TEK-BATCH 7900B
NEMA 4X Large Display Batcher

Instruction Manual

Document Number: IM-7900B

www.tek-trol.com

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1.1   Intended Use

Tek-Batch 7900B NEMA 4X Large Display Batcher satisfies the instrument requirements for various flow meter types in liquid batching applications.

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CE Approvals.

1.3   Safety Instructions from the Manufacturer

1.3.1   Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to direct, indirect, or incidental and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice, and will not be answerable in any way for the possible consequence of such changes.

1.3.2   Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.3.3   Information Concerning the Documentation

To prevent any injury to the operator or damage to the device it is essential to read the information in this document and the applicable national standard safety instructions This operating manual contains all the information needed in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.4   Safety Precautions

You must read these instructions carefully prior to installing and commissioning the device. These instructions are an important part of the product and must be kept for future reference. Observing these instructions can ensure optimum protection of both personnel and the environment and safe and fault-free operation of the device.

For additional information that is not discussed in this manual, contact the manufacturer.

Warnings and Symbols Used

The following safety symbol marks are used in this operation manual and on the instrument.

⚠ **WARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury

⚠ **CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

ℹ **NOTE**

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.5 Packaging, Transportation and Storage

1.5.1 Packaging

The original package consists of

- Tek-Batch 7900B NEMA 4X Large Display Batcher.
- Documentation

ℹ **NOTE**

Unpack and Check the contents for damages or sign of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.5.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.5.3 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
    1. Free from rain and water
    2. Free from vibration and impact shock
    3. At room temperature with minimal temperature and humidity variation
- Properties of the instrument can change when stored outdoors.

1.5.4   Nameplate

The nameplate lists the important information, such as design details and technical data.

> **ⓘ   NOTE**
>
> Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2   Product Description

2.1   Introduction

The Tek-Batch 7900B NEMA 4X Large Display Batcher satisfies the instrument requirements for various flow meter types in liquid batching applications. It also provides multiple flow equations and instrument functions in a single unit with several advanced features. The large digit alphanumeric display shows measured and calculated parameters in an easy-to-understand format. Measurements and display scrolling can be accessed with a single key. The versatile Large Display Batcher permits various functions within the instrument's attractive wall mount package. The multiple hardware inputs and outputs can be "soft" assigned to meet different common application needs. While configuring the instrument, the user "soft selects" the use of each input/output. The isolated analog output can be set to follow volume flow, corrected volume flow, mass flow, temperature, or density through a menu setting. This approach can be used to assign most hardware characteristics. The user can use the standard RS-232 Serial Port for data logging, transaction printing, or connection to a modem for a remote meter reading. Remote metering software is available. A Service or Test mode is available to help the user during system startup by monitoring inputs, exercising outputs, and reporting system configuration.

Fig 1: Tek-Batch 7900B NEMA 4X Large Display Batcher

2.2   Specifications

Accuracy	0.02% FS at 20 ° C
Ranges	Voltage: 0-10 VDC, 0-5 VDC, 1-5 VDC, Current: 4-20 mA, 0-20 mA
Flow Meters and Computations	Meter Types: All linear and square law meters supported including vortex, turbine, magnetic, PD, target, orifice, venturi, v-cone, Coriolis, and many others. Linearization: Square root, 16-point table or UVC table Computations: Volume, Corrected Volume and Mass. Fluid Computations: Temperature, Density, Viscosity and API 2540 for petroleum.
Operating Temperature	32°F to 122°F (0°C to 50°C)
Storage Temperature	-40°F to 185° (-40°C to 85°C)
Humidity	0-95% non-condensing
Extended Temperature	-4°F to 131°F (-20°C to 55°C)
Display	UL/C-UL Listed (File No. E192404), CE Compliant, Type: 2 lines of 20 characters, Types: Backlit LCD, Character Size: 0.35" (8.3mm) nominal user programmable label descriptors and units of measure
Keypad	Membrane Keypad with 16 keys
Type	NEMA 4X
Materials	Plastic, UL94V-0, Flame retardant Bezel: Textured per matt finish
Real Time Clock	The Tek-Batch is equipped with a battery backed real time clock with display of time and date. Format: 12- or 24-hour time display; Day, Month, Year, date display
Power Input	The factory equipped power option is internally fused. An internal line to line filter capacitor and MOV are provided for added transient suppression. 110VAC Power: 85 to 127Vrms, 50/60 Hz 220VAC Power: 170 to 276Vrms, 50/60 Hz DC Power: 2VDC (10 to 14VDC), 24VDC (14 to 28VDC) Power Consumption: AC: 11.0VA (11W), DC: 300mA max
Basic Measurement Resolution	16 bit
Update Rate	4updates/sec
Automatic Fault Detection	Signal over/under-range, Current Loop Broken
Calibration	Software Calibration (no trimmers) and Auto-zero Continuously
Extended Calibration	Learns Zero and Full Scale of each range using special test mode
Fault Protection	Reverse Polarity: No ill effects Over-Voltage Limit: 50VDC Over voltage protection Over-Current Protection: Internally current limited protected to 24VDC
Pulse Inputs	Number of Flow Inputs: one with or without quadrature or pulse security checking

	Input Impedance: 10 KΩ nominal Pullup Resistance: 10 KΩ to 5 VDC (menu selectable) Pull Down Resistance: 10 KΩ to common Trigger Level: (menu selectable) High Level Input Logic On: 3 to 30 VDC, Logic Off: 0 to 1 VDC Low Level Input (mag pickup) Sensitivity: 0 mV or 100 mV Minimum Count Speed: Menu selectable Maximum Count Speed: Menu Selectable: 40Hz, 3000Hz or 20 kHz Over voltage Protection: 50 VDC
Auxiliary / Compensation Input	The auxiliary/compensation input is menu selectable for temperature, density or not used. This input is used for the compensated input when performing compensated flow calculations. It can also be used as a general purpose input for display and alarming. Operation: Ratiometric Accuracy: 0.02% FS at 20° C Basic Measurement Resolution: 16 bit Update Rate: 1 update/sec minimum Automatic Fault detection: Signal Over-range/under-range, Current Loop Broken, RTD short, RTD open, Fault mode to user defined default settings Fault Protection: Reverse Polarity: No ill effects, Over-Voltage Limit (Voltage Input): 50VDC Available Input Ranges: Voltage: 0-10VDC, 0-5VDC, 1-5VDC, Current: 4-20mA, 0-20mA, Resistance: 100 Ohms DIN RTD 100 Ohm DIN RTD (DIN 43-760, BS 1904) Three Wire Lead Compensation Internal RTD linearization learns ice point resistance 1 mA Excitation current with reverse polarity protection Temperature Resolution: 0.01 °C, Temperature Accuracy: ± 0.25 °C
Control Inputs	Switch Inputs are menu selectable for Start, Stop, Reset, Lock, Inhibit, Alarm Acknowledge, Print or Not Used. Number of Control Inputs: 3 Control Input Specifications Input Scan Rate: 10 scans per second Logic 1: 4 - 30VDC, Logic 0: 0 - 0.8VDC Input Impedance: 100 KΩ Control Activation: Positive Edge or Pos. Level based on product definition for switch usage.
Excitation Voltage	Menu Selectable: 5, 12 or 24VDC @ 100mA (fault protected)
Relay Outputs	The relay outputs are menu assignable to (Individually for each relay) Low-Rate Alarm, Hi Rate Alarm, Prewarn Alarm, Preset Alarm or General-purpose warning (security), low temperature/high temperature. Number of relays: 2

|	
	Contact Style: Form C contacts
	Contact Ratings: 5A, 240VAC or 30VDC
Serial Communication	The serial port can be used for printing, data logging, modem connection and communication with a computer.
	RS-232: Device ID: 01-99
	Baud Rates: 300, 600, 1200, 2400, 4800, 9600, 19200 Parity: None, Odd, Even
	Handshaking: None, Software, Hardware
	Print Setup: Configurable print list and formatting.
	Print Out: Custom form length, print headers, print list items.
	Print Initialization: Print on end of batch, key depression, interval, time of day, control input or serial request.
	RS-485: (optional 2nd COM port) Device ID: 01-247
	Baud Rates: 2400, 4800, 9600, 19200 Parity: None, Odd, Even
	Protocol: Modbus RTU (Half Duplex)
Data Logging	The data logger captures print list information to internal storage for approximately 1000 transactions. This information can be used for later uploading or printing. Storage format is selectable for Comma-Carriage Return or Printer formats.
Isolated Analog Output	The analog output is menu assignable to correspond to the Uncompensated Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Volume Total, Corrected Volume Total or Mass Total.
	Type: Isolated Current Sourcing
	Available Ranges: 4-20mA, 0-20mA
	Resolution: 12 bit
	Accuracy: 0.05% FS at 20° C
	Update Rate: 1 update/sec minimum
	Temperature Drift: Less than 200 ppm/C
	Maximum Load: 1000 ohms (at nominal line voltage) Compliance Effect: Less than .05% Span
	60 Hz rejection: 40 dB minimum
	Calibration: Operator assisted Learn Mode
	Averaging: User entry of damping constant to cause a smooth control action
Isolated Pulse Output	The isolated pulse output is menu assignable to Uncompensated Volume Total, Compensated Volume Total or Mass Total
	Pulse Output Form: Photozmos Relay
	Maximum On Current: 25 mA
	Maximum Off Voltage: 30 VDC
	Saturation Voltage: 1.0 VDC
	Maximum Off Current: 0.1 mA
	Pulse Duration: 10 mSec or 100 mSec (user selectable) Pulse output buffer: 256
	Fault Protection Reverse polarity: Shunt Diode

2.3 Dimensional Drawings
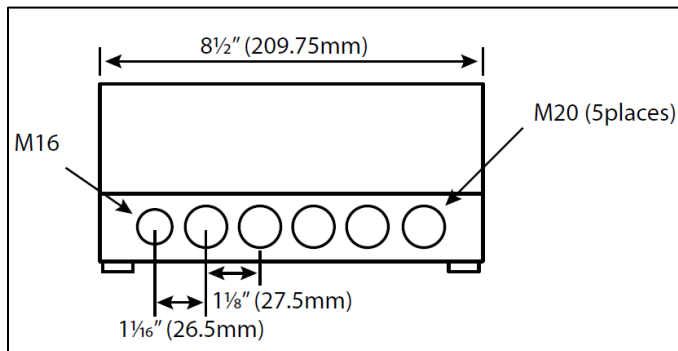
Fig 2: Bottom View
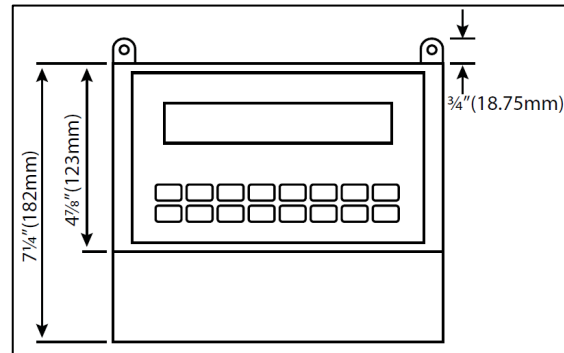
Fig 3: Front View
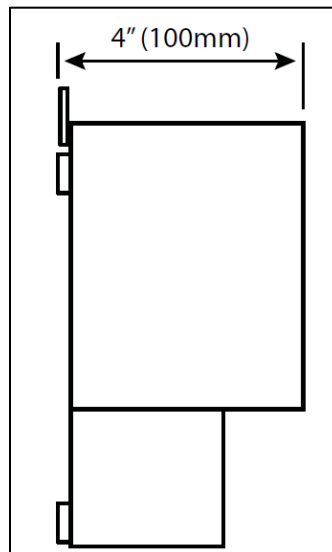
Fig 4: Side View

2.4 Popular Models

Model	Description
7900B-LDB	NEMA 4X Large Display Batcher

3 Installation

This section covers instructions on installation and commissioning. Installation of the device must be carried out by qualified trained, specialists authorized to perform such works.

⚠️ CAUTION

- When removing the instrument from hazardous processes, avoid direct contact with the fluid and the meter.
- All installation must comply with local installation requirements and local electrical code.

> **i** NOTE
>
> There is no need to remove the meter from its case to complete the installation, wiring, and setup of the meter for most applications.

3.1   Mounting

The Tek-Batch 7900B NEMA 4X Large Display Batcher should be located in an area where, atmosphere is clean, dry, shock and vibration free.

4   Wiring Connection

> ⚠️ **CAUTION**
>
> - Use copper wire with 60°C or 60/75°C insulation for all line voltage connections. Observe all safety regulations.
> - Electrical wiring should be performed in accordance with all applicable national, state, and local codes to prevent damage to the meter and ensure personnel safety.
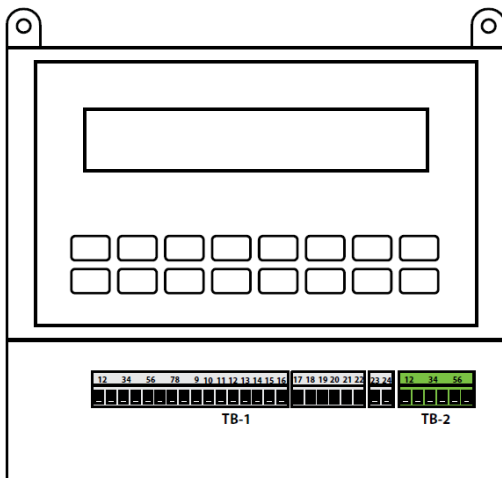
4.1   Wiring Connection

Fig 5: Tek-Batch 7900B Pin Diagram

Table 2: Communication Port (TB-2)

RS 232		RS 485	
1	TX	4	TX/RC +
2	RX	5	TX/RC –
3	COM	6	GND 180REF

*Note: * Power Terminals 23 & 24 used for DC Input only when ordered with DC INPUT option

Table 1: Pin Description (TB-1)

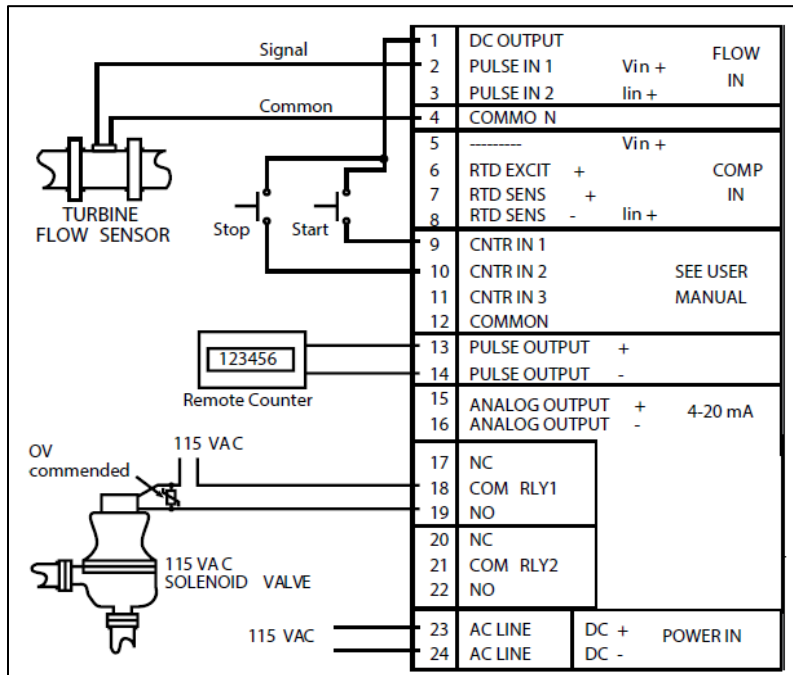| Pin	Description	
1	DC OUTPUT	
2	PULSE IN 1 (Vin +)	
3	PULSE IN 2 (Iin +)	
4	COMMON	
5	--------- (Vin +)	
6	RTD EXCIT +	
7	RTD SENS +	
8	RTD SENS – (Iin +)	
9	CNTR IN 1	
10	CNTR IN 2	
11	CNTR IN 3	
12	COMMON	
13	PULSE OUTPUT +	
14	PULSE OUTPUT -	
15	ANALOG OUTPUT +	
16	ANALOG OUTPUT -	
17	NC	
18	COM RLY 1	
19	NO	
20	NC	
21	COM RLY 2	
22	NO	
23	AC LINE	DC +
24	AC LINE	DC -
25	NC	
26	COM RLY 3	
27	NO	
28	NC	
29	COM RLY 3	
30	NO	

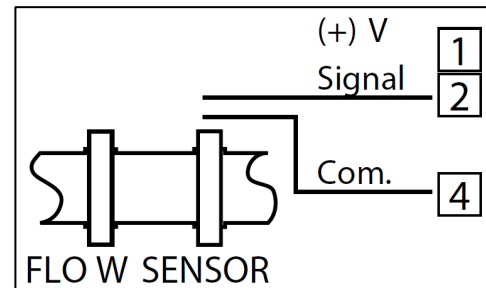## 4.2 Batcher Wiring

Fig 6: Typical Batcher Wiring

Fig 7: Optional Wiring for
Flow Sensor with Preamp
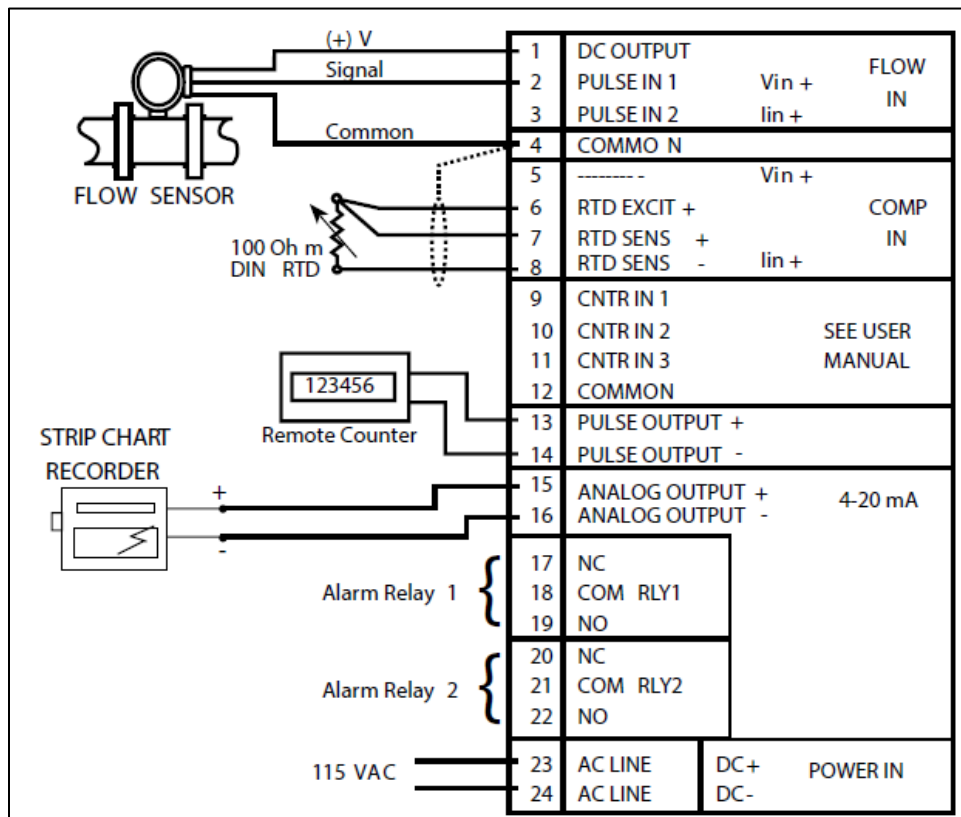
4.3 Rate or Total Wiring

Fig 8: Typical Rate/Total Wiring
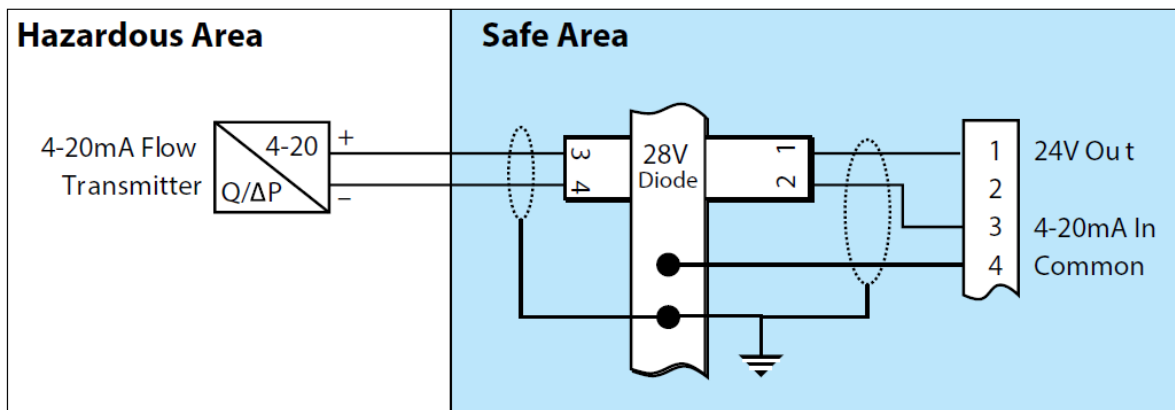
4.4   Wiring in Hazardous Areas

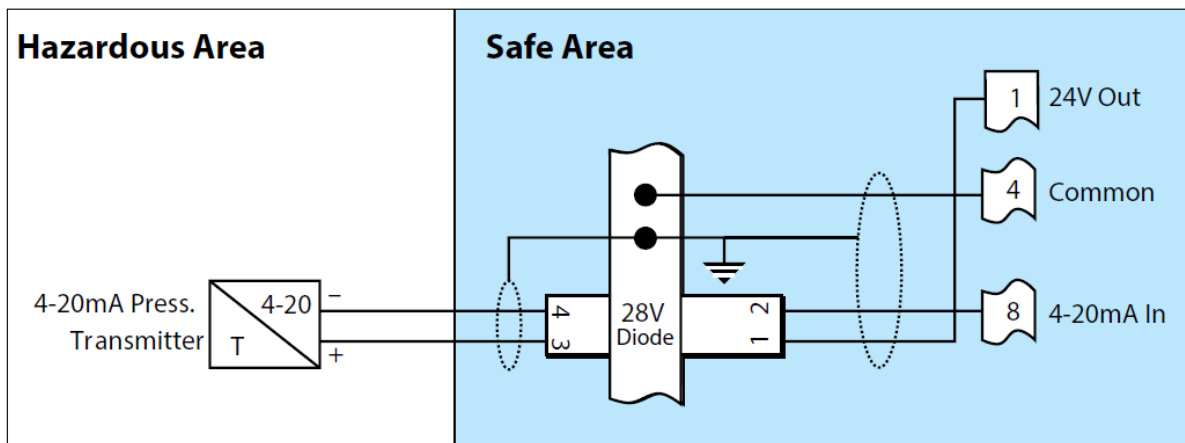Fig 9: Wiring in Hazardous Area with Flow Input

Fig 10: Wiring in Hazardous Area with Temperature Input (4 to 20mA Transmitter)
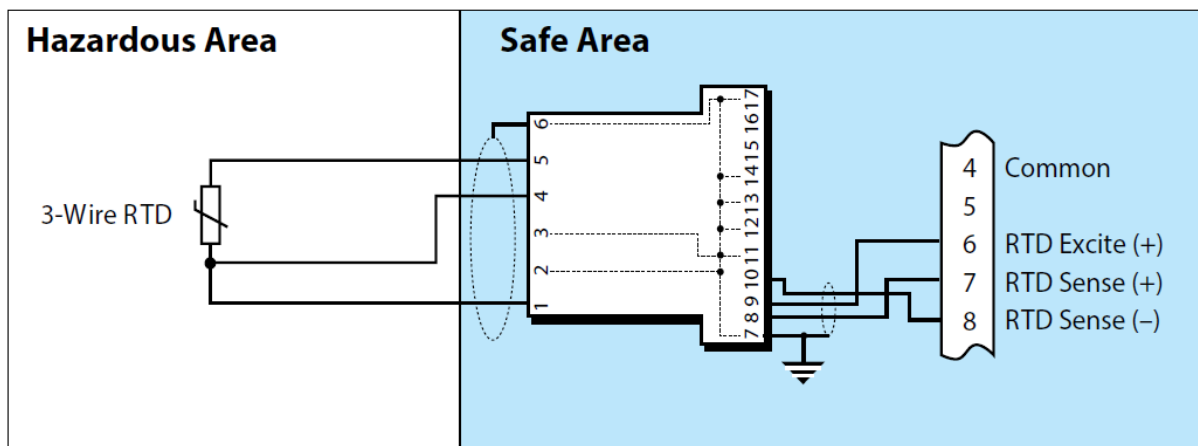

Fig 11: Wiring in Hazardous Area with Temperature Input (RTD)

5   Operations

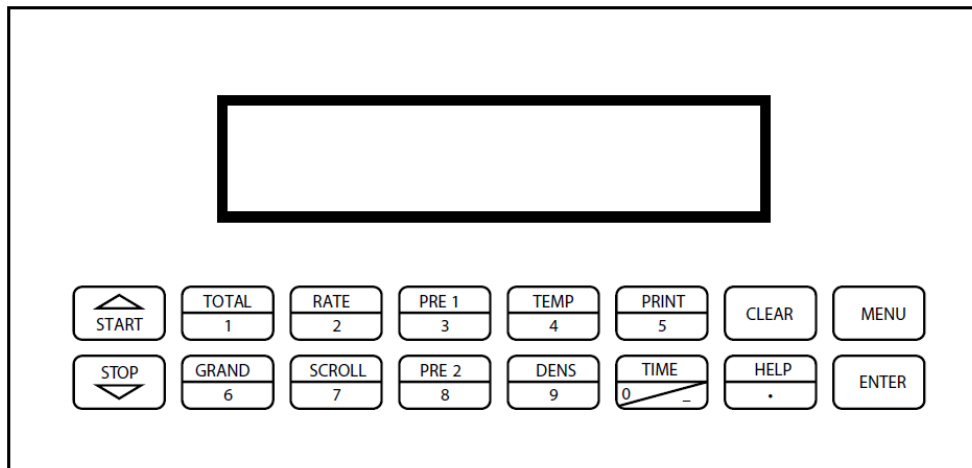## 5.1   Front Panel Operation Concept for Run Mode

Fig 12: Display of NEMA 4X Large Display Batcher

Table 3: Display Key with its Function

Key	Function
HELP	On-line help is provided to assist the operator
Total	To clear the total
GRAND	To clear the grand total
PRE 1 & PRE 2	Used to view and/or change the preset setpoints
SCROLL	To setup a display list
PRINT	Used to print on demand
START	Start Batches
STOP	Stop Batches
MENU	Used to enter the Setup and Test modes
ENTER	To acknowledge and clear alarms

5.1.1   General Instructions

- The unit can display Rate, Total, Grand Total, Temperature, Density, Presets and Time of Day.
- Even if you're using the Volumetric Flow Equation, you can see the temperature and/or density (a Temperature or Density sensor must be installed).
- Using a temperature or density sensor, the device may compute Mass or Corrected Volume equations (these equations can also be computed without Temperature/Density sensors using user-defined default values).
- The unit can be programmed to perform Ratemeter/Totalizer or Batching functions (see section SELECT INSTRUMENT Submenu).

5.1.2   Ratemeter or Totalizer Operation

The Ratemeter/Totalizer mode is primarily used to keep track of flow rate and total. The relays can be used to trigger flow, total, temperature or density alarms.

5.1.2.1 Password Protection for Rate or Total Mode

- The device will be locked when an Operator and/or Supervisor have entered a password in the setup mode (see section SETUP PASSWORD submenu). The unit will prompt the user for the password when trying to perform the following functions:
  - o Clear Total
  - o Clear Grand Total
  - o Enter Menu
  - o Edit Preset 1 (PRE 1 Key)
  - o Edit Preset 2 (PRE 2 Key)
- Only supervisors should have access to the supervisor password. The supervisor password will allow access to restricted areas of the Setup and Test menus.

5.1.2.2 Relay Operation in Rate/Total mode

- Alarm outputs can include up to four relays (two are common).
- The relays can be programmed to trip in response to rate, total, temperature, density, or system alarms.
- Low and high alarms can be programmed into the relays. By tapping the PRE 1 or PRE 2 keys on the front panel, you can quickly access Preset 1 (RLY1) and Preset 2 (RLY2).
- Presets 3 and 4 can only be accessed through the setup menu.

5.1.2.3 Pulse Output in Rate/Total mode

- Volume Total, Corrected Volume Total, or Mass Total are the menu options for the isolated pulse output (open collector).
- The pulse output duration can be set to 10mS (50Hz max) or 100mS (5Hz max).
- A pulse output scale factor (pulse value) can be set to scale the pulse output.
- The pulse output is used to connect remote totalizers or other devices such as a PLC. Refer electrical specifications section.

5.1.2.4 Analog Output in Rate/Total mode

- The analog output can be assigned to the Volume Rate, Corrected Volume Rate, Mass Rate, Temperature, Density, Volume Total, Corrected Volume Total, or Mass Total through the menu system.
- The analog output is used to employ strip chart recorders or other devices to track "trends."

5.1.2.5 RS-232 Serial Port Operation in Rate/Total mode

In the Operating Mode (Run Mode), one can use the RS-232 serial port to program (using the Setup Disk), communicate with printers, and connect to computers.

5.1.2.5.1 PC Communication

The Setup Disk allows the user to check the operating status unit including, Flow Rate, Flow Total, Temperature, Density, Presets, etc.

5.1.2.5.2 Operation of RS-232 Serial Port with Printers

5.1.2.5.2.1 Transaction Printing

The user defines the items included in the printed document (Refer section SET DATA OUTPUT, Select list). The transaction document can be started by either pressing the PRINT key or closing the remote contact.

5.1.2.5.2.2 Data Logging

The user defines the items included in each data log (Refer SET PRINTER OUTPUT, Select list section). The user can also select when (time of day) or how often (print interval) the data log is to be made (see SET PRINTER OUTPUT, Configure section).

5.1.2.5.2.3 System Setup and Maintenance Report

The system setup and maintenance reports list all instrument setup parameters and usage for the current instrument configuration. The audit trail information and a status report are also printed. This report is initiated in the Test menu (Refer PRINT SYSTEM SETUP section).

5.1.2.6 RS-485 Serial Port (optional)

5.1.2.6.1 RS-485 Port Description

The RS-485 card utilizes Modbus RTU protocol to access various process parameters and totalizers. The Relays can be controlled through Modbus. Additionally, action routines can be executed.
For further information, contact the factory and request the RS-485 Protocol manual.

5.1.2.6.2 Operation of Serial Communication Port with PC

- The Batcher's RS-485 channel supports several Modbus RTU commands.
- Modbus RTU drivers are available from third-party sources for a variety of Man-Machine Interface software for IBM-compatible PCs.
- The user reads and writes the information from/to the RS-485 using the Modbus RTU commands.
- The Batcher responds to this information and command requests.
- Process variables and totalizers are read in register pairs in floating-point format.
- Time and date are read as a series of integer register values.
- Alarms are individually read as coils. Action routines are initiated by writing to coils.

5.2 Batcher Operation

- The Batcher mode is used to control the batches.
- The relay operation is the main difference between Batch and Rate/Total modes.
- The operator can "START" the unit through the front panel or a remote input in Batch mode. The relays (RLY1 & RLY2) will energize and transfer electricity to a flow control device once they are started (i.e., solenoid valve or pump).
- The total accumulation will begin when the unit receives a signal from the flow sensor.
- Relay 2 will be turned off when the Prewarn value (PRE 2) is reached (ideal for flow slow down). Relay 1 will drop out and complete the Batch when the Batch amount (PRE 1) is reached.

- Several messages will be displayed during regular batch operation (i.e., Batch Fill, Batch Stopped).
- The keypad is disabled for the duration of these timed messages (approx. 2 sec).

5.2.1   Batcher Configuration

Several batch operation options are available when the unit is programmed for batch mode. Following are batch operation options:

- Up or Down Counting
- Maximum Batch Preset
- Batch Overrun Compensation
- Auto Batch Restart
- Time Delay
- Flow Signal Timeout
- Maximum Drain Time
- Slow Start Quantity
- Start or Reset/Start
- Stop or Stop/Reset

5.2.1.1   Standard Preset or EZ Preset

- Standard Preset is used for applications in which the batch amount does not change frequently.
- EZ Preset is used in applications in which the batch amounts change frequently.
- The EZ Preset mode was designed to enter presets with minimum keystrokes.

5.2.1.2   Batch Count Mode

The Batch Count Mode allows the user to choose whether the unit will batch up to a preset value or batch down from a preset value to zero.

5.2.1.3   Maximum Batch Preset

- The user can preset the Maximum Batch value that can be entered by the operator using the Maximum Batch Preset.
- If an operator should try to program a batch higher than this value, the unit will not allow the value to be entered and will prompt the user with an error message, i.e., Maximum Batch Preset has been exceeded.

5.2.1.4   Batch Overrun

- The Batch Overrun is used for batch applications with slow responding valves and a consistent batching flow rate.
- When the Batch Overrun is set, the unit will compensate for batch overruns by computing an averaged overrun value from the last four batches.
- This average is used to adjust the batch setpoint to minimize overrun internally.

5.2.1.5 Flow Signal Timeout
- The user can set a timeout between 0 and 99 seconds with the Flow Signal Timeout.
- If a batch is "Filling" and zero flow persists for more than the user entered time, the batch will be aborted.
- Overflows caused by malfunctioning flow sensors and/or wiring are avoided.

5.2.1.6 Maximum Drain Time
- When the flow rate is equal to 0, the unit declares the batch is done.
- A flow rate may be present long after the Preset Relay de-energizes due to slow reacting valves or leaky valves.
- The Maximum Drain Time allows the user to enter an amount of time (0 to 99 seconds) to wait before declaring "Batch Done."
- When the flow rate is "0" or the Maximum Drain Time has expired, the device will proclaim "Batch Done" after the Preset Batch quantity has been reached. After that, the batch data s

5.2.1.7 Slow Start Quantity
- The Slow Start Quantity function allows you to input an amount for a Slow Start up.
- This function necessitates the use of two-stage valve control.
- RLY 1 (slow flow) will activate for Slow Start, whereas RLY 2 (rapid flow) will activate after the Slow Start Quantity is delivered.
- When filling an empty container, this reduces turbulence.

5.2.1.8 START, RESET/START and STOP, STOP/RESET
- When configuring the control inputs, Control Input1 is for START or START/RESET. When the signal is applied to Control Input1 or the front panel Start key is clicked, the unit is set to START and begins batching.
- A separate Reset signal clears the previous batch total.
- When the unit is set for RESET/START, is when the signal is applied to Control Input1 or the Start key at the front panel is clicked, the unit will automatically reset then start (provided that the prior batch was accomplished or completed).
- When a previous batch was stopped in the middle of a batch cycle, the unit would START from where it was finished.
- STOP/RESET or STOP can be set for Control Input 2.
- When the unit is set to STOP, a signal is applied to Control Input 2, or the front panel Stop key is pressed, the unit will stop batching.
- A separate Reset signal clears the batch total.
- When the STOP/RESET option is selected, a batch in progress will finish when a signal is applied to Control Input 2, or the front panel Stop key is pressed.
- For Control Input 2, when a signal is applied, or the front panel Stop key is pressed, the device will reset if it is stopped or after a finished batch

*Note: Applying a voltage level to Control Input 2 will disable all Start inputs in either mode.

6 Setup and Programming

6.1 Setup Mode

6.1.1 Mode Changes

- Press the MENU key for RUN, SETUP, TEST selections.
- RUN is the normal operating mode for the instrument.
- SETUP offers various sub-menus used for instrument setup.
- TEST provides various sub-menus to test, calibrate and system start-up.

6.1.2 Submenu GROUP NAVIGATION

- When in SETUP or TEST mode, use the UP and DOWN arrow keys to browse up and down through the Sub-Menu groupings.
- Press the ENTER key to enter a desired setup or test Sub-Menu group.

6.1.3 Item Selection

- The unit will frequently provide many options for a particular topic during setup.
- The topic prompt appears on the top line of the display.
- The options are displayed on the display's lower line.
- Press the key next to the option you want to choose an item.
- The selected option will blink.
- Press the ENTER key to accept the selected choice.
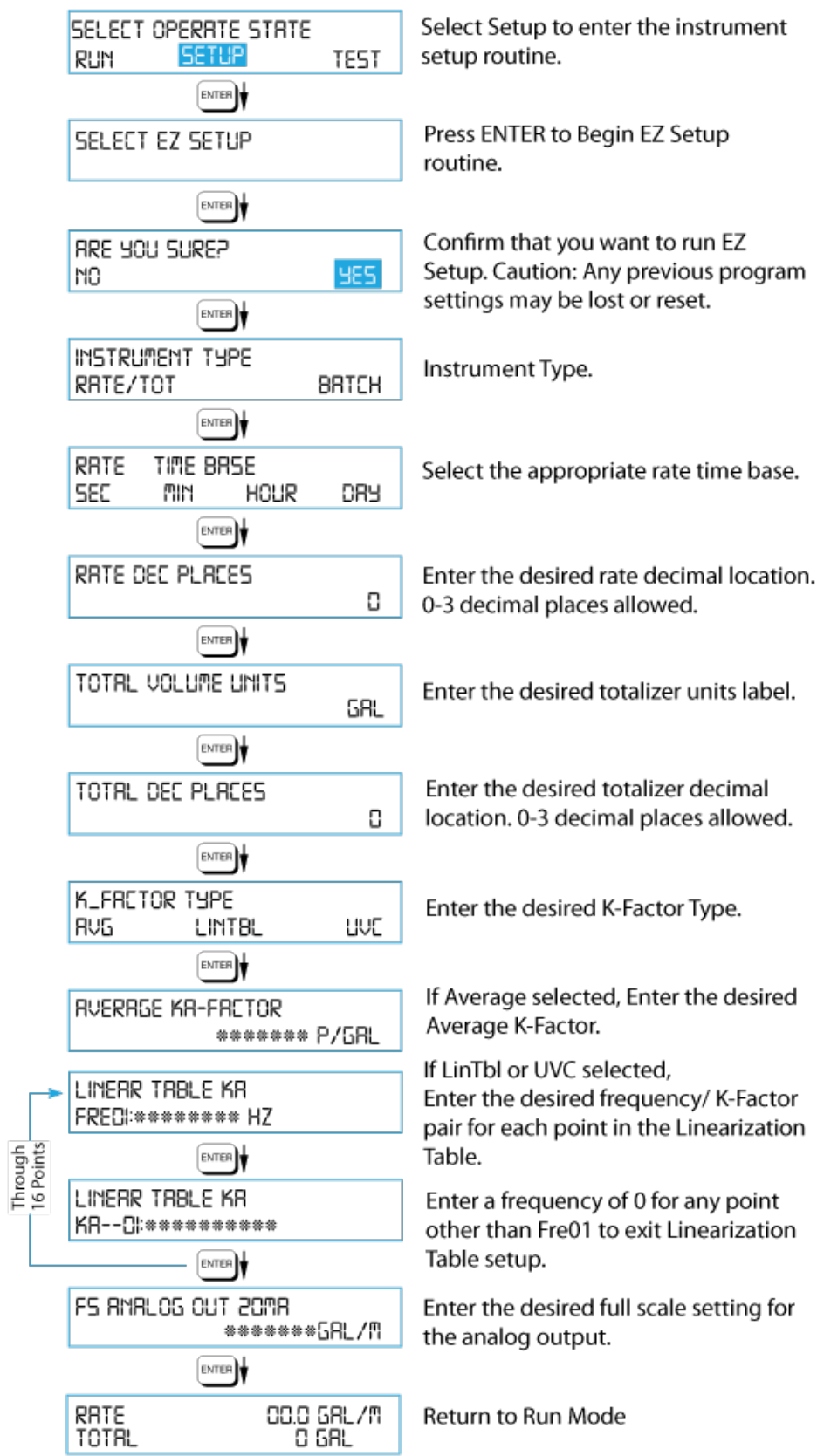
6.1.4 Numeric Entry

- Numerical values are entered using the keys labeled "0 - 9", "−", ".", CLEAR, and ENTER.
- A leading 0 will assume that you intend to enter a minus "−" sign.
- Press the CLEAR key to clear the current value and to enable editing.
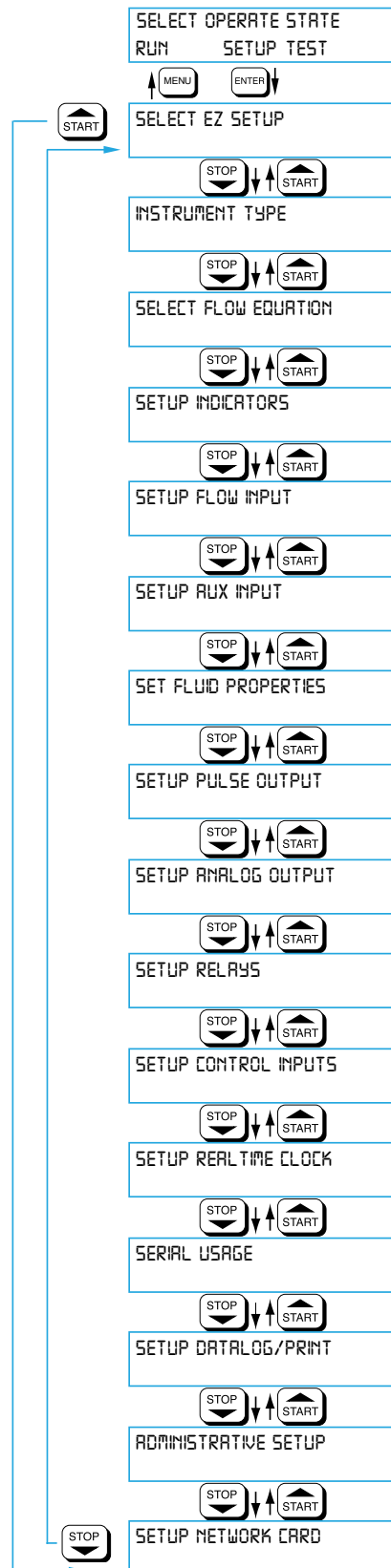
6.1.5 Text Character Entry

- The user must insert text characters for some configuration elements (e.g., Descriptors, Units Label).
- Press CLEAR to enable editing.
- The UP and DOWN arrow keys are used to scroll through the available character sets for each character.
- Press the ENTER key to accept the character and advance to the next character.

6.2 EZ Setup

- The EZ Setup method allows you to configure the unit for the most regularly utilized instrument functions quickly and easily.
- This configuration implies you are measured Volumetric Flow with a DC Pulsing flow sensor at a high level. Many functions are automatically set in EZ Setup mode.
- This may cause any previously programmed information to be lost or reset.

SELECT OPERATE STATE RUN SETUP TEST	Select Setup to enter the instrument setup routine.
ENTER ↓	
SELECT EZ SETUP	Press ENTER to Begin EZ Setup routine.
ENTER ↓	
ARE YOU SURE? NO YES	Confirm that you want to run EZ Setup. Caution: Any previous program settings may be lost or reset.
ENTER ↓	
INSTRUMENT TYPE RATE/TOT BATCH	Instrument Type.
ENTER ↓	
RATE TIME BASE SEC MIN HOUR DAY	Select the appropriate rate time base.
ENTER ↓	
RATE DEC PLACES 0	Enter the desired rate decimal location. 0-3 decimal places allowed.
ENTER ↓	
TOTAL VOLUME UNITS GAL	Enter the desired totalizer units label.
ENTER ↓	
TOTAL DEC PLACES 0	Enter the desired totalizer decimal location. 0-3 decimal places allowed.
ENTER ↓	
K_FACTOR TYPE AVG LINTBL UVC	Enter the desired K-Factor Type.
ENTER ↓	
AVERAGE KA-FACTOR ******* P/GAL	If Average selected, Enter the desired Average K-Factor.
LINEAR TABLE KA FREQ:********* HZ	If LinTbl or UVC selected, Enter the desired frequency/ K-Factor pair for each point in the Linearization Table.
ENTER ↓	
LINEAR TABLE KA KA--01:***********	Enter a frequency of 0 for any point other than Fre01 to exit Linearization Table setup.
ENTER ↓	
FS ANALOG OUT 20MA *******GAL/M	Enter the desired full scale setting for the analog output.
ENTER ↓	
RATE 00.0 GAL/M TOTAL 0 GAL	Return to Run Mode

Through 16 Points

6.3   Menu Setup

```
┌─────────────────────────────┐
│ SELECT OPERATE STATE        │
│ RUN       SETUP TEST        │
└─────────────────────────────┘
          ↑[MENU]    [ENTER]↓

┌─────────────────────────────┐
│ SELECT EZ SETUP             │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ INSTRUMENT TYPE             │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SELECT FLOW EQUATION        │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP INDICATORS            │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP FLOW INPUT            │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP AUX INPUT             │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SET FLUID PROPERTIES        │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP PULSE OUTPUT          │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP ANALOG OUTPUT         │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP RELAYS                │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP CONTROL INPUTS        │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP REALTIME CLOCK        │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SERIAL USAGE                │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP DATALOG/PRINT         │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ ADMINISTRATIVE SETUP        │
└─────────────────────────────┘
         [STOP]↓ ↑[START]
┌─────────────────────────────┐
│ SETUP NETWORK CARD          │
└─────────────────────────────┘
```

6.4 Submenu Setup

SELECT EZ SETUP

STOP ↕ START
Advance To
INSTRUMENT TYPE

Refer to page 20 for EZ Setup routine.

Press the DOWN (stop) key to advance to Instrument Type. Press the UP (start) key to advance to Administrative Setup.

INSTRUMENT TYPE

Press ENTER to enter Instrument Type sub menus.

ENTER

INSTRUMENT TYPE
RATE/TOT   BATCH

Press ENTER when Rate/Total is flashing to configure the instrument as a Ratemeter/ Totalizer.

START ENTER

Advance To
SELECT FLOW EQUATION

If Rate/Tot selected, advance to Select Flow Equation.

INSTRUMENT TYPE

Press ENTER to enter Instrument Type sub menus.

ENTER

INSTRUMENT TYPE
RATE/TOT   BATCH

Press ENTER when Batch is flashing to configure the instrument as a Batcher.

START ENTER

SELECT PRESET TYPE
STANDARD   EZ PRESET

Select Standard or EZ Preset

START ENTER

BATCH COUNT MODE
UP   DOWN

Select UP to Reset to 0 and count up to preset. Select DOWN to reset to Preset and count down to 0.

START ENTER

MAXIMUM BATCH PRESET
1000.0 GAL

Enter the maximum allowable Batch Preset. The operator will not be able to enter a batch preset larger than this value.

START ENTER

BATCH OVERRUN COMP
OFF   ON

Select ON to set the unit to operate using a Batch Overrun Compensation routine. Select OFF to inhibit Batch Overrun Compensation routine. (See Section 5.4)

ENTER

FLOW SIGNAL TIMEOUT
10

Enter a timeout of 0 to 99 seconds. If a batch is "Filling" and zero flow persists for more than this time, the batch will be aborted.

ENTER

MAXIMUM DRAIN TIME
10

Enter time (0-99 sec.) for Max. Drain Time. After batch quantity is reached, "Batch Done" is declared when the flow rate is "0" or the Maximum Drain Time has expired.

ENTER

SLOW START QUANTITY
10

Enter a quantity for a Slow Start up. RLY 2 (slow flow) will energize for Slow Start and RLY 1 (fast flow) will energize after the Slow Start Quantity has been delivered.

ENTER

Advance To
SELECT FLOW EQUATION

6.4.1 Flow Equation Selection

SELECT FLOW EQUATION

Press ENTER to enter Select Flow Equation submenus.

ENTER ↓

SELECT FLOW EQUATION
VOLUME MASS COR/VOL

Press ENTER when desired flow equation is flashing.

ENTER ↓

Advance To
SETUP INDICATORS
(**Total**)

6.4.2 Setup Indicators Total

SETUP INDICATORS

Press ENTER to begin setup of the Indicators

ENTER ↓

SETUP INDICATORS
TOTAL   DENS   RATE   TEMP

Press ENTER when Total is flashing to configure the Totalizer Indicators

ENTER ↓

TOTAL DESCRIPTOR
TOTAL

Enter the desired Total Descriptor

ENTER ↓

TOTAL VOLUME UNITS
GAL

Enter the desired Volume Units Label for the Totalizer.

ENTER ↓

TOTAL DEC PLACES
0

Select the desired Total Decimal Place.
0-3 decimal places allowed.

ENTER ↓

Advance To
SETUP INDICATORS
(Density)

6.4.3   Setup Indicators Density

SETUP INDICATORS
TOTAL DENS RATE TEMP — Press ENTER when Dens is flashing to configure the Density Indicators.

DENSITY DESCRIPTOR
DENS — Enter the desired Density Descriptor.

DENSITY MASS UNITS
LBS — Enter the desired Mass Units Label for Density.

DENSITY DEC PLACES
0 — Select the desired Density Decimal Place. 0-3 decimal places allowed.

Advance To
SETUP INDICATORS
(Rate)

6.4.4   Setup Indicators Rate

SETUP INDICATORS
TOTAL DENS RATE TEMP — Press ENTER when Rate is flashing to configure the Ratemeter Indicators

RATE TIME BASE
SEC   MIN   HOUR   DAY — Select the desired Rate Time Base.

RATE DESCRIPTOR
RATE — Enter the desired Descriptor for the Ratemeter.

RATE DEC PLACES
0 — Select the desired Rate Decimal Place. 0-3 decimal places allowed.

RATE AVG FILTER
0 — Enter desired Rate Averaging Filter.

QUICK UPDATE %
5 — Enter desired Percent of Change for Quick Update. If the current flowrate deviates by an amount greater than the percentage value entered, the Rate Averaging is inhibited. (See Page 57 for more details.)

Advance To
SETUP INDICATORS
(Temperature)

6.4.5   Setup Indicators Temperature

SETUP INDICATORS
TOTAL DENS RATE   TEMP

Press ENTER when Temp is flashing to configure the Temperature Indicators.

[ENTER]

TEMP DESCRIPTOR
                      TEMP

Enter the desired Temperature Descriptor.

[ENTER]

TEMPERATURE SCALE
DEG_C   DEG_F

Enter the desired Temperature Scale.

[ENTER]

TEMP DEC PLACES
                        0

Select the desired Temperature Decimal Place. 0-3 decimal places allowed.

[ENTER]

Advance To
SETUP FLOW INPUT

6.4.6   Setup Fluid Properties

SET FLUID PROPERTIES

Press ENTER at this prompt to Set Fluid Properties.

[ENTER]

REF. DENSITY
          ****** LBS/G

Enter the Reference Density. This is used in the calculation of density when you have a temp transmitter and used for corrected flow calculation if you have a density transmitter.

[ENTER]

REF. TEMPERATURE
          ******   F

Enter the Reference Temperature.

[ENTER]

EXPAN. FACTOR (XE-6)
            ****

Enter the proper Expansion Factor. (If Temp Compensated for Mass or Corrected Volume) See Section 7.4, Calculating the Expansion Factor.

[ENTER]

CALIBRATION DENSITY
            ****

Enter the Calibration Density. This is used in calculation of flow for analog inputs using SQRT.

[ENTER]

VISCOSITY COEF. A
          0.000

Enter the Viscosity A Coefficient. See section 7.5, Computation of Viscosity Coef. A and B.

[ENTER]

VISCOSITY COEF. B
          0.000

Enter the Viscosity B Coefficient. See section 7.5, Computation of Viscosity Coef. A and B.

[ENTER]

BASE DENSITY H2O@4C
          ****** LBS/G

Enter the Base Density H2O@4C. This is used in the centistoke calculation for UVC.

[ENTER]

Advance To
SETUP PULSE OUTPUT

6.4.7   Setup Pulse Output

SETUP PULSE OUTPUT	Press ENTER at this prompt to setup the Pulse Output.
ENTER ↓	
PULSE OUTPUT USAGE OFF VOL CVOL/MASS	Select the desired Pulse Output Usage.
ENTER ↓	
PULSE WIDTH IOMS IOOMS	Select the desired Pulse Width for the Pulse Output.
ENTER ↓	
PULSE VALUE ******** GAL/P	Enter the desired Pulse Value for the Pulse Output (Units per Pulse).
ENTER ↓	

Advance To
SETUP ANALOG OUTPUT

6.4.8   Setup Analog Output

SETUP ANALOG OUTPUT	Press ENTER when Analog is flashing to setup the Analog Output.
ENTER ↓	
ANALOG OUTPUT USAGE RATE TOTAL TEMP DENS	Select the desired Analog Output Usage.
ENTER ↓	
ANALOG OUT FLOW TYPE VOL CVOL/MASS	Only if Rate selected & Flow EQ. = Mass, Cor/Vol Select the desired Analog Output Flow.
ENTER ↓	
ANALOG OUTPUT RANGE 4-20MA 0-20MA	Select the desired current range for the Analog Output.
ENTER ↓	
LS ANALOG OUTPUT ******** GAL/M	Enter desired Analog Output Low Scale Value. **NOTE:** Units label will correspond with output usage type selected.
ENTER ↓	
FS ANALOG OUT 20MA ******** GAL/M	Enter desired Analog Output Full Scale Value.
ENTER ↓	
ANALOG OUT DAMPING 0.0	Enter the desired Analog Output Damping Constant.
ENTER ↓	

Advance To
SETUP RELAYS

Technology Solutions

6.4.9   Setup Relays

| SETUP RELAYS | Select the desired Relay for setup. |
| RLY1 RLY2 RLY3 RLY4 | (Relays 3 & 4 Optional) |

⬇ ENTER

| RELAY 1 USAGE | If Relay 1 or Relay 2 Selected, |
| RATE   TOTAL   NA | Select Rate, Total or NA. |

⬇ ENTER

| RELAY 1 DELAY   SEC | If Rate selected, enter desired relay activation |
| 0 | delay value. |

⬇ ENTER

RELAY 1 MODE	Select the desired Relay Activation.
LO_ALARM HI_ALARM	Low: Relay activates when reading is below setpoint.
	High: Relay activates when reading is above setpoint.

⬇ ENTER

| RELAY 1 DURATION | |
| ***** | If Total Selected, Enter desired Relay Duration. |

⬇ ENTER

| RELAY 1 SETPOINT | Enter the desired Setpoint. The Setpoint can |
| ******* GAL | be edited in run mode using the PRE 1 key (PRE 2 key for Relay 2). |

⬇ ENTER

| RELAY 1 HYSTERESIS | If Rate, selected, Enter desired Relay |
| ***** GAL/M | Hysteresis. |

⬇ ENTER

Advance To
SETUP RELAYS 3, 4

7   Menu Tree

SETUP MENUS

START HERE

SELECT EZ SETUP

INSTRUMENT TYPE | INSTRUMENT TYPE | SELECT PRESET TYPE | BATCH COUNT MODE | MAX. BATCH PRESET | BATCH OVERRUN COMP. | FLOW SIGNAL TIMEOUT | MAX. DRAIN TIME | SLOW START QUANTITY

SELECT FLOW EQUATION | SELECT FLOW EQUATION

SETUP INDICATORS | SETUP INDICATORS | TOTAL DESCRIPTOR | VOLUME UNITS | TOTAL DECIMAL PLACES | DENSITY DESCRIPTOR | MASS UNITS | DENSITY DECIMAL PLACES | RATE TIME BASE | RATE DESCRIPTOR | RATE DECIMAL PLACES | RATE AVERAGE FILTER | QUICK UPDATE % | TEMP DESCRIPTOR | TEMPERATURE SCALE | TEMPERATURE DECIMAL PLACES

SETUP FLOW INPUT | EXCITATION VOLTAGE | FLOW INPUT TYPE | PULSE INPUT TYPE | PULSE TRIGGER TYPE | LOW PASS FILTER | INPUT TERMINATION | MAX WINDOW | K-FACTOR TYPE | AVERAGE KA-FACTOR | AVERAGE KB-FACTOR | CHANGE TABLE A | CHANGE TABLE B | LOW FLOW RATE ALARM | HIGH FLOW RATE ALARM

ANALOG INPUT TYPE | VOLTAGE/CURRENT RANGE | LINEARIZATION TYPE | FLOW LOW SCALE | FLOW HIGH SCALE | CHANGE TABLE A | LOW FLOW CUTOFF | LOW FLOW RATE ALARM | HIGH FLOW RATE ALARM

SETUP AUX INPUT | AUX INPUT TYPE | AUX SIGNAL TYPE | VOLTAGE/CURRENT RANGE | AUX LOW SCALE | AUX FULL SCALE | AUX. DEFAULT | AUX LOW ALARM | AUX HIGH ALARM | DENS EXTRACT METHOD

SET FLUID PROPERTIES | REF. DENSITY | REF. TEMPERATURE | EXPANSION FACTOR | CALIBRATION DENSITY | VISCOSITY COEF. A | VISCOSITY COEF. B | H2O DENSITY AT 4DEGC

These functions will only appear with appropriate settings in other functions.

SETUP PULSE OUTPUT | PULSE OUPUT USAGE | PULSE WIDTH | PULSE VALUE

SETUP ANALOG OUTPUT | ANALOG OUPUT USAGE | ANALOG OUT FLOW TYPE | ANALOG OUTPUT RANGE | ANALOG OUT LOW SCALE | ANALOG OUT FULL SCALE | ANALOG OUT DAMPING

SETUP RELAYS | SETUP RELAYS 1, 2, 3, 4 | RELAY USAGE | RELAY DELAY | RELAY DURATION | RELAY MODE | RELAY SETPOINT | RELAY HYSTERESIS

SETUP CONTROL INPUTS | SETUP CONTROL INPUTS 1, 2, 3 | CONTROL INPUT 1 USAGE | CONTROL INPUT 2 USAGE | CONTROL INPUT 3 USAGE

SETUP REAL TIME CLOCK | SETUP REAL TIME CLOCK | CLOCK TYPE | SELECT CLOCK AM/PM | TIME OF DAY | ENTER DATE

SERIAL USAGE | SERIAL HARDWARE | DEVICE ID | BAUD RATE | PARITY | HANDSHAKE | DEVICE LINE FEED | MODEM CONTROL | MODEM AUTO ANSWER | CALL OUT DAY OF WEEK | CALL OUT TIME | CALL ON ERROR/ALARM | CALL OUT PHONE NUMBER | NUMBER OF REDIALS | HANGUP IF 2MIN. INACTIVE

SETUP DATALOG/PRINT | SETUP DATALOG/PRINT | OUTPUT FORMAT | PAGE LENGTH | TOP MARGIN | DATALOG ONLY | PRINT TIME | PRINT INTERVAL | ENABLE PRINT KEY | PRINT END OF BATCH | CLEAR TOTAL IF PRINT | PRINT LIST ITEMS

ADMINISTRATIVE SETUP | OPERATOR PASSWORD | TAG NUMBER | SUPERVISOR PASSWORD | SOFTWARE VERSION | PRODUCT ORDER CODE | UNIT SERIAL NUMBER | SENSOR SERIAL NUMBER

SETUP NETWORK CARD | SELECT NETWORK PROTOCOL | NETWORK DEVICE ID | BAUD RATE | PARITY
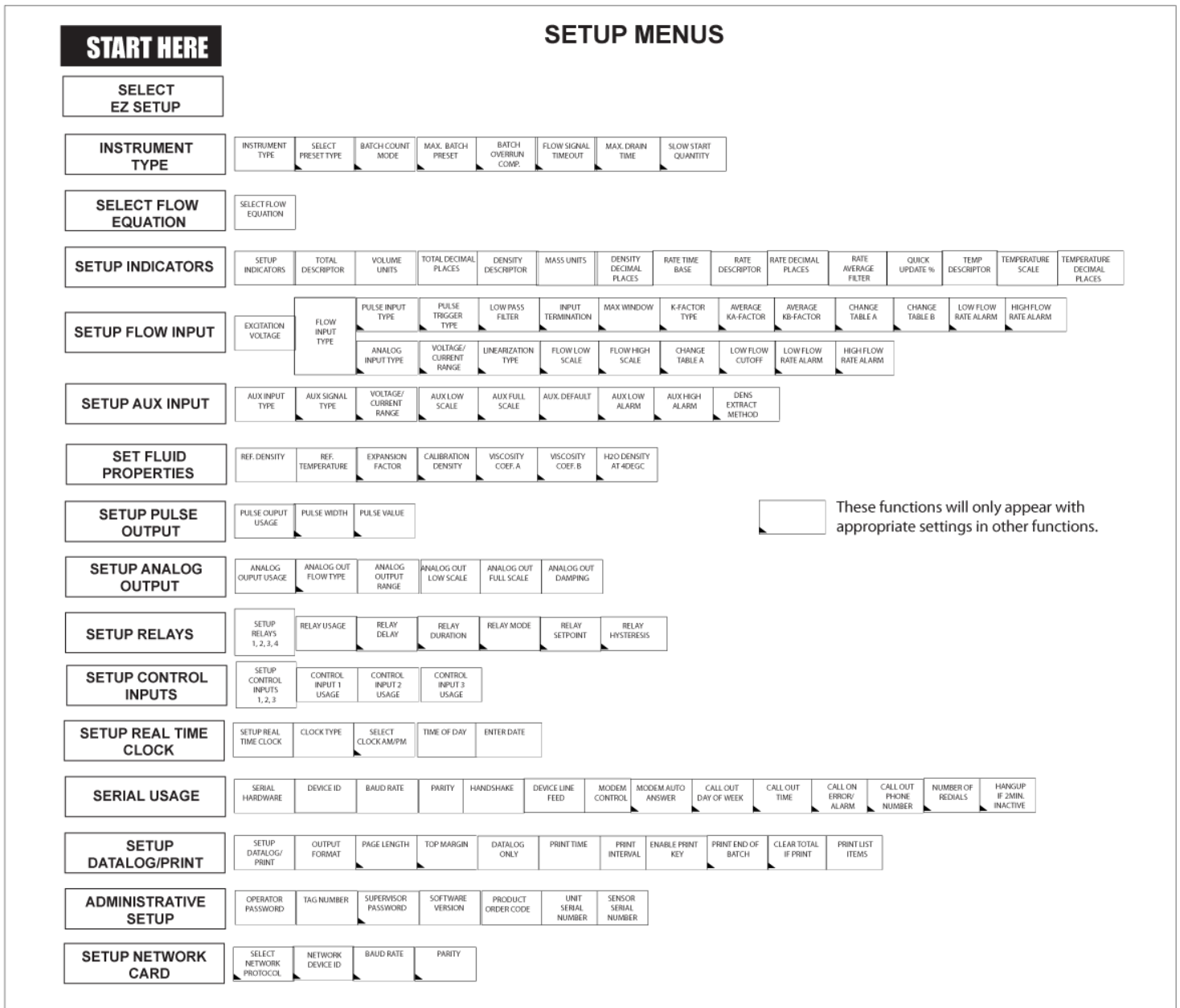
8 Troubleshooting

8.1 Response of Batcher on Error or Alarm

Error and warning indications occur during operation are indicated in the RUN mode alternately with the measured values. The Batcher has three types of error as shown in table 4:

Table 4: Type of Error with its Description

Type of Error	Description
Sensor/Process Alarms	Errors detected due to sensor failure or process alarm conditions
Self-Test Errors	Errors detected during self-test
System Alarms	Errors detected due to system failure

*Note: A historical error alarm log is available in the "Test Mode".

Technology Solutions

8.2 Diagnosis Flow Chart and Troubleshooting

Is there an input power supply voltage across Terminals 23 and 24?

No → Check the connections according to the circuit diagrams.

Check junction box fuses.

Yes ↓

Is the Display Backlight Visible?

No → Check/Replace internal fuse. If fuse is OK, Factory Service Required.

Yes ↓

Are the Display Characters Visible?

No → The display may not be visible with ambient temperatures below -10 °C Allow the instrument to warm up. Contact factory if necessary

Yes ↓

Is there a black bar across the display?

Yes → Check line voltage. If voltage is OK, Factory Service Required.

No ↓

Does the display alternate between blank and sign on message?

Yes → Check line voltage. If voltage is OK, Factory Service Required.

No ↓

Does the display show an error message?

Yes → See section 12.3 for cause and remedy.

No ↓

No system or process errors present.

8.3 Error and Warning Messages

Table 5: Error and Waring Messages

Error or Warning Messages	Cause	Remedy
Totalizer Rollover	Displayed when totalizer rolls over	Acknowledge Rollover, Remedy not required
AUX Input Too Low	4-20 mA Input current at aux input smaller than 3.5 mA: • Faulty Wiring • Transmitter not set to "4-20 mA" • Transmitter defective	• Check wiring • Check function of sensor
RTD Out of Range	Input current at RTD input too low: • Faulty wiring • RTD defective	• Check wiring • Check function of RTD sensor
Rate Overflow Error	Pulse counter overflowed. The totalizer may have lost counts.	• Report error to factory • Check application conditions • Check wiring
Pulse Out Overflow	Calculated pulse frequency too large: • Pulse width setting too long • Larger pulse scaler needed	• Adjust pulse value • Adjust pulse width • Check process conditions
Flow Rate Alarm Low Flow Rate Alarm High Temp Alarm Low Temp Alarm High Density Alarm Low Density Alarm High	Limit value exceeded	• Check application if necessary • Check limit value • Adjust the limit value if required
Batch Overrun Alarm	Batch size exceeded by more than set limit	• Check valves in system for proper operation and/or leaks • Check limit value • Adjust the limit value if required
Modem Not Present	The setup expects modem usage and a modem is not responding.	• Check setup for proper baud rate, parity, etc. • Check modem connection and cycle power to Batcher • Replace modem
Software Error Reset	Watchdog Error like Transient	• Check data in unit. Totalizer may have inaccuracies • Investigate brownout cause

Flow Input Too High	Analog input signal of the flow input exceeded by more than 3%: • Sensor over ranged • Incorrect full scale setting of flow meter • Function error in transmitter or faulty wiring	• Check analog signal range • Check the application conditions • Check wiring
AUX Input Too High	Analog input signal of the auxiliary input exceeded by more than 3%: • Sensor over ranged • Incorrect full scale setting of transmitter • Function error in transmitter or faulty wiring	• Check analog signal range • Check the application conditions • Check wiring
Flow Input Too Low	Analog input signal of the flow input fell below the low scale range by more than 3% of full scale value: • Flow meter not set to 4-20 mA • Function error in transmitter or faulty wiring	• Check wiring • Check calibration of flow meter • Check function of flow meter
Battery Low Warning	Battery voltage too low	• Replace Battery • Consult Factory for service information
A To D Not Converting	Fault in analog/digital converter	• Unit may self-correct, Press ENTER to acknowledge & clear alarm • If error reasserts, factory service is required
Time Clock Error	The correct time/date is no longer shown	• Re-enter time and date • If error occurs again contact factory
Cal Checksum Error	Calibration constants have been corrupted	Report error to factory
Setup Checksum Error	The unit's setup has been corrupted	Report error to factory

TEKTROL

www.tek-trol.com

Tek-Trol LLC

796 Tek Drive Crystal Lake,

IL 60014, USA

📞 +1 847-857-6076　　　✉ tektrol@tek-trol.com　　　🌐 www.tek-trol.com

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Flow | Level | Temperature | Pressure | Valves | Analyzers | Accessories | TekValSys