read all warnings and instructions in this manual.
Save all instructions.



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DEMA XT Touch Screen Controller

Instruction & Maintenance Manual

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I. Introduction

The DEMA XT microprocessor-based controllers are programmable through a front panel touch screen and can be configured to control a wide range of digital and analog inputs. Your particular unit's functions can be determined by comparing the unit's model number to the Model Numbering table listed below.

Model Numbering

DEMA XT units have several base system control functions and unit optional features. Your unit may be supplied with one or more of the features described in this manual. To determine what features apply to your unit check the model number label located on the controller enclosure.

Build a DEMA Model.... **X** **C** **P** **R** — **N8**

Step 1 system card functions

Conductivity	
C	EC conductivity
pH	
P	Single set point with TPE-21
ORP	
R	Standard with TOE-21

Step 2 whole unit options

XT standard features include 5 control relays with prewired USA cords and WebAdvantage communications. List any desired options in alphabetical order.

mA In/Out Signals		16 signals max
N4	(4) mA inputs	
N8	(8) mA inputs	
O4	(4) mA isolated outputs	

Irrigation / general range conductivity sensors include a temperature reading. Additional sensor types are available. Consult dealer for additional options.

Notice: Your unit may not have all features and functions described in this manual. This list represents our most popular options, additional option codes are available. Consult representative for more details.

Description of Unit

DEMA XT controllers can control single or multiple water systems, including irrigation and livestock applications, and may have various features depending on the model number.

Control Functions

Each of these control functions are based on an analog input from a probe and will include user settable relay control settings along with a High and Low Alarm setting and Limit Timer. Each control function will include a control relay output. When the reading reaches the Set Point, the control relay is activated until the reading changes by the Differential amount.

1. **System Conductivity** - The conductivity function of the controller is designed to monitor and control Total Dissolved Solids (TDS).
2. **pH** - The pH function monitors and controls pH on a scale of 0-14 pH units.
3. **ORP** - The ORP function monitors and controls ORP on a scale of +/- 1000 mV.

II. Intended Use

 The DEMA XT is a microprocessor-based measuring and control instrument used to measure water quality parameters and other process variables in a wide range of water treatment applications.

 Operating the instrument in any way other than as described in these instructions may compromise the safety and function of the measuring system and is therefore impermissible. Electrical connection work and maintenance work may only be carried out by qualified personnel. The manufacturer is not liable for damage caused by improper or non-designated use.

Mechanical Specifications

Electrical Input	100-230 VAC, 50/60 Hz, 2A rated	Relative Humidity	0 to 100%
Relay Outputs	Individually fused and 2.5 amps. Dry contact limited to 2.5 mA at 28 VDC.	Conductivity Control	µS/cm, mS/cm, PPM scales up to 50,000 depending on sensor selection
Display	6.875" Diagonal LCD Touch Screen	pH Control	0-14 with single or optional dual set point
Digital Inputs	Inputs have 10K Ω pullup to 3.3 VDC from open collector open drain output	ORP Control	+/- 1,000 mV, 2nd set point timer linked
Flow Totalizing Inputs	10K Ω pullup to 5 VDC max rate 2.5 KHz from open collector open drain output	Accuracy	+/- 1% of scale
mA Inputs	Optical isolation, 250 Ω / 5 VDC @ 20 mA. Loop voltage to not exceed 30 VDC.	Selectable Feed Timers	Water meter pulse, Percent, Post, Limit, Recycle, and 28 day with reminder 1 for loss flow.
mA Outputs	Non-isolated. 12 VDC max load = 400 Ω. Isolated ext 24 VDC max load = 800 Ω.	mA Input Control	Customizable to desired range and scale
Approvals	CE, UL61010-1& CSA C22.2 No. 61010-1-12 3rd addition + A1:2022 (R2022)	mA Output	Proportional with second input conditioning
Enclosure	NEMA 4X style polycarbonate	Irrigation probes supplied in 3/4" quick release PVC tees. pH and ORP probe bodies are CPVC.	
Ambient Temp	0° to 125°F (-17° to 52°C)	TE-4A	150 psi (10.3 bar), 140°F (60°C) max
Shipping Weight	Approximately 10 lbs. (4.536 kg)	TPE-21	100 psi (6.8 bar), 140°F (60°C) max
Dimensions	11" (27.94cm) W x 11.75" (29.84 cm) H	TOE-21	100 psi (6.8 bar), 140°F (60°C) max

Icon Definitions

Symbol	Publication	Description
	IEC 417, No. 5019	Protective Conductor Terminal
	IEC 417, No. 5007	On (Supply)
	IEC 417, No. 5008	Off (Supply)
	ISO 3864, No. B.3.6	Caution, risk of electric shock
	ISO 3864, No. B.3.1	Caution

III. Installation

A. Electrical Wiring Information

The controller has an internal regulated power supply that will operate in the range of approximately 100 to 230 VAC on the incoming wiring. Output relay(s) are protected with a replaceable fuse. Relay output voltage will equal the incoming line voltage.

Your controller will arrive from the factory prewired or ready for hardwiring. Depending on your configuration of controller options, you may be required to hardwire some or all of the input/output devices.

Note: When wiring the optional flow meter contactor input, the 4-20 mA outputs or a remote flow switch, it is advisable to use stranded, twisted, shielded pair wire between 22-26 AWG. Shield should be terminated at the controller at the most convenient shield terminal.

Prewired units are supplied with a 16 AWG cable with a 3-wire grounded USA 100 volt plug for incoming power and 18 AWG 3-wire grounded receptacle cords for all control relay outputs. Conduit units are supplied with liquid tights and adaptors for easy hard wiring to supplied connector.

   CAUTION   	
1.	There are live circuits inside the controller even when the power switch on the front panel is in the OFF position! The front panel must never be opened before power to the controller is REMOVED! If your controller is prewired, it is supplied with an 8 foot, 18 AWG power cord with USA style plug. A tool (#1 Phillips driver) is required to open the front panel.
2.	Low voltage signal wires (probes, flow switches, water meter, etc.) should never be run in conduit with high voltage (like 100VAC) wires.
3.	Never attempt to land connections to the controller without first disconnecting power from the outlet.
4.	Do not block access to disconnect power during mounting and installation.
5.	The electrical installation of the controller must be done by trained personnel only and conform to all applicable National, State and Local codes!
6.	Proper grounding of this product is required. The controller should be connected to its own isolated circuit breaker, and for the best results, the ground should be a true earth ground, not shared. Any attempt to bypass the grounding will compromise the safety of persons and property.
7.	Operating this product in a manner not specified by the manufacturer may impair the protection provided by the equipment.
8.	Only power device with cover installed. Never operate device with cover removed.

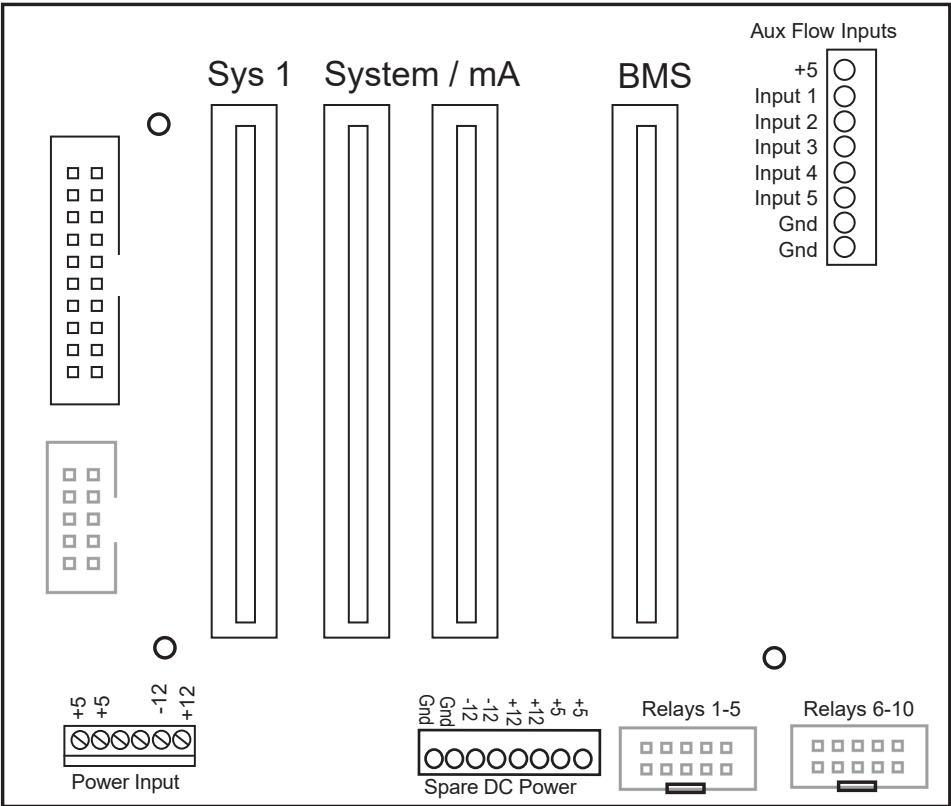
Additional Notes:

1. Liquid tight fittings and some labeled signal leads are provided for signal (low voltage) connections, such as water meter inputs.
2. Hall effect meters that require +12 VDC must use an external power supply (TFS-PWR).
3. Optional 4-20mA output is produced with 12 VDC on the loop. Do not connect output to devices that are trying to power the loop.

B. Mounting Location Information

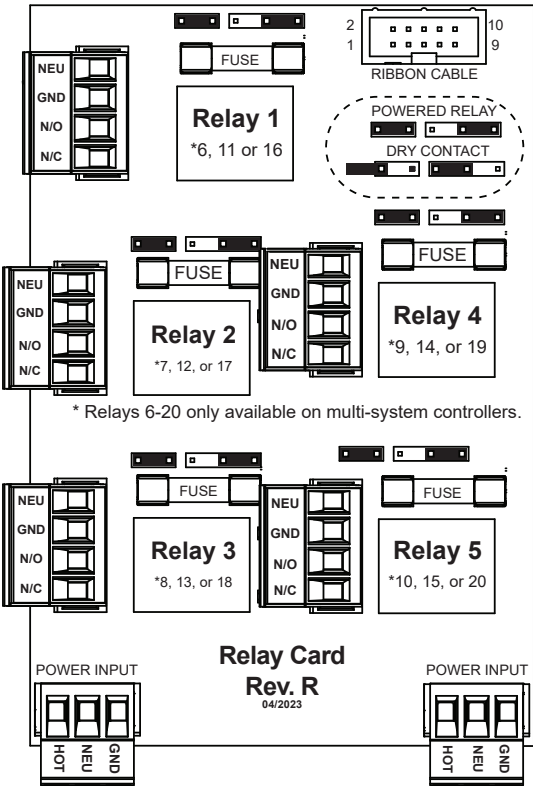
1. Select a mounting location that provides the operator easy access to the unit and a clear view of the controls through the cover of the controller. The location should be convenient to grounded electrical connections, the needed sample line plumbing and is on a stable vertical surface.
2. Do not block access to disconnect power during mounting and installation.
3. Avoid mounting in locations that expose the controller to direct sunlight, vapors, vibration, liquid spills or extreme temperatures; less than 0°F (-17.8°C) or greater than 120°F (50°C). EMI(electromagnetic interference) from radio transmissions and electric motors can also cause damage or interference and should be avoided.
4. Minimum screw / bolt size is #8 or larger.

Back Pane and System Card Connections

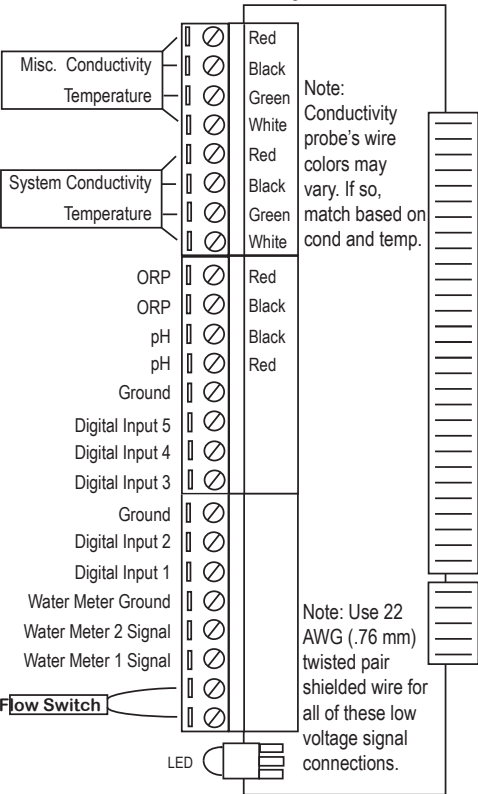


Wiring Diagrams

Standard 5 Relay Card Wiring



System Card Wiring



4-20mA Output Card Wiring

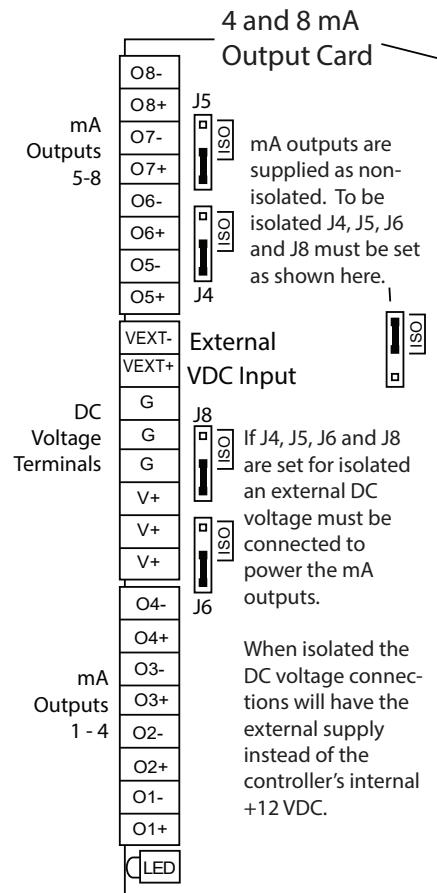
A. Isolated Configuration

For isolated 4-20mA outputs an external power source for the loop must be supplied. JP4 and JP5 on the board must be jumpered for isolated, with an external power source supplied to the external VDC input. The external power source must not exceed 24 volts DC.

B. Non-isolated Configuration

For non-isolated 4-20mA outputs the controller will supply the power for the loop. JP4 and JP5 must be jumpered for non-isolated, and no connections are made to the external VDC points.

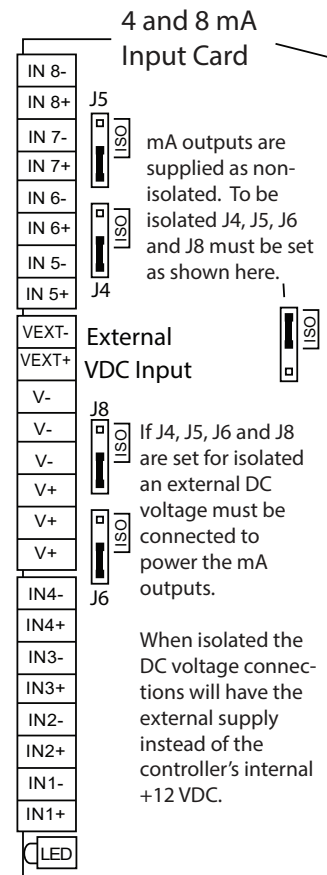
NOTE: The power for the mA output loop is always provided by the controller with either isolated or non-isolated configuration.



4-20mA Input Card Wiring

The 4-20mA input card requires that the external device sending the 4-20mA input signal(s) supply the power for the loop. The external power source must not exceed 24 volts DC.

NOTE: Older green versions of the 4 input cards supply +12 VDC and ground on the voltage terminals, and newer blue versions supply +12 and -12 VDC instead of ground on the "G" positions, if not configured for isolated voltage.



Electrode Installation

DEMA XT controllers may come configured for various water systems. Listed below are instructions for typical installations. Your specific installation requirements may differ, but should conform to these instructions as much as possible for proper operation.

The standard probe(s) are constructed of schedule 80 PVC and supplied with $\frac{3}{4}$ " slip fittings for installing into a sample line. To ensure proper operation the sample line must have a flow rate of 3-10 gpm. Inlet pressure must be higher than outlet pressure in order for water to flow past the electrode(s) to achieve the required rate. The probes are temperature compensated for increased accuracy.

NOTES:

1. **Install an isolation valve on either side of electrodes so they can be easily isolated for removal and cleaning.**
2. **Mount pH or ORP electrodes vertically.**

WARNINGS:

1. **Electrodes are O-ring sealed, which, if damaged, will cause a leak.**
2. **Do not allow pH sensor tips to dry out, damage will occur.**
3. **Do not exceed a water temperature range of 32°F (0°C) to 140°F (60°C).**
4. **Do not exceed a maximum pressure of 125 psi (8.618 bar)**

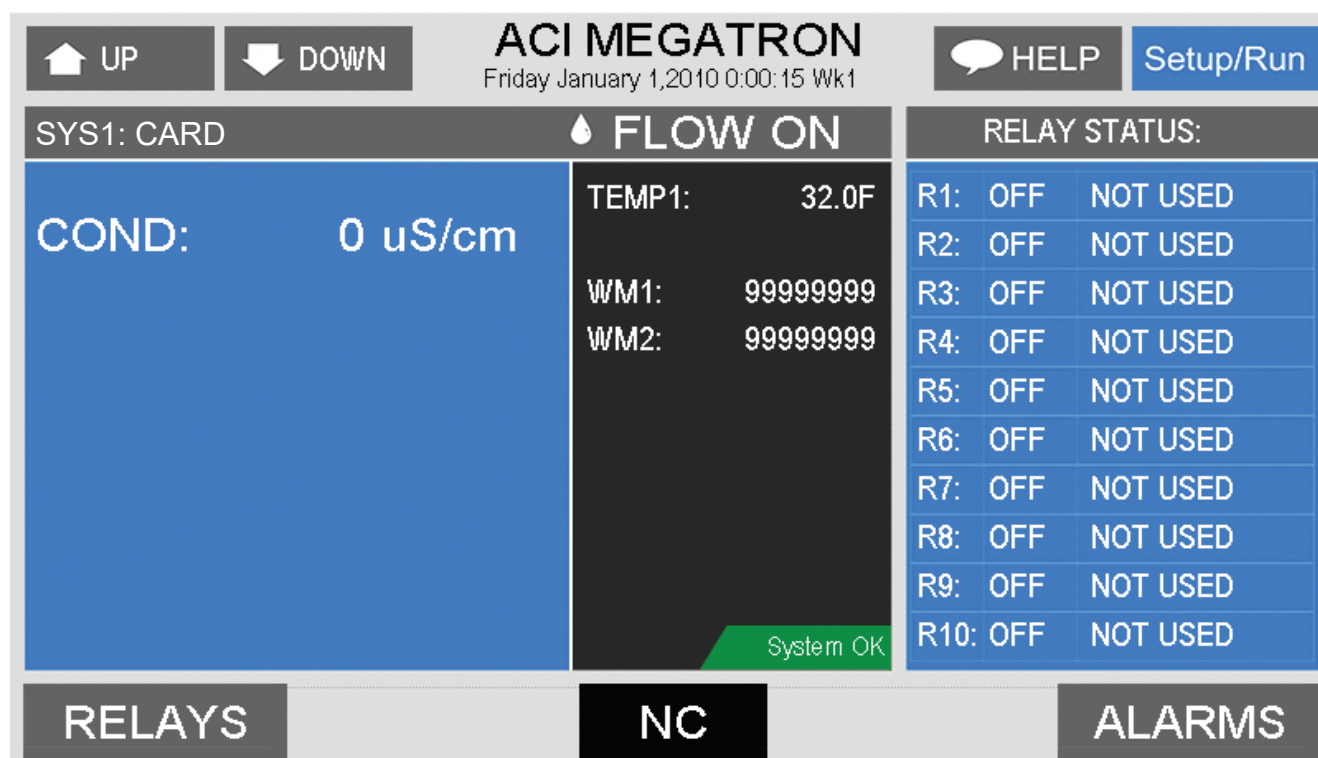
Standard Irrigation Probes

Conductivity: 0960.E4A.10

pH: 0960.PE.21

ORP: 0960.OE.2

IV. Front Panel Description



SET UP/RUN - System initializes into RUN mode. Press this key to put the controller in SET UP Mode and see HOME menu page.

HOME - Used to go back to the HOME menu page.

HELP - Used to access help screens.

BACK - Used to go back to last menu screen viewed or clear values keyed in that are not wanted.

The default is the RELAY status menu, but this can be changed by navigating to the desired screen and pressing the HELP button. Follow the on-screen instructions to set the new hot key location.

V. System Operation Overview

Operation

DEMA XT controllers have two modes of operation, RUN and SET-UP.

RUN - This mode is for normal operation. In the RUN mode the display will show each system's parameters. If an alarm is present, the ALARM box will flash how many alarms are activated. No settings may be entered or changed in the RUN mode. Readings are updated every 6 seconds on the screen while in the RUN mode.

SET-UP - This mode is used to make adjustments to settings and readings on the controller. To access the SET UP mode from the RUN screen, press the SETUP/RUN key.

Typical Start Up Instruction

Complete all installation steps before beginning this procedure. Ensure that all controlled devices (pumps, solenoid valves, etc.) are operational and connected to the controller. Open the isolation valves to allow water to pass through the sample stream assembly if equipped. Before beginning the startup procedure, familiarize yourself with the programming and operation of the system by reviewing the menus available. Use the keys of the controller to skim through all your options.

A. Calibration

All DEMA XT controllers are factory calibrated for temperature, conductivity, pH, and ORP. All units are shipped with the date preset, and the clock set to your current time. These readings and settings should be verified for accuracy, and adjusted as per the instructions listed below.

1. **Conductivity** - To calibrate the conductivity reading, remove the electrode from the line and wipe the flat surface with a clean cloth. Re-install the electrode and open the isolation valves to allow a sample across the probe if equipped. Be sure to allow the reading to stabilize for one minute. Select "SYSTEM COND" from the "CALIBRATION" menu. Then key in the corrected conductivity value. Press ENTER to log in that reading.
2. **pH** - Under normal operating conditions, pH calibration is achieved using the following steps. From the "CALIBRATION" menu, select "SYSTEM PH." Enter the correct pH value. Press ENTER to log in the new reading.
3. **ORP** - To calibrate ORP, from the CALIBRATION menu, select "SYSTEM ORP". Compare the displayed reading to the actual system ORP. If these readings do not match, key in the correct ORP value, and push ENTER.

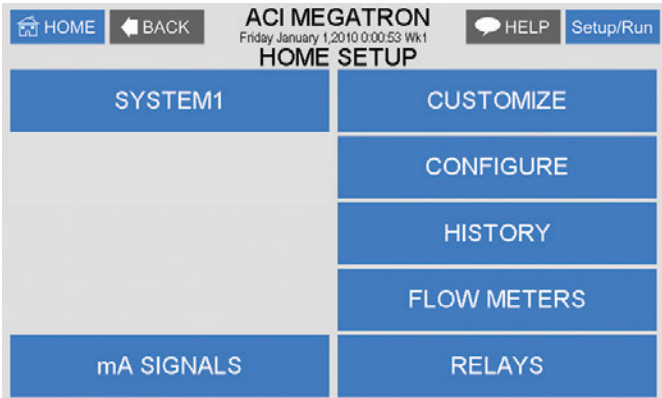
There are limits to how much the calibration can be adjusted. The instrument will only accept new conductivity values which are from 1/3 to 8x the present reading. Any entry outside this range will cause a default to the original reading. If this happens, call 1-918-686-6211 for technical assistance.

VI. Menu Navigation

To access the menus, press the Set Up / Run key on the front panel. This takes you to the Home menu. DEMA XT controller’s menus are easily navigated by pressing the associated number key next to a menu box on the screen. Once you have stepped through the sub menus to reach a point at which a value or selection is made, a Pop-up window will appear prompting you to enter a desired value or selection.

NOTE: When entering new numeric values, enter all available digits (characters).

1. Home Menu

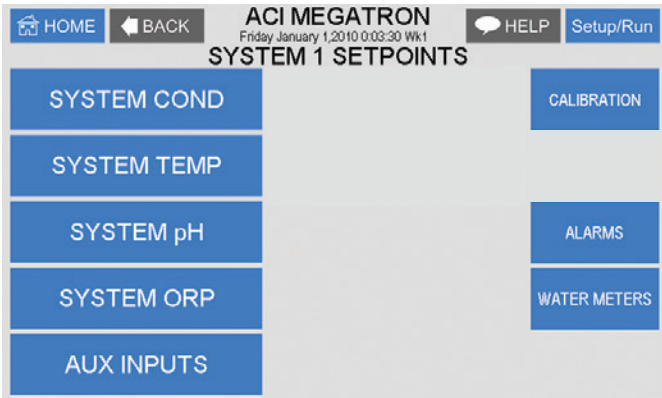


From the **HOME** menu select the desired menu. The menu name explains what parameters can be programmed in the menu.

- SYSTEM1 -** Setting control set points for conductivity, temperature, pH, and ORP for System 1.
- CUSTOMIZE -** Giving the controller, each system, mA input, and all relays a user-defined name.
- mA SIGNALS -** Menus for setting mA inputs and outputs calibration and control settings.
- CONFIGURE -** Menus for configuring passwords, relay activations, setting history interval, flow switch, contrast, temperature scale.
- HISTORY -** Allows for view history on board in a graph form.
- FLOW METERS -** Menu for configuring flow meter totalizing.
- RELAYS -** Menu for resetting accumulated “ON” times and manual relay activation.

2. Set Points

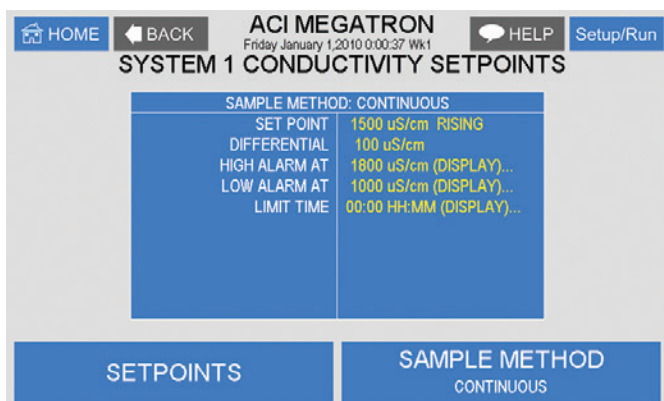
The same basic format is used for defining each available analog probe input’s control parameters. Irrigation conductivity systems will also have an additional menu step for programming the sampling method desired from continuous, timed or sample and hold.



SET POINTS - For setting the relay set points for the available analog probe readings such as conductivity, pH, ORP, or temperature.

NOTE: In the Setpoint pop-up screen the direction (Rising or Falling) of the setpoint can also be set. Rising setpoints will activate the control relay when the particular probe reading rises above the setpoint and will stay activated until the reading comes down by the amount of the differential. If set for Falling the relay is activated when the probe reading falls below the setpoint and stays on until the probe reading comes back up by the amount of the differential.

2.1. Set Point Options



SAMPLE METHOD: CONTINUOUS	
SET POINT	1500 uS/cm RISING
DIFFERENTIAL	100 uS/cm
HIGH ALARM AT	1800 uS/cm (DISPLAY)...
LOW ALARM AT	1000 uS/cm (DISPLAY)...
LIMIT TIME	00:00 HH:MM (DISPLAY)...

SETPOINTS SAMPLE METHOD
CONTINUOUS

SET POINT - What reading turns the relay on.

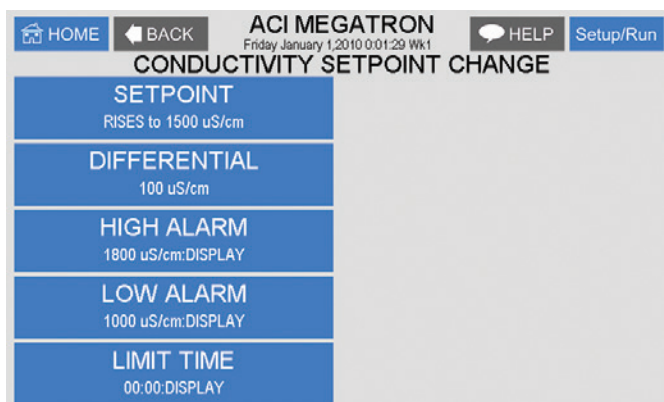
DIFFERENTIAL - Amount reading changes by before the relay is turned off

HIGH ALARM - What reading generates a High alarm.

LOW ALARM - What reading generates a Low alarm.

LIMIT TIME - What amount of continuous bleeding will generate a time alarm notice. The bleed is not locked-out by this alarm.

Note: Each alarm value can also be set up to be displayed or not on the front screen, as well as remotely notified or not, if connected to the WebAdvantage server.



SETPOINT	RISES to 1500 uS/cm
DIFFERENTIAL	100 uS/cm
HIGH ALARM	1800 uS/cm:DISPLAY
LOW ALARM	1000 uS/cm:DISPLAY
LIMIT TIME	00:00:DISPLAY

SET POINT - What reading turns the relay on

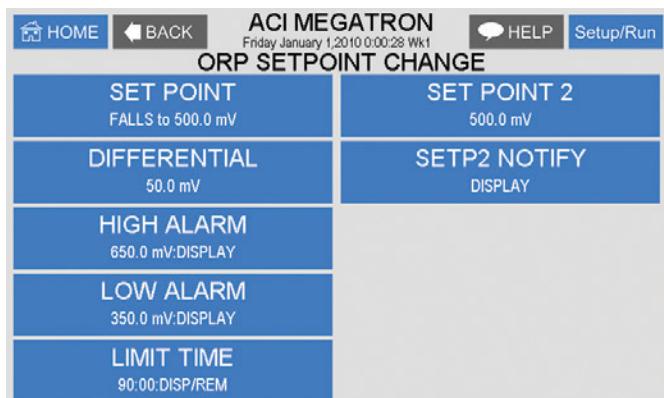
DIFFERENTIAL - Amount reading changes by before the relay is turned off

HIGH ALARM - What reading generates a High alarm notification.

LOW ALARM - What reading generates a Low alarm notification.

2.2. pH and ORP

The pH and ORP set point settings follow the same format as shown above in section 2.1.



SET POINT	SET POINT 2
FALLS to 500.0 mV	500.0 mV
DIFFERENTIAL	SETP2 NOTIFY
50.0 mV	DISPLAY
HIGH ALARM	
650.0 mV:DISPLAY	
LOW ALARM	
350.0 mV:DISPLAY	
LIMIT TIME	
90:00:DISP/REM	

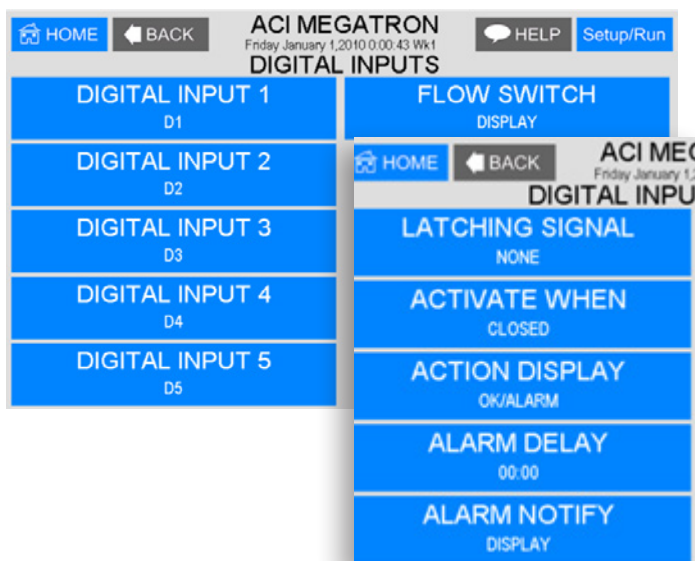
INTERRUPT - Only applies to pH settings and allows the Interruption of pH control during bleed, other chemical feed, or both.

ORP SET POINT 2 - If a 28-day timer is interlocked to ORP, the ORP control will go off of SET POINT 2 during the 28-day timer's run time.

Note: When the Limit Time value is met it will force off the control relay being driven by pH or ORP. To reset the limit timer and get the control relay active again, enter a new Limit Timer value.

2.3. Aux Inputs

Auxiliary inputs are the digital inputs for optional Flow Switch and other digital inputs, such as low drum level alarms. From these menus, alarms, notification, action, and latching settings can be made.



LATCHING SIGNAL - Allows a digital input to stay Active until a second latched input becomes active.

ACTIVE WHEN - Set if input is active seeing closed or open.

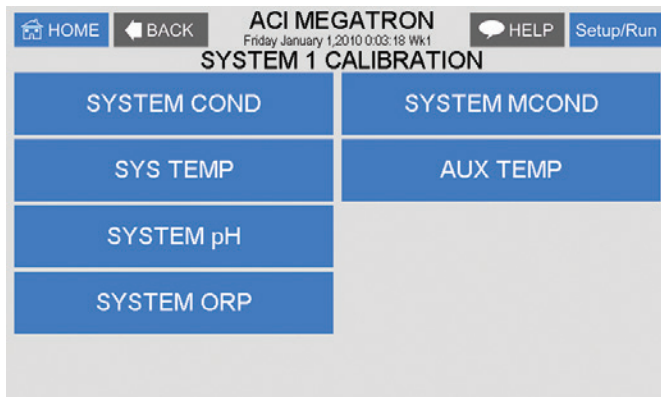
ACTION DISPLAY - Set if the input is being set as alarm or just On/Off.

ALARM DELAY - How long input must be in open/closed before registering.

ALARM NOTIFY - Set the alarm notification.

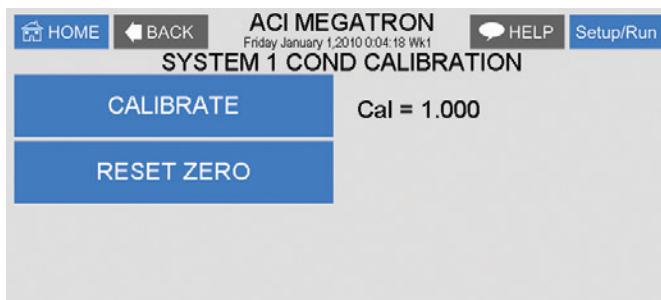
2.4. Calibration

Calibration is for adjusting the displayed value of a probes reading to match your tester or known solution. Pick the system or mA input first. From a particular system, pick the probe to calibrate.



CALIBRATION - For adjusting the actual reading values of the available analog probe inputs, such as conductivity, pH, ORP or temperature.

2.4.a. Conductivity Calibration



CALIBRATE - With a clean probe on-line seeing the system's water enter the known (tested from a calibrated handheld tester) value.

RESET ZERO - With the probe out of solution and dry, enter a new zero point. **Note:** Probe must be dry!

NOTE: In the calibration pop-up window, the raw analog-to-digital (A/D) value will be displayed. A new calibration value should only be entered when the

probe is sensing a stable A/D value.

2.4.b. pH and ORP Calibration

HOME BACK ACI MEGATRON Friday January 1, 2010 0:00:22 Wk1 HELP Setup/Run

SYSTEM 1 pH CALIBRATION

1 POINT CAL

2 POINT CAL

DEFAULT CAL

1 POINT - With a clean probe on-line seeing the system's water enter the known (tested from a calibrated handheld tester) value.

2 POINT - Enter a known Low value with a clean probe in a buffer solution. Then enter a known High value with the clean probe in a buffer.

Notes:

1. Probes must be rinsed between buffers when doing a 2 Point calibration and given at least 30 seconds in solution to adjust to the buffer.

2. There must be at least 2 full pH points between buffer solutions. Using a buffer of 4 and 10 is the best procedure. ORP buffers should be at least 200 points apart.

2.5. Alarms

HOME BACK ACI MEGATRON Friday January 1, 2010 0:03:26 Wk1 HELP Setup/Run

ALL ALARMS

SYS1 DIGIN 1 D1	SYS2 DIGIN 2 D2
SYS1 DIGIN 2 D2	SYS2 DIGIN 3 D3
SYS1 DIGIN 3 D3	SYS2 DIGIN 4 D4
SYS1 DIGIN 4 D4	SYS2 DIGIN 5 D5
SYS1 DIGIN 5 D5	SYS2 LO COND
SYS1 LO COND	SYS2 LO TEMP 1
SYS1 LO pH	
SYS1 LO ORP	
SYS1 LO TEMP 1	
SYS1 LO TEMP 2	
SYS1 LO MAKEUP COND	
SYS2 DIGIN 1 D1	

ALL ALARMS

ALARMS - Shows any current alarms. Accessible from the Setup/Run screen.

2.6. Water Meters / Totalizers

Each system with a timer on it will have 2 water meter inputs. Each of these can have the incoming contact defined, allowing the controller to keep track of water usage. If desired, the controller can calculate evaporation loss by subtracting the deference between a system's two water meter inputs.

HOME BACK ACI MEGATRON Friday January 1, 2010 0:04:08 Wk1 HELP Setup/Run

SYS1 METER 1

FLOW RATE : 0000.0 GALLONS/MIN
WATER METER TOTAL : 99999999.9 GALLONS
LAST RESET ON: 00/00/-001

CONTACT VALUE 1.0 GAL/CONTACT	DEBOUNCE 0 Seconds
CONTACT UNIT GAL/CONTACT	CYCL CALC DISABLED
RESET TOTAL 99999999 GALLONS	EVAP CALC NONE

CONTACT VALUE - Defines the numerical value for a contact; i.e. 10.

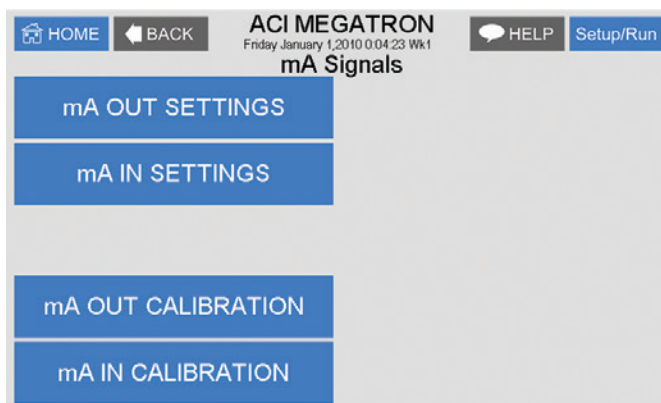
CONTACT UNIT - Defines the units of measurement for a contact; i.e. Gallons / Contact. If there is a mA input set for a gpm or lpm reading, that mA input can be selected in the Contact Units as the source for the meter input to total flow rate.

RESET TOTAL - Resets the totalizer count.

EVAP CALC - Defines which way to subtract the two water meter inputs for an evaporation value.

DEBOUNCE - An additional amount of time the input will wait before accepting another water meter contact to reduce false contacts from a chattering read switch.

3. mA Signals



mA OUT SETTINGS - Selecting source and range of outputs.

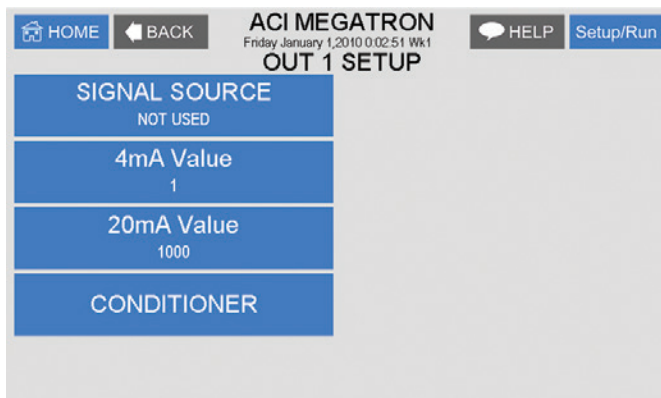
mA IN SETTINGS - Setting control and alarms for inputs

mA OUT CALIBRATION - Calibrating outputs.

mA IN CALIBRATION - Calibrating inputs and displayed range.

3.1. 4-20mA Out Settings

Units with a 4-20mA output option will have a menu for setting up the 4-20mA output. The 4mA and 20mA values can be defined by giving the output proportioning capability. i.e. 4mA = a pH of 6.0 and 20mA = a pH of 8.0.



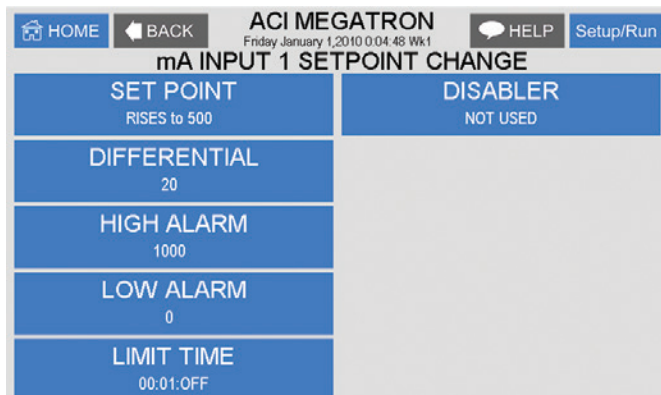
SIGNAL SOURCE - Select which probe reading the mA will use as its reading source.

4 mA VALUE - What the 4mA signal equals

20mA VALUE - What the 20mA signal equals on the assigned signal sources scale.

CONDITIONER - Select a second reading that can change or condition the original mA output.

3.2. 4-20mA Input Settings



SET POINT - What reading turns the relay on

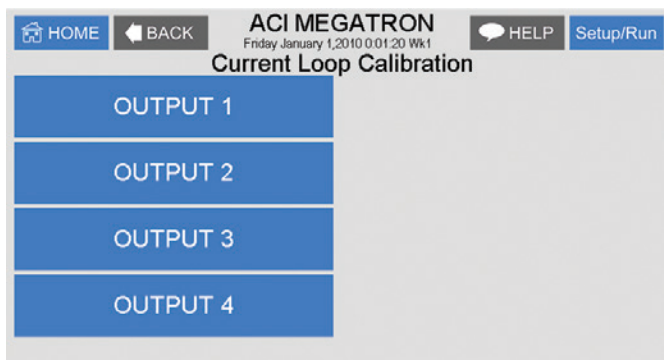
DIFFERENTIAL - Amount reading changes by before the relay is turned off.

HIGH ALARM - What reading generates a High alarm notification.

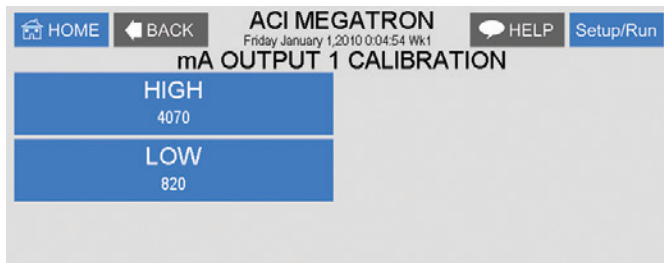
LOW ALARM - What reading generates a Low alarm notification.

DISABLER - Selected input will disable HIGH/LOW alarm notifications and a control relay being activated by the input's setpoint.

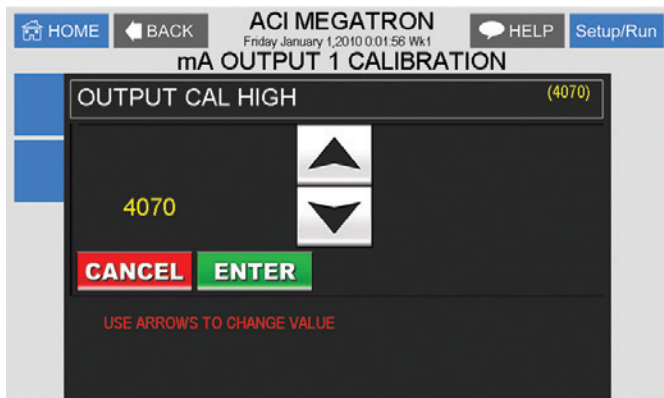
3.3. 4-20mA Output Calibration



4-20mA outputs can be calibrated to ensure that the output generated by the controller and received by the external device match. With a voltmeter connected across the out and return wires (see page 6) of the 4-20mA output channel, to be calibrated, go into the output's Low or High calibration.

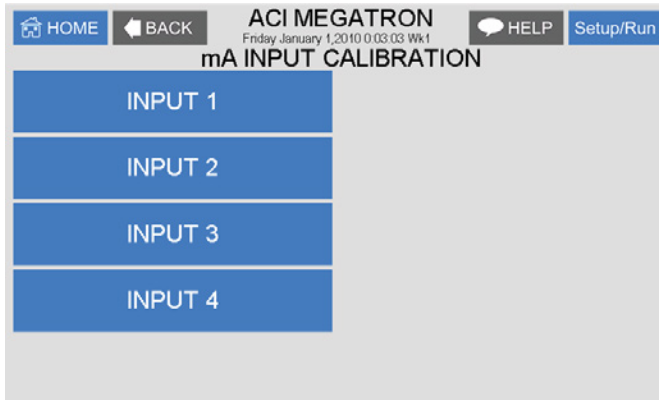


The number displayed in the Calibration dialog box can range from 0-4,095, with 800 equal to 0 mA output, and 4,030 equal to 20 mA. This number range of 0-4,095 is the raw digital-to-analog (D/A) values and is strictly used for reference. The D/A numbers that you get will vary based on your installation conditions.



While in the High or Low calibration pop-up screen use the up and down arrows to change the output value being read with the voltmeter. Adjust the High value for the 20-mA reading and the Low value for the 4-mA value.

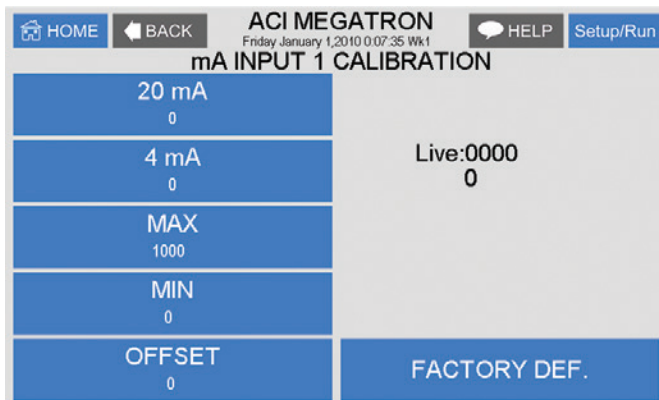
3.4. 4-20mA Input Calibration



4-20mA inputs can be calibrated to ensure that the input seen by the controller from the external device match. It also allows for setting the 4-20mA input into a number range that relates to the value being read.

Select the Input to be calibrated.

Firmware version XT.16.03 and newer have logic that suspends any control logic if the mA received is 50% below the stored 4mA value. A # will be placed in the RUN screen for any mA value in this invalid state.



The **20mA** and **4mA** values are where the controller's raw analog to digital value is adjusted to match a 20mA (full scale) and 4mA (bottom of scale) signal from the external device inputting the 4-20mA input. The external device must be connected to the controller and showing either full or bottom of scale when calibrating each. The number shown along with either the 20mA or 4mA while calibrating is the raw A/D value, and is only a reference. A 20mA input should be around 5,500, and 4mA around 1,100. If the A/D numbers are not in this range, check the input device.

If a mA Input is receiving an A/D value 50% below the stored value for 4mA, the reading is viewed as invalid, and control logic is suspended. This is represented on the RUN screen with a #.

The **MAX** and **LOW** calibration inputs define what to display for a 20mA input and a 4mA input. For a drum level sensor on a 55-gallon drum, the value for **MAX** should be 55 and **MIN** should be 0. A number is automatically displayed between 55 and 0 based on the input value. The scale and units of measure (gallons for example) are set in the Customize menu from the Home page. If the decimal position is changed in Customize, all mA input settings and **MIN/MAX** will need to be reset.

OFFSET - Changes the current displayed value of the 4-20mA input reading to allow for a manual 1pt calibration of the displayed value.

FACTORY DEFAULT - If the 20mA or 4mA calibration has been incorrectly set (not at 4 or 20) this will reset the settings back to a factory value for 4 and 20.

4. Customize

This menu allows the user to define the on-screen name of the unit plus the name of each system and relay. The user can also set up the Notepad for each system and 4-20mA Input's name and unit of measurement.

The screenshot shows the 'CUSTOMIZE' menu with the following options:

UNIT NAME ACI MEGATRON	FLOW METERS
RELAY NAMES	NOTEPAD
SYS NAME	
INPUT NAMES	mA IN
	RUN SCREEN

RUN SCREEN - Allows the user to select what will be shown on the screen while the controller is in the RUN mode, such as displaying temperature readings, water meter totals for a particular system, or the conductivity units of measure.

NOTE: When entering values for custom names use the numerical keys for numbers and the up / down arrows to scroll through all the characters of a keyboard. Press the right arrow to advance the cursor after setting a desired value. Press the Help button to place the last entered character into the new cursor space to speed up the process. The Help button will also jump advance through the characters.

4.1. Notepad

The Notepad function allows the user to set up and store manually entered data or perform simple calculations between two different sensor or notepad inputs. There are ten notepad fields per system card and each can be given a custom name, UOM and number range.

The screenshot shows the 'NOTEPAD NOTE 1' setup screen with the following options:

NAME	SENSOR 1 COND2
NUMBER xx.xx	SENSOR 2 COND1
UNITS %	
ALARMS	

NAME - Pick from a list of defined names or customize your own or if you want the Notepad to be a Calculation.

NUMBER - Set the number range.

UNITS - Set the units of measurement.

ALARMS - Set Hi/Low alarm points and how frequently a new value is expected to be manually entered via the History menu.

If the Notepad is a calculation no time alarm is defined and the calculation results are stored in history at the time stamp interval.

CALCULATION - If a Notepad is to be a calculation select the type of calculation desired.

The screenshot shows the 'NOTEPAD NAME' selection screen with the following options:

DEFINED NP2
CUSTOM NP2
CALCULATION NONE

The screenshot shows the 'CALCULATION TYPE' selection screen with the following options:

CALCULATION TYPE (NONE)
% DIFFERENCE [(S1-S2)/S1]*100
CANCEL ENTER
USE ARROWS TO CHANGE VALUE

Calculation Types:

- None
- % Increase
- Product
- Total
- Ratio
- % Difference
- Difference

ACI MEGATRON Friday January 1, 2010 0:02:43 Wk1 NOTEPAD NOTE 1	
NAME	SENSOR 1 COND2
NUMBER xx.xx	SENSOR 2 COND1
UNITS %	
ALARMS	

SENSOR 1 - The first sensor reading or Notepad value to be used in the calculation.

SENSOR 2 - The second sensor reading or Notepad value to be used in the calculation.

4.2. mA Inputs

ACI MEGATRON Friday January 1, 2010 0:01:37 Wk1 CUSTOMIZE mA INPUT 1	
NAME mAin1	
UNITS	
NUMBER xxxxx	

NAME - Name the input.

UNITS - Set the units of measurement.

NUMBER - Set the number range.

4.3. Run Screen

ACI MEGATRON Friday January 1, 2010 0:02:49 Wk1 CUSTOMIZE RUN SCREEN	
MAIN SCREEN	
SCREENS SHOWN	
CYCLE TIME 00:10	
COND UNITS	

This lets you customize various aspects of the RUN screen.

MAIN SCREEN - Customize what is displayed on the RUN screen.

SCREENS SHOWN - Pick if the mA input & Aux Flow screens are scrolled.

CYCLE TIME - The amount of time between screen scrolls.

COND UNITS - Select the units of measure to be displayed with the conductivity reading.

5. Configure

ACI MEGATRON Friday January 1, 2010 0:04:13 Wk1 CONFIGURE	
PASSWORD	DATE/TIME
RELAYS	TEMP SCALE DEGREES F
	NETWORK
HISTORY	SYS INFO
FLOW SW	FACTORY

Provides access to menus to set-up passwords, relay activation, temp scale, display contrast, flow switch, inputs, history time stamps, factory set-up and system information.

FLOW SW - Defines a flow switch to be open or closed with flow.

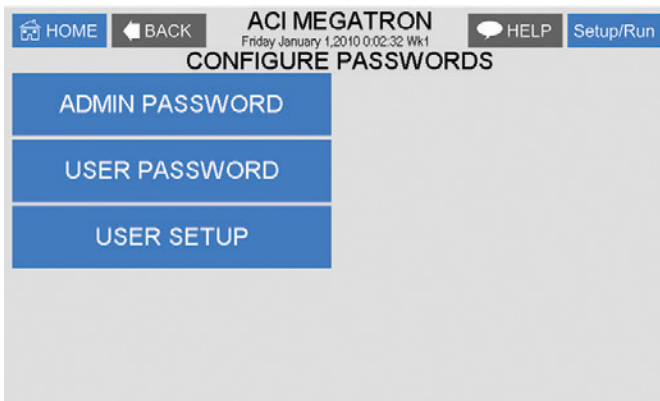
FACTORY - A factory only menu

TEMP SCALE - Set Celsius or Fahrenheit

HISTORY - Sets the history time stamp interval.

SYS INFO - Tells unit software specifics.

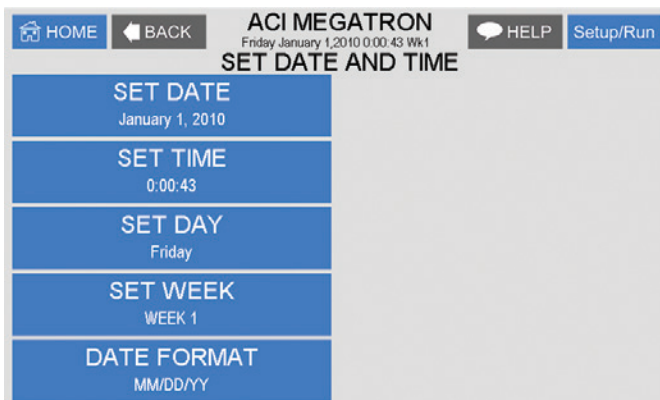
5.1. Password



ADMIN PASSWORD - The administrator password gives access to all menus except factory set up.

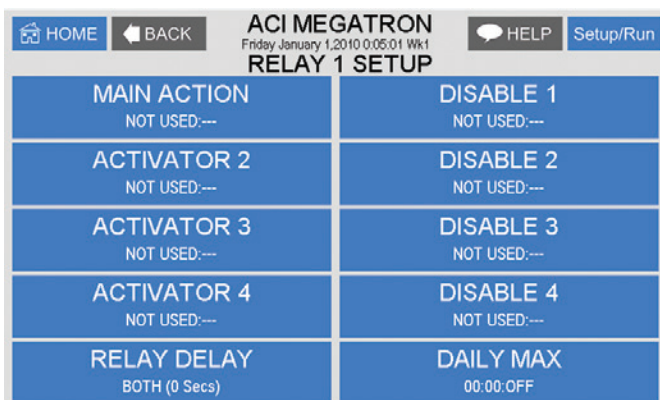
USER PASSWORD - The user password allows the user to access HOME menus that are made available in USER SET UP.

5.2. Date and Time Set Up



DATE AND TIME - For setting the date, time, day, and week on the controller.

5.3. Relays



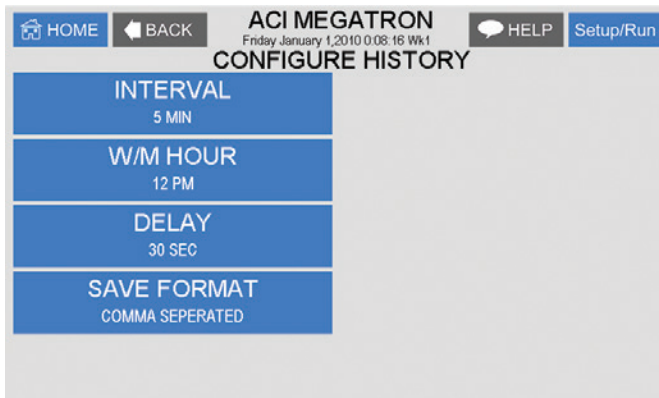
CONFIGURE RELAYS - This menu lets you choose a **Main Action** or function (timer 1, conductivity, alarms etc...) to activate a relay.

A pop-up screen appears with a list of all available activation functions to arrow through.

Additional relay logic is available with up to 3 additional **Activators** and up to 4 **Disablers** allowing multiple functions to activate the same relay and multiple functions to prevent the relay from coming on. There is also a Daily Max amount of time that a relay can be on. If a relay is on for the max amount, it does not let the relay come on anymore that day (a 24-hour clock is used for the day with midnight being the start of the day). The Delay setting is the amount of time a control function must come on before the relay will react and activate. This is to prevent a relay from chattering on/off if a reading is bouncing around the set point or alarm.

5.4. History

This menu is used to set the history “time stamp” interval, the water meter daily history starting hour, the alarm delay period and the USB history save format.



INTERVAL - The amount of time between each history time stamp for probe readings.

W/M HOUR - The time of day that the daily water meter history cycle is to start.

ALARM DELAY - The amount of time an alarm has to be on before it is recognized as an alarm.

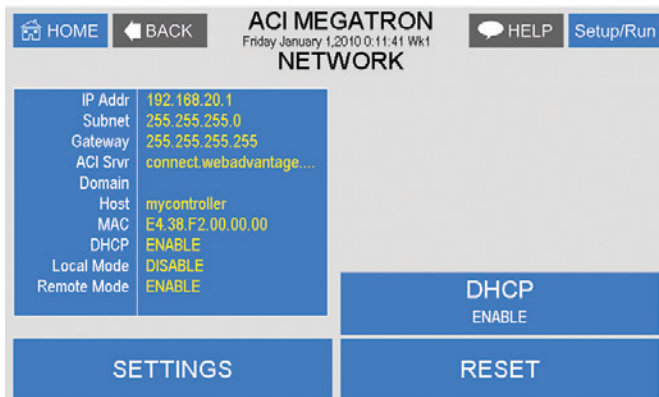
SAVE FORMAT - The USB history save format.

5.5. Temperature Scale

This menu is used to select the type of temperature scale to display.

5.6. Network

The Network menu is used when a controller is being remotely communicated with either a local network connection or over the internet on the WebAdvantage server. IP Address, IP Mask, Gateway, and other information can be viewed from this menu.



SETTINGS - This menu is used for setting up the remote WebAdvantage communications and is covered in a separate manual.

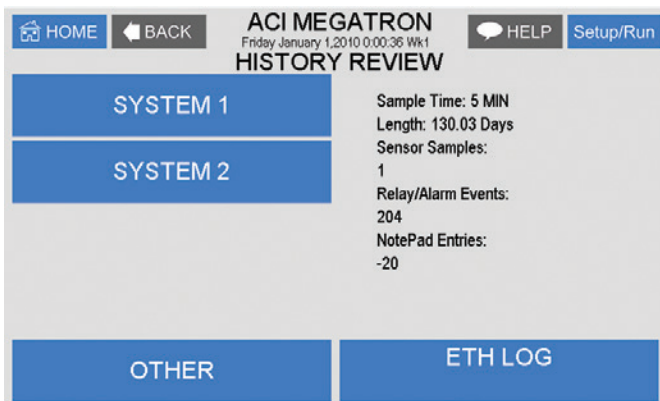
<http://www.advantagecontrols.com/downloads/pdf/M-WebAdvantage.pdf>

Note: The Network card must be RESET after making any changes to Network setting in order to save changes and reset communications.

5.7. System Information

System information will identify the version of firmware installed in the controller along with the controller's serial number.

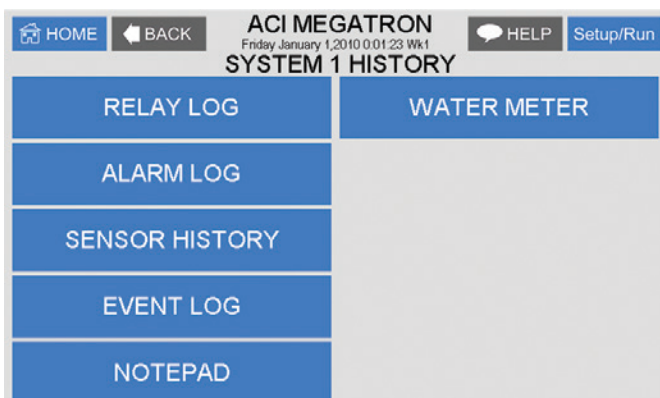
6. History



The onboard history allows for viewing the history of the probe readings, relay activations, key-pad activity, calibrations, water meter hourly and daily logs, and alarms for each system present. It is also where Notepad data is entered and reviewed. An initial overview page is displayed showing your current sample interval, the calculated number of days the unit can keep probe history for before losing the oldest. The number of sensor samples and relay/alarm events and Notepad entries currently stored is also displayed.

NOTE: The history can be reset by going to the configure menu and entering a different sample interval. After the new sample interval has been set, the onboard history is reset.

6.1. Viewing History

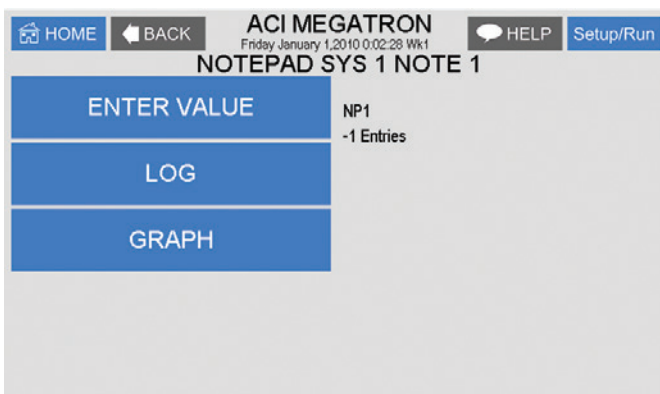


RELAY LOGS - Relay activations displayed in a log form. Arrow up to advance through the log.

ALARM LOG - Alarm activations in log form. **SENSOR HISTORY** - For selecting the parameters and viewing of a given probe reading's history in log or graph form.

EVENT LOG - Displays various activities.

6.2. Notepad Entries

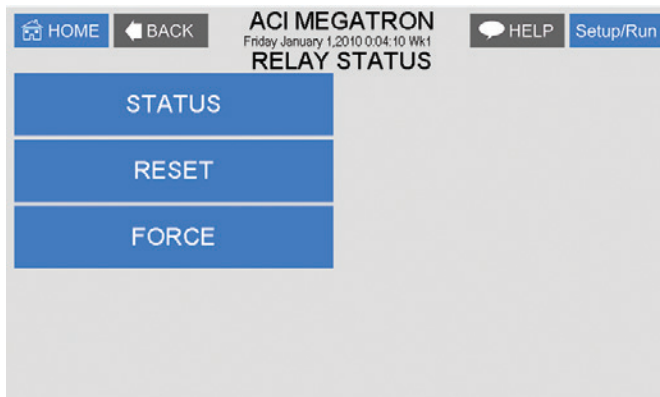


The Notepad section under History is where the user goes to enter new values for the customized notepad items. Each individual notepad item's manually entered entries are stored in the unit's history and can be reviewed in log or graph form after 4 or more values have been entered.

6.3. Water Meter History

The water meter history allows the user to review both water meter one and two of a particular system in both an hourly format (for the past 24 hours) or a daily format for the past 60 days. If an evaporation calculation is being kept, a daily history of this value is also available.

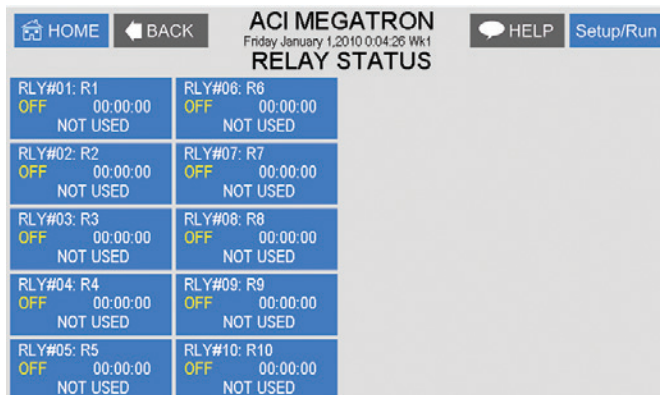
7. Relays



STATUS - Allows for viewing accumulated relay ON times, temporary forcing relays ON or OFF or seeing which relay is on.

RESET - Allows the accumulated run time of a particular relay to be reset to zero.

FORCE - Allows a relay to be manually forced ON or OFF for a single event from 0-999 minutes. When the event is over the relay goes back to its normal automatic control.



In the STATUS view the accumulated ON time is shown along with the main activator, custom name and current status:

ON = Relay on by relay activators

OFF = Relay off by normal logic

OFF-T = Relay off for daily max

OFF-D = Relay off for relay disabler

ON-A = Relay activated by activator other than main action

H-ON = Relay manually forced on

H-OFF = Relay manually forced off

VII. Maintenance

The only required maintenance for normal uninterrupted operation of your DEMA XT controller is cleaning of the electrode(s). After initial startup, it is a good idea to clean the electrode frequently until a schedule based on need has been developed. Since each application is unique, it is difficult to estimate the required frequency of cleaning. The first cleaning should take place after about one week of the system being online.

To determine the required cleaning frequency, record the reading on the controller before the electrode is removed for cleaning. After cleaning, record the new reading. If a change is observed in the two readings, the electrode was dirty. The more significant the change, the dirtier the electrode. If no change occurs, cleaning needs to be done less often.

Conductivity Electrode Cleaning Procedure

1. Record the current conductivity reading.
2. Turn off water flow through the electrode loop, bleed pressure from the line and remove electrode.
3. Use a clean cloth and a mild cleaning solution to remove loose dirt etc., from the flat surface of the electrode.
4. If the electrode has deposits such as scale attached to the electrode surface, a more aggressive cleaning approach will be needed. There are several ways to do this, the preferred method being the one that is easiest for the user.
 - a. Use a mild acid solution to dissolve deposits.
 - b. Lay a piece of sandpaper (200 grit or finer) on a flat surface such as a bench top. "Sand" electrode to remove stubborn deposits. Do not wipe the surface with your finger. Oil from your skin will foul carbon tips.
5. Reinstall the electrode in the system. After the reading stabilizes, calibrate the unit to a reliable test reading.

Many times, an electrode can appear to be clean, but the unit still cannot be calibrated. If this is the case, use one of the more aggressive electrode cleaning procedures listed in step 4 above. Recheck the calibration after completion of this procedure. If no change was observed in the reading, replace the electrode. If a change occurred but the unit still will not calibrate, repeat procedure as many times as necessary.

pH and ORP Electrode Cleaning Procedure

1. Remove the pH electrode from the system.
2. Spray with water and/or detergent, using a soft brush to dislodge any fouling.
3. Visually inspect the electrode for signs of damage.
4. Calibrate the electrode while it is in a known solution.

Slow response or non-reproducible measurements are signs that the electrode has become coated or clogged. The pH glass is susceptible to mounting by many substances. The speed of response, normally 95% of the reading in less than 10 seconds, is dramatically degraded when the pH glass is coated.

To restore the speed of response for a pH electrode, clean the bulb with a high-quality detergent, methyl alcohol or other suitable solvent using a Q-tip. Rinse well with distilled water and retest. If the electrode now responds, but erratically, soak the sensor in 0.1 Molar HCl for 5 minutes. Remove and rinse with water and place in 0.1 Molar NaOH for 5 minutes. Remove, rinse again, and then place the sensor in pH 4. buffer for 10 minutes before use.

VIII. Warranty

Merchandise Returns

No merchandise will be returned for credit without DEMA'S written permission. Returned merchandise authorization number is required in advance of return.

Product Warranty

DEMA products are warranted against defective material and workmanship under normal use and service for one year from the date of manufacture. This limited warranty does not apply to any products that have a normal life shorter than one year or failure and damage caused by chemicals, corrosion, physical abuse, or misapplication. Rubber and synthetic rubber parts such as "O"-rings, diaphragms, PVC tubing, and gaskets are considered expendable and are not covered under warranty. This warranty is extended only to the original buyer of DEMA products. If products are altered or repaired without prior approval of DEMA, this warranty is void. Defective units or parts should be returned to the factory with transportation prepaid. If inspection shows them to be defective, they will be repaired or replaced without charge, F.O.B. factory. DEMA assumes no liability for damages. Return merchandise authorization number must be granted in advance of returned units for repair or replacement (See "Merchandise Returns" above).

30 Day Billing Memo Policy

DEMA maintains a unique factory exchange program to ensure uninterrupted service with minimum downtime. If your controller malfunctions, call 1-918-686-6211, provide our technician with Model and Serial Number information. If they are unable to diagnose and solve your problem over the phone, a fully warranted replacement will be shipped, usually within 48 hours, on a 30-Day Billing Memo.

This service requires a purchase order, and the replacement is billed to your regular account for payment.

The replacement will be billed at the current list price for that model less any applicable resale discount. Upon return of your old panel, credit will be issued to your account at either 100% if your unit is in warranty or at 50% if your unit was out of warranty. The exchange covers only the panel. Electrode and enclosure are not included.

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. See 47 CFR Sec. 15.19(3).