Model: HIT-4L
Liquid Flow Rate Indicator & Dual Totalizer with Modbus & Data Logging

USER’S MANUAL

HP- 329
August 2020

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1. P.O. number to cover the COST of the repair/calibration,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.
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1. INTRODUCTION

The HIT-4L is a microprocessor-based liquid flow rate indicator and totalizer with data logger and Modbus Communications Protocol. The instrument can accept a low-level signal from a magnetic type pickup coil, a DC pulse signal, contact closure or modulated carrier pickup (MCP/RF). Pulses from the signal input are converted into volume and rate values based on flowmeter calibration settings stored in the instrument. Temperature, pressure and viscosity compensation may be used to calculate corrected volume and mass flow. The total and flow rate are displayed on a two-line liquid crystal display (LCD). A 4-20 mA analog signal proportional to the flowrate is output on the current loop. The HIT-4L is configurable from the instrument front panel keypad or via Modbus communications.

Optional features include 20-point linearization to correct flow meter non-linearity, a Scaled Pulse Output and Alarm Output configurable for Rate or Total. An add-on printed circuit board provides additional inputs for temperature and pressure transmitters as well as 100 Ohm RTD.
Enclosure options include NEMA 4X, panel mount, IP66 rated aluminum and Ex d certified for hazardous areas. Most enclosure options may be wall mounted or directly mounted on a flowmeter using an optional riser.

This instrument is designed to conform to the EMC-Directive of the Council of European Communities 89/336/EEC and the following standards:

*Generic Emission Standard EN 61000-6-3*
  Residential, Commercial & Light Industry Environment.

*Generic Immunity Standard EN 61000-6-1*
  Residential, Commercial & Light Industry Environment.

*Electrostatic discharge requirements EN 61000-4-2*

*Radiated, radio-frequency, electromagnetic immunity EN 61000-4-3*

*Electrical fast transient/burst requirements EN 61000-4-4*

*Immunity to conducted disturbances EN 61000-4-6*
# Model Number Designation

## Model HIT-4( )

**Temperature and Pressure Compensated Gas Flow Rate Indicator & Dual Totalizer with Modbus® & Data Logging**

<table>
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<th>HIT-4( A )-( B )-( C )-( D )-( E )-( F )-( G )-( H )-( I )-( J )</th>
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### Type

**Model HIT-4( A )-( B )-( C )-( D )-( E )-( F )-( G )-( H )-( I )-( J )**

**Option ( A )**

- (L) LIQUID
- (G) GAS
- (U) UNCOMPENSATED

### Enclosure Style

**Model HIT-4( A )-( B )-( C )-( D )-( E )-( F )-( G )-( H )-( I )-( J )**

**Option ( B )**

- (2)* NEMA 4X ENCLOSURE (HIT-4U MOUNTED BEHIND ENCLOSURE)
- (3)* ALUMINUM CASTING POWDER COATED ENCLOSURE (IP66)
- (7)* STAINLESS STEEL ENCLOSURE (IP66)
- (P) PANEL MOUNT ENCLOSURE (IP40)
- (PD) PANEL MOUNT ENCLOSURE WITH CLEAR DOOR AND LOCK (IP40)
- (PF) PANEL MOUNT ENCLOSURE WITH CLEAR FLEXIBLE PVC COVER (IP65 FRONT ONLY)

* Options for Enclosure Style 3 and 7

- (M) M20 CONDUIT THREAD. (NOT ALLOWED FOR USE IN CANADA)
- (S) SUNSHADE

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HIT-4L

HP-329
4 Introduction

INPUT POWER
MODEL HIT-4(_)-(____)-(__)(C)-(____)-(____)-(___)-(__)-(__)-(___)
OPTION (C )
(B) BATTERY POWERED
NOTE: MAG ONLY, NO ANALOG, PULSE, OR ALARM
(L) 2-WIRE, 4-20MA LOOP POWERED 8-30VDC
NOTE: MAG ONLY, NO PULSE OR ALARM
(D) 12 TO 30 VDC POWERED
NOTE: 4-20MA ANALOG OUT INCLUDED
(AC) AC POWERED UNIVERSAL 100-240VAC @ 0.15A 50/60 HZ
NOTE: NOT AVAILABLE FOR Ex d CERTIFIED SYSTEMS 4-20MA ANALOG OUT INCLUDED

PULSE INPUT
MODEL HIT-4(_)-(____)-(__)(D)-(____)-(____)-(____)-(____)-(____)
OPTION (D )
(M) MAGNETIC COIL, DRY CONTACT
(R) ISOLATED PULSE, RPM, RPR, HALL EFFECT COILS
(RF) MODULATED CARRIER COIL

PULSE OUTPUT
MODEL HIT-4(_)-(____)-(__)-(E)-(____)-(____)-(____)-(____)-(____)
OPTION (E )
(5*) 0-5V TTL/CMOS
(OC*) OPEN COLLECTOR
* INSERT (R) FOR RAW FREQUENCY PULSE OUTPUT
NOTE: NOT AVAILABLE WITH (B) OR (L) POWER INPUTS

ALARM - WITH USER-DEFINED LEVELS FOR RATE AND/OR TOTAL
MODEL HIT-4(_)-(____)-(____)-(____)-(____)-(F)-(____)-(____)-(____)-(____)
OPTION (F )
(5) 0-5V TTL/CMOS
(OC) OPEN COLLECTOR
NOTE: NOT AVAILABLE WITH (B) OR (L) POWER INPUTS

COMPENSATION METHOD-TEMP/PRESSURE LIQ/GAS
MODEL HIT-4(_)-(____)-(____)-(____)-(___)-(G)-(____)-(____)-(____)
OPTION (G )
(X) NO COMPENSATION, ALWAYS USE X ON HIT-4U
DEFAULT TEMPERATURE / PRESSURE COMPENSATION ON HIT-4L
(TP1_) TEMPERATURE AND PRESSURE TRANSMITTER INPUTS (4-20MA)
(TP2_) 100 OHM RTD (DIN385) / PRESSURE TRANSMITTER INPUTS (4-20MA)
(-UVC) UNIVERSAL VISCOSITY CURVE CORRECTION
NOTE: ADD TO (TP1) OR (TP2) OPTIONS.

HP-329 HIT-4L
VISCOSITY COMPENSATION OPTION (UVC)
(_UVC) ADD (UVC) FOR UNIVERSAL VISCOSITY CURVE
NOTE: COMPENSATION (TP, TPZ) NOT AVAILABLE WITH (B) OR (L) POWER INPUTS

MOUNTING
MODEL HIT-4(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)(_)
OPTION (H)
(X) REMOTE MOUNTING
(FX) STYLE 3 OR 7 ENCLOSURES MOUNTED ON TURBINE. MUST BE USED WITH “X” RISER TURBINE OPTION.
(FXHT) 8” LONG TEMPERATURE RISER FOR STYLE 3 OR 7 ENCLOSURE MOUNTED ON TURBINE. REQUIRED WHEN TEMPERATURES EXCEEDS 140 DEG. F. MUST BE USED WITH “X” RISER TURBINE OPTION.
(F) NEMA 4X STYLE 2 ENCLOSURE MOUNTED ON TURBINE. MUST BE USED WITH “X” RISER TURBINE OPTION.
(FHT) 8” LONG TEMPERATURE RISER FOR NEMA 4X STYLE 2 ENCLOSURES MOUNTED ON TURBINE. REQUIRED WHEN FLUID TEMPERATURES EXCEED 140 DEG. F. USED WITH “X” RISER TURBINE OPTION.
(NP) NEMA 4X ENCLOSURE PIPE MOUNTING KIT 2” PIPE OR SMALLER. SPECIFY IF PIPE IS VERTICAL OR HORIZONTAL.

SYSTEM CERTIFIED MOUNTING OPTIONS FOR ENCLOSURE STYLE 3 AND 7:
(MX_) METER MOUNTED
NOTE: USED WITH “X” RISER, AND 1” X ¾” SS ADAPTER.
PROCESS TEMP -40°C TO +78°C.

(MA_) METER MOUNTED
NOTE: USE WITH A (X-ATEX) RISER.
PROCESS TEMP -40°C TO +78°C.

(RX_) REMOTE MOUNTED
NOTE: USE WITH “X” RISER. INCLUDES “E2” JUNCTION BOX AND 1” X 3/4” SS ADAPTER.

(RA_) REMOTE MOUNTED
NOTE: USE WITH A (X-ATEX) RISER. INCLUDES “E2” JUNCTION BOX.

UNION OPTIONS:
(___U1) OPTIONAL 1” MALE X 1” FEMALE EX-PROOF UNION
NOTE: USE WITH MX AND RX OPTIONS

(___U2) OPTIONAL 3/4” MALE X 3/4” FEMALE EX-PROOF UNION
NOTE: USE WITH MA AND RA OPTIONS
SYSTEM CERTIFIED EXPLOSION-PROOF RATINGS:
STYLE 3 & 7: CSA/FM: CLASS I DIV. 1, GR. C,D; CLASS II, DIV. 1, GR. E,F,G;
   CLASS III, T6; TYPE 4X;
   CLASS I ZONE 1 AEx db IIB, T6 Gb IP66
   ZONE 21 AEx tb IIIIC T80°C Db IP66
   Ex db IIB T6 Gb; Ex tb IIIIC T80°C Db; IP66
   - ATEX/IECEx:   II 2 G Ex db IIB T6 Gb; IP66
                   II 2 D Ex tb IIIIC T80°C Db; IP66

COMMUNICATION PORT
MODEL HIT-4-(____)-(____)-(____)-(____)-(____)-(____)-(____)
OPTION (I)
(T)* INTERNAL TERMINAL BLOCK
   RS485/MODBUS, DATA LOGGING, CONFIGURATION AND MONITORING
   RECOMMENDED FOR PERMANENT FIELD CONNECTION TO HIT-4X
   ALL ENCLOSURES
(U)* EXTERNAL USB STYLE CONNECTOR
   RS485/MODBUS FOR DATA LOGGING/CONFIGURATION
   NEMA 4X ENCLOSURE ONLY
(X) NONE

SPECIAL FEATURES
MODEL HIT-4(____)-(____)-(____)-(____)-(____)-(____)-(____)(J)
OPTION (J)
CE) CE MARK REQUIRED FOR EUROPE
(SP) ANY SPECIAL FEATURES THAT ARE NOT COVERED IN THE
     MODEL NUMBER USE A WRITTEN DESCRIPTION OF THE -SP.
(X) NO SPECIAL FEATURES
2. FEATURES AND SPECIFICATIONS

- LCD display for Total, Rate, Temperature and Pressure
- Non-resettable Grand Total
- Full front panel operation with magnetic pointer via Ex enclosure
- Up to 20-Point Linearization to correct for flowmeter non-linearity
- 4-20mA analog output proportional to flow rate
- Optional Scaled Pulse Output representing an incremental total volume
- Alarm Output with dual set point configurable for Rate or Total
- Magnetically operated switch for Total reset
- Internal battery pack backup
- Configuration and Grand Total stored in non-volatile memory. Total and Grand Total saved when pressing ►button.
- Data Logging: Hourly Total, Daily Total, Event Logs
- Modbus Communications Protocol via RS485
- Real Time Clock
- Up to 20-Point table for liquid density and viscosity
2.1 General

Display: LCD, updated every 1 seconds.

Total: 8 digits 3/8" high. Resettable using a magnet, a dry contact, from front panel keypad or via Modbus communications. Value is stored in non-volatile memory when pressing ►button.

Total Units: GAL, LIT, FT3, ACF, ACFx1000, M3, BBL, KG, LB, NM3, SCF, SCFx1000.

Grand Total: 8 digits 3/8" high, non-resettable. Value is stored in non-volatile memory when pressing ►button. Grand Total is displayed for 7 seconds after pressing the ▲ button.

Rate: 6 digits 1/2" high.

Rate Units: /SEC, /MIN, /HR, /DAY

K-factor: The pulses per unit of Total (e.g. pulses/gallon) are configurable in the range 0.001 to 9,999,999.

Linearization: 2-20 points.

Decimal Points: Decimal Point positions are configurable for 0, 0.0, 0.00, or 0.000 for rate, total and K-factor.

Accuracy: Total and Rate: ±0.01% of reading, ±1 Count

Density and Viscosity Compensation: 2-20 points
2.2 Flowmeter Inputs

**Magnetic Pickup:**
- Frequency Range: 0.2 Hz to 5000 Hz.
- Signal Level: 30 mV_P-P to 30 V_P-P.

**Opto-Isolated DC Pulse:**
- Frequency Range: 0 Hz to 3000 Hz.
- Signal Level: 0 to +DC pulse.
- Internal Pull-Up: 10 kΩ to +DC
- Low (Logic 0): < 1 VDC
- Min Pulse width: 0.1 msec

**Contact Closure:**
- Frequency Range: 0 Hz to 5000 Hz
- Internal Pull-up: 220 kΩ to +3.3 VDC

**Reset:**
- Signal Type: Contact closure
- Min Time On: 25 msec
- Internal Pull-up: 35 kΩ to +3.3 VDC

**MCP/RF Input**

2.3 Temperature and Pressure Inputs

**Temperature Input:**
- Type: *4-20 mA, 100Ω RTD (DIN385)
- Resolution: 12 bit

**Pressure Input:**
- Type: *4-20 mA
- Resolution: 12 bit
*4-20 mA input not available with battery power.

2.4 DC Power/Loop Powered

- Voltage: 8 to 30 VDC
- Current: < 24 mA
- Loop Burden: 8 VDC maximum
- Supply Backup: One C-size 3.6V lithium or battery pack for Ex system
- Protection: Reverse polarity protected
2.5 **Battery Powered Version**

- **Battery Type:** Two C-size 3.6 lithium battery or battery pack (4xAA) for Ex systems
- **Battery Life:** 2 years typical
- **Protection:** Reverse polarity protected
- **1 year typical – Ex system battery pack**

2.6 **Analog Output**

- **Scale:** 4 – 20 mA follows rate.
- **Accuracy:** 0.02% of Full Scale @ 20°C
- **Temperature drift:** 40 ppm/°C
- **Update Time:** 0.125 seconds
- **Protection:** Reverse polarity protected

2.7 **Pulse Output**

- **Type:** 0-5V TTL, Open collector (30 VDC, 100 mA)
- **Divider:** 0.01, 0.1, 1, 10, 100
- **Pulse Width:** Adjustable 4ms to 300ms
- **Max Frequency:** 100Hz

2.8 **Alarm Output with Dual Set Point**

- **Type:** 0-5V TTL, Open collector (30 VDC, 100 mA)
- **Function:** Rate or Total

2.9 **Serial Port RS485**

- **Protocol:** Modbus RTU
- **Function:** Data Logging, Configuration Process Monitor

2.10 **Data Logging**

- **Hourly Total Log:** 768
- **Daily Total Log:** 378
- **Event Log:** 345
- **Accessing Logs:** Via Modbus communication. Up to 100 latest logs are viewable on the front panel

2.11 **Physical**

- **Temperature:** Operating: -40°F (-40°C) to 158°F (70°C).
- **Humidity:** 0 – 90% Non-condensing.
- **Packaging:** Explosion proof (Approx. 5"x5"x5", 3 lbs.)
3. INSTALLATION

Warning: Do not open explosion-proof enclosure while circuits are powered in hazardous locations.

Field wiring connections

All field wiring connections should be made using shielded cables. The shield should be connected to the chassis ground lug on the HIT-4L enclosure. The shield on the opposite end of the cable should be left open. Connections are made to the HIT-4L terminal blocks using wire gauges 26-16 AWG, tightening Torque 0.22 to 0.25Nm.

Accessing terminal block connections

Ex Enclosure:

1. Loosen the locking set screw using a 1/16" hex key (Allen wrench) and unscrew the cover of the enclosure counter-clockwise until it separates from the body of the enclosure.

2. Remove two #4-40 x 3/8" pan head screws from the front panel by turning counter-clockwise.

3. Lift the display assembly from the enclosure. Terminal blocks are on the bottom.

NEMA Enclosure:

1. Loosen, by turning counter-clockwise, the screws in each corner of the enclosure cover to remove.

2. Remove four #4-40 thumb screws from the front panel by turning counter-clockwise.

3. Lift the display assembly from the enclosure. Terminal blocks are on the bottom.

Making connections to terminal blocks

1. Use a small flat blade screwdriver and turn counter-clockwise to loosen the proper terminal screw.

2. Insert wire (26-16 AWG) and turn terminal screw clockwise to tighten.

3. Lightly pull on wire to ensure proper connection.
Battery Powered with Magnetic Pickup

Battery Powered with Contact Closure
Loop Powered with Magnetic Pickup

Loop Powered with Contact Closure
14 Installation

DC Powered with Analog Output and RediPulse Pickup (0-5V/TTL)

DC Powered with Analog Output and RediPulse Pickup (Open Collector)
DC Powered (no analog output) with RediPulse Pickup (Open Collector)

* Jumper is required if 4-20mA is not connected

DC Powered (no analog output) with RediPulse Pickup (TTL)

* Jumper is required if 4-20mA is not connected
DC Powered with Analog Output and Magnetic Pickup

DC Powered with Analog Output and MCP/RF Pickup
DC Powered with Temperature and Pressure Transmitters

Two-Wire RTD Connection
RS485 Communications Port Wiring

Communication Kit P/N: 800-0483
Flowmeter Input

The flowmeter input accepts a low-level sinusoidal signal from a magnetic type pickup coil, contact closure or DC pulse signal. An optional circuit board (PCA193) provides an input that will accept a signal from MCP/RF type pickups. Switches 1,2,3,4,5,6 on SW-1 must be set according to the type of pickup coil to be used.

### SW-1 SWITCH SETTINGS FOR FLOWMETER INPUT OPTIONS

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<th>INPUT OPTION</th>
<th>PCA192</th>
<th>SW-1 SETTINGS</th>
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<td>Magnetic pickup</td>
<td>1,2,3 - ON</td>
<td>4,5,6 - OFF</td>
</tr>
<tr>
<td>Contact Closure</td>
<td>1,2,3 - ON</td>
<td>4,5,6 - OFF</td>
</tr>
<tr>
<td>RediPulse TTL</td>
<td>1,2,3,5 - OFF</td>
<td>4,6 - ON</td>
</tr>
<tr>
<td>RediPulse Open Collector</td>
<td>1,2,3,6 - OFF</td>
<td>4,5 - ON</td>
</tr>
<tr>
<td>*MCP/RF</td>
<td>1,2,3,6 - OFF</td>
<td>4,5 - ON</td>
</tr>
</tbody>
</table>

* PCA193 is required and J2 must be equipped for MCP/RF

### 3.1 4-20 mA Current Loop

When powered from a two-wire 4-20 mA current loop, a minimum supply voltage in the range of 8-30 Volts DC is required, depending on the loop load resistance. At nominal 250 Ohms loop resistance the minimum power supply is 13V.

Backup batteries are included to ensure that volume accumulation will not be interrupted during a power failure.
The HIT-4L outputs a 4-20mA analog signal that is proportional to the calculated flow rate. The 4mA and 20mA settings referred to as **OUT LO** and **OUT HI** respectively, may be configured from the front panel of the instrument or via Modbus communications.

### 3.2 Analog Output Update Time

The displayed Rate and Total are updated once per second. The analog output update time is 1/8 seconds. It takes about .25sec. to reach steady state due to a change in the input.

When flow stops the time for the display to reach 0 and for the analog output to return to 4 mA is between 0.25 and 8 seconds, depending on the Sample Time setting (SMPL T). With the default setting the time is 0.25 seconds.

Changing the SMPL T is only recommended for low flow applications where the input frequency is below 1 Hz. See Chapter 4 for more information on Sample Time.
3.3 Pulse Output

HIT-4L provides an optional Pulse Output factory configured for turbine raw frequency or scaled pulse. The scaled pulse outputs one pulse for the least significant digit of the displayed total. A scaling factor of 0.01, 0.1, 1, 10 or 100 is available to reduce or increase the resolution of the pulse output. For example, if the Total Decimal Point is set to 0000000.0, and the Pulse Scale is 1, then 1 pulse will be output for each tenth (0.1) of a unit of measure. Changing the Pulse Scale to 10, would result in an output pulse for each 1.0 unit of measure. The output must be scaled so that the pulse frequency does not exceed 100Hz at the maximum flow rate.

The pulse width can be configured between 4 and 300ms.

The Pulse Output may be configured as an Open Collector by removing J9 or 0-5V (TTL/CMOS) by installing J9.
3.4 Alarm Output

HIT-4L provides an optional Alarm Output configurable for Rate or Total. The Alarm Output can be configured as Low Alarm, High Alarm or Low/High.

Alarm Active – Output transistor is in OFF state
Alarm Not Active – Output transistor is in ON state

The Alarm Output may be configured as an Open Collector by removing J10 or 0-5V (TTL/CMOS) by installing J10.
3.5 Temperature and Pressure Inputs

HIT-4L provides inputs for temperature and pressure using an add-on printed circuit board PCA193. SW1 on PCA193 must be properly set according to the type of input being used.

<table>
<thead>
<tr>
<th>INPUT OPTION</th>
<th>PCA193 SW-1 SETTINGS</th>
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<tbody>
<tr>
<td>Temperature Transmitter</td>
<td>1 - ON 2 - ON</td>
</tr>
<tr>
<td></td>
<td>1 - OFF</td>
</tr>
<tr>
<td>RTD</td>
<td>1 - ON 2 - OFF</td>
</tr>
<tr>
<td>Pressure Transmitter</td>
<td>3, 4 - OFF 5, 6 - ON</td>
</tr>
</tbody>
</table>

Legend:
- Black square: ON
- White square: OFF
4. CONFIGURATION

The HIT-4L may be configured locally from the front panel, or remotely using Hoffer HIT-4 Communication program or a Modbus master. Front panel configuration may be done with magnetic pointer through the glass cover, or pressing front panel keys when cover is off. Do not remove cover in hazardous locations!

4.1 Local Configuration

- Enters Configuration Mode
- Steps through each menu item.
- Accepts entry when editing numeric values.
- Saves Totals in Operate Mode
- Scrolls through Menu Group
- Scrolls though all values for each menu item.
- Moves to the next digit to the right when editing numeric values.
- Displays Grand Total, Temperature and Pressure in Operate Mode
- Returns to Operate Mode from Menu Group level.
- Returns to Menu Group level from sub level menu.
- Increments digit when editing numeric values.
Examples of configuration steps to Clear Total, Set Total, and displaying software version:

1. **Operate Mode**
   - Enters Configuration Mode
   - Next Menu Item
2. **System Menu**
   - Next Menu Group
3. **Flow Menu**
   - Returns to Operate Mode
4. **Clear Total**
   - Next Option
5. **Flow Menu**
   - Next Menu Item
6. **Clear Total**
   - Accepts Selection
   - Done Clear Total
   - Next Menu Item
7. **Set Total**
   - Next Option
   - Next Digit
   - Increments Digit
8. **Set Total**
   - Accepts Selection
   - 10000000
   - Next Menu Item
9. **Software Version**
   - Next Menu Item
Configuration Menu Chart

System Menu
- Clear Total
- Set Total
- Software Version
- Date
- Time
- ID Number
- Password
- Lock Unit
- Sample Time
- Contract Hour
- Hourly log
- Daily Log

Flow Menu
- Turbine Serial #
- K Factor Method
- K Factor Decimal
- Average K Factor
- Flow Units
- Total Decimal
- Rate Units
- Rate Decimal
- Low Cut off Frequency
- Recal
- Number of points
- Frequency 2-20 points
- K Factor 2-20 points
- Pulse Function
- Pulse Scale
- Alarm Function
- Total Set Point
- Rate Low Set Point
- Rate High Set Point
- Modbus Menu
- Analog Function
- Out Low
- Out High
- Pulse Function
- Pulse Width
- Pulse Scale
- Alarm Function
- Total Set Point
- Rate Low Set Point
- Rate High Set Point
- Baud Rate
- Modbus Address
- Temp Input Type
- 4mA Temperature
- 20mA Temperature
- Default Temperature
- Reference Temperature
- 4mA Pressure
- 20mA Pressure
- Default Pressure
- Reference Pressure
- Default Density
- Reference Density
## Configuration Fields Description

### SYSTEM MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min Max Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLEAR</td>
<td>Clear Total and save new value (0) to EEPROM. Grand Total is non-resettable.</td>
<td>NO YES</td>
<td>N/A</td>
<td>NO</td>
</tr>
<tr>
<td>SETTOT</td>
<td>Set Total and save to EEPROM.</td>
<td>Numeric Entry</td>
<td>0 99999999</td>
<td>0</td>
</tr>
<tr>
<td>SW VER</td>
<td>Read-only displays HIT-4L software version.</td>
<td>N/a</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DATE</td>
<td>Current Date (mm-dd-yy)</td>
<td>mm-dd-yy</td>
<td>N/A</td>
<td>01-01-10</td>
</tr>
<tr>
<td>TIME</td>
<td>Current time in 24-hour format.</td>
<td>hh-mm-ss</td>
<td>N/A</td>
<td>23-00-00</td>
</tr>
<tr>
<td>ID NUM</td>
<td>HIT-4L Serial Number</td>
<td>Numeric Entry</td>
<td>0 99999999</td>
<td>1234567</td>
</tr>
<tr>
<td>PASSWD</td>
<td>Password</td>
<td>0000 – 9999</td>
<td>0000 9999</td>
<td>1234</td>
</tr>
<tr>
<td>LOCK</td>
<td>Password protected</td>
<td>NO (0) YES (1)</td>
<td>N/A</td>
<td>NO</td>
</tr>
<tr>
<td>SMPL T</td>
<td>Sample Time</td>
<td>1-80 80 (8 sec.)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>CONTHR</td>
<td>Contract Hour for daily logs</td>
<td>1-24</td>
<td>1</td>
<td>1 (1 AM)</td>
</tr>
<tr>
<td>HR LOG</td>
<td>Displays Hourly Logs</td>
<td>Incremental Scroll ►</td>
<td>1 (previous hour) 99</td>
<td>0 (current)</td>
</tr>
<tr>
<td>DAYLOG</td>
<td>Displays Daily Logs</td>
<td>Incremental Scroll ►</td>
<td>1 (yesterday) 99</td>
<td>0 (current)</td>
</tr>
</tbody>
</table>
## FLOW MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min Max Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TURBIN</td>
<td>Turbine serial #</td>
<td>Numeric Entry</td>
<td>0000000 9999999</td>
<td>1234567</td>
</tr>
<tr>
<td>K FACT</td>
<td>K Factor Method</td>
<td>Average Table Viscous</td>
<td>N/A</td>
<td>Average</td>
</tr>
<tr>
<td>KFAC D</td>
<td>The number of decimal places for the K-Factor. For Average K and K Factors in table.</td>
<td>0 0.0 0.00 0.000</td>
<td>N/A</td>
<td>0.000</td>
</tr>
<tr>
<td>AVG K</td>
<td>Average K Factor</td>
<td>Numeric Entry</td>
<td>0.001 9999999.9</td>
<td>1.000</td>
</tr>
<tr>
<td>C FACT</td>
<td>Flow and total multiplier</td>
<td>Numeric Entry</td>
<td>0.001 9999999.99</td>
<td>1.000</td>
</tr>
<tr>
<td>UNITS</td>
<td>Units of measure for flow. LB, KG, SCF, SCFx1000, and NM3 have K-Factors adjusted at fixed temperature and pressure</td>
<td>Gallons Barrels Liters LB KG ACF ACFx1000 SCF SCFx1000 M3 NM3</td>
<td>N/A</td>
<td>Gallons</td>
</tr>
<tr>
<td>TOTL D</td>
<td>Total Decimal Point</td>
<td>0 0.0 0.00 0.000</td>
<td>N/A</td>
<td>0.0</td>
</tr>
<tr>
<td>RATE</td>
<td>Time base for flow rate.</td>
<td>N/A</td>
<td>/sec /min /hour /day</td>
<td>/sec</td>
</tr>
<tr>
<td>RATE D</td>
<td>Rate Decimal Point</td>
<td>0 0.0 0.00 0.000</td>
<td>N/A</td>
<td>0.0</td>
</tr>
<tr>
<td>CUTOFF</td>
<td>Low flow frequency cutoff threshold in Hz.</td>
<td>Numeric Entry</td>
<td>0.000 100.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>
### TABLE MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min Max Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>RECAL</td>
<td>Restores K-Factor table to factory default values to allow entry of new calibration data.</td>
<td>NO YES</td>
<td>N/A</td>
<td>NO</td>
</tr>
<tr>
<td>POINTS</td>
<td>Number of points</td>
<td>2-20</td>
<td>2 20</td>
<td>10</td>
</tr>
<tr>
<td>FR 01</td>
<td>Frequency points 2 – 20. Follow monotonic and separation rules.</td>
<td>Numeric Entry</td>
<td>0.001 5000.000 Fr20 = 5000.000 Fr19 = 4999.999 Fr18 = 49999.998 ETC.</td>
<td></td>
</tr>
<tr>
<td>K 01</td>
<td>K factor points 2 - 20</td>
<td>Numeric Entry</td>
<td>0.001 9999999.9</td>
<td>1.000</td>
</tr>
</tbody>
</table>

### MODBUS MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min Max Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADDRESS</td>
<td>Modbus address</td>
<td>Numeric entry</td>
<td>000-254</td>
<td></td>
</tr>
<tr>
<td>BAUD</td>
<td>Baud rate for RS485</td>
<td>9600 *57600 *115200</td>
<td>N/A</td>
<td>9600</td>
</tr>
</tbody>
</table>

*Not currently supported.*
## OUTPUT MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALOG</td>
<td>Analog Out Function.</td>
<td>OFF RATE 4mA 12mA 20mA</td>
<td>N/A</td>
<td>OFF</td>
</tr>
<tr>
<td>OUT LO</td>
<td>4 mA setting in units selected for Total. OUT LO must be &lt; OUT HI.</td>
<td>Numeric Entry</td>
<td>0.000 999998</td>
<td>0.000</td>
</tr>
<tr>
<td>OUT HI</td>
<td>20 mA setting in units selected for Total. OUT HI must be &gt; OUT LO.</td>
<td>Numeric Entry</td>
<td>0.001 999999</td>
<td>100.000</td>
</tr>
<tr>
<td>PULSE</td>
<td>Pulse Function</td>
<td>OFF ON TEST</td>
<td>N/A</td>
<td>OFF</td>
</tr>
<tr>
<td>WIDTH</td>
<td>Pulse width in mS</td>
<td>Numeric Entry</td>
<td>4 ms 300 ms</td>
<td>4 ms</td>
</tr>
<tr>
<td>SCALE</td>
<td>Pulse Scale. This factor represents the number of output pulses per least significant digit of displayed total determined by the total decimal selection.</td>
<td>0.01 0.1 1 10 100</td>
<td>N/A</td>
<td>1</td>
</tr>
<tr>
<td>ALARM</td>
<td>Alarm function.</td>
<td>OFF RATE LO RATE HI RATE LOHI TOTAL TEST</td>
<td>N/A</td>
<td>OFF</td>
</tr>
<tr>
<td>TOTSET</td>
<td>Total alarm set point.</td>
<td>Numeric Entry</td>
<td>0.001 9999999</td>
<td>1000.00</td>
</tr>
<tr>
<td>LO SET</td>
<td>Rate alarm low set point.</td>
<td>Numeric Entry</td>
<td>0 9999999</td>
<td>10.00</td>
</tr>
<tr>
<td>HI SET</td>
<td>Rate alarm high set point.</td>
<td>Numeric Entry</td>
<td>0 9999999</td>
<td>100.00</td>
</tr>
</tbody>
</table>
### INPUT MENU

<table>
<thead>
<tr>
<th>Menu Item</th>
<th>Description</th>
<th>Options</th>
<th>Min</th>
<th>Max</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE T</td>
<td>Temperature Input Type</td>
<td>RTD 4-20mA</td>
<td>N/A</td>
<td>4-20mA</td>
<td>4-20mA</td>
</tr>
<tr>
<td>MIN T</td>
<td>4 mA Temperature</td>
<td>Numeric Entry</td>
<td>-450 F</td>
<td>999 F</td>
<td>0 F</td>
</tr>
<tr>
<td>MAX T</td>
<td>20 mA Temperature</td>
<td>Numeric Entry</td>
<td>-449 F</td>
<td>1000 F</td>
<td>100 F</td>
</tr>
<tr>
<td>DEF T</td>
<td>Default Temperature</td>
<td>Numeric Entry</td>
<td>-450 F</td>
<td>1000 F</td>
<td>68 F</td>
</tr>
<tr>
<td>REF T</td>
<td>Reference Temperature</td>
<td>Numeric Entry</td>
<td>-450 F</td>
<td>1000 F</td>
<td>68 F</td>
</tr>
<tr>
<td>MIN P</td>
<td>4 mA Pressure</td>
<td>Numeric Entry</td>
<td>0 psia</td>
<td>49999 psia</td>
<td>0 psia</td>
</tr>
<tr>
<td>MAX P</td>
<td>20 mA Pressure</td>
<td>Numeric Entry</td>
<td>1 psia</td>
<td>50000 psia</td>
<td>500 psia</td>
</tr>
<tr>
<td>DEF P</td>
<td>Default Pressure</td>
<td>Numeric Entry</td>
<td>0 psia</td>
<td>50000 psia</td>
<td>500 psia</td>
</tr>
<tr>
<td>REF P</td>
<td>Reference Pressure</td>
<td>Numeric Entry</td>
<td>0 psia</td>
<td>50000 psia</td>
<td>14.696 psia</td>
</tr>
<tr>
<td>DEF D</td>
<td>Default Density</td>
<td>Numeric Entry</td>
<td>0.001 lb/gal</td>
<td>100,000 lb/gal</td>
<td>1.0 lb/gal</td>
</tr>
<tr>
<td>REF D</td>
<td>Reference Density</td>
<td>Numeric Entry</td>
<td>0.0001 lb/gal</td>
<td>100 lb/gal</td>
<td>1.0 lb/gal</td>
</tr>
</tbody>
</table>

### 4.2 Default Configuration

HIT-4L is fully configured by the factory prior to shipment. When the instrument is purchased with a Hoffer Flowmeter or when calibration and configuration data are supplied, the instrument is configured as specified. When calibration or configuration data is not available, the instrument is shipped with default values. Refer to the above table for a listing of the HIT-4L factory default configuration.
5. OPERATION

5.1 Front Panel

The HIT-4L displays flow total and flow rate on a two-line liquid crystal display (LCD). The display is updated once per second. The 8-digit non-resettable Grand Total, Temperature and Pressure can be viewed on the top line by pressing the ▲ key.

5.2 Saving Total

Total and Grand Total can be saved at any time by pressing ► button. When changing the battery (see section 5.6 Battery Replacement), it is recommended to stop the flow and save Total prior to removing power from the unit.
5.3 Clearing the Total

The Flow Total may be cleared by using a magnetic pointer, a contact closure to power common on the RESET input terminal, from the front panel key, or via Modbus communications (See Chapter 6 Modbus Communications).

To clear the total using a magnetic pointer, slide the magnet slowly across the HIT-4 model name at the top of the front panel overlay.

To reset the total from the front panel keypad, use the following key sequence:

Press M  SYSTEM MENU is displayed
Press M  CLEAR NO is displayed
Press ▼  CLEAR YES is displayed
Press M  CLEAR DONE is displayed
Press ▲  To return to SYSTEM MENU
Press ▲  To return to operating mode

5.4 Displaying Logs

HIT-4L records up to 768 hourly logs, 378 daily logs and 345 event logs. Data logs can be read via Modbus. The newest 99 Hourly and Daily logs can be displayed on the front panel by accessing the Log Menu. Event logs can be read only via Modbus.

---

Logs Screen

000000234
01 deputies
34

Flow Total
Flow Time
Minutes for Hourly Logs
Hours for Daily Logs

Log Number
To access Hourly Logs

Press M 12 times
Press ► The last recorded log is displayed
Press ► Previous log is displayed
Press ▲ To return to SYSTEM MENU
Press ▲ To return to operating mode

To access Daily Logs

Press M 13 times
Press ► The last recorded log is displayed
Press ► Previous log is displayed
Press ▲ To return to SYSTEM MENU
Press ▲ To return to operating mode

5.5 Fault Conditions

The HIT-4L detects numerous system faults and sends error message via Modbus. (Refer to chapter 6. Modbus Communications.)

5.6 Battery Replacement

The HIT-4L monitors the battery voltage and displays LOW BAT on the LCD when the battery is approaching the end of its life (3V).

The Total and Grand Total are NOT saved automatically when power is removed from the HIT-4L.

When changing the battery, it is recommended to stop the flow and save Total prior to removing power from the unit.
6. MODBUS COMMUNICATIONS

HIT Com Software or a Modbus Master may be used to configure HIT-4L, monitor process variables and obtain diagnostic information from the HIT-4L.

Supported Commands

<table>
<thead>
<tr>
<th>Function Code (Hex)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03</td>
<td>Read holding registers</td>
</tr>
<tr>
<td>05</td>
<td>Preset Boolean (for Enron event record acknowledgement)</td>
</tr>
<tr>
<td>10</td>
<td>Write Commands</td>
</tr>
</tbody>
</table>

Data Types

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Byte Count</th>
<th>Register Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unsigned Int (U16)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Unsigned Int (U32)</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Floating Point (FP32)</td>
<td>4</td>
<td>*1 or 2</td>
</tr>
<tr>
<td>Double Precision Float (FP64)</td>
<td>8</td>
<td>*1 or 4</td>
</tr>
</tbody>
</table>

* The variables Rate, Total and Grand Total are available as single 32 or 64-bit registers as well as multiple 16-bit registers.

Registers

Each register is labeled as Read Only (RO) or Read/Write (R/W) according to access type.

<table>
<thead>
<tr>
<th>Register (Decimal)</th>
<th>Description</th>
<th>Data Type</th>
<th>Access</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Clear Event Logs</td>
<td>U16</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Clear Hourly Logs</td>
<td>U16</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Clear Daily Logs</td>
<td>U16</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Clear Grand Total</td>
<td>U16</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Clear Total</td>
<td>U16</td>
<td>RO</td>
<td>Send a read request to this register to clear Total</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------</td>
<td>-----------------</td>
<td>--------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>32</td>
<td>Request Event Logs</td>
<td>U16 (2)</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>700</td>
<td>Request Hourly Logs</td>
<td>FP32 (4)</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>701</td>
<td>Request Daily Logs</td>
<td>FP32 (4)</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>1002</td>
<td>Software Version</td>
<td>FP32</td>
<td>RO</td>
<td></td>
</tr>
<tr>
<td>1003</td>
<td>Device Type</td>
<td>U16</td>
<td>RO</td>
<td>0=4U, 1=4G, 2=4L</td>
</tr>
<tr>
<td>1005</td>
<td>Turbine Serial Number</td>
<td>U32</td>
<td>R/W</td>
<td>1 – 999999999</td>
</tr>
<tr>
<td>1006</td>
<td>Electronic ID Number</td>
<td>U32</td>
<td>R/W</td>
<td>1 – 999999999</td>
</tr>
<tr>
<td>1007</td>
<td>Password</td>
<td>U16</td>
<td>R/W</td>
<td>0000-9999</td>
</tr>
<tr>
<td>1008</td>
<td>Lock Unit</td>
<td>U16</td>
<td>R/W</td>
<td>0=No, 1=Yes</td>
</tr>
<tr>
<td>1009</td>
<td>Slave Address</td>
<td>U16</td>
<td>R/W</td>
<td>0-253</td>
</tr>
<tr>
<td>1010</td>
<td>Baud Rate</td>
<td>U16</td>
<td>R/W</td>
<td>0 = 9600, 1 = 57000, 2 = 115200</td>
</tr>
<tr>
<td>1011</td>
<td>Sample Time</td>
<td>U16</td>
<td>R/W</td>
<td>1-80</td>
</tr>
<tr>
<td>1013</td>
<td>Contract Hour</td>
<td>U16</td>
<td>R/W</td>
<td>1-24</td>
</tr>
<tr>
<td>1200</td>
<td>Year</td>
<td>U16</td>
<td>R/W</td>
<td>0-99</td>
</tr>
<tr>
<td>1201</td>
<td>Month</td>
<td>U16</td>
<td>R/W</td>
<td>1-12</td>
</tr>
<tr>
<td>1202</td>
<td>Day</td>
<td>U16</td>
<td>R/W</td>
<td>1-31</td>
</tr>
<tr>
<td>1203</td>
<td>Hour</td>
<td>U16</td>
<td>R/W</td>
<td>1-24</td>
</tr>
<tr>
<td>1204</td>
<td>Minute</td>
<td>U16</td>
<td>R/W</td>
<td>0-59</td>
</tr>
<tr>
<td>1205</td>
<td>Second</td>
<td>U16</td>
<td>R/W</td>
<td>0-59</td>
</tr>
<tr>
<td>2000</td>
<td>Total Units</td>
<td>U16</td>
<td>R/W</td>
<td>0=gal, 1=bbl, 2=L, 3=lb, 4=kg, 5=acf, 6=acf1000, 7=scf, 8=scf1000, 9=m3, 10=nm3</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------</td>
<td>-----------</td>
<td>--------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>2001</td>
<td>Total Decimal Point</td>
<td>U16</td>
<td>R/W</td>
<td>0-3</td>
</tr>
<tr>
<td>2003</td>
<td>Rate Time Base</td>
<td>U16</td>
<td>R/W</td>
<td>0=sec, 1=min, 2=hr, 3=day</td>
</tr>
<tr>
<td>2004</td>
<td>Rate Decimal Point</td>
<td>U16</td>
<td>R/W</td>
<td>0-3</td>
</tr>
<tr>
<td>2005</td>
<td>K-Factor Method</td>
<td>U16</td>
<td>R/W</td>
<td>0=Average, 1=Linear, 2=Viscosity</td>
</tr>
<tr>
<td>2006</td>
<td>Average K-Factor</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2007</td>
<td>Low Frequency Cutoff</td>
<td>U16</td>
<td>R/W</td>
<td>0-100 Hz</td>
</tr>
<tr>
<td>2008</td>
<td>K-Factor Number of Points</td>
<td>U16</td>
<td>R/W</td>
<td>2-20</td>
</tr>
<tr>
<td>2009</td>
<td>Correction Factor</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001 to 99999.999</td>
</tr>
<tr>
<td>2010</td>
<td>K-Factor Decimal Point</td>
<td>U16</td>
<td>R/W</td>
<td>0-3</td>
</tr>
<tr>
<td>2011</td>
<td>Frequency 1</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2013</td>
<td>Frequency 2</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2015</td>
<td>Frequency 3</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2017</td>
<td>Frequency 4</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2019</td>
<td>Frequency 5</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2021</td>
<td>Frequency 6</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2023</td>
<td>Frequency 7</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2025</td>
<td>Frequency 8</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2027</td>
<td>Frequency 9</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2029</td>
<td>Frequency 10</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2031</td>
<td>Frequency 11</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2033</td>
<td>Frequency 12</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
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<td>K-Factor 1</td>
<td>FP32</td>
<td>R/W</td>
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</tr>
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<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2041</td>
<td>K-Factor 4</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2043</td>
<td>K-Factor 5</td>
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<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
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<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2047</td>
<td>K-Factor 7</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
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<td>K-Factor 8</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2051</td>
<td>K-Factor 9</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2053</td>
<td>K-Factor 10</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
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<td>-------------------</td>
<td>-----------</td>
<td>--------</td>
<td>----------------------------------------</td>
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<tr>
<td>2055</td>
<td>K-Factor 11</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
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<td>K-Factor 12</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
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<td>Frequency 13</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2061</td>
<td>Frequency 14</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2063</td>
<td>Frequency 15</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2065</td>
<td>Frequency 16</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2067</td>
<td>Frequency 17</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2069</td>
<td>Frequency 18</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2071</td>
<td>Frequency 19</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2073</td>
<td>Frequency 20</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
</tr>
<tr>
<td>2075</td>
<td>K-Factor 13</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2077</td>
<td>K-Factor 14</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2079</td>
<td>K-Factor 15</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2081</td>
<td>K-Factor 16</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2083</td>
<td>K-Factor 17</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2085</td>
<td>K-Factor 18</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2087</td>
<td>K-Factor 19</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>2089</td>
<td>K-Factor 20</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
</tr>
<tr>
<td>4000</td>
<td>Pulse Function</td>
<td>U16</td>
<td>R/W</td>
<td>0=off, 1=on, 2=test</td>
</tr>
<tr>
<td>4001</td>
<td>Pulse Width (mS)</td>
<td>U16</td>
<td>R/W</td>
<td>4-300mS</td>
</tr>
<tr>
<td>4003</td>
<td>Pulse Scale</td>
<td>U16</td>
<td>R/W</td>
<td>0=0.01, 1=0.1, 2=1, 3=10, 4=100</td>
</tr>
<tr>
<td>4005</td>
<td>Analog Out Function</td>
<td>U16</td>
<td>R/W</td>
<td>0=off, 1=rate, 2=4mA, 3=12mA, 4=20mA</td>
</tr>
<tr>
<td>4007</td>
<td>Analog Out Low</td>
<td>FP32</td>
<td>R/W</td>
<td>0.000-999998</td>
</tr>
<tr>
<td>4009</td>
<td>Analog Out High</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-999999</td>
</tr>
<tr>
<td>4011</td>
<td>Alarm Function</td>
<td>U16</td>
<td>R/W</td>
<td>0=off, 1=rate lo, 2=rate hi 3=rat lohi, 4=total, 5=test</td>
</tr>
<tr>
<td>4012</td>
<td>Total Alarm Set Point</td>
<td>FP64</td>
<td>R/W</td>
<td>0.001-99999999</td>
</tr>
<tr>
<td>4013</td>
<td>Rate Alarm Low Set Point</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001- Max limited by rate decimal point selection: 999.999, 9999.99, 99999.9, 99999</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------</td>
<td>-----------</td>
<td>--------</td>
<td>-------</td>
</tr>
<tr>
<td>4014</td>
<td>Rate Alarm High Set Point</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001- Max limited by rate decimal point selection: 999.999, 9999.99, 99999.9, 99999</td>
</tr>
<tr>
<td>7000</td>
<td>Request Hourly Log Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>-1 (cleared logs) - 767</td>
</tr>
<tr>
<td>7001</td>
<td>Request Daily Log Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>-1 (cleared logs) - 383</td>
</tr>
<tr>
<td>7002</td>
<td>Request Event Log Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>0-344</td>
</tr>
<tr>
<td>7003</td>
<td>Request Date</td>
<td>FP32</td>
<td>RO</td>
<td>010100 - 123199</td>
</tr>
<tr>
<td>7004</td>
<td>Request Time</td>
<td>FP32</td>
<td>RO</td>
<td>000000 - 235959</td>
</tr>
<tr>
<td>7005</td>
<td>Request Grand Total</td>
<td>FP64</td>
<td>RO</td>
<td>0 – 999999999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>16-bit registers available at address 7056-7059 (FP64) and 7062-7063 (FP32)</strong></td>
</tr>
<tr>
<td>7006</td>
<td>Request Rate</td>
<td>FP32</td>
<td>RO</td>
<td>0 – Max limited by rate decimal point selection: 999.999, 9999.99, 99999.9, 99999</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>16-bit registers available at address 7050-7051</strong></td>
</tr>
<tr>
<td>7007</td>
<td>Request Daily Total</td>
<td>FP64</td>
<td>RO</td>
<td>0 – 999999999</td>
</tr>
<tr>
<td>7008</td>
<td>Request Daily Run Time Seconds</td>
<td>FP32</td>
<td>RO</td>
<td>0 – 86400</td>
</tr>
<tr>
<td>7009</td>
<td>Request Hourly Total</td>
<td>FP64</td>
<td>RO</td>
<td>0 – 999999999</td>
</tr>
<tr>
<td>7010</td>
<td>Request Hourly Run Time Seconds</td>
<td>FP32</td>
<td>RO</td>
<td>0 – 3600</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------------------------</td>
<td>-----------</td>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>7011</td>
<td>Request Current Total</td>
<td>FP64</td>
<td>R/W</td>
<td>0 – Max limited by total decimal point selection: 99999.999, 999999.99, 9999999.9, 99999999.99. This register is also used to clear total by writing 0 or set total by writing desired value. 16-bit registers available at address 7052-7055 (FP64) and 7060-7061 (FP32)</td>
</tr>
<tr>
<td>7013</td>
<td>Request Previous Day Total</td>
<td>FP64</td>
<td>RO</td>
<td>0 – 999999999</td>
</tr>
<tr>
<td>7014</td>
<td>Request Previous Day Run Time Seconds</td>
<td>FP32</td>
<td>RO</td>
<td>0 – 86400</td>
</tr>
<tr>
<td>7015</td>
<td>Request Previous Hour Total</td>
<td>FP64</td>
<td>RO</td>
<td>0 – 999999999</td>
</tr>
<tr>
<td>7016</td>
<td>Request Previous Hour Run Time Seconds</td>
<td>FP32</td>
<td>RO</td>
<td>0 - 3600</td>
</tr>
<tr>
<td>7018</td>
<td>Request Hourly Download Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>-1 (cleared logs) - 767</td>
</tr>
<tr>
<td>7019</td>
<td>Request Daily Download Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>-1 (cleared logs) - 383</td>
</tr>
<tr>
<td>7020</td>
<td>Request Event Log Download Pointer</td>
<td>FP32</td>
<td>R/W</td>
<td>-1 (cleared logs) – 344 (To increment by one, use function code 5)</td>
</tr>
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</table>

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<table>
<thead>
<tr>
<th>Register (Decimal)</th>
<th>Description</th>
<th>Data Type</th>
<th>Access</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7022</td>
<td>Fault History</td>
<td>U32</td>
<td>RO</td>
<td>Fault has occurred since last power on. Each bit represents a specific fault defined below.</td>
</tr>
<tr>
<td>7023</td>
<td>Active Faults</td>
<td>U32</td>
<td>RO</td>
<td>Fault is currently active. Each bit represents a specific fault defined below.</td>
</tr>
<tr>
<td>7050-7051</td>
<td>Request Rate</td>
<td>FP32</td>
<td>RO</td>
<td>Rate stored in two 16-bit registers</td>
</tr>
<tr>
<td>7052-7055</td>
<td>Request Current Total</td>
<td>FP64</td>
<td>RO</td>
<td>Current Total stored in four 16-bit registers. Total is reset by sending a read request to register 9.</td>
</tr>
<tr>
<td>7056-7059</td>
<td>Request Grand Total</td>
<td>FP64</td>
<td>RO</td>
<td>Grand Total stored in four 16-bit registers</td>
</tr>
<tr>
<td>7060-7061</td>
<td>Request Current Total</td>
<td>FP32</td>
<td>RO</td>
<td>Current Total stored in two 16-bit registers. Total is reset by sending a read request to register 9.</td>
</tr>
<tr>
<td>7062-7063</td>
<td>Request Grand Total</td>
<td>FP32</td>
<td>RO</td>
<td>Grand Total stored in two 16-bit registers</td>
</tr>
<tr>
<td>8000</td>
<td>Temperature Input Min (4 mA)</td>
<td>FP32</td>
<td>R/W</td>
<td>-450 F – 999 F</td>
</tr>
<tr>
<td>8001</td>
<td>Temperature Input Max (20 mA)</td>
<td>FP32</td>
<td>R/W</td>
<td>-449 F – 1000 F</td>
</tr>
<tr>
<td>8002</td>
<td>Temperature Default</td>
<td>FP32</td>
<td>R/W</td>
<td>-450 F – 1000 F</td>
</tr>
<tr>
<td>8003</td>
<td>Temperature Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>-450 F – 1000 F</td>
</tr>
<tr>
<td>8004</td>
<td>Pressure Input Min (4 mA)</td>
<td>FP32</td>
<td>R/W</td>
<td>0 psia – 49999 psia</td>
</tr>
<tr>
<td>8005</td>
<td>Pressure Input Max (20 mA)</td>
<td>FP32</td>
<td>R/W</td>
<td>1 psia – 50000 psia</td>
</tr>
<tr>
<td>8006</td>
<td>Pressure Default</td>
<td>FP32</td>
<td>R/W</td>
<td>0 psia – 50000 psia</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------------</td>
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<td>--------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>8007</td>
<td>Pressure Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>0 psia – 50000 psia</td>
</tr>
<tr>
<td>8009</td>
<td>Density Method</td>
<td>U16</td>
<td>R/W</td>
<td>Density Method: 0 = Default, 1 = Table</td>
</tr>
<tr>
<td>8010</td>
<td>Density Default</td>
<td>FP32</td>
<td>R/W</td>
<td>Default Density</td>
</tr>
<tr>
<td>8011</td>
<td>Density Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>0.0001 – 100.000</td>
</tr>
<tr>
<td>8012</td>
<td>Compressibility Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>0.0001 – 2.0</td>
</tr>
</tbody>
</table>
| 8013              | Compressibility Method           | U16       | R/W    | 0= Default Z  
1 = Z Table                                |
| 8014              | Default Z                        | FP32      | R/W    | 0.0001 – 2.0                               |
| 8015              | Temperature Input Source         | U16       | R/W    | 0= RTD  
1=Transmitter                                |
| 8016              | Calibrate RTD Low               | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8017              | Calibrate RTD High              | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8020              | Request Flow Temperature         | FP32      | RO     | Flowing Temperature                        |
| 8021              | Request Flow Pressure            | FP32      | RO     | Flowing Pressure                           |
| 8022              | Request Flow Density             | FP32      | RO     | Flowing Density                            |
| 8023              | Request Flow Compressibility     | FP32      | RO     | Flowing Z                                  |
| 8024              | Request Flow Viscosity           | FP32      | RO     | Flowing Viscosity                          |
| 8025              | Calibrate Temp Low              | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8026              | Calibrate Temp High             | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8027              | Calibrate Press Low             | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8028              | Calibrate Press High            | U16       | R/W    | Write 5000 to calibrate                   |
|                   |                                 |           |        | Read for A/D counts                        |
| 8029              | Temperature Units                | U16       | R/W    | 0 = Fahrenheit;  
1 = Celsius                                 |
| 8030              | Pressure Units                   | U16       | R/W    | 0 = PSIA, 1 = bar-a,  
2 = PSIG, 3 = bar-g                           |
| 8031              | Density Units                    | U16       | R/W    | 0 = lb/gal; 1 = kg/l                       |

* NOTE – The Total and Grand Total values are available in 3 formats:  
64-bit in a single register, 64-bit in four consecutive 16-bit  
registers and 32-bit in two consecutive 16-bit registers. The
64-bit format is recommended for greater precision, especially with values greater than 7-digits.

Fault Codes

The following table defines each bit for the fault codes returned when polling register 7022 and 7023 using function code 03. When a value of 1 is returned for a bit, it indicates that the fault has occurred since last power on (7022) or is currently active (7023).

<table>
<thead>
<tr>
<th>Bit</th>
<th>Fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Reset, brownout</td>
</tr>
<tr>
<td>1</td>
<td>Reset, reset pin</td>
</tr>
<tr>
<td>2</td>
<td>Reset, DoBOR</td>
</tr>
<tr>
<td>3</td>
<td>Reset, wakeup from LPM5</td>
</tr>
<tr>
<td>4</td>
<td>Reset, security violation</td>
</tr>
<tr>
<td>5</td>
<td>Reset, supply voltage supervisor low</td>
</tr>
<tr>
<td>6</td>
<td>Reset, supply voltage supervisor high</td>
</tr>
<tr>
<td>7</td>
<td>Reset, supply voltage monitor low</td>
</tr>
<tr>
<td>8</td>
<td>Reset, supply voltage monitor high</td>
</tr>
<tr>
<td>9</td>
<td>Reset, DoPOR</td>
</tr>
<tr>
<td>10</td>
<td>Reset, watchdog timer timeout</td>
</tr>
<tr>
<td>11</td>
<td>Reset, watchdog timer key violation</td>
</tr>
<tr>
<td>12</td>
<td>Reset, flash key violation</td>
</tr>
<tr>
<td>13</td>
<td>Reset, PLL unlock</td>
</tr>
<tr>
<td>14</td>
<td>Reset, peripheral/configuration area fetch</td>
</tr>
<tr>
<td>15</td>
<td>Reset, power management key violation</td>
</tr>
<tr>
<td>16</td>
<td>Low battery</td>
</tr>
<tr>
<td>17</td>
<td>Pulse output overflow</td>
</tr>
<tr>
<td>18</td>
<td>Alarm, rate low</td>
</tr>
<tr>
<td>19</td>
<td>Alarm, rate high</td>
</tr>
<tr>
<td>20</td>
<td>Alarm, total</td>
</tr>
<tr>
<td>21</td>
<td>Flash segment 1 invalid</td>
</tr>
<tr>
<td>22</td>
<td>Flash segment 2 invalid</td>
</tr>
<tr>
<td>23</td>
<td>Maximum input frequency exceeded</td>
</tr>
<tr>
<td>24</td>
<td>EEPROM read error on startup</td>
</tr>
<tr>
<td>25</td>
<td>Code execution error</td>
</tr>
<tr>
<td>26</td>
<td>Flow rate exceeds 20mA setting</td>
</tr>
<tr>
<td>27</td>
<td>Temperature Input Fail</td>
</tr>
<tr>
<td>28</td>
<td>Pressure Input Fail</td>
</tr>
<tr>
<td>29</td>
<td>Flash Segments Table Invalid</td>
</tr>
<tr>
<td>30</td>
<td>Spare 2</td>
</tr>
<tr>
<td>31</td>
<td>Spare 1</td>
</tr>
</tbody>
</table>
7. HIT-4 COMMUNICATION PROGRAM

Introduction
Hoffer’s HIT-4 Communication Program allows user to configure HIT-4 devices, monitor process variables, read data logs, and obtain diagnostic information from the HIT-4.

The program can be run without HIT-4 device connected to view and edit previously saved configuration files and data log files.

System Requirements
PC Windows XP, 7

Installation

Running the HIT-4 Communication Program
Connect HIT-4 device to a computer with either a RS-232 to RS-485 or USB to RS-485 converter.

HIT-4 port settings:

- Baud Rate = 9600
- Data Bits = 8
- Stop Bits = 1
- Parity = none.

The port settings are automatically selected by the program.

To start communication with the HIT-4:

1. Open the program by clicking on the HIT-4 icon on the desktop, or navigate the program file located at C:\Program Files (x86)\Hoffer Flow Controls\HIT-4 and double click on the file “Hit4Master.exe”. The “Com Port” screen will appear.

2. Enter HIT-4 slave address.

3. Click on the “Connect” button to establish connection to the HIT-4.

The connection status is displayed in the lower left corner.
4. If the HIT-4 is not connected or the PC serial port is not configured correctly, the following message will appear in the Communication Log window on the right side of the screen:

>HH:MM:SS AM OR PM: The PortName cannot be empty. Parameter name: PortName

Shut down the software, connect the HIT-4 to the PC and launch the HIT-4 Communication Program software.

5. If only the USB to Serial cable is attached to the PC, when the “Connect” button is clicked the following error will occur:

![Device is disconnected or not](image)

Click “OK”; connect HIT-4 to the USB to serial cable, click on the “Disconnect” and click “Connect”.

6. When communication is established with HIT-4 the Connecting to device widow will appear:

![Connecting to device](image)

Click “Yes” to read HIT-4 configuration information. Once the configuration has been successfully read, the following window will pop-up:

![Configuration has been read from](image)
Search for Connected Devices

If multiple HIT-4 devices are daisy chained together in a network, the Auto Search feature located on the “Com Port” screen provides the ability to search for all connected devices.

To select a device from a network perform the following:

- In the Auto Search enter a numeric value for “Start Address” and “Stop Address”.
- Click “Search for Devices”. The software will scan all addresses in the specified range and display all connect devices in the “Found Devices” field as well in the “Slave Address” drop down box.
- Select the desired device address from the “Slave Address” drop down box.
- Click on the “Connect” button to establish communication with the field device.
Configuration of the HIT-4

In order to configure the HIT-4 click on the “Configuration” menu selection that will open the “System Settings” page.

System Settings Page

ID Number:
Enter the HIT-4 serial number. Valid entries are 0 through 99999999

Password:
Enter desired numeric password. Valid entries are 0000 through 9999.

Lock Unit:
Determines whether unit is password protected. Selection options:
  No = not password protected
  Yes = password protected

Sample Time:
Set maximum time to hold the display and analog output. Valid entries are 1 to 80, where 80 represents 8.0 seconds.

Contract Hour:
Determines the time when the daily log begins. Valid entries are 1 to 24.

Set Total: Set Total to user defined value. Valid entries 0 to 99999999.
Flow Settings Page

The Flow Configuration screen is used to configure all parameters related to the flowmeter calibration.

**Turbine Serial #:**
Numeric entry of Flowmeter serial number. Valid entries 0000000 to 9999999

**Units:**
Units of measure for flow. Select Gal, BBL, L, LB, KG, ACF, ACFx1000, SCF, SCFx1000, M3 and NM3.

**Total Decimal:**
Sets location of the Total decimal point. Select 0, 1, 2 or 3.

**Rate Time:**
Selects the flow rate time base. Select sec, min, hour or day.

**Rate Decimal:**
Sets location of the Rate decimal point. Select 0, 1, 2 or 3.

**Cutoff Frequency:**
The frequency cutoff threshold in Hz. The HIT-4 will ignore an input frequency that is below this user entered value. Valid entries are 0.000 to 100.000.

**K-Factor Decimal:**
Sets location of the K-Factor decimal point. Select 0, 1, 2 or 3.
Table Points:
Set the number of points to be used for the linearization table. Valid entries are 2 to 20.

Average K-Factor:
Enter the average flowmeter K-Factor. Valid entries are 0.001 to 9999999.9.

Correction Factor:
Enter flow and total multiplier. Valid entries are 0.001 to 99999.999.

K-Factor Method:
Select flowmeter linearization method as “Average” (single K-Factor), “Linear” (2 to 20 point linearization table), or “Viscosity”.

K-Factor Units:
The K-Factor Units selection provides a way to enter calibration data in various units of measure. The units of measure must be selected prior to entering the K-Factors. When K-Factors are written to the device, they are converted to and stored in the base units pulses/gallon. The K-Factor Units parameter is provided for convenience and is not stored in the device.

Outputs Page
The Outputs Configuration screen is used to configure the Analog, Alarm and Pulse outputs.
Analog Output:
Drop down menu selection:
- Off: turns off analog out
- Rate: turn on analog output proportional to flow rate
- 4mA: sets output to 4mA for diagnostic testing
- 12mA: sets output to 12mA for diagnostic testing
- 20mA: sets output to 20mA for diagnostic testing

Out Low:
Sets flow rate value for 4mA output. Valid entries 0.000 to 999999

Out High:
Sets flow rate value for 20mA output. Valid entries 0.001 to 999999

Alarm Output:
Drop down menu selection:
- Off: turns off analog out
- Rate_low: sets low flow alarm
- Rate_high: sets high flow alarm
- Rate_lohi: sets low and high flow alarm
- Total: sets total alarm
- Test: sets alarm output for diagnostic testing

Low Set:
Sets flow rate value for low flow alarm. Valid entries 0 to 999999. Max value is determined by Rate Decimal selection.

High Set:
Sets flow rate value for high flow alarm. Valid entries 0 to 999999. Max value is determined by Rate Decimal selection.

Total Set Point:
Sets total alarm set point. Valid entries 0 to 99999999. Max value is determined by Total Decimal selection.

Pulse Output:
Drop down menu selection:
- Off: turns off pulse out
- On: turns on pulse out
- Test: outputs a test frequency of 1Hz, 50% duty cycle
Pulse Width:
Sets the pulse width in mS. Valid entries 4mS to 300mS.

Pulse Scale:
Pulse scaling that represents the number of output pulses per least significant digit of displayed total determined by the total decimal selection. Valid entries 0.01, 0.1, 1, 10 and 100.

Inputs Page
The Inputs Configuration screen is used to configure the Temperature and Pressure inputs and select the Reference Conditions.

Temperature Input Type:
Drop down menu selection:
   RTD:  100 Ohm, DIN385
   4-20mA: 4 to 20mA temperature transmitter

Temperature Units:
Drop down menu selection:
   C: Degrees Celsius
   F: Degrees Fahrenheit

Temperature Min:
Temperature value for 4mA input. Valid entries -450F to 999F (-267.8C to 537.2C).
**Temperature Max:**
Temperature value for 20mA input. Valid entries -449°F to 1000°F (-267.2°C to 537.8°C).

**Temperature Default:**
Select default temperature condition. Valid entries -450°F to 1000°F (-267.8°C to 537.8°C).

**Temperature Calibrate 4mA:**
Connect 4mA source to temperature input and press 4mA button to calibrate Min.

**Temperature Calibrate 20mA:**
Connect 20mA source to temperature input and press 20mA button to calibrate Max.

**Pressure Units:**
Drop down menu selection:
- PSIA
- BAR-A
- PSIG
- BAR-G

**Pressure Min:**
Pressure value for 4mA input. Valid entries 0 psia to 49999 psia (0 bar to 3447.3 bar).

**Pressure Max:**
Pressure value for 20mA input. Valid entries 1 psia to 50000 psia (0.069 bar to 3447.4 bar).

**Pressure Default:**
Select default pressure condition. Valid entries 0 psia to 50000 psia (0 bar to 3447.4 bar).

**Pressure Calibrate 4mA:**
Connect 4mA source to pressure input and press 4mA button to calibrate Min.

**Pressure Calibrate 20mA:**
Connect 20mA source to pressure input and press 20mA button to calibrate Max.
**Reference Temperature:**
Enter reference temperature in selected units.

**Reference Pressure:**
Enter reference pressure in selected units.

**Reference Density:**
Input reference density to be used for mass flow calculations.

**Reference Density Units:**
Drop down menu selection:
- LB/GAL
- KG/L

**Fluid Properties Table Page**
The Fluid Properties Table page is used to define fluid density and viscosity over the temperature and pressure ranges.

![Fluid Properties Table](image)

The buttons at the bottom of the page are used to:
- Load table from liquid properties file
- Save to file
- Upload from the device
- Download to the device
Reference Density:
Enter the liquid density at reference conditions.

Default Density:
Enter the liquid density at nominal operating conditions.

Configuration Files
HIT-4 Communication Program Software allows the configuration of the device to be saved as a text file for future use. Configuration files may be saved from any of the configuration screens. The two available file functions are:

File Open:
Opens a previously saved configuration file. File format is *.txt.

File Save:
Saves the configuration as a text file.

Download the Configuration
Once all the required parameters have been programmed, the configuration may be downloaded to the HIT-4 by clicking on the “Download” button located on the bottom of any of the configuration screens.

Note: As each configuration parameter is entered, the parameter is automatically sent to the HIT-4.

Upload the Configuration
Clicking of the “Upload” button located on the bottom of any of the configuration screen will read the configuration data from the unit.

Printing Configuration Files
The configuration may be printed by clicking on the “Print” button located on the bottom of any of the configuration screens.

When the “Print” button is clicked on, the user has the option to select a printer for printing or saving the configuration as a text file.
**Process Monitor**

The Process Monitor screen allows the user to monitor the process flow variables such as Flow Total, Grand Total, Flow Rate, Temperature, Pressure and Compressibility. These variables can be read once or automatically updated on a user defined time interval by clicking the Start Auto Update button.

**Flow Readings Update:**
Clicking on the “Update” button will read and display the “Flow Total”, “Grand Total”, “Flow Rate”, “Current Day Total”, “Previous Day Total”, "Temperature", "Pressure", "Density", and "Viscosity".

**Refresh Rate (sec):**
Sets update rate in seconds when the Flow Readings are taken in the automatic update mode.
**Start Auto Update:**
Click on the “Start Auto Update” button to have the HIT-4 software auto poll the selected device and in real time to update the “Flow Total”, “Grand Total”, “Flow Rate”, “Current Day Total”, and “Previous Day Total”, "Temperature", "Pressure", "Density", and "Viscosity".

**Stop Auto Update:**
Click on the “Stop Auto Update” stops auto updating.

**Faults**

HIT-4 self-diagnostic function records the following fault conditions:

- Power Reset
- Low battery
- Pulse output overflow
- Alarm, rate low
- Alarm, rate high
- Alarm, total
- Flash segment 1 invalid
- Flash segment 2 invalid
- Maximum input frequency exceeded
- EEPROM read error on startup
- Code execution error
- Flow rate exceeds 20mA setting
- Temperature Input Fail
- Pressure Input Fail
- Flash Segments Table Invalid

The fault conditions are reported on the Process Monitor page. Faults currently active are displayed in the “Active” window. Faults that have occurred in the past, since the last power reset, are displayed in the “Since Power On” window. The numerical code displayed above each window is used for factory diagnostics.
Data Logs

The HIT-4 records flow data into hourly and daily logs. Each log entry contains a Date/Time stamp, Total Flow and Run Time. The Run Time is the duration of flow in seconds recorded during the log interval. The maximum Run Time for an hourly log is 3600 and 86400 for a daily log. The data can be viewed in tabular, graph, save to file, print logs, and to export log data into an Excel spreadsheet. In addition the Event log allows the user to identify changes to the configuration parameters.

The Flow Logs and Event Log can be downloaded from the HIT-4 by clicking on the “Logs” in the menu bar.

The “New Data Logs” field will display the number of new “Hourly Logs”, “Daily Logs” and “Event Log”.

Logs are downloaded by clicking on the drop down “Select Log” box, and selecting the desired log to be downloaded. Once the selection has been made, either click on the “Download New” or “Download All” menu options.
For example; the desired log to be downloaded is the Hourly Log. Select Hourly Log from the drop down selection box and click on “Download All”. The following screen will be generated:

From this screen, the user will be able to save the log, export log to Excel for printing or saving, clear the log, mark records as being read and use the graph for analyzing the flow volume trends.

Records can be selected either individually or in multiples to be marked as read. Individual records can be selected by clicking on the furthest left hand column. Multiple records can be selected by clicking on the first and last desired records to be marked as read. Selected record(s) will be highlighted in blue.

Clicking on the “Mark as Read” menu selection will mark all highlighted records as read, and change the new data logs status.
8. MAINTENANCE

Batteries require periodic replacement, and battery life depends on whether battery power is the primary or secondary power source.

All configuration settings are stored in nonvolatile memory; therefore, configuration settings will not be lost in the event of battery failure.

Lithium Battery Replacement

⚠️ **WARNING:** To prevent ignition of hazardous atmospheres, do not remove the cover unless the area is void of combustible gas and vapors. Replace the batteries only with battery pack part number 100-2732 for Ex d certified systems.

⚠️ **WARNING:** The lithium battery that powers the HIT-4L is a sealed unit; however, should Lithium batteries develop a leak, toxic fumes could escape upon opening the enclosure. Ensure that the instrument is in a well-ventilated area before opening the enclosure to avoid breathing fumes trapped inside the enclosure. Exercise caution in handling and disposing of spent or damaged batteries.

**Important:** Before replacing the lithium battery press the ► key to save the Total and Grand Total to nonvolatile memory. Once the battery is replaced and power is restored to the unit, the last saved Total will be displayed.

The lithium battery is secured inside the enclosure by a Velcro strap and connected to a connector (J3) near the top of the circuit assembly.

To replace a lithium battery in the HIT-4, perform the following steps:

**Ex Enclosure:**

1. Loosen the cover set screw and unscrew the cover of the enclosure counter-clockwise until it separates from the main body of the enclosure.

2. Using a small standard blade screwdriver, remove the two #4-40 screws located to the right and left side of the LCD display.
3. Lift the display/keypad assembly from the enclosure, making sure the circuit assembly does not contact the enclosure.

4. Loosen the Velcro strap, disconnect the battery from the J3 connector on the circuit assembly, and remove the battery from the enclosure.

5. Install the new battery in the enclosure in the same position as the original battery, and secure the Velcro tightly around the battery.

6. Connect the replacement battery to the J3 connector.

7. Place the circuit assembly over the standoffs and fasten with the two #4-40 screws, ensuring that all connector wiring is inside the enclosure.

8. Replace the enclosure cover, threading it onto the enclosure in a clockwise direction.

**NEMA Enclosure:**

1. Loosen, by turning counter-clockwise, the screws in each corner of the enclosure cover to remove.

2. Remove four #4-40 thumb screws from the front panel by turning counter-clockwise.

3. Lift the display assembly from the enclosure.

4. Loosen the Velcro strap, disconnect the battery from the J3 connector on the circuit assembly, and remove the battery from the enclosure.

5. Install the new battery in the enclosure in the same position as the original battery, and secure the Velcro tightly around the battery.

6. Connect the replacement battery to the J3 connector.

7. Replace the display assembly and enclosure cover.

**Important:** The interruption of power to the HIT-4 will cause the internal clock time to be inaccurate. After replacing the battery, set the date and time via the HIT-4 Communication Program or use the front panel keys.

Battery shelf life is estimated at 10 years at a storage temperature of 25° C.
APPENDIX A

DECLARATION OF CONFORMITY

EU Declaration of Conformity – HIT-4 Flow Rate Indicator/Totalizer

Manufacturer: Hoffer Flow Controls Inc, 107 Kitty Hawk Ln, Elizabeth City, NC 27909

Equipment: Flame Proof Flow Rate Indicator/Totalizer


NOTE: “X” in Model number may be any combination of numbers and characters representing specific options.

Marking: With Aluminum Explosion Proof Enclosure

Canada/US:
Class I, Division 1, Groups CD; Class II, Division 1, Groups E,F,G; Class III; T6 Type 4X;
Ex db IIB T6; Gb; Ex tb IIIC T80°C Db; IP66;
Class I, Zone 1, AEx db IIB T6; Gb; Zone 21, AEx tb IIIC T80°C Db; IP66;

ATEX/IECEX:
II 2 G Ex db IIB T6 Gb
II 2 D Ex tb IIIC T80°C Db IP66
T1-T6 = -40°C to +78°C

Seal within 50mm of enclosure.

2/13/2018
We hereby declare that the product, which is subject of this declaration, is in conformity with the following standards:


EC-Type Examination Certificate and IECEx Certificate issued by:
TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln
Country: Germany
Notified Body Number: 0035

CSA-Type Examination Certification issued by:
CSA Group Testing & Certification Inc.
Edmonton, AB, Canada T6N 1E6

2/13/2018
APPENDIX B

INSTALLATION DRAWINGS AND CONDITIONS
FOR SAFE USE FOR CERTIFIED SYSTEMS
ATEX/IECEx INSTALLATION INSTRUCTIONS

1. THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES AND VAPORS FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS AS FOLLOWS
   HIT-4 Ex e IIC T6 70°C Ex e II 1G T70°C Ex e 1G

2. THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF
   −40°C TO 70°C FOR 71 T SERIES
   −40°C TO 70°C FOR 71 T SERIES FOR HIT-4 SERIES

3. WHEN PROCESS TEMPERATURES ARE OUTSIDE THE MAXIMUM OR MINIMUM TEMPERATURE
   SPECIFIED BELOW, THE FLOWMETER/TOTALIZER WILL BE MOUNTED AWAY FROM THE FLOWMETER.
   HIT-4 SERIES: PROCESS TEMPERATURE < −40°C OR > 70°C

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE
   APPLICABLE CODES OF PRACTICE, NAMELY IEC 60079-16.

5. INSTRUMENT ENCLOSURE IS PURCHASED WITH A COMBINATION LOCKING 3/4" NPT CONDUIT ENTRANCE.

6. TIGHTEN THE COVER LOCKING SCREW TO PREVENT THE COVER FROM LOOSENING UNDER VIBRATION.

CONDITIONS FOR SAFE USE: ATEX/IECEx

1. DO NOT REMOVE THE COVER UNLESS AREA IS FREE OF COMBUSTIBLE GAS OR VAPORS.

2. SELECT AN INSTALLATION LOCATION SO THAT THE ENCLOSURE WILL NOT BE SUBJECTED TO IMPACT BY HEAVY OBJECTS.

3. ALL VALVED CONDUIT ENTRANCES MUST BE PLUGGED.

4. ALL CABLE CONDUIT ENTRANCE PLUGS MUST BE CERTIFIED

5. CONDUIT ENTRANCE MUST BE SEALED AT THE ENCLOSURE WALL.

MARKING HIT-4

Ex e IIC T6 70°C Ex e 1G T70°C Ex e 1G

Note: Flowmeter process fittings available options: 3/4" NPT, Flanged, Grooved and welded.
ATEX/IECEx INSTALLATION INSTRUCTIONS

1. THE EQUIPMENT IS SUITABLE FOR USE IN THE PRESENCE OF FLAMMABLE GASES AND VAPORS, FOR USE INDOORS OR OUTDOORS IN HAZARDOUS LOCATIONS AS FOLLOWS:
   - Ex d IIA T120°C; Ex e IIC T70°C; Ex p IIB T90°C; Ex e IIA T130°C
   - Ex d IIA T120°C; Ex e IIC T70°C; Ex p IIB T90°C

2. THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF:
   - EX d TYPE: -40°C TO 70°C FOR HRT-4 SERIES
   - EX e TYPE: -40°C TO 70°C FOR HRT-4 SERIES
   - EX p TYPE: -40°C TO 70°C FOR HP-329 SERIES
   - HP-329 SERIES PROCESS TEMPERATURE: -40°C TO 70°C
   - HRT-4 SERIES PROCESS TEMPERATURE: -40°C TO 70°C

3. WHEN PROCESS TEMPERATURES ARE OUTSIDE THE RANGE OF THE NOMINAL TEMPERATURE AS SPECIFIED ABOVE, THE RATE TEMPERATURE WILL BE INDICATED TO THE OPERATOR USING AN INSTRUMENT.

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODE OF PRACTICE, (E.G., IEC 60079-16).

5. INSTRUMENT ENCLOSURES ARE EQUIPPED WITH 3/4" NPT CONDUIT ENTRIES.

6. TRIM THE COVER LOCKING SCREW TO PREVENT THE COVER FROM LOSING UNDER VIBRATION.

CONDITIONS FOR SAFE USE: ATEX/IECEx

1. DO NOT REMOVE THE COVER OR EXPOSE THE AREA TO CONTACT WITH COMBUSTIBLE GAS OR VAPORS.
2. SELECT AN INSTALLATION LOCATION SO THAT THE ENCLOSURE WILL NOT BE SUBJECT TO IMPACT BY HEAVY OBJECTS.
3. ALL CONDUIT ENTRANCE DEVICES MUST BE PLUGGED.
4. ALL CABLE/CONDUIT ENTRANCE DEVICES MUST BE PLUGGED.
5. BLANKING PLUGS MUST BE CERTIFIED BY A PLUG.

3/4" NPT END

HITTER/HIT-4

NOTE: AVAILABLE CONDUIT ENTRIES AND PLUGS FOR INSTALLATION OF NPT, FLANGED, GROOVED AND WAVER. HOFFER FLOW CONTROLS, INC.

ELECTRIC CITY, NC 27909

INSTALLATION DWG. ATEX/IECEx

Ex d CERTIFIED XD-IWEN HRT-1/HIT-4

CERTIFIED NO. 0954

HIT4-913 B 04-10-96

180326