Model TMC430 Pump Controller

Installation and Operation Manual



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1. Controller Package Contents

1.1 Package Contents

- (1) Model TMC430 Pump Controller
- (1) 5.08mm, 2-pin Power Supply Connector
- (2) 5.08mm, 6-pin Output Contact Connectors
- (1) 3.5mm, 2-pin RS-485 Communications Port Connector
- (3) 3.5mm, 5-pin Pump Input Switch Connectors
- (1) 3.5mm, 3-pin analog input connector
- (1) 3.5mm, 2-pin analog output connector
- (1) Installation Download Information Page

1.2 Optional Contents

(1) 24VDC output power supply with 2-pin power supply connector (above) attached

- (1) 35mm Din Rail mounting kit
- (1) in-door / panel mounting kit
- (1) 6ft standard USB-A to USB-B cable

1.3 Missing Or Broken Parts

If any parts are missing or broken, do not hesitate to contact a Time Mark representative at: 800.862.2875, Monday through Friday 8:00am to 5:00pm central time. You may also contact a representative at <u>sales@time-mark.com</u>.

1.4 Controller Software Version

This manual corresponds to the controller software, or firmware, released in September of 2024. Your controller's software may differ from these instructions.

2.Introduction

2.1 Description

 An advanced pump management and control system with powerful out of the box features that make it a snap to setup and customize using the on-screen menus or USB communication port with a Windows[™] based computer.

- 2) All pump alarms are logged to the Model TMC430 with the pump identification number, alarm type [seal fail, over temperature, contactor fail, or "spare"], date, and time. The logs can be instantly accessed by pressing the LOG menu button, or by downloading to the Windows[™] software in a .csv formatted file for use in a spreadsheet application.
- 3) Each alarm may be disabled (for all pumps) via the setup menu if not used.
- 4) Three sets of discreet pump alarm inputs and a full range of pump and sensor configurable menu options. (*Note: current hardware utilizes the third pump's alarm inputs as floats, meaning to use any "floats" mode will necessitate using only two of the available pump outputs.*)
- 5) H-O-A [Hand-Off-Auto] is allowed for each pump from the menu buttons, as well as from the Windows[™] software.
- 6) Separately configurable on-delay time, and off-delay time to prevent very large in-rush currents when multiple pumps need to be activated at the same time. Both may be adjusted from 0.0 to 10.0 seconds.
- 7) The Windows[™] software allows for easier setup by:
 - a. Simplifying the setup process for a single controller, most settings are presented on a single screen
 - b. Save the configuration settings if:
 - i. Multiple controllers will use the same settings
 - ii. The factory restore option was accidentally performed, erasing all settings
 - iii. The controller malfunctions and needs to be repaired or replaced.
- 8) There is a CR2032 battery inside the controller that maintains the Real-Time-Clock (RTC) settings (date and time of day). *This battery is not user replaceable. All other settings are stored in non-volatile memory.

*Battery is installed in a position that is not easily accessible, and the controller must be completely disassembled (which will void the warranty) to change the battery.

2.2 Overview



Figure 1

3. Controller Orientation

3.1 Manual Orientation Convention

This diagram shows the orientation of the model TMC430 and how this reference manual will refer to the views when necessary.



Figure 2

3.2 Model TMC430 Connections

- 1) All wiring connections to the controller should be made before powering on the Model TMC430
- 2) Provide plenty of wire or cable slack between the model TMC430 and their terminating connections.
- 3) Keep all wires bundled and secured away from hinges and other moving parts where wires might be damaged or frayed.

4) Keep low-voltage signal wires away from high-current carrying conductors to prevent electrical noise from interfering with the small signals.



RIGHT SIDE VIEW - WIRE HOOKUP

Figure 3

TOP SIDE VIEW - WIRE HOOKUP



Figure 4

Note: "High Level Alarm" is just "Level Alarm", it would be High or Low depending on if you select pump UP or DOWN.

BOTTOM SIDE VIEW – WIRE HOOKUP



Note: FLT0 = "STOP" float, FLT1= "Lead", FLT2="Lag", FLT3="Alarm"

5) The left side (no image) of the Model TMC430 only has the USB-B connection. This is a "standard" printer, or device, type USB cable connection

4. Mounting Hardware

4.1 Panel Mount



4.2 Din Rail Mount, 35mm



Figure 6 – Back View (as well as bottom and left-side view)

4.3 Flush Mount



Figure 7

5. Getting Started

5.1 Power Supply Connection

- A facility provided 24 V.D.C. power connection may be used with the 5.08mm, 2pin connector that comes in your installation kit, if 24 V.D.C. power is not provided, a plug-in power adapter may be purchased as an optional accessory.
- Install the 5.08mm, 2-pin connector (see Figure 4 on page 8)
- Apply power to the 24 V.D.C. connector into the model TMC430, the screen should light up and show a boot-loader screen. Do not press any buttons here unless told to do so by technical support. After the boot-loader screen, the Time Mark logo will be shown (this is where you can press the outside two buttons to either "Factory Reset" or calibrate the input and/or output). After the logo screen, the first user-interface screen will be shown. You may begin setup of the controller when this first screen appears (see figure 8).

5.2 Top Screen Menu



Figure 8

6. Configuration

Note: If no key is pressed for approximately 60 seconds, the controller will automatically reset back to the first user-interface screen (see Figure 8).

6.1 Pump Configuration

Note: all relays (pump outputs) will be disabled while in the pump configuration menu and will not be re-enabled until the last option has been set and EXIT is pressed. If no key is pressed for approximately 60 seconds, the controller will automatically revert to the run mode screen (Figure 8) and re-enable the relay outputs.

- 1) Press CFG once; the screen will change to the CONFIG screen
- 2) On the CONFIG screen the selections are
 - Pump Config
 - System Config
 - Display Options
 - Communications
- 3) Press **Selct** when the selection arrows are pointing to the "Pump Config" option
- 4) A confirmation screen will appear: "STOP SYSTEM"
- 5) Press Exit to cancel and return to the CONFIG screen
- 6) Press **OK** to advance into the pump configuration menu
- 7) The PUMP Configuration screen presents the following
 - DOWN
 - UP
 - Select Num Pumps x
- Use the ↑ or ↓ keys to select the setting you would like and press Selct (the currently selected option will be displayed in reverse video e.g.: DOWN)
- 9) Press **Selct** when the selection arrows are pointing to "Select Num Pumps" to adjust the number of pumps to be controlled (1 to 3)
- 10)Use the + and keys to adjust the number of pumps
- 11)Press Enter to lock in the value
- 12)Press **Next** to continue to input type
- 13)The input type presents three choices:
 - FLOAT
 - 4-20 mA
 - 4-20 mA \rightarrow FLOAT
 - •
 - Alarm Float: OFF/ON
 - Activate Pumps x

The input type is where you may choose the type of input that will control the pump outputs.

- The FLOAT option will use only floats, connected to pump 3 switch inputs (see Figure 5 on page 9), and will ignore the 4-20 mA input.
- The "4-20 mA" option will use a transducer only and ignore the float inputs.
- The "4-20 mA → FLOAT" option will use the transducer normally, but should the signal drop out will revert to floats mode. The signal must drop below 2 mA to switch to floats mode.
- The "Alarm Float" option, if present, will allow for an alarm float (connected to the Pump 3 "Spare" input) to be connected that will trigger the alarm relay should the float activate before the 4-20 mA signal reaches the alarm point.
- The "Activate Pumps" option, if present, will turn on either 1 or 2 pumps when the alarm float (Pump 3 "spare") activates (if set to ON in the above setting)

If you selected three pumps, the 4-20 mA $\,\rightarrow\,$ FLOAT mode will not be available.

14)Press Next to continue to set the unit of measure (if FLOATS option was selected, the next screen will be "CONFIG – ALARM ENABLE", step 36 below)
15)The UNIT OF MEASURE screen presents the following choices:

- FT FEET
- IN INCHES
- M METER
- PI PSI

This is a cosmetic setting only and shows with the value on the main run screen (Figure 8), the values do not automatically re-calculate upon change.

16)Press **Next** to continue to the AI (analog input) configuration 17)The CONFIG – AI – RANGE screen presents the following:

- 4 mA = xx.x FT (or the unit of measure selected above)
 - 20 mA = xx.x FT

18)When the selection arrows are pointing to the "4 mA" line, press **Selct**

19)Use the +1 and -1 buttons, in conjunction with the *10 button, if necessary, to adjust the low input value. (The *10 button will need to be pressed at the same time as the +1 or -1 buttons.) This should correspond to the value at which the sensor is sending 4.00 mA.

20)Press Enter to lock in the value

21)When the selection arrows are pointing to the "20 mA" line, press **Selct**

- 22)Use the +1 and -1 buttons, in conjunction with the *10 button, if necessary, to adjust the low input value. (The *10 button will need to be pressed at the same time as the +1 or -1 buttons.) This should correspond to the value at which the sensor is sending 20.00 mA.
- 23)Press Enter to lock in the value
- 24) Press **Next** to continue to the CONFIG SET POINTS screen
- 25) The CONFIG SET POINTS screen will show the following:
 - STOP = xx.x FT (or the unit of measure selected above)
 - LEAD = xx.x FT
 - LAG1 = xx.x FT
 - LAG2 = xx.x FT
 - ALARM = xx.x FT

This order will reverse based on if UP or DOWN was selected in the first setup screen (pump UP or pump DOWN), the order shown is pump UP. "LAG1" and "LAG2" will only be shown if the number of pumps selected to control is appropriate (2 or 3).

- 26)When the selection arrows are pointing to the line you would like to set, press **Selct**
- 27)Use the +1 and -1 buttons, in conjunction with the *10 button, if necessary, to adjust the values. (The *10 button will need to be pressed at the same time as the +1 or -1 buttons.)
- 28)Repeat steps 26 and 27 until all set points have been set to their desired values 29)Press **Next** to continue to the CONFIG AO RANGE setting
- 30) The CONFIG AO RANGE screen presents the following: (like the AI screen in step 17)
 - 4 mA = xx.x FT (or the unit of measure selected above)
 - 20 mA = xx.x FT

This allows the controller to have a smaller analog output range than the input, you cannot invert the signal however, if the 4-mA input value is less than the 20-mA value then the same should be true of these output values.

- 31)Use the +1 and -1 buttons, in conjunction with the *10 button, if necessary, to adjust the low input value. (The *10 button will need to be pressed at the same time as the +1 or -1 buttons.) This should correspond to the value at which you want the TMC430 to output 4.00 mA.
- 32)Press **Enter** to lock in the value
- 33)When the selection arrows are pointing to the "20 mA" line, press **Selct**
- 34)Use the +1 and -1 buttons, in conjunction with the *10 button, if necessary, to adjust the low input value. (The *10 button will need to be pressed at the same time as the +1 or -1 buttons.) This should correspond to the value at which you want the TMC430 to output 20.00 mA.

35)Press Enter to lock in the value

36)Press **Next** to continue to the CONFIG – ALARM ENABLE selection 37)The CONFIG – ALARM ENABLE screen presents the following:

- Seal Fail = ON
- Over Temp = ON
- Contactor = ON
- Spare = OFF

These affect the switch inputs for all pumps, and the default values are shown.

All four alarms will activate the alarm relay, however, only the "Contactor" will disable the pump when activated.

38)Press **Selct** when the selection arrows are next to the option you want to change

- 39)Use the + and keys to adjust the value from ON to OFF or OFF to ON
- 40)Press **Enter** to lock in the choice
- 41)Repeat steps 38 to 40 until the settings match your needs
- 42)Press Enter to lock in the value
- 43)Press **Next** to continue to the FLOAT ERR CORRECTION screen (if the 4-20 input option was selected, this menu will be skipped)
- 44) The FLOAT ERR CORRECTION screen selection is either OFF or ON (this setting allows the controller to correct should the floats activate out of sequence)
- 45)Use the ↑ or ↓ keys to move the selection arrows to the selection of choice and press **Selct**

46)Press **Next** to lock in the value and proceed to the CONFIG – PUMP ALTERNATE setting

47)Press **Next** to continue to the CONFIG – PUMP ALTERNATE screen 48)The CONFIG – PUMP ALTERNATE screen presents the following:

- Pump 1 Lead
- Pump 2 Lead
- Pump 3 Led
- •
- •
- Alternate Pumps

The number of pumps shown will depend on the number of pumps selected in the first pump configuration screen. "Alternate pumps" will switch the lead pump after each "Lead pump" activation to allow for equal amounts of run time per pump.

49)Use the ↑ or ↓ keys to move the selection arrows to the selection of choice and press **Selct**

50)Press Next to lock in the choice and proceed to RESET ON CONT FAIL setting

- 51) The RESET ON CONT FAIL selection is either OFF or ON (this setting allows the next available pump to turn on should the first selected pump trigger a contact fail alarm, thus generating an error for the first pump and setting it's HOA status to OFF)
- 52)Use the ↑ or ↓ keys to move the selection arrows to the selection of choice and press **Selct**
- 53)Press Next to lock in the value and proceed to RESET CONT FAIL HOA screen
- 54) The RESET CONT FAIL HOA screen is also an OFF/ON selection (this setting will allow the controller to automatically set any pump's HOA status to Auto should the contact fail alarm be remedied)
- 55)Use the ↑ or ↓ keys to move the selection arrows to the selection of choice and press **Selct**
- 56)Press **Next** to lock in the value and proceed to the DELAY BETWEEN PUMPS setting
- 57) The DELAY BETWEEN PUMPS setting presents the following: (this is the amount of time that must pass before another pump can be activated, or deactivated, to prevent large in-rush currents)
 - On Delay (sec) xx.x (default 2.0)
 - Off Delay (sec) xx.x (default 0.0)
- 58)Use the ↑ or ↓ keys to move the selection arrows to the selection of choice and press **Selct**
- 59) Use the + and keys to adjust the value from 0.0 to 10.0
- 60)Press Enter to lock in the value
- 61)Repeat steps 54 to 56 to set both ON and OFF delay times.
- 62)Press **Next** to finishe the pump configuration menu and return to the CONFIG screen

6.2 System Configuration

63)Press **CFG** once; the screen will change to the CONFIG screen

64)On the CONFIG screen the selections are:

- Pump Config
- System Config
- Display Options
- Communications

65)Press ↓ until the selection arrows are pointing to the "System Config" option and then press **Selct**

66) The CONFIG – SYSTEM menu will present more choices

- Time/Date
- Password OFF (or ON if previously enabled)
- Reset Run Times
- Version Number
- Clear Log

67)Press Exit to return to the CONFIG – SYSTEM screen

68)Press **Exit** a second time to return to the normal run screen (Figure 8)

- 6.2.1 Time and Date Setting
 - 1) Press **Selct** when the selection arrows are pointing to the "Time/Date" option
 - 2) Two choices will be presented:
 - Time hh:mm:ss
 - Date mm.dd.yy
 - 3) Press Exit to return to the CONFIG SYSTEM screen
 - 4) Press **Exit** a second time to return to the normal run screen (Figure 8)

6.2.1.1 Time Setting

- 1) Press Selct while the selection arrows are pointing to the "Time" option
- 2) Use the + and keys to adjust the hours; note this is a 24-hour format (0 to 23)
- 3) Press **Next** to advance to the minutes
- 4) Use the + and keys to adjust the minutes
- 5) Press Next to advance to the seconds
- 6) Use the + and keys to adjust the seconds
- 7) Press Enter to lock in the value and leave the time adjustment mode

6.2.1.2 Date Setting

- 8) Press **Selct** while the selection arrows are pointing to the "Date" option
- 9) Use the + and keys to adjust the month (1 to 12)
- 10)Press Next to advance to the date of the month
- 11)Use the + and keys to adjust the date of the month
- 12)Press Next to advance to the year
- 13)Use the + and keys to adjust the year
 - The model TMC430 uses a 2-digit year
- 14)Press **Enter** to lock in the value and leave the date adjustment mode

6.2.2 Password Selection

Note: if the Password is turned ON and a password other than 0000 is entered, the password will be required to enter the CONFIG screen in future.

- Press ↓ until the selection arrows are pointing to the "Password OFF" option and then press Select
- 2) The SYSTEM PASSWORD screen presents two choices:
 - OFF
 - ON
- 3) If ON is selected, the password digits will be presented and using the + and keys, each digit may be adjusted from 0 to 9.
- 69) Press Exit to return to the CONFIG SYSTEM screen
- 70)Press Exit a second time to return to the normal run screen (Figure 8)

6.2.3 Reset Run Times

- Press ↓ until the selection arrows are pointing to the "Reset Run Times" option and then press Selct
- 2) The following choices will be presented:
 - P1 xxxx.x
 - P2 xxxx.x
 - P3 xxxx.x
- 3) Use the \uparrow or \downarrow keys to select the pump run time to be reset and press **Selet**
- 4) Press **OK** to clear the run time to 0.0 hours
- 5) Press **Exit** to cancel
- 6) Press **Exit** again to return to the CONFIG SYSTEM menu
- 7) Keep pressing **Exit** to return to the normal run mode screen (Figure 8)

6.2.4 Version Number

Note: This menu has no user settings, it is provided only for troubleshooting purposes to provide information to technical support when/if required. This allows the tracking of the current version of the firmware in the controller.

The firmware in the controller may be updated in the field to add functionality or fix issues identified after manufacture. Consult with a Time Mark representative for more information.

- Press ↓ until the selection arrows are pointing to "Version Number" and then press Selct
- 2) The following options will be displayed
 - Build date dd-mmm-yy
 - Build time hh:mm:ss
- 3) Press **Exit** again to return to the CONFIG SYSTEM menu
- 4) Keep pressing **Exit** to return to the normal run mode screen (Figure 8)

6.2.5 Clear Log

- Press ↓ until the selection arrows are pointing to "Clear Log" and then press Selct
- 2) A confirmation screen will appear "CLEAR LOGS"
- 3) Press **EXIT** to cancel and return to the previous screen
- 4) Press **OK** to clear all the log information from the controller.
- 5) Keep pressing Exit to return to the normal run mode screen (Figure 8)

6.3 Display Options

The display options menu will allow you to adjust the backlight and contrast of the display to allow for more readable options. Use the \uparrow and \downarrow keys to select and adjust the values if necessary, being sure to press **Enter** to lock in the values.

The backlight is the blue light and may be adjusted from fully off, or 1 to fully on at 63.

The contrast may be adjusted from 17 to 37.

6.4 <u>Communications Setup (MODBUS configuration)</u>

- 1) Press CFG once; screen will change to CONFIG SCREEN
- 2) On the CONFIG screen, the selections are
- Pump Config
- System Config
- Display Options
- Communications
- Press ↓ until the selection arrows are pointing to the "Communications" option and then press Selct
- 4) The CONFIG COMM screen presents the following choices
- Modbus Address xxx
- Baud Rate 9600
- 5) Press **Exit** to get back to the CONFIG SYSTEM screen
- 6) Press **Exit** a second time to get back to the normal run screen (or first userinterface screen, Figure 8)

6.4.2 MODBUS Address

- Press Selct when the selection arrows are pointing to "Modbus Address" and adjust the MODBUS address value This should be a unique address on the RS-485 bus that this controller will respond to. It can range from 1 to 240. For more information consult with the administrator of the MODBUS / RS-485 system.
- 2) Press ENTER to lock in (and save) the value

6.4.3 Baud Rate

- 1) Press \downarrow and **Selct** to adjust the baud rate, baud rate options are:
 - 9600
 - 19200
 - 38400
 - 57600
 - 115200

Note: the 115200 setting should be reserved for very short runs of the RS-485 bus. Only the 9600 baud option has been thoroughly tested and all other values should be used with caution.

2) Press Enter to lock in and save the value

6.5 Calibration

Note: Under normal conditions, calibration should not be necessary, it is only included if the configuration of the controller is such that the default or standard calibration is unacceptable. This procedure requires a multimeter capable of measuring current (amps).

6.5.1 Input Calibration

- 1) Reboot Controller; holding down the outer two buttons at the logo screen (when the word "CAL" appears in the lower-right of the LCD, you may release the buttons).
 - a. First option will be "Reset Fact Settings"; answer "NO" here if you do not wish to erase or reset **ALL** settings to their factory defaults
 - b. Press "NEXT" to advance to "CONFIG-AI-CALIB"
- 2) Make sure input is at 4 mA
 - a. Using a loop power device, such as the Time Mark model 680, make sure the input is at 4 mA.
 - b. The ADC value shown should normally be between 185 and 195.
- 3) Press Selct when arrows are pointing at "ZERO"
- 4) Make sure input is at 4 mA
- 5) Press **BACK** to cancel or press **SAVE** to accept the new calibration value as 4 mA
- 6) Move the arrows to "SPAN"
- 7) Make sure the input is at 20 mA
- 8) Press Selct when arrows are pointing at "SPAN"
- 9) Make sure the input is at 20 mA
 - a. Using a loop power device, such as the Time Mark model 680, make sure the input is at 20 mA.
 - b. The ADC value shown should normally be between 925 and 935.
- 10)Press **BACK** to cancel or press **SAVE** to accept the new calibration value as 20 mA
- 11)Press NEXT to proceed to output calibration

6.5.2 Output Calibration

There is an "auto" calibration feature that should allow the output to be within 10%; this is an experimental feature and should be used with caution.

- 1) You will need a measurement multimeter connected to the 4-20 mA output of the controller
- 2) Press Selct when the arrows are pointing at "ZERO"
- 3) The output should switch to 4 mA, use the +1 and -1 buttons to adjust each digit, pressing the left arrow key (←) to move between the digits. Adjust this value until the multimeter is reading 4.00 mA
- 4) Press ENTER to lock in this value

- 5) Press **Selct** when the arrows are pointing to "SPAN"
- 6) The output should switch to 20 mA, use the +1 and -1 buttons to adjust each digit, pressing the left arrow key (←) to move between the digits. Adjust this value until the multimeter is reading 20.00 mA
- 7) Press ENTER to lock in this value
- 8) Press **Exit** to leave calibration mode and enter normal operation

It is good practice to reboot the controller after calibration, though this may not be strictly necessary.

6.6 Status Screen

Press **Stat** to see the System Status screen

The SYSTEM STATUS screen shows the following:

- P1 HOA[ERR] xxxx.x
- P2 H O A [ERR] XXXX.X
- P3 H O A [ERR] XXXX.X

This screen shows the status of the pump outputs. The number of pumps shown will depend on the number of pumps selected in the PUMP configuration. [ERR] will either be OFF, ON, or ERR. If ERR is shown, a contact failure alarm has occurred, and the HOA status should be OFF. The value displayed to the far right is the run time for the pump in hours, updated in tenths of hours (every 6 minutes).

- 1) Press **HOA** to enter the PUMP HOA menu
- 2) Use the \downarrow or \uparrow keys to select which pump you want to control
- Use the → or ← keys to select H, O, or A (H = HAND, or forced ON, O = OFF, or forced OFF, and A = Auto)
 Note: the HOA status should change as soon as you press the arrow keys.
- 4) Press Enter to exit HOA mode
- 5) Repeat these steps for the other pumps, if necessary

6.7 Alarm Screen

If the word "ALARM" is showing on the main run screen (Figure 8) press **Alrm** to see the status of the alarms:

- P1 Alrms: SF OT CF SP
- P2 Alrms: SF OT CF SP
- P3 Alrms: SF OT CF SP
- Level Alarm
- Improper Sequence Alarm

Only the active alarms will be shown, if the SF alarm is not triggered it space will be blank.

- SF = Seal Fail
- OT = Over temperature
- CF = Contact failure
- SP = Spare

The level alarm will activate if the level goes above the alarm float, or above/below the alarm set point.

The Improper Sequence Alarm will activate if the floats activate out of their "normal" sequence, such as Lag 1 float activating before the Lead float.

Press Exit to go back to the normal run mode screen (Figure 8).

6.8 Log Screen

Press the **Log** button to view the current logs, three per screen. Use the \downarrow or \uparrow keys to advance to the next/previous screens. This screen will show "NO ALARMS" at the top if no logs have been saved since the last time the CLEAR LOG option was selected. Press Exit to go back to the normal run mode screen (Figure 8).

The possible alarms are:

- System power fail ("pwr fail")
- System power restore ("pwr restore")
- Pump x seal fail
- Pump x over temp
- Pump x contact fail ("aux contact")
- Pump x spare

7. Restoring Settings

Note: This is usually only required if something has gone wrong and you cannot adjust the settings any other way, such as if the backlight/contrast has been turned all the way up or down.

7.1 Factory Defaults

7.1.1 To reload factory defaults into ALL user settings.

1) Reboot Controller; holding down the outer two buttons at the logo screen.

- a. First option will be "Reset Fact Settings"; select "YES" to reset, "NO" will allow you to advance to analog input calibration
- b. Press "NEXT" to advance to "CONFIG-AI-CALIB"

7.1.2 CONFIG-AI-CALIB

See section 6.5.1 above

7.1.3 CONFIG-AO-CALIB

See section 6.5.2 above





8. Specifications

- Unit weight: 15 oz. (with 35mm din kit installed)
- Installation environment: Cabinet (indoors, protected)
- Voltage requirement: 24 V.D.C. @ 200mA
- Operating Temperature: -20°C to +70°C
- Power Consumption: 170 mA (0.17 A) @ 24 V.D.C.
- Contact Rating: 10 A @ 240 V.A.C. resistive
- Contact Life: (relays)
 - 10,000,000 operations (no load)
 - o 100,000 operations at rated load
- Case material: ABS plastic
- Termination: Removable terminal plugs

9. MODBUS Communications Option

The MODBUS operates over an RS-485 connection and allows multiple devices to share a two-wire interface. The following are the registers accessible over MODBUS.

9.1 Holding Registers

- Read: 0x03
- Write: 0x06
- Format: 4xxxx

Address	Description	R/W	Notes
0	Setpoint [0] (Alarm/Stop)	R/W	Implied Decimal Place (ex. 20 is 2.0)
1	Setpoint [1]	R/W	Implied Decimal Place (ex. 20 is 2.0)
2	Setpoint [2]	R/W	Implied Decimal Place (ex. 20 is 2.0)
3	Setpoint [3]	R/W	Implied Decimal Place (ex. 20 is 2.0)
4	Setpoint [4] (Stop/Alarm)	R/W	Implied Decimal Place (ex. 20 is 2.0)
5	AlZeroFt	R/W	Implied Decimal Place (ex. 20 is 2.0)
6	AIRangeFt	R/W	Implied Decimal Place (ex. 20 is 2.0)
7	AOZeroFt	R/W	Implied Decimal Place (ex. 20 is 2.0)
8	AORangeFt	R/W	Implied Decimal Place (ex. 20 is 2.0)
9	AlZeroCnts	R/W	Implied Decimal Place (ex. 20 is 2.0)
10	AIRangeCnts	R/W	Implied Decimal Place (ex. 20 is 2.0)
11	AOZeroCnts	R/W	Implied Decimal Place (ex. 20 is 2.0)

Address			
12	AORangeCnts	R/W	Implied Decimal Place (ex. 20 is 2.0)
13	RTC – Date month/year	R/W	Month, Year in BCD
14	RTC – Date/Time	R/W	Day, Hours in BCD
15	RTC – Time min/sec	R/W	Minutes, Seconds in BCD
16	RunTimeMeter [0] Hi	R/O	Run times are in tenths of hours (every 6 minutes)
17	RunTimeMeter [0] Low	R/O	Hi holds bytes 4 and 3
18	RunTimeMeter [1] Hi	R/O	Low holds bytes 2 and 1
19	RunTimeMeter [1] Low	R/O	Up to 4,294,967,296 hours
20	RunTimeMeter [2] Hi	R/O	
21	RunTimeMeter [2] Low	R/O	
22	Number of Current Pumps	R/O	maximum of 3 pumps per controller
23	Number of Pumps On	R/O	
24	PumpStatus[0]	R/O	bit 0; Pump On – bit 1; Available
25	PumpStatus[1]	R/O	bit 2; Error bit – bit 3; Error Latch for Alarm
26	PumpStatus[2]	R/O	bit 4; Hand/Off/Auto - Auto – bit 5; Hand/Off/Auto - Hand
27	PumpAlarm[0]	R/O	bit 0; Spare – bit1; Contactor Fail – bit 2; Seal Fail
28	PumpAlarm[1]	R/O	– bit 3; Over Temp bit 4; Previous Spare Condition – bit 5; Previous Seal Fail Condition
29	PumpAlarm[2]	R/O	bit 6; Previous Over Temp Condition

*RTC values expressed in BCD (Binary Coded Decimal)

RTC: Date - Month, Year

Month	Year
Tens digit	Upper 4 bits (Nibble)
Units digit	Lower 4 bits (Nibble)

RTC: Date - Time

Dav	Hours
Tens digit	Upper 4 bits (Nybble)
-	
Units digit	Lower 4 hits (Nyhhle)
ornito digit	

9.2 <u>Coils</u>

- Read: 0x01
- Write: 0x05
- Format: 0xxxx

Address	Notes	Bit	R/W
0	Local Pump 1 Relay	0	R/O
	Local Pump 2 Relay	1	R/O
	Local Pump 3 Relay	2	R/O
	Local Hi Level Relay	3	R/O
	-Not Used-	4-7	R/O
1	Password Enabled	0	R/W
	Contact Fail Reset HOA	1	R/W
	On Demand Option	2	R/W
	Auto Reset Option	3	R/W
	Pump Up/Down Option	4	R/W
	Float Err Check Opt	5	R/W
	Xdcr Fail to Floats	6	R/W
	Level Mode Floats	7	R/W
2	AlarmFloat	0	R/W
	Pump Active 1	1	R/W
	Pump Active 2	2	R/W
	-Not Used-	3	-NA-
	-Not Used-	4	-NA-
	-Not Used-	5	-NA-
	-Not Used-	6	-NA-
	-Not Used-	7	-NA-
	-Not Used-	8	-NA-

9.3 Discrete Inputs

- Read: 0x02
- Write: NONE; read only registers
- Format: 1xxxx

Address	Description	Notes
0	Pump 1 bits 4-1	Lower Nibble (4-bits)
	Pump 2 bits 8-5	Upper Nibble (4-bits)
1	Pump 1 Spare	Bit 0
	Pump 1 Contactor	Bit 1
	Pump 1 Over Temp	Bit 2
	Pump 1 Seal Fail	Bit 3
	Pump 2 Spare	Bit 4
	Pump 2 Contactor	Bit 5
	Pump 2 Over Temp	Bit 6
	Pump 2 Seal Fail	Bit 7
2	Pump 3 bits 4-1	Lower Nibble (4-bits)
	Bits 8-5 unused	Upper Nibble (4-bits)
3	Pump 3 Spare	Bit 0
	Pump 3 Contactor	Bit 1
	Pump 3 Over Temp	Bit 2
	Pump 3 Seal Fail	Bit 3

9.4 Input Registers

- Read: 0x04
- Write: NONE; read only registers
- Format: 3xxxx

Address	Description
1	Fluid Level – implied decimal place
2	Raw A/D Counts
3	Run Time Seconds Pump 1 (0 to 3600)
4	Run Time Seconds Pump 2 (0 to 3600)
5	Run Time Seconds Pump 3 (0 to 3600)

(When Run Time Seconds reaches 3600, the Run Time Hours will increment.)

10. USB Communications Option

10.1 Compatible Systems

The latest version of the communication software for the Model TMC430 controller was designed for the 64-bit version of the Windows™ software and has been tested on Windows 10 and Windows 11. The 32-bit versions are no longer supported.

10.2 Application Download

Contact a Time Mark representative for the username and password of the download site, as well as the latest version download. The Time Mark representative should also provide an alternative download link via Microsoft[™] OneDrive[™] or you can download Version 2.13 here: <u>http://demo.time-</u>

mark.com/TMC_430/program/TMC430Comm_V2-13.zip

(Username & password are required.)

10.3 Application Setup

1) After downloading the zip file, extract the TMC430Comm_V2-13[.msi] file to your choice directory, such as Downloads (Note: if you do not wish to extract the file, Windows may be able to launch the installer from the compressed zip file.)

			Dow	aloada				×
		Manage	DOW	nodas		_		^
File Home Shar	e View	Application Tools						~ 💙
← → * ↑ ↓ × T	his PC → Dov	vnloads ⇒	~	ō				
A Quick access	Name	(2)			Date modified	Туре	Size	
Desktop 📌		30Comm V2-13			9/9/2024 11:14 AM	Compressed (zipp		438 KB
🕂 Downloads 🖈		30Comm V2-13			9/9/2024 11:19 AM	Windows Installer		796 KB
 Documents Pictures Music Videos OneDrive This PC Network 								
	<							>
2 items 1 item selected	795 KB							

Figure 10

 Double click on the TMC430Comm_V2-13[.msi] file to launch the setup process. If the UAC (User Account Control) pops up, click the "More Info" link:



Figure 11

3) Then click "Run Anyway":



Figure 12

Page 32 of 41 Rev: 2024-10-03 4) Click "Next" to continue the installation process



Figure 13

5) Select "Everyone" to install the program in a system-wide configuration that will allow all users of the computer to access the software. You will need to provide a password and/or select Accept with the UAC. If you select "Just Me" then only the current user will have access to the software.



Figure 14

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6) Click "Next" to continue installation

🕼 TMC430 Comm 2.13	_		×
Confirm Installation			
The installer is ready to install TMC430 Comm 2.13 on your computer.			
Click "Next" to start the installation.			
	_		
< Back Next :	•	Ca	ncel

Figure 15

7) If the UAC window pops up, select "Yes" to continue installation

User Account Control	×					
Do you want to allow th unknown publisher to r device?	nis app from an make changes to your					
C:\Users\Time Mark User\ \TMC430Comm_V2-13.ms	C:\Users\Time Mark User\Downloads \TMC430Comm_V2-13.msi					
Publisher: Unknown						
File origin: Hard drive on this con	nputer					
Show more details	Show more details					
Yes	No					

Figure 16

8) When the process completes successfully, click "Close" to finish the installation



Figure 17

9) There should be a new folder created under "Program Files" named "Time Mark Corp", each version of the program will be placed in a separate folder under this main folder. (*Note: if you changed the default installation folder, the "Time Mark Corp" folder will be in whatever folder you chose.*)

📙 🖓 📙 🖛 Program Files — 🗆					
File Home Share	View			~ 🕐	
\leftarrow \rightarrow \checkmark \uparrow \square « Loc	al Disk > Program Files > 🛛 🗸 Ö	🔎 Search Program	Files		
 ← → · ↑ ▲ < Loc ✓ Quick access ■ Desktop * → Downloads * ⊠ Documents * ■ Pictures * → Music ■ Videos ● OneDrive ■ This PC ☆ Network 	al Disk » Program Files » v C Name Common Files Internet Explorer ModifiableWindowsApps Time Mark Corp Windows Defender Windows Defender Windows Defender Windows Mail Windows Mail Windows Multimedia Player Windows Multimedia Platform Windows NT Windows Portable Devices Windows Portable Devices Windows Security WindowsPowerShell	A Search Program Date modified 12/7/2019 1:31 AM 9/7/2022 8:12 PM 9/9/2024 11:59 AM 9/7/2022 8:12 PM 9/7/2022 8:12 PM 9/7/2022 8:12 PM 9/7/2022 8:12 PM 9/7/2022 8:12 PM 12/7/2019 1:54 AM 12/7/2019 1:54 AM 12/7/2019 1:54 AM 12/7/2019 1:54 AM 12/7/2019 1:54 AM 12/7/2019 1:54 AM 12/7/2019 1:31 AM 12/7/2019 1:31 AM 12/7/2019 1:31 AM	Files Type File folder File folder	Size	
14 items 1 item selected	¢			> 	

Figure 18

10) There will be a "Drivers" folder in the main program folder should Windows not install them automatically when you connect the controller.

📙 🕑 📙 🗢 TMC430 Comm 2.13 —					
File Home Shar	re View			~ 🕐	
← → · ↑ 📙 « T	īme → TMC430 Comm 2 → v Č	, ○ Search TMC430 C	omm 2.13		
🛨 Quick access	Name	Date modified	Туре	Size	
Deckton d	Drivers	9/9/2024 11:59 AM	File folder		
	HIDLibrary.dll	10/15/2018 11:22 AM	Application exten	40 KB	
Uownloads	ic_usb_black_48dp	10/15/2018 11:22 AM	PNG File	1 KB	
🔮 Documents 🚿	ic_usb_black_48dp_no	10/15/2018 11:22 AM	PNG File	1 KB	
E Pictures 💉	📓 led_grn	10/15/2018 11:22 AM	PNG File	1 KB	
Music	led_off	10/15/2018 11:22 AM	PNG File	1 KB	
Videos	led_red	10/15/2018 11:22 AM	PNG File	1 KB	
	Model 430	7/15/2024 2:52 PM	Application Manif	2 KB	
OneDrive	📧 Model 430	7/15/2024 2:52 PM	Application	466 KB	
This PC	Model 430.exe.config	11/12/2020 11:32 AM	CONFIG File	1 KB	
	Model 430.exe.manifest	7/15/2024 2:52 PM	MANIFEST File	8 KB	
i Network	tmlogo	10/15/2018 11:22 AM	lcon	39 KB	
	<			>	
12 items 1 item selecte	d				



11) Double click the program's icon from the desktop or Windows Start menu (listed as "TMC430" in the start menu)



Figure 20

12) The splash screen should display (might be very quick) followed by the main program window



Figure 21

Model 430 Pump Controller	- 🗆 🗙		
File Edit Controller Options	Help		
i 🗋 📂 📕 🔮 🌏			
Controller Interface Relays Logs			
Set Points	Controller Date:		
Stop	Controller Time:		
Lead	Analog In max (20mA)		
Lag 1			
Lag 2			
Alarm	Analog In min (4mA)		
Send	FT		
Float Correct O OFF O ON	Measured Units Send Input Range		
Reset on Contact Fail OFF ON When ON will allow the next pump to turm on upon contact fail	Pump Configuration Number of Pumps V V Pump Delay Time (sec) On Delay Input Mode V O		
Reset Contact Fail HOA	Lead Pump v		
When ON will reset HOA status back to Auto on Cont Fail error clear	Alarm Float Alarm Float will cause Pump 3 Spare to be a High/Low alarm level input; if active will force pumps applied by 'Astivate Pumps'		
Send	to be on.		
Model 430 Not Found	firmware		

Figure 22

- 13) Looking at the very bottom of the window, you will note the "Model 430 Not Found" message. This means that the software was unable to detect a model TMC430 connected to the computer. You may connect the controller now.
- 14)Select "Controller Options" and then "Scan for Controller" will allow the software to scan over the USB ports and try to locate the controller.
- 15)Once the software detects a controller, it will show the "COM" port number in the lower left (this may be the same each time the controller connects, but it may also change)
- 16)When a controller is connected, and found by the software, you may click the "connect" button on the toolbar, or "Controller Options" -> "Connect"
- 17) The block that says "firmware" in the image above will show the version of firmware that is installed in the connected controller. This will match the "Version Number" found at the controller interface under "System Config"
- 18)When any setting is changed, it will change to a red color until the corresponding "Send" button is pressed (also changes to red). When this button is pressed, the software will send the new setting to the controller and refresh the screen.
- 19)The software will refresh approximately every 1 to 2 seconds providing a near real time view of what the controller is doing.
- 20)Selecting "File" and "Save" or "Save As" or clicking the save icon in the toolbar will allow you to save the current settings to a file. This is useful for loading the same settings to future controllers, or simply to backup the settings of the current controller. (Note: this must be done from the "Controller Interface" tab. The "logs" tab, will allow a .csv file to be saved of the current controller logs.)
- 21)When finished, be sure to click the disconnect icon (changed from the connect icon earlier) before simply closing the program.

11. Menu Tree



Figure 23

12. Miscellaneous

12.1 Glossary

- 1) Pump UP: operation to keep level high (e.g.: water tower)
- 2) Pump DOWN: operation to keep level low (e.g.: sump)
- FLT ERR CORR: Float error correction method to detect stuck floats (e.g.: if float gets stuck when level is below it)
- 4) On demand refers to pump operation (e.g.: if level requires two pumps operating and one faults out, next available pump will start)

12.2 Firmware Update

- Obtain the bootloader program and new firmware file from a Time Mark Corporation representative. (The files are available from the same Microsoft[™] OneDrive[™] link mentioned in section 10.2.)
- 2) Launch the TMC_Bootloader_x64_2.1.exe program *This is a stand-alone program, no installation is required.* (Make sure to use the correct 32-bit or 64-bit version, most new Windows[™] computers are 64-bit.)
- 3) Reboot Controller; holding down the third button from the left the screen will say "LOAD PROGRAM" on the top line.
- 4) Connect the controller to the computer with a USB-A to USB-B cable.
- 5) Click the "Scan for Controller" button in the bootloader program; this "scan" button should disappear, and the text above will be Time Mark Controller: COMx (e.g.: COM8).
- 6) Click the "Open File" button and select the .bin file obtained from the Time Mark Corporation representative.
- 7) Click "Send to Controller" and wait for the process to complete; this should take about 20 seconds.
- 8) When the process is complete, the controller should reboot into the new firmware, and you may click the "Exit" button to close the program.



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