Model: HIT-4G

Gas Flow Rate Indicator & Dual Totalizer
With Modbus & Data Logging

USER’S MANUAL

HP- 328
August 2020

HOFER
Flow Controls

Perfecting Measurement™

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Please review the complete model number of each item to be connected and locate the appropriate manual(s) and/or drawing(s). Identify all model numbers exactly before making any connections. A number of options and accessories may be added to the main instrument, which is not shown on the basic user wiring. Consult the appropriate option or accessory user manual before connecting it to the system. In many cases, a system wiring drawing is available and may be requested from Hoffer Flow Controls.

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HFC 9907-B
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FOR NON-WARRANTY REPAIRS OR CALIBRATIONS, consult HOFFER FLOW CONTROLS for current repair/calibration charges. Have the following information available BEFORE contacting HOFFER FLOW CONTROLS:

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-4G is a microprocessor-based gas 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 compressibility 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-4G 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

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

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</tbody>
</table>

OPTION ( A )

(G)  GAS
(U)  UNCOMPENSATED

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

HIT-4G
4 Introduction

INPUT POWER
MODEL HIT-4(_)(_)-(C)-(D)-(E)-(F)-(G)-(H)-(I)-(J)
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)-(E)-(F)-(G)-(H)-(I)-(J)
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)-(F)-(G)-(H)-(I)-(J)-(K)
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)-(G)-(H)-(I)-(J)-(K)-(L)
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)-(H)-(I)-(J)-(K)-(L)-(M)
OPTION (G)
(X) NO COMPENSATION, ALWAYS USE X ON HIT-4U
DEFAULT TEMPERATURE / PRESSURE COMPENSATION ON HIT-4G
(TP1_) TEMPERATURE AND PRESSURE TRANSMITTER INPUTS (4-20MA)
(TP2_) 100 OHM RTD (DIN385) / PRESSURE TRANSMITTER INPUTS (4-20MA)

HP-328 HIT-4G
COMPRESSIBILITY OPTION

(_Z) ADD (Z) COMPRESSIBILITY SOFTWARE FOR GAS APPLICATIONS EXCEEDING 50 PSIG. AT Pressures ABOVE 50 PSIG THE ERROR DUE TO COMPRESSIBILITY WOULD BE GREATER THAN ± 1.0%

NOTE: COMPENSATION (TP, TPZ) NOT AVAILABLE WITH (B) OR (L) POWER INPUTS

MOUNTING

MODEL HIT-4(____)(____)(____)(____)(____)(____)(____)(____)(__H)(____)(____)

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 ¼” 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 IIIC T80°C Db IP66  
- Ex db IIB T6 Gb; Ex tb IIIC T80°C Db; IP66

- ATEX/IECEx:  
  - II 2 G Ex db IIB T6 Gb; IP66  
  - II 2 D Ex tb IIIC T80°C Db; IP66

**COMMUNICATION PORT**

**MODEL HIT-4-(__)-(__)-(__)-(__)-(__)-(__)-(__)-(__)-(__)**

**OPTION (T)**  
- INTERNAL TERMINAL BLOCK  
- RS485/MODBUS, DATA LOGGING, CONFIGURATION AND MONITORING  
- RECOMMENDED FOR PERMANENT FIELD CONNECTION TO HIT-4X ALL ENCLOSURES

**OPTION (U)**  
- EXTERNAL USB STYLE CONNECTOR  
- RS485/MODBUS FOR DATA LOGGING/CONFIGURATION  
- NEMA 4X ENCLOSURE ONLY

**OPTION (X)**  
- NONE

**SPECIAL FEATURES**

**MODEL HIT-4(__)(__)(__)(__)(__)(__)(__)(__)(__)(__)**

**OPTION (J)**  
- CE)  
  - CE MARK REQUIRED FOR EUROPE

**OPTION (SP)**  
- ANY SPECIAL FEATURES THAT ARE NOT COVERED IN THE MODEL NUMBER USE A WRITTEN DESCRIPTION OF THE -SP.

**OPTION (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
- AGA-8 Compliant
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, SCF x1000.

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
2.2 Flowmeter Inputs

**Magnetic Pickup:**
- Frequency Range: 0.2 Hz to 5000 Hz.
- Signal Level: 30 mV<sub>P.P</sub> to 30 V<sub>P.P</sub>.

**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 battery pack for Ex systems
- 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
1 year typical – Ex system battery pack
Protection: Reverse polarity protected

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-4G enclosure. The shield on the opposite end of the cable should be left open. Connections are made to the HIT-4G 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.
Loop Powered with Magnetic Pickup

Loop Powered with Contact Closure
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

<table>
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<tr>
<th>INPUT OPTION</th>
<th>PCA192 SW-1 SETTINGS</th>
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<tbody>
<tr>
<td>Magnetic pickup Contact Closure</td>
<td>1,2,3 - ON 4,5,6 - OFF</td>
</tr>
<tr>
<td>RediPulse TTL</td>
<td>1,2,3,5 - OFF 4,6 - ON</td>
</tr>
<tr>
<td>RediPulse Open Collector *MCP/RF</td>
<td>1,2,3,6 - OFF 4,5 - ON</td>
</tr>
</tbody>
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* 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-4G outputs a 4-20mA analog signal that is proportional to the calculated flow rate. The 4mA and 20mA settings referred to as \texttt{OUT LO} and \texttt{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 0.25sec. 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-4G 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-4G 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-4G 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>
</tr>
</thead>
</table>
| Temperature Transmitter | 2 - ON  
1 - OFF             |
|                       | ![Temperature Switch Position](image) |
| RTD                   | 1 - ON  
2 - OFF             |
|                       | ![RTD Switch Position](image) |
| Pressure Transmitter  | 5, 6 - ON  
3, 4 - OFF          |
|                       | ![Pressure Switch Position](image) |
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4. CONFIGURATION

The HIT-4G 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 through 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:
Configuration Menu Chart

System Menu → Flow Menu → Table Menu → Output Menu → Modbus Menu → Input Menu

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

- Recal
- K Factor Method
- Number of points
- Frequency 2-20 points
- Average K Factor
- K Factor 2-20 points
- Out Low
- Out High
- Pulse Function
- Pulse Width
- Pulse Scale
- Alarm Function
- Total Set Point
- Rate Low Set Point
- Rate High Set Point

- Temp Input Type
- Temp Input
- 4mA Temperature
- 20mA Temperature
- Default Temperature
- Reference Temperature
- 4mA Pressure
- 20mA Pressure
- Default Pressure
- Reference Pressure
- Reference Density

- Turbine Serial #
- Number of points
- K Factor
- Method
- Frequency
- Out
- Low
- Baud Rate
- Modbus Address
- Analog Function
- Modbus

- Analog Function
- Modbus Address
- 4mA Temperature
- 20mA Temperature
- Default Temperature
- Reference Temperature
- 4mA Pressure
- 20mA Pressure
- Default Pressure
- Reference Pressure
- Reference Density

- 2-20 points
- Out
- High

- 4mA
- 20mA
- Default
- Reference
- Density

- Software
- Version
- Date
- Time
- ID Number
- Password
- Lock Unit
- Sample Time
- Contract Hour
- Hourly log
- Daily Log

- Temperature
- 4mA
- 20mA
- Pressure
- Reference

- Pressure
- 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-4G 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-4G 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</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 9999999.9</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>/sec /min /hour /day</td>
<td>N/A</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 NO</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</td>
<td>Fr20 = 5000.000 Fr19= 4999.999 Fr18 = 49999.998 ETC.</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>ADDRSS</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 9600</td>
<td></td>
</tr>
</tbody>
</table>

*Not currently supported.*
## OUTPUT 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>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 999999</td>
<td>1000.00</td>
</tr>
<tr>
<td>LO SET</td>
<td>Rate alarm low set point.</td>
<td>Numeric Entry</td>
<td>0 999999</td>
<td>10.00</td>
</tr>
<tr>
<td>HI SET</td>
<td>Rate alarm high set point.</td>
<td>Numeric Entry</td>
<td>0 999999</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 Value</th>
<th>Max Value</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>TYPE T</td>
<td>Temperature Input Type</td>
<td>RTD</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</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</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</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</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</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</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</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</td>
<td>0 psia</td>
<td>50000 psia</td>
<td>14.696 psia</td>
</tr>
<tr>
<td>REF D</td>
<td>Reference Density</td>
<td>Numeric</td>
<td>0.0001 lb/ft3</td>
<td>100 lb/ft3</td>
<td>1.0 lb/ft3</td>
</tr>
<tr>
<td>REF Z</td>
<td>Reference Compressibility</td>
<td>Numeric</td>
<td>0.0001</td>
<td>2.000</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### 4.2 Default Configuration

HIT-4G 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-4G factory default configuration.
5.  OPERATION

5.1  Front Panel

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

5.6 Battery Replacement

The HIT-4G 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-4G.

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-4G, monitor process variables and obtain diagnostic information from the HIT-4G.

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>32</td>
<td>Request Event Logs</td>
<td>U16 (2) FP32 (4)</td>
<td>RO</td>
<td></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>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=acf x 1000, 7=scf, 8=scf x 1000, 9=m3, 10=nm3</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>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------</td>
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<td>2004</td>
<td>Rate Decimal Point</td>
<td>U16</td>
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<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</td>
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<tr>
<td>2006</td>
<td>Average K-Factor</td>
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<td>R/W</td>
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<tr>
<td>2007</td>
<td>Low Frequency Cutoff</td>
<td>U16</td>
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<td>K-Factor Number of Points</td>
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<td>R/W</td>
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<td>R/W</td>
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</tr>
<tr>
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</tr>
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<td>R/W</td>
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<td>2031</td>
<td>Frequency 11</td>
<td>FP32</td>
<td>R/W</td>
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<td>Frequency 14</td>
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<td>FP32</td>
<td>R/W</td>
<td>0.001-5000.000</td>
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<td>Data Type</td>
<td>Access</td>
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<td>R/W</td>
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<td>R/W</td>
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<td>K-Factor 18</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
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<td>FP32</td>
<td>R/W</td>
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</tr>
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<td>K-Factor 20</td>
<td>FP32</td>
<td>R/W</td>
<td>0.001-9999999</td>
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<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>0.001-9999999</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>
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<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, 999999.9, 99999</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, 999999.9, 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>
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<td>Request Daily Log Pointer</td>
<td>FP32</td>
<td>RO</td>
<td>-1 (cleared logs) - 383</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
</tr>
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<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>
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<td></td>
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<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, 999999</td>
</tr>
<tr>
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<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>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, 99999999.9.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>This register is also used to clear total by writing 0 or set total by writing desired value.</td>
</tr>
<tr>
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<td><strong>16-bit registers available at address 7052-7055 (FP64) and 7060-7061 (FP32)</strong></td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
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<td>--------------------------------------------</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</td>
<td>FP32</td>
<td>RO</td>
<td>0 – 86400</td>
</tr>
<tr>
<td></td>
<td>Seconds</td>
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</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</td>
<td>FP32</td>
<td>RO</td>
<td>0 - 3600</td>
</tr>
<tr>
<td></td>
<td>Seconds</td>
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<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</td>
<td>FP32</td>
<td>R/W</td>
<td>-1 (cleared logs) – 344</td>
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<td>Pointer</td>
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<td></td>
<td>(To increment by one, use function code 5)</td>
</tr>
<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</td>
</tr>
<tr>
<td></td>
<td>Total</td>
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<td>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>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
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</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>8007</td>
<td>Pressure Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>0 psia – 50000 psia</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>
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<td>Compressibility Reference</td>
<td>FP32</td>
<td>R/W</td>
<td>0.0001 – 2.0</td>
</tr>
<tr>
<td>8013</td>
<td>Compressibility Method</td>
<td>U16</td>
<td>R/W</td>
<td>0= Default Z 1 = Z Table</td>
</tr>
<tr>
<td>8014</td>
<td>Default Z</td>
<td>FP32</td>
<td>R/W</td>
<td>0.0001 – 2.0</td>
</tr>
<tr>
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<td>Temperature Input Source</td>
<td>U16</td>
<td>R/W</td>
<td>0= RTD 1=Transmitter</td>
</tr>
<tr>
<td>8016</td>
<td>Calibrate RTD Low</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8017</td>
<td>Calibrate RTD High</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8020</td>
<td>Request Flow Temperature</td>
<td>FP32</td>
<td>RO</td>
<td>Flowing Temperature</td>
</tr>
<tr>
<td>Register (Decimal)</td>
<td>Description</td>
<td>Data Type</td>
<td>Access</td>
<td>Notes</td>
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</tr>
<tr>
<td>8021</td>
<td>Request Flow Pressure</td>
<td>FP32</td>
<td>RO</td>
<td>Flowing Pressure</td>
</tr>
<tr>
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<td>Request Flow Density</td>
<td>FP32</td>
<td>RO</td>
<td>Flowing Density</td>
</tr>
<tr>
<td>8023</td>
<td>Request Flow Compressibility</td>
<td>FP32</td>
<td>RO</td>
<td>Flowing Z</td>
</tr>
<tr>
<td>8025</td>
<td>Calibrate Temp Low</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8026</td>
<td>Calibrate Temp High</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8027</td>
<td>Calibrate Press Low</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8028</td>
<td>Calibrate Press High</td>
<td>U16</td>
<td>R/W</td>
<td>Write 5000 to calibrate Read for A/D counts</td>
</tr>
<tr>
<td>8029</td>
<td>Temperature Units</td>
<td>U16</td>
<td>R/W</td>
<td>0 == Fahrenheit; 1 == Celsius</td>
</tr>
<tr>
<td>8030</td>
<td>Pressure Units</td>
<td>U16</td>
<td>R/W</td>
<td>0 = PSIA, 1 = bar-a, 2 = PSIG, 3 = bar-g</td>
</tr>
<tr>
<td>8031</td>
<td>Density Units</td>
<td>U16</td>
<td>R/W</td>
<td>0 = lb/ft3; 1 = kg/m3</td>
</tr>
</tbody>
</table>

* 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 ZTable 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 disconnected or not]

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 window will appear:

![Connecting to device]

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

![HIT-4 Communication Program](image)

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

![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) or “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 999998

**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 Temperature and Reference Pressure.

**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 -449F to 1000F (-267.2C to 537.8C).

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

**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/FT3
  - KG/M3

Z-Table Page

The Z-Table page is used to upload/download gas compressibility files.

![Z-Table Page Image]

The parameters at the top of the page display the attributes of the Z-table as well as the gas composition.

The buttons at the bottom of the page are used to load Z-Tables from file, save to file, upload from the device and download to the device.

Reference Z:
Enter the gas compressibility at reference conditions.

Default Z:
Enter the gas compressibility 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”, and “Previous Day Total”.

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”.

**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 ZTable 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:

![Screen shot of HIT-4 Communication Program](image)

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.
This page intentionally left blank
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-4G 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

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

\textbf{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 IIIIC T80°C Db, IP66;
Class I, Zone 1, AEx db IIB T6; Gb; Zone 21, AEx tb IIIIC T80°C Db; IP66;

\textbf{ATEX/IECEX:}
II 2 G Ex db IIB T6 Gb
II 2 D Ex tb IIIIC 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-51109 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. THIS 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 IIC T6 per IEC 79-17, 79-18, 60079-16
   - Hit-4: Ex d IIB T6 Per IEC 79-17

2. THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF
   -40°C to 70°C for T1 and T2 for Hit-4 Series
   -40°C TO 70°C FOR T1 THRU T6 FOR HIT-4 SERIES

3. WHEN PROCESS TEMPERATURES ARE OUTSIDE THE MAXIMUM OR MINIMUM TEMPERATURE SPECIFIED ABOVE, THE RING/TOTALIZER WILL BE MOUNTED AWAY FROM THE FLUIDMETER.
   - Hit-4 SERIES: PROCESS TEMPERATURE < -40°C OR > 70°C
   - Hit-4 SERIES: PROCESS TEMPERATURE < -40°C OR > 70°C

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE

5. INSTRUMENT ENCLOSURE IS PURCHASED WITH NPT OR 3/4" NPT CONDUIT ENTERIES.

6. TOgaben THE COVER LOOKING DEVICES TO PREVENT THE
   - COVER FROM LOSSENG UNDER VIBRATION.

CONDITIONS FOR SAFE USE: ATEX/IECEx

C. 1. DO NOT REMOVE THE COVER UNLESS AREA IS
   - VACOF CONTAMINATE GWE OR VAPORS.

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

3. ALL VALVED CONDUIT ENTERIES MUST BE PLUGGED.
   - PLUGS MUST BE ATEX/IECEx CERTIFIED NPT PLUGS.

4. ALL CABLE/CONDUIT ENTRY DEVICES AND
   - BLANKING PLUGS MUST BE CERTIFIED
     - Ex d, SUITABLE FOR THE CONDITIONS OF USE
     - AND CORRECTLY INSTALLED.

5. CONDUIT ENTERIES MUST BE SEATED AT THE ENCLOSURE WALL.

WARNING HIT-4

- Ex d IIB T6 Per IEC 79-17
- Ex d IIC T6 Per IEC 79-17
- Hit-4: Ex d IIB T6 Per IEC 79-17

NOTE:
- AVAILABLE FLOWMETER
- SEDS: HD SERIES (LUMAY AND GAS), HQ SERIES, LD LIQUID SERIES, CT LIQUID SERIES, GUN INDUSTRIAL SERIES, GUN THERMAL SERIES AND NAMUR SERIES (LUMAY AND GAS)

NOTES:
- PLUGS ARE DESIGNATED BY THE MANUFACTURER.

INSTALLATION DWG, ATEX/IECEx

- Ex d CERTIFIED 81000SM
- HIT-4
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 d IIC T6 Ga, Ex tb IIC T7 T8 Db, Ex e IIC T12 Db, Ex p IIC T6 Db
   - HIT-5: Ex d II2C T6 Ga, Ex tb II2C T7 T8 Db, Ex e II2C T12 Db, Ex p II2C T6 Db

2. THE EQUIPMENT IS CERTIFIED FOR USE WITH Ambient Temperature RANGE OF
   -40°C T 70°C for HIT-4 and HIT-5 Series
   -40°C T 70°C for HIT-4 and HIT-5 Series

3. WHEN PROCESS TEMPERATURES ARE OUTSIDE THE MINIMUM OR MAXIMUM TEMPERATURE
   SPECIFIED BELOW, THE RATE/TOTALIZER WILL BE MODERATED AWAY FROM THE FLOWMETER.

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE
   APPLICABLE CODE OF PRACTICE, namely IEC 60079-14.

5. INSULATION OF THE FLOWMETER IS FURNISHED WITH A HOOD OR A 3/4" NPT CONDUIT ENTRIES.

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 THE AREA IS FREE OF COMBUSTIBLE GASES OR VAPORS.

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

3. ALL UNUSED CONDUIT ENTRIES MUST BE PLUGGED.
   PLUGS MUST BE ATEX/IECEx CERTIFIED.

4. ALL CABLE/CONDUIT ENTRY DEVICES AND BLANKING PLUGS MUST BE CERTIFIED
   EXCEPT FOR THE CONDUIT ENTRIES AND CORRECTLY INSTALLED.

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

MARKING HIT-1:

Ex d IIC T6 Ga
Ex e II2C T7 T8 Db, Ex p II2C T6 Db
T4-T6: -40°C T 74°C
T5: -40°C T 74°C

MARKING HIT-4:

Ex d II2C T6 Ga
Ex e II2C T7 T8 Db, Ex p II2C T6 Db
T4-T6: -40°C T 74°C
T5: -40°C T 74°C
Appendix B – Installation Drawings and Conditions for Safe Use for Certified Systems

CSA INSTALLATION INSTRUCTIONS

1. The equipment is suitable for use in the presence of flammable gases and vapors for the industries of supermarkets, chemical processing, and petroleum.

2. The equipment is suitable for use in the presence of flammable gases and vapors for the industries of invisible locations.

3. The equipment is suitable for use in the presence of flammable gases and vapors for the industries of invisible locations.

4. The equipment is suitable for use in the presence of flammable gases and vapors for the industries of invisible locations.

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ATEX/CE/EX 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 IIC T6 (HP-328 HIT-4G)
   - Ex e IIIC T6 (HP-328 HIT-4G)
   - Ex d IIB T6 (HP-328 HIT-4G)
   - Ex e IIIB T6 (HP-328 HIT-4G)

2. THE EQUIPMENT IS CERTIFIED FOR USE WITH AMBIENT TEMPERATURE RANGE OF -40°C TO 70°C FOR HPC SERIES.

3. WHEN PROCESS TEMPERATURES ARE OUTSIDE THE MAXIMUM OR MINIMUM TEMPERATURE SPECIFIED BELOW, THE RATE REDUCER WILL BE HEATED UP TO PREVENT CONTAMINATION.

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONNEL IN ACCORDANCE WITH THE APPLICABLE CODES OF PRACTICE, SUCH AS IEC 60730-1-4.

5. INSTALLATION ENCLOSURE IS PREPARED WITH 3/8" NPT CONDUIT ENTRANCE TO PREVENT THE COVER FROM OPENING UNDER VIBRATION.

CONDITIONS FOR SAFE USE: ATEX/CE/EX

1. DO NOT REMOVE THE OTHER UNAFFECTED AREA.

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

3. ALL UNAFFECTED CONDUIT ENTRANCES MUST BE PLUGGED. PLUGS MUST BE ATEX/CE/EX CERTIFIED WITH PLUGS.

4. ALL CABLE/CONDUIT ENTRANCE DEVICES AND BLANKING PLUGS MUST BE CERTIFIED suitable FOR THE CONDITIONS OF USE AND CORRECTLY INSTALLED.

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

MARKING HIT3:

Ex d IBT6 Gb (IP66)
T6T6< -40°C ≤ T6 ≤ 70°C

MARKING HIT4:

Ex e IIIB T6 Gb (IP66)
T6≤ -40°C ≤ T6 ≤ 70°C

NOTE: AVAILABLE FLOWMETER PROCESS FITTING AVAILABLE OPTIONS, AS PLOTTED FOR 3/8" NPT, FLANGED, GROOVED AND WAVER.
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HP-328

HIT-4G
Appendix B – Installation Drawings and Conditions for Safe Use for Certified Systems

NORTH AMERICA: REMOTE INSTALLATION NOTES
1. The equipment is suitable for use in the presence of flammable gases, vapors and dust. For use indoors or outdoors in hazardous locations.
   - HP-328 HIT-4G

2. Certified installations: Class I, Div. 1 Groups A, B, C, D, and Class II, Div. 1 Groups E, F, G.
   - Zone 1
   - Zone 2
   - Zone 3
   - Zone 4
   - Zone 5
   - Zone 6

3. END USER OR INSTALLER IS RESPONSIBLE FOR THE SELECTION OF APPROPRIATE CABLES, WIRING AND CONDUIT.
   - All cables and cable conduit must be rated for a minimum of 60°C.

4. INSTALLATION SHALL BE PERFORMED BY TRAINED PERSONAL IN ACCORDANCE WITH THE APPLICABLE CODES OF PRACTICE, SUCH AS THE NATIONAL ELECTRICAL CODE AND THE CANADIAN ELECTRICAL CODE.

CONDITIONS FOR SAFE USE – NORTH AMERICA
1. DO NOT REMOVE THE OUTER GUARDING UNLESS VIEWING SIGNALS OR DATA.
2. ALL VENTED OUTER BODIES MUST BE PLACED WITH STAINLESS STEEL PLUGS.
3. ALL CABLE ENTRY DEVICES AND PLUGGABLE PLUGS MUST BE INSTALLED PLUGGABLE PLUGS, SUITABLE FOR THE CONDITION TO USE, AND CORRECTLY INSTALLED PER MANUFACTURER INSTRUCTIONS.
4. CONTACT SETTINGS MUST BE SEATED AT THE EXCLUSION.

ALTERNATE MOUNTING SCHEME

5/8" NPT W/IN

NOTE: AVAILABLE TERMINAL SERIES 6/0 SERIES A/B SERIES. D/C SERIES, STOP RUN BREATHERS, RELAY TERMINALS AND WATER SERIES.

HOPPER FLOW CONTROLS, INC.

WILMINGTON, DE 19880

INSTALLATION DRAWING
REMOTE MOUNTED HP-328 HIT-4G

78 Appendix B – Installation Drawings and Conditions for Safe Use for Certified Systems