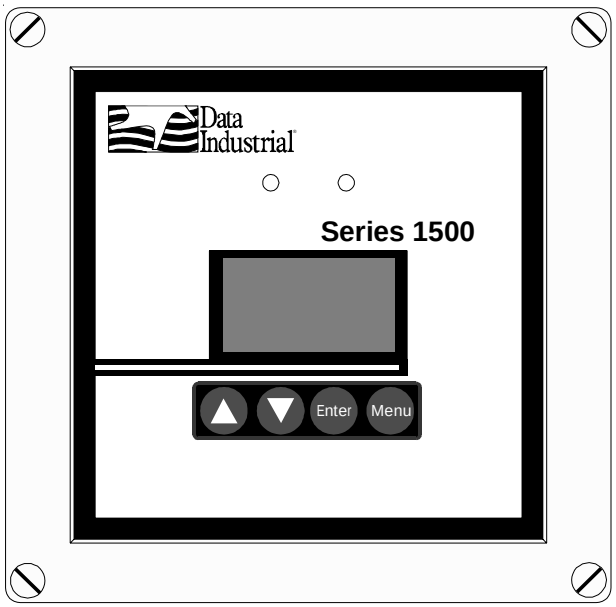

Series 1500
Owners Manual
by Data Industrial

Introduction

The Data Industrial Series 1500 Flow Monitor is an economical, full featured, digital flow monitor.

The two line x 8 character alphanumeric display can be configured by the user to display flow rate and flow total separately or simultaneously.

The panel meter has a NEMA 4X rated front panel and conforms to DIN Standard dimensions, 96 mm X 96 mm, for meter sizes and panel cutouts. Versions of the Series 1500 are also available in NEMA 4 wall mount or sensor mount configurations.

The Series 1500 accepts pulse, sine wave, or optional 4-20 mA analog input signals. Like all Data Industrial flow monitors, the Series 1500 may be field calibrated by the user. Data Industrial sensors are calibrated by entering "K" and offset numbers, while other pulse or frequency output sensors may use a "K" factor only.

Programming is menu driven. All data is entered using the LCD/keypad interface. A password gate is included to prevent unauthorized access to programming parameters. Programming flexibility is extended to units of measure. Series 1500 software contains eight flow rate and four total flow units of measure. There is also a provision for adding custom units for rate and total.

The Series 1500 provides two pulse outputs to interface with external data collection devices that accept electronic pulses, one is a function of flow rate, the other flow total. The resolution of this TTL compatible signal may be programmed via the user interface.

Two LEDs are located on the front panel. One is an indication of power. The other is programmed to represent impeller status, totalizer status, or alarm status.

All calibration information, units of measure and flow totals are stored in a non-volatile memory that does not require battery backup for data retention.

1500 Series Ordering Matrix

EXAMPLE:	1500	-	x	x	x	
SERIES						
Flow Monitor	1500					
Portable Calibrator	1520					
OPTION-TRANSMITTER						
No Option			0			
Analog Input 0-1 VDC			1			
Analog Input 0-5 VDC			2			
Analog Input 0-10 VDC			3			
Analog Input 4-20mA VDC			4			
Analog Output 4-20mA			5			
OPTIONS-DIGITAL OUTPUT						
No Relays				0		
2 Relays-1 Alarm/Set PT- 1-Totalizer				1		
2 Alarm/Set Point Relays				2		
2 Totalizer Relays				3		
2 Opto-Isolators- 1 Alarm - 1 Totalizer				4		
2 Alarm/Set Pt. Opto-Isolators				5		
2 Totalizer Opto-Isolators				6		
MOUNTING						
Panel Mount, NEMA 4X Front Panel						0
Wall Mount, NEMA 4X						1

Options

- Control relays- SPST mechanical relays, 2 available: Programmable for rate or totalization functions.
- Analog output- isolated current sinking 4-20 mA, programmed from the keypad.
- Analog input- allows the use of other flow devices with analog outputs.

Installation

Mechanical Installation

The Series 1500 can be either panel mounted or wall mounted with two different wall mount enclosures.

Location

In any mounting arrangement, the primary concern is easy viewing and convenient operation of the keypad.
The unit generates very little heat, so no consideration need be given to cooling or ventilation.

PN# 72007
REV D 11/25/02

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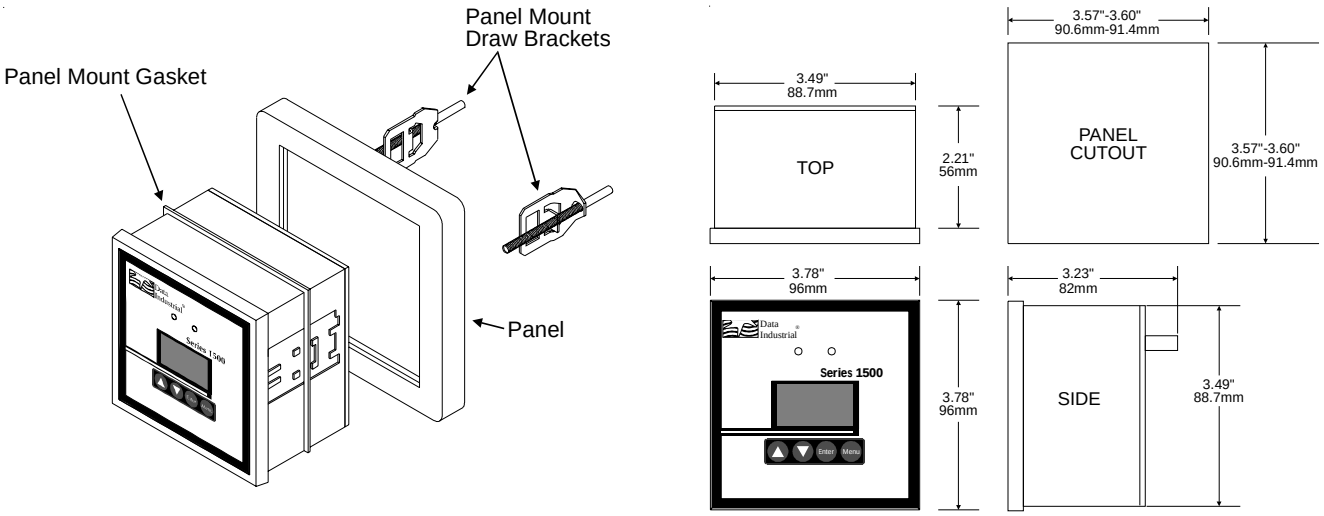
Panel Mount Installation

The Model 1500 Panel Mount is designed for through panel mounting, which allows access to the back of the unit. The 1500 is secured to the panel by two draw brackets shown in Figure 1 below. Refer to Figure 1 for flow monitor and panel cutout dimensions.

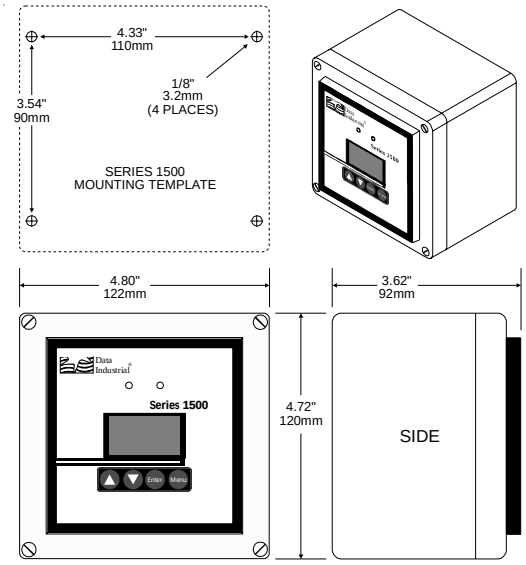
Figure 1: Panel Mounting Dimensions For Series 1500 Installation



Wall Mount Installation

The Model 1500 Wall Mount is designed to mount onto a wall with 4 bolts or screws. The mounting hole pattern and box dimensions for the Model 1500 NEMA 4 wall mount are shown right in Figure 2.

Figure 2: Wall Mounting Dimensions For Series 1500 Installation



Electrical Installation

Power Supply Wiring

The Series 1500 requires 12-24 VDC to operate. Refer to Figure 3 on page 3 for location of power supply input on terminal strip.

Connect the positive of the power supply to the Series 1500 terminal marked (+) and connect the negative of the power supply to the Series 1500 terminal marked (-).
If a Data Industrial plug-in power supply (Model A1026, A-503) is being used connect the black/white wire to the terminal marked (+) and the Black wire to the terminal marked (-).

Sensor Wiring

The Series 1500 Flow Sensor Input can accept either a pulse input (Data Industrial 200 Series, 4000 Series) or a sine wave input (Data Industrial M Series, other magnetic sensors). All parameters are set with the LCD/keypad interface and there are no jumpers to change. Refer to Figure 3 page 3 for flow sensor input connections.

Data industrial Flow Sensor Wiring

For wiring instructions below, refer to Figure 3 for location of the sensor input on terminal strip.

200 Series: Connect Red wire to **SENSOR SIGNAL**, Black wire to **SENSOR COM**, and Bare wire (Not Present in "IR" Sensors) to **SENSOR COM**.

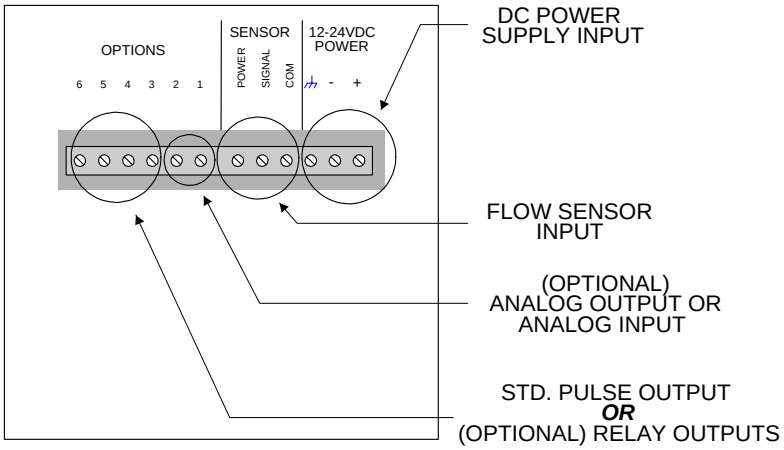
4000 Series: Connect Red wire to **SENSOR POWER**, Black wire to **SENSOR COM**, Clear wire to **SENSOR SIGNAL**, and Bare wire to **SENSOR COM**.

M Series: Connect Red wire to **SENSOR SIGNAL**, Black wire to **SENSOR COM**, and Bare wire to **SENSOR COM**.

Pulse Output or Relay Output Wiring

The Series 1500 has two available types of digital outputs; open collector transistor **or** (optional) relay closure. The base pulse function is an open collector transistor pulse with a maximum sinking current of 150 mA @ 24 VDC. The (optional) relay closure outputs are SPST contacts rated 2.0 amps @ 250 VAC or 30 VDC. Each output of both options has a different function. The Totalizer output is a pulse output adjustable from 50 milliseconds to 5 seconds in 50ms increments. The Alarm (Rate) output is a single set point that may be set as a high or low rate alarm. To program digital outputs reference pages 6-7 for flow charts and page 8 for examples.

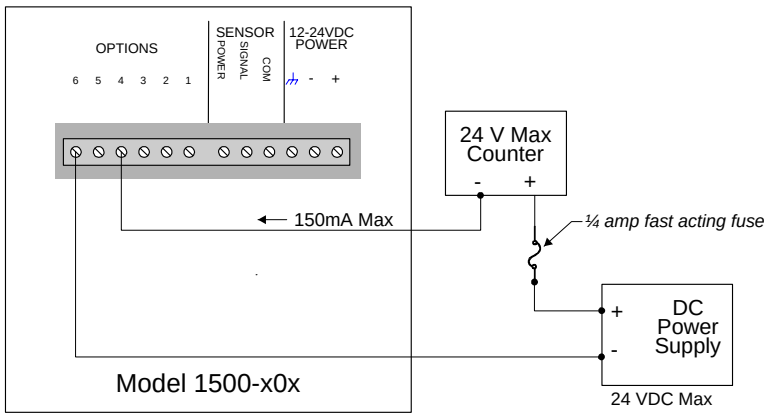
Figure 3: Rear Panel Connections and Options Configuration Table



OPTION TERMINAL NUMBERS

MODEL NUMBERS	6	5	4	3	2	1
1500-00x	COMMON	ALARM	PULSE	N/A	N/A	N/A
1500-01x	ALARM COM	ALARM N.O.	TOTAL COM	TOTAL N.O.	N/A	N/A
1500-02x	ALARM 2 COM	ALARM 2 N.O.	ALARM 1 COM	ALARM 1 N.O.	N/A	N/A
1500-03x	TOTAL2 COM	TOTAL2 N.O.	TOTAL1 COM	TOTAL1 N.O.	N/A	N/A
1500-50x	COMMON	ALARM	PULSE	N/A	LOOP -	LOOP +
1500-51x	ALARM COM	ALARM N.O.	TOTAL COM	TOTAL N.O.	LOOP -	LOOP +
1500-52x	ALARM 2 COM	ALARM 2 N.O.	ALARM 1 COM	ALARM 1 N.O.	LOOP -	LOOP +
1500-53x	TOTAL2 COM	TOTAL2 N.O.	TOTAL1 COM	TOTAL1 N.O.	LOOP -	LOOP +
1500-10x	COMMON	ALARM	PULSE	N/A	ANALOG GND	ANALOG IN
1500-11x	ALARM COM	ALARM N.O.	TOTAL COM	TOTAL N.O.	ANALOG GND	ANALOG IN
1500-12x	ALARM 2 COM	ALARM 2 N.O.	ALARM 1 COM	ALARM 1 N.O.	ANALOG GND	ANALOG IN
1500-13x	TOTAL2 COM	TOTAL2 N.O.	TOTAL1 COM	TOTAL1 N.O.	ANALOG GND	ANALOG IN

Figure 4: Pulse Output Wiring Example



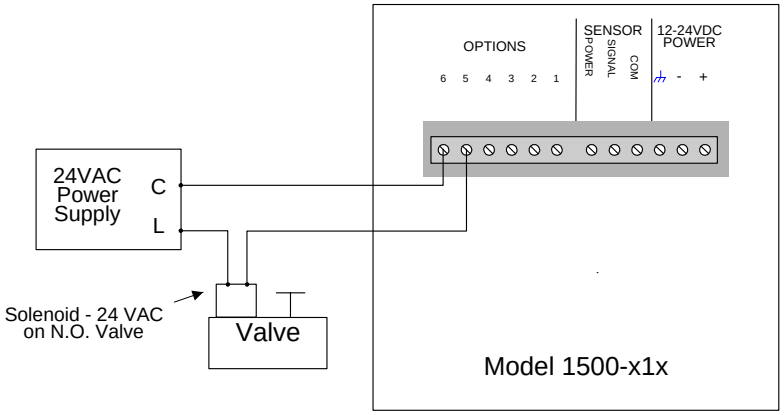
Wiring to Pulse Output

1. Remove power from Model 1500 and counter power supply.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 above.
3. Connect negative terminal of counter to Model 1500 **OPTIONS** (PULSE) terminal marked **4**.
4. Connect negative terminal of counter power supply to **OPTIONS** (PULSE COM) terminal marked **6** of Model 1500.
5. Connect positive terminal of counter power supply to positive terminal of counter. (¼ Amp fuse recommended).
6. Reconnect power to Model 1500 and counter power supply.

Wiring to Relay Output

1. Remove power from Model 1500 and solenoid power supply.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 above.
3. Connect common of solenoid power supply to Model 1500 **OPTIONS** (RELAY 2) terminal marked **6**.
4. Connect one side of solenoid valve to **OPTIONS** (RELAY 2) terminal marked **5** of Model 1500.
5. Connect load of solenoid power supply to other side of solenoid valve.
6. Reconnect power to Model 1500 and solenoid power supply.

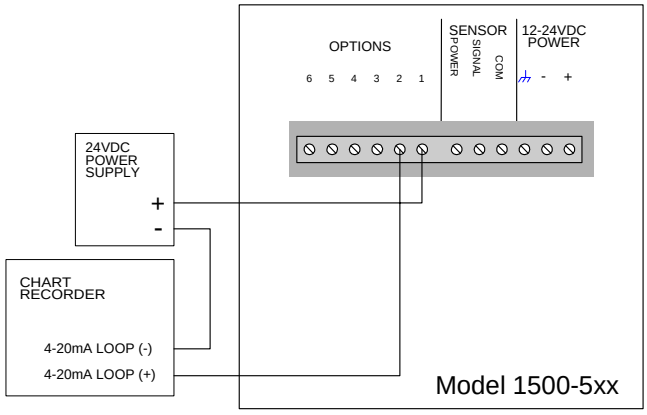
Figure 5: Relay Output Wiring Example



Analog Output and Analog Input Wiring

The Series 1500 has optional analog output or inputs available. Refer to ordering matrix on page 1 for options installed. The analog input can receive four different types of analog signals and they are 4-20 mA, 0-1 V, 0-5 V, and 0-10 V. The analog 4-20 mA output is a current sinking device so a loop power supply is required.

Figure 6: Analog Output Wiring Example



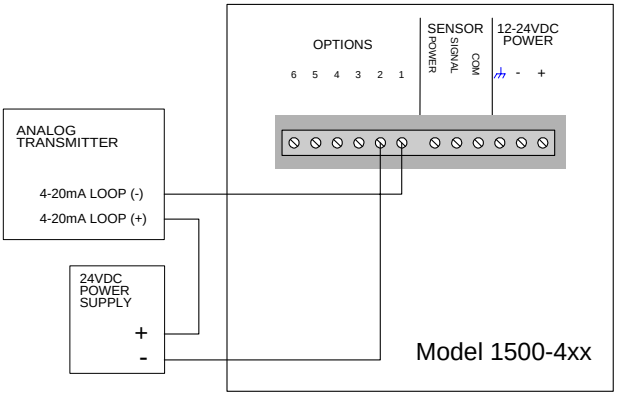
Analog Output Wiring

1. Remove power from Model 1500 and loop power supply. Refer to figure 6 for wiring instructions.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 on page 3.
3. Connect loop power supply positive terminal (+) to Model 1500 **OPTIONS** (loop +) terminal marked **1**.
4. Connect **OPTIONS** (loop -) terminal marked **2** of Model 1500 to positive analog terminal of input device (Chart Recorder, PLC, etc.).
5. Connect negative analog terminal of input device to loop power supply negative .
6. Reconnect power to Model 1500 and loop power supply.

Analog Input Wiring

1. Remove power from Model 1500 and loop power supply. Refer to figure 7 for wiring instructions.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 on page 3.
3. Connect 4-20 mA (loop-) terminal of analog output device to Model 1500 **OPTIONS** (loop +) terminal marked **1**.
4. Connect (loop +) terminal of analog output device to loop power supply positive.
5. Connect loop power supply negative to Model 1500 **OPTIONS** (loop -) terminal marked **2**.
6. Reconnect power to Model 1500 and loop and refer to programming section of this manual for analog setup.

Figure 7: Analog Input Wiring Example



Wiring for Model 1500-x2x

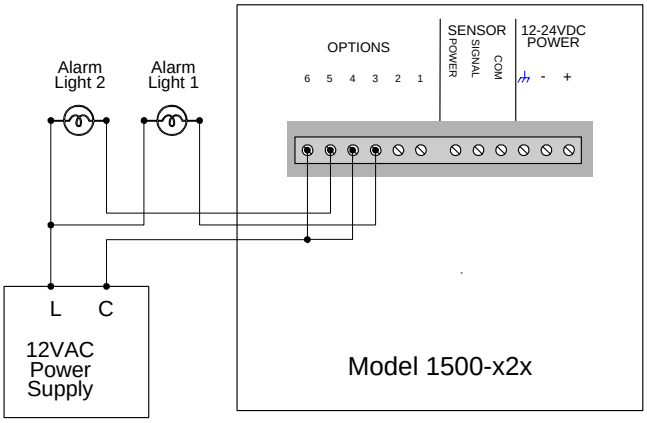
ALARM 1 WIRING

1. Remove power from Model 1500 and auxiliary power supply.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 page 3.
3. Connect common of auxiliary power supply to Model 1500 **OPTIONS** (ALARM 1 COM) terminal marked **4**.
4. Connect one side of 12 volt alarm light to **OPTIONS** (ALARM 1 N.O.) terminal marked **3** of Model 1500.
5. Connect load of auxiliary power supply to other side of alarm light.
6. Reconnect power to Model 1500 and auxiliary power supply.

ALARM 2 WIRING

1. Remove power from Model 1500 and auxiliary power supply.
2. Locate the **OPTIONS TERMINAL** on the Model 1500, reference Figure 3 page 3.
3. Connect common of auxiliary power supply to Model 1500 **OPTIONS** (ALARM 2 COM) terminal marked **6**.
4. Connect one side of 12 volt alarm light to **OPTIONS** (ALARM 2 N.O.) terminal marked **5** of Model 1500.
5. Connect load of auxiliary power supply to other side of alarm light.
6. Reconnect power to Model 1500 and auxiliary power supply.

Figure 8: Sample Wiring to Alarm outputs of Model 1500-x2x



Programming Notes

The Model 1500 flow monitor has four keys on the front panel for programming.
Two of the keys serve a single function, while the other two have a dual purpose.

When the Model 1500 is first powered up, it displays the current software revision, then defaults to the operating display. The ***Enter*** key is not functional in this mode. Pushing the ***Menu*** key from the operating screen brings up the programming menu. In this mode, the two ***Arrow*** keys are used to toggle between the programming options. Pressing the ***Enter*** key selects the completes the selection. The ***Menu*** key can be pressed at any time to return the display to the previous level.

TO ANSWER A "YES/NO" QUESTION:

Press the ***Up*** or ***Down Arrow*** for ***"YES"*** or ***Enter*** or ***Menu*** Keys for ***"NO"***.

TO ENTER DATA:

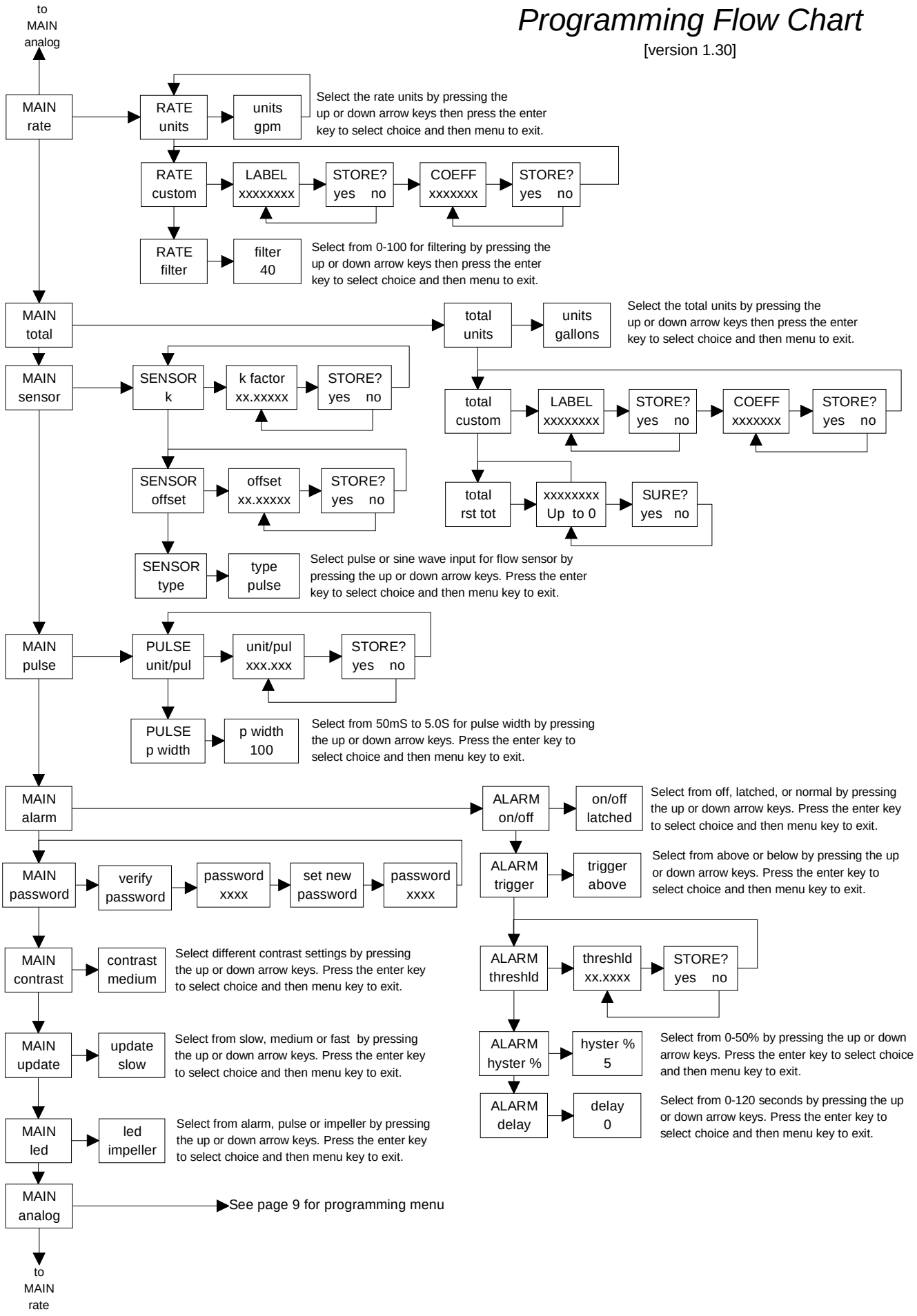
The display will show the existing values, with a cursor below the character to change.
Pressing the ***Up Arrow*** key increases the numerical value or the letter of the alphabet. Pressing the ***Down Arrow*** key decreases the alpha-numerical value. Pressing the ***Enter*** key moves the cursor to the next place to the right. Data entry is completed by pressing the ***Enter*** key. Decimal Points are entered in any of the positions by scrolling the value past zero.
After entering calibration data or units of measurement, a message will appear ***"STORE?"*** warning that continuing will reset the totals. The user will be asked to respond **"YES"** or **"NO"**.

TO SELECT CHOICES:

The display will show one of the choices on the bottom line. Pressing the ***Up*** or ***Down Arrows*** will scroll through the available choices. Data entry is completed by pressing the ***Enter*** key. To exit Press ***Menu*** Key.

Programming Flow Chart

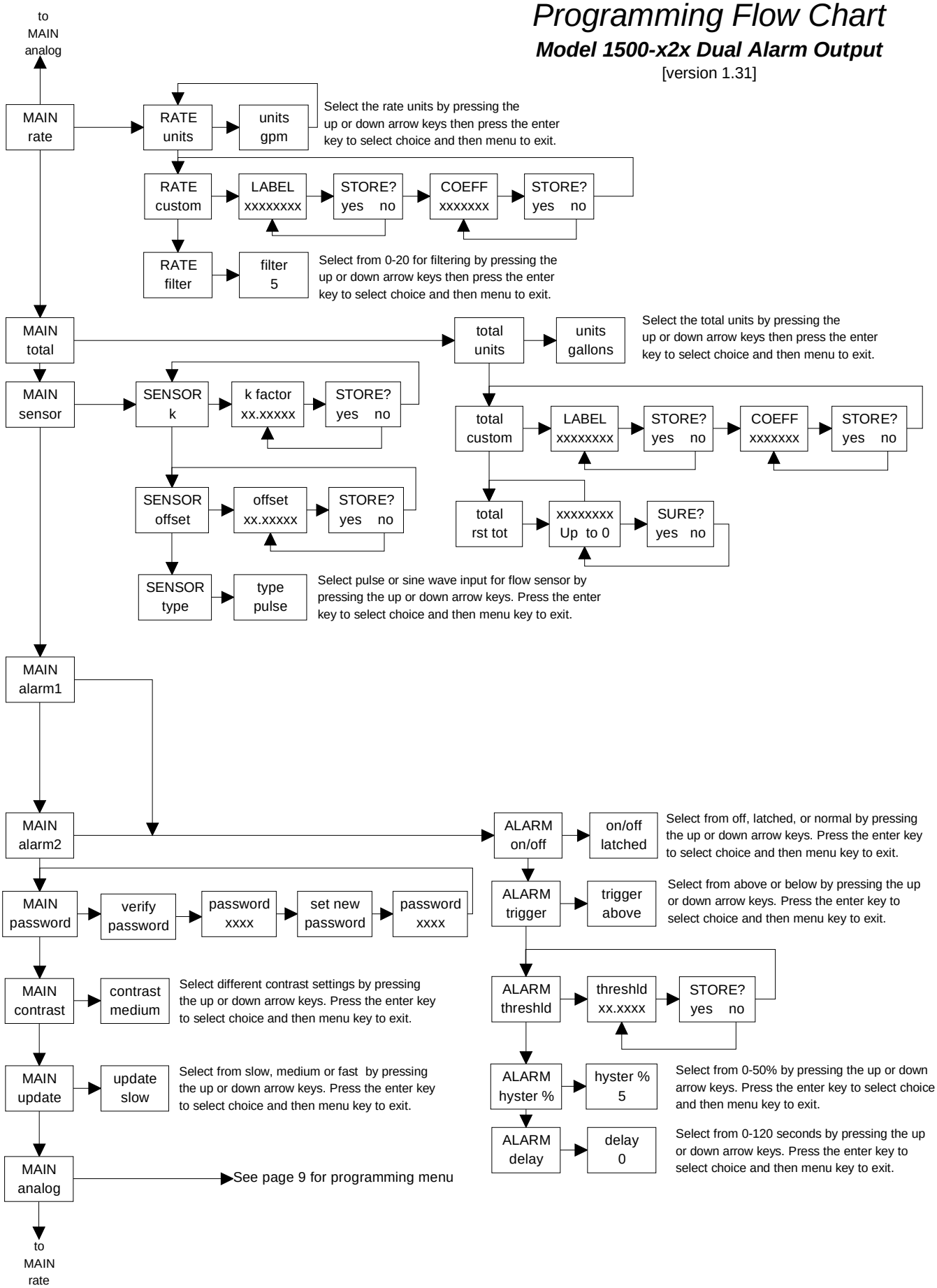
[version 1.30]



Programming Flow Chart

Model 1500-x2x Dual Alarm Output

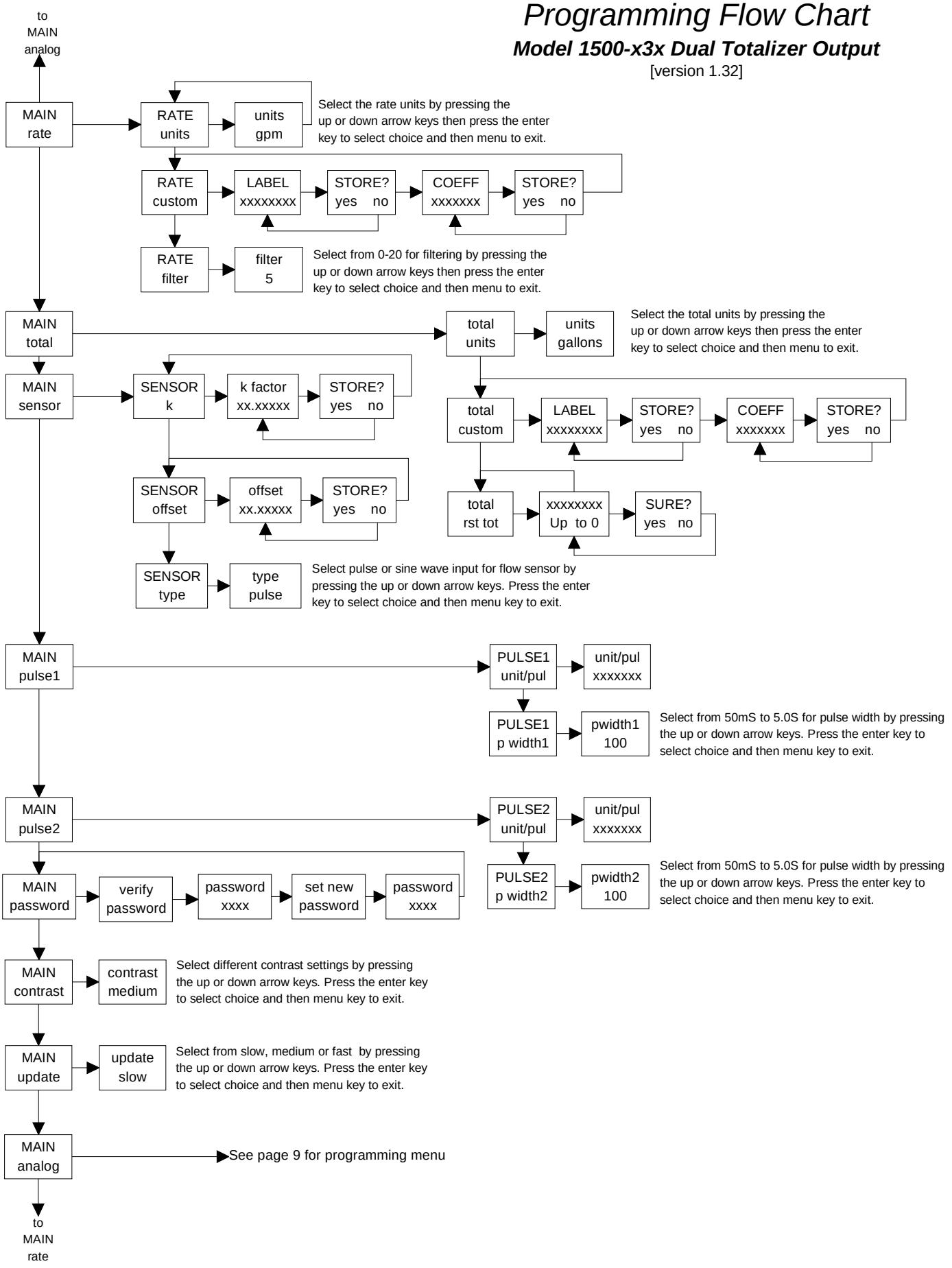
[version 1.31]



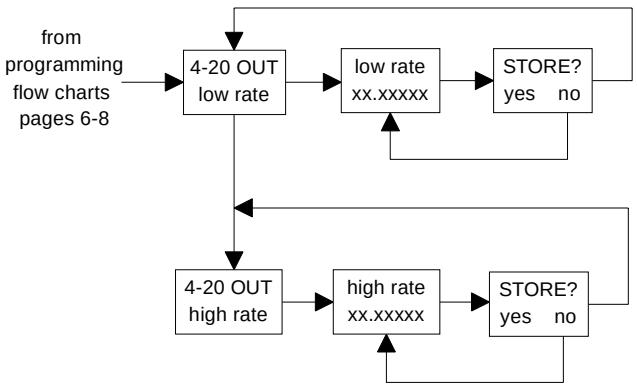
Programming Flow Chart

Model 1500-x3x Dual Totalizer Output

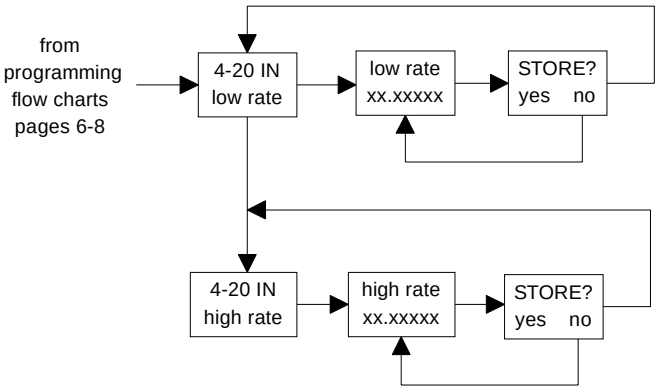
[version 1.32]



Analog Output Programming Flow Chart



Analog Input Programming Flow Chart



EXAMPLES:

In order to understand the programming procedure, this section will outline the keystrokes necessary to perform several common programming steps.

To calibrate for a Data Industrial sensor:
Press ***Menu***, then ***DnArrow — DnArrow — Enter — Enter,*** then enter the "K" number from the table in the Sensor Owner's Manual then press ***Enter*** and answer the ***STORE?*** Question. Then press the keys ***DnArrow — Enter ,*** and enter offset from the table in the Sensor Owner's Manual, then press ***Enter*** and answer the ***STORE?*** Question to complete. Press ***Menu*** Key **two times** to return to **operation display**.

To select the units of measurement for flow rate:
Press ***Menu***, then ***Enter — Enter,*** Then scroll through the choices with the ***Up*** or ***Down arrow*** keys. When the chosen unit is displayed, press the ***Enter*** key to complete. Press ***Menu*** Key **three times** to return to **operation display**.

To select the units of measurement for total flow:
Press ***Menu***, then ***DnArrow — Enter — Enter,*** Then scroll through the choices with the ***Up*** or ***Down arrow*** keys. When the chosen unit is displayed, press the ***Enter*** key to complete. Press ***Menu*** Key **three times** to return to **operation display**.

To select the units/pulse of totalizer pulse:
Press ***Menu***, then ***DnArrow —DnArrow —DnArrow — Enter — Enter,*** then enter the desired units/pulse number, then press ***Enter*** and answer the ***STORE?*** Question. To set pulse width press ***DnArrow — Enter*** then press the ***Up*** or ***Down arrow*** keys until the desired pulse width (in milliseconds) is reached. Press ***Menu*** Key Three times to return to **operation display**.

To set a password:
Press the ***Menu*** key, then the press the ***DnArrow key 5 times*** then press ***Enter,*** unit will then ask you to verify password. Enter in old password. ***By default the password is aaaa which means no password.*** Then enter in new password. If you forget password consult factory for assistance. Press ***Menu*** Key to return to **operation display**.

Set a alarm point (except 1500-x2x):
Press the ***Menu*** key, then the press the ***DnArrow key 4 times*** then press ***Enter — Enter,*** at this point by pressing the arrow keys select the alarm state the three choices are ***normal***, ***off***, and ***latched***. After the state is selected press ***Enter — Menu.*** Press the ***DnArrow — Enter*** to set the trigger. Press the ***Up*** or ***Down arrow*** key one of the two trigger choices (***above*** or ***below*** the set point) then press ***Enter*** to select and press ***Menu*** to back out of trigger menu. Press the ***DnArrow — Enter*** to set the set point or threshold. Enter in the set point then press ***Enter*** and answer the ***STORE?*** Question. Press the ***DnArrow — Enter*** to set the hysteresis%. The maximum hysteresis value is 50% of set point. Press the ***Up*** or ***Down arrow*** keys until the desired hysteresis% is reached press ***Enter*** to select and ***Menu*** to back out of hysteresis menu. Press the ***DnArrow — Enter*** to set the time delay The maximum delay value is 120 seconds in steps of 10 seconds. Press the ***Up*** or ***Down arrow*** keys until the desired delay is reached press ***Enter*** to select and ***Menu*** to **three times** to return to **operation display**.

Specifications: Series 1500

Power:
- power supply options:
  12-24 VDC (10.5 to 26 VDC)
- power consumption:
  3 Watts maximum @110 mA

Display:
- 8 characters by two lines, alphanumeric, dot matrix LCD display with a temperature compensating, variable contrast
- STN (Super-Twisted Nematic) display

Operating Temperature:
-4°F to +158°F (-20°C to +70°C)

Storage Temperature:
-40°F to +185°F (-40°C to +85°C)

Dimensions:
- Panel Mount
  3.78"W x 3.78"H x 3.23"D
- Wall Mount
  4.80"W x 4.72"H x 3.62"D

Weight:
- 8.5 oz. maximum (panel mount with DIN draw mounting brackets)

Sensor Input:

Digital Sensors:
- signal amplitudes:
  2.5 VDC threshold
- signal limits:
  -24 volts < V in < V (power supply)
- frequency input range:
  1 to 160 Hz
- Pull-up :
  2KΩ

Sine Wave Sensors:
- signal amplitude:
  10 mV p-p threshold
- signal limits:
  -24 volts < V in < V (power supply)
- frequency:
  1 to 160 Hz
- input impedance:
  10 KΩ

Contact Closure Sensors:
- dry contact closure or open collector
- frequency:
  24 ppm to 160 Hz

Sensor Calibration:
- Data Industrial "K" and offset

Other Sensors:
- "K" or "K" and offset

Units Of Measure:

Flow rate:
8 standard, 1 custom programmable
- standard flow rate units:
  gpm gallons/minute
  gph gallons/hour
  l/sec liters/second
  l/min liters/minute
  ft3/sec cubic feet/second
  ft3/min cubic feet/minute
  m3/sec cubic meters/second
  m3/min cubic meters/minute
  custom flow rate unit:
  7 character label
  7 digit floating point conversion from gallons/minute to custom unit

Flow total:
- 4 standard, 1 custom programmable
- standard flow total units:
  gallons gallons
  liters liters
  ft3 cubic feet
  m3 cubic meters
  custom flow total unit:
  7 character label.
  7 digit floating point conversion from gallons to custom unit with a range from 0.000001 to 1,000,000

Data Update Rate:
- **slow**, **medium**, or **fast** corresponding to 0.25, 1 or 2 seconds.
- adjustable averaging filter for smoothing erratic flow rates

Totalizer:
- range: 0.000001 to 1,000,000

Pulse Output:
- open collector transistor pulse user selectable for any units
- adjustable 50 mS to 5.0 second pulse output width in 50 mS increments (totalizer only)
- maximum sinking current:
  150 mA @ +24 VDC

Option Specifications:

Relays:
- 2 optional relays: operating from rate and or totalizer functions
- SPST contacts,
  3.0 amps @ 250VAC or 30VDC maximum resistive load

Rate Relay:
- user selectable, high rate and low rate alarm functions
- adjustable 0 to 120 second delay (in 10 second increments) for activation of alarm functions
- 0 to 50% (of set point) hysteresis for alarm functions
- latched feature

Totalizer Relay:
- user selectable output to any units. Width and units/pulse are user set

Analog Input:
- Accepts linear signals : 0 - 1 VDC, 0 - 5 VDC, 0 - 10 VDC, 4 - 20 mA
- Input impedance
  4 - 20 mA - 50Ω
- Voltage inputs: 2 KΩ or greater

Analog Output:
- Current sinking,
  isolated 4 - 20 mA
  Minimum voltage: 7 VDC
  Maximum voltage: 30 VDC

Factory Defaults

Listed below are the factory defaults for the Series 1500. Next to the defaults are lines so your custom settings can be recorded.

	Default Value	Customer Value		Default Value	Customer Value
Main Rate Units	gpm		Main Alarm Threshold	1000	
Main Rate Filter	40		Main Alarm Hysterises %	5	
Main Total Units	gallons		Main Alarm Delay	0	
Main Sensor "K"	1		Main Password	aaaa	
Main Sensor Offset	0		Main Contrast	medium	
Main Sensor Type	pulse		Main Update	slow	
Main Pulse Unit/Pul	1		Main Led	impeller	
Main Pulse P Width	100		Analog Low	0	
Main Alarm On/off	off		Analog High	10000	
Main Alarm Trigger	above				

Model Number _____

Serial Number _____

Warranty

Data Industrial Corporation ("Seller") of 11 Industrial Drive, Mattapoisett, Massachusetts 02739-0740, U.S.A., warrants to the original purchaser of its product that such product manufactured by Data Industrial Corporation shall be free from defects in materials or workmanship when installed, serviced and operated according to Data Industrial Corporation instructions or in other such normal use. This warranty is effective for a period of 12 months from the date of installation by the Purchaser or 18 months from the date of shipment by the "Seller" whichever occurs or terminates first. This limited warranty does not cover damage or loss resulting from corrosion or erosion caused by acids or other chemicals or by severe environmental conditions or negligent or improper installation or improper operation, misuse, accident, unauthorized repair or substitution of components other than those provided by the "Seller", and does not cover limited life components such as bearings, shafts, impellers where wear rate is a function of application and environment. Any component not manufactured by the "Seller" but included in its products shall not be covered by this warranty and is sold only under such warranty as the manufacturer may provide.

If Buyer or Purchaser wishes to make a claim hereunder, he shall send written notice of any defect within the warranty period, to "Seller" at the above address. "Seller" may at its sole option instruct Buyer to ship subject part, postage prepaid, to the "Seller" at above address or authorize a representative to inspect the part on site. "Seller" will at its sole option repair or replace any defective product covered by this warranty. If Buyer makes repairs or alterations to any product or part covered by this warranty without "Sellers" prior written approval, this warranty shall be null and void.

The foregoing shall constitute Buyers or Purchasers sole and exclusive remedy against "Seller", and no other remedy, including but not limited to, incidental or consequential damages for personal injury, loss of fluids, gases or other substances or for loss of profits or injury to property or person shall be available to the Buyer or Purchaser. The warranty extended herein shall be in lieu of any other implied warranty of merchantability or fitness for a particular purpose, and seller shall bear no liability for representatives or retail sellers. In no event shall Data Industrial Corporation be liable for any contingent, incidental, or consequential damage or expenses due to partial or complete inoperability of its product.

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