MODEL 314di
Field Mounted Batch Controller

USER'S MANUAL

HP-301
December 2002

H HOFFER FLOW CONTROLS, INC.
The Turbine Flowmeter Company

NOTICE

Hoffer Flow Controls, Inc. makes no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

This manual has been provided as an aid in installing, connecting, calibrating, operating, and servicing this unit. Every precaution for accuracy has been taken in the preparation of this manual; however, Hoffer Flow Controls, Inc. neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that result from the use of the products in accordance with information contained in the manual.

HOFFER FLOW CONTROLS' policy is to provide a user manual for each item supplied. Therefore, all applicable user manuals should be examined before attempting to install or otherwise connect a number of related subsystems.
During installation, care must be taken to select the correct interconnecting wiring drawing. The choice of an incorrect connection drawing may result in damage to the system and/or one of the components.

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 are 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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HOFFER FLOW CONTROLS' policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. The information contained in this document is subject to change without notice.

Limited Warranty POLICY FOR Hoffer Flow Controls

HOFFER FLOW CONTROLS, INC. ("HFC") warrants HFC's Precision Series and API Series of turbine flowmeters to be free from defects in material and workmanship under normal use and service, only if such goods have been properly selected for the service intended, properly installed and properly operated and maintained as described in the turbine flowmeter manual. Reference "turbine flowmeter manual" for specific details. This warranty shall extend for a period of five (5) years from the date of shipment to the original purchaser and covers the Precision Series and API Series of flowmeters All other HFC products carry a one (1) year warranty. This warranty is extended only to the original purchaser ("Purchaser"). *Purchaser's sole and exclusive remedy is the repair and/or replacement of nonconforming goods as provided in the following paragraphs.*

In the event Purchaser believes the Hoffer product is defective, the product must be returned to HFC, transportation prepaid by Purchaser, within the appropriate warranty period relative to the product. If HFC's inspection determines that the workmanship or materials are defective and the required maintenance has been performed and, has been properly installed and operated, the product will be either repaired or replaced, at HFC's sole determination, free of additional charge, and the goods will be returned, transportation paid by HFC, using a transportation method selected by HFC.

Prior to returning the product to HFC, Purchaser must obtain a Returned Material Authorization (RMA) Number from HFC's Customer Service Department within 30 days after discovery of a purported breach of warranty, but not later than the warranty period; otherwise, such claims shall be deemed waived. See the Return Requests/inquiries Section of this manual.

If HFC's inspection reveals the Hoffer product to be free of defects in material and workmanship or such inspection reveals the goods were improperly used, improperly installed, and/or improperly selected for service intended, HFC will notify the purchaser in writing and will deliver the goods back to Purchaser upon receipt of Purchaser's written instructions and agreement to pay the cost of transportation. If Purchaser does not respond within thirty (30) days after notice from HFC, the goods will be disposed of in HFC's discretion.

HFC does not warrant the product to meet the requirements of any safety code of any state, municipality, or other jurisdiction, and Purchaser assumes all risk and liability whatsoever resulting from the use thereof, whether used singlely or in combination with other machines or apparatus.

This warranty shall not apply to any HFC product or parts thereof, which have been repaired outside HFC's factory or altered in any way, or have been subject to misuse, negligence, or accident, or have not been operated in accordance with HFC's printed instructions or have been operated under conditions more severe than, or otherwise exceeding, those set forth in the specifications.

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.

CONTENTS

1. INTRODUCTION

The Model 314d*i* Batch Controller accepts a pulse or frequency flow signal and automatically controls the batching of fluids via a one or two stage control valve. The instrument displays the Preset value, a Resettable Batch Total, and an Accumulated Total directly in engineering units.

The Batch Controller is intrinsically safe and can be used in hazardous areas provided it is connected as directed to approved flowmeters and control solenoids.

The Model 314d*i* is fully programmable with K-factors, decimal point positions, valve delays and signal timeouts being programmed via the front panel switches. Switches on the input board enable the input to be readily configured for most applications, including turbine flowmeters, paddlewheel flowmeters, reed switches and Namur proximity switches.

The instrument is housed in an attractive polycarbonate enclosure which is completely watertight. A universal bracket is supplied as standard for wall mounting while an optional pipe or panel mounting brackets is also available.

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

Generic Emission Standard EN 50081-1   Residential, Commercial & Light Industry Environment.

Generic Emission Standard EN 50081-2   Industrial Environment.

Generic Emission Standard EN 50082-1   Residential, Commercial & Light Industry Environment.

Generic Emission Standard EN 50082-2   Industrial Environment.

In order to comply with these standards, the wiring instructions in Section 9-5 must be followed.

1-1   Model Number Designation

MODEL 314di
DC POWERED BATCH CONTROLLER, INTRINSICALLY SAFE
(TO BE USED ONLY WHEN APPROVALS ARE REQUIRED)

MODEL **314di-**(A)**-** (B)**-**(C)

TYPE OF MOUNTING

POWER OPTIONS

OPTIONS

TYPE OF MOUNTING
MODEL **314di-**(**A**)**-**(__)**-**(__)
OPTION **(A)**
(0)   NO CABLE ENTRY HOLES
(2)   WALL MOUNT WITH CABLE GLANDS
(4)   1" NPT BOTTOM MOUNT WITH UNION (SEE NOTE 5)
(5)   1" NPT REAR MOUNT WITH UNION (SEE NOTE 5)
(6)   2" GALVANIZED PIPE BRACKET (SEE NOTE 6)

POWER OPTIONS
MODEL **314di-**(__)**-**(**B**)**-**(__)
OPTION (B)
(3)   12-28 VDC

OPTIONS
MODEL **314di-**(__)**-**(__)**-**(C)
OPTION (C)
(CE)INTEFERENCE CE COMPLIANCE
(CEN)CENELEC, CSA NRTL/C AND SAA APPROVAL

NOTES:

1.   MUST USE ISM INTRINSICALLY SAFE MAGNETIC COIL FOR
       INTRINSICALLY SAFE SYSTEM.

2.   STANDARD COILS ARE SUITABLE FOR SYSTEMS THAT DO NOT
       REQUIRE INTRINSICALLY SAFE.

3.   LCD DISPLAY:

       7 DIGIT 0.4" (10MM) TOTAL CONTINUOUSLY DISPLAYED

       4 DIGIT 0.33" (85MM) CONTINUOUSLY DISPLAYED RATE,
       ACCUMULATED DISPLAYED BY KEY DEPRESSION

4.   BATTERY LIFE FULL 2 YEARS IF CONTINUOUSLY USED.

5.   1" RISER IS REQUIRED ON TURBINE FOR MOUNTING OPTION (4) OR (5).

6.   A GALVANIZED METAL BRACKET ENABLES THE UNIT TO BE ATTACHED TO A 2" VERTICAL OR HORIZONTAL PIPE.

7.   BARRIERS ARE REQUIRED FOR THE DC POWER AND FOR AIS@ SOLENOIDS OR RELAYS -

8.   CAN NOT BE USED WITH MF SERIES.

APPROVALS
CENELEC, CSA NRTL/C & SAA APPROVED
INTRINSICALLY SAFE
WATER TIGHT TO IP67 (NEMA 4X)

1-2   Intrinsic Safety Considerations

The Model 314d*i* is certified for use in hazardous areas to CENELEC and $CSA_{US/C}$ standards.

Approval details are as follows:

CENELEC Approval: Kema 98.E.1873X.
Type of Protection: Ex ia.
Group: II B.
Temperature Class: T4 at ambient temperature of 60°C.

$CSA_{US/C}$ Approval
File Number: LR104840-5
Type: Class 1, Groups C and D

When installing in hazardous areas, the instrument must be installed according to the guidelines in Sections 8 & 5 and in accordance with local wiring standards for installation in hazardous areas.

Flowmeter Inputs

Entity Parameters on the flowmeter input enable connection to a wide range of approved sensors.

Input Parameters are:

$Ui = 24V$
$Ii = 20mA$
$Pi = 320mW$

Maximum allowed internal capacitance is 0.002 µF.
Maximum allowed internal inductance is 0 mH.

Output Parameters are:

$Uo = 10.0V$
$Io = 9.0mA$

Maximum allowed external capacitance is 60 µF.
Maximum allowed external inductance is 1.5 H.

DC Power Input and Switching Outputs

The power input and the relay outputs can be connected to I.S. circuits with the following maximum values per circuit:

$U_i = 28V$
$I_i = 93mA$
$P_i = 653mW$

Maximum allowed internal capacitance is 0.1 μF.
Maximum allowed internal inductance is 0 mH.

2. SPECIFICATIONS

General

Display:	LCD, continuously powered
Batch Total:	7 digits with 10mm (0.4") high digits
Accumulated Total:	Displayed when the ACCUM TOTAL button is pressed.
Preset:	5 digits with 8.5mm (0.33") high digits.
K-factor:	The pulses per unit of measure (e.g. pulses/gallon) is programmable in the range 0.0001 to 999,999.
Decimal Points:	Decimal Point positions are fully programmable for batch total and preset.
Frequency Range:	0Hz to 10kHz.
Signal Type:	Link settable for Sinewave (15mV P-P minimum), Open Collector, Reed Switch, or Pulse.
DC Power Input:	9-28 Vdc at 4mA maximum.

Battery Backup

Type:	Two lithium battery packs.
Function:	The backup batteries will power the instrument for up to 5 years if no DC power is provided. The batteries will not power the sensor or solenoid outputs..

Outputs

|	
Outputs:	Two open collector outputs suitable for driving DC solenoids or external relays.
Switching Power:	200mA 30VDC maximum.
Saturation Volts:	2.0Vdc max across the output in the "on" state.
Isolation:	Both outputs are separately isolated via opto-isolators.

6   Specification

Physical

Temperature:	Operating: -20°C to 60°C.
Dimensions:	98mm (3.9") high x 152mm (6.0") wide x 43mm (1.7") deep (cable glands not included).
Protection:	Sealed to Nema 4X or IP67 standards.
Cable Entry:	By cable glands.
Material:	Polycarbonate and ABS
Wall Mounting:	Universal Mounting Bracket supplied as standard.
Pipe Mounting:	A galvanized metal bracket is available which enables the instrument to be attached to a 2" vertical or horizontal pipe.
Turbine Meter Adapter:	An optional mounting stem is available for mounting the instrument directly on turbine flowmeters which have a 1" MNPT boss or 1" BSP boss.
Panel Mounting:	Supplied with mounting brackets. Terminals accessible from rear. The panel mount version is NOT watertight.
Cutout:	142mm (5.6") wide x 88mm (3.5" high).

3. OPERATION

The Model 314d*i* Batch Controller accepts a frequency or pulse input from a wide range of flowmeters. The instrument is fully programmable from the front panel. The setup parameters are stored in a non-volatile memory and are retained for at least 10 years in the event of a power loss.

3-1   Front Panel Operation

Three keys on the front of the instrument provide an easy and straight forward method to set up batches and control operations. The three keys each have dual functions as described below:
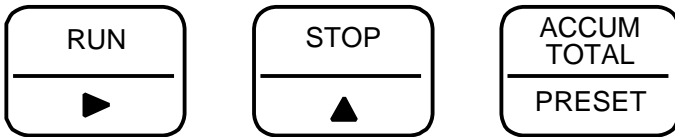
Front Panel Keys

3-1-1   Setting the PRESET Quantity

The Batch quantity is programmed as follows:

Switch Action	Display	Comments
Press PRESET		The Accumulated Total together with the Preset quantity is displayed.
	"1" 2345	The most significant digit of the Preset quantity flashes indicating that it can be changed.
Press ▲	"*2*" 2345	Pressing the ▲ key will increment the digit. (The up arrow on the Stop key indicates to increment the digit.).
Press ▶	2 "*2*" 345	Pressing the ▶ key will change digit and enables the next digit to be incremented. (The right arrow on the RUN key indicates to change digit.).

Switch Action	*Display*	*Comments*
Press PRESET	22345.00	Pressing PRESET returns the instrument to the Run mode and batches can now be run.

Note: If there are no keys pressed within 10 seconds while the instrument is in preset mode, it will return to the run mode saving the current value as the preset quantity.

Once programmed, the Preset quantity will be retained in memory and will not alter until changed by the user.

The Preset quantity can only be set while the instrument is in a non-operational state such as when the batch is complete or has been cancelled.

3-1-2   Starting a Batch

To start a batch press the RUN key. The Total will then reset to zero and, provided there is flow, the Total display will start counting upwards.

The batcher has two output transistors and these are switched on and off as described in Section 0.

3-1-3   Stopping

The process can be stopped at any time by pressing the STOP switch. This is indicated by the "Pause" message displayed on the screen (either flashing or solid). Once the process has been interrupted in this way, it can be continued by pressing the RUN key or the process can be aborted by pressing the STOP switch a second time.

3-1-4   Accumulated Total

During a batch run, the Accumulated Total can be displayed by pressing the ACCUM TOTAL key.

In the non-operational state (i.e., when the batch is complete) the ACCUM TOTAL key also functions as the PRESET key and enables the Preset quantity to be changed.

The Accumulated Total cannot normally be reset, except by pressing the internal Reset button (see Section 9-4). Pressing this button will also reset all the setup parameters.

3.2 TEST MODE

The 314d*i* has a Test Mode which can be entered and exited by pressing and holding all 3 front panel keys in certain sequences to avoid accidental entry or falsely starting a batch. To enter Test Mode, all 3 front panel keys should be pressed and held in the following order: the STOP key, then the ACCUM TOTAL key and finally the RUN key.

Note the test mode cannot be entered while the instrument is in program mode or preset mode.

The tests are as follows:

Relay 1 Test   By pressing the RUN key, the display will show the test for Relay 1. The output will only activate while the RUN key is being pressed.

Relay 2 Test   **By pressing the STOP key, the display will show the test for Relay 2. The output will only activate while the STOP key is being pressed.**

***Display Test***   **By pressing the PROGRAM key, all segments of the display will flash.**

Note the relay outputs are only operated when external DC power is present. And any batch in progress when test mode is entered is stopped and cannot be resumed.

To exit Test Mode, all 3 front panel keys should be pressed and held in the following order: the ACCUM TOTAL key, then the STOP key and finally the RUN key.

3-2   Batch Operations

The operation of the Batch Controller is shown below:
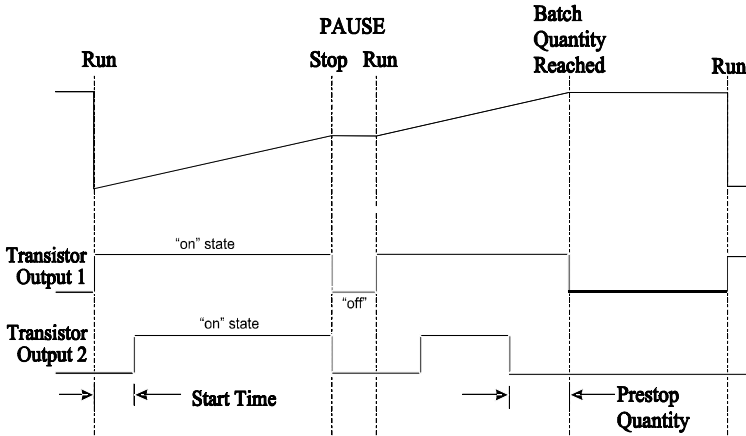
3-2-1   Control Outputs

The two output transistors can be set up to control a single valve or a dual valve with slow stop and/or slow start. Alternatively, the second output can be used to control a pump.

The output operation is shown above.

A time delay between the Start and the time when Output 2 switches on can be programmed to provide a soft startup. The delay can range from 0 (no delay) to 9 seconds.

A Prestop quantity (i.e., the quantity to the end of the batch) can also be programmed to provide a slowdown of flow at the end of the batch, thereby enabling precise quantities to be batched.

The process can be stopped at any time by pressing the STOP key, whereby both outputs will immediately switch off. The process can then be aborted and the batcher reset by pressing the STOP key again, or the process continued by pressing the RUN key.

If the process is continued and the instrument was previously in the slow start or main control phases (i.e., not the prestop phase), the timer will be reset and a slow start will occur with a full time delay to ensure a correct start up. The totals will not be reset and the batch quantity will remain unchanged.

3-2-2   Signal Timeout

The Signal Timeout period defines a time interval which is used to detect if the flow has stopped. If there is no signal input for a time greater than the Signal Timeout period, the flow is deemed to have stopped. A Signal Timeout period detects the loss of signal midway through a batch when the outputs are on. In this case, the Batcher will enter a Flow Alarm condition and switch off the outputs.

The Flow Alarm condition is maintained until acknowledged by pressing the STOP switch. The alarm condition is also signaled to the operator by the PAUSE message being displayed (either flashing or solid).

The instrument enables the user to program a time interval of up to 99 seconds to detect an absence of signal input.

If the Signal Timeout is set to 0, this function is disabled.

4. PROGRAMMING

The Model 314d*i* is fully programmable, with all parameters being stored in memory.

The Program Mode can be entered in one of two ways:

> 1. By removing the lower cover strip (i.e., the dark gray strip along the bottom of the enclosure) and turning it end for end and replacing it. This brings a small magnet on the inside of the cover strip in close vicinity of a reed switch inside the instrument.
>
> 2. By removing the front section of the enclosure which contains the main processor board and batteries. Once removed, the PRESET key is pressed to enter the Program Mode.

The PRESET switch is used to step through the program (CAL sequences) and the ▶ and ▲ keys on the front panel are used to change and increment the flashing digits.

Six CAL steps are accessible in the Program mode. The CAL number is displayed on the lower display and the parameter is displayed on the upper display.

Any batch in progress when the Program mode is entered is stopped and can not be resumed. Also, no incoming pulses are totalized while the unit is in the Program mode.

To exit the Program mode return the lower cover strip to its original position or refit the front panel.

4-1   Program Steps

Step	*Comment*

CAL 1   **Scaling Factor - whole numbers.**

CAL 2   **Scaling Factor - digits after the decimal point.**

> The Scaling Factor is the pulses per unit of measure (e.g., pulses/litre, pulses/gallon, etc). The Scaling Factor can be programmed in the range of 0.0001 - 999,999.

CAL 3   **Decimal Point for Total Display.**

> The total and preset quantity can be displayed with 0, 1, 2 or 3 decimal point places.

CAL 4   **Start Time Delay.**

> The time in seconds (0-9 sec) when Output 2 will switch "on" once the RUN key is pressed.

CAL 5   **Prestop Quantity.**

> The quantity at which Output 2 will switch "off" before the end of the batch (e.g., If the Preset quantity is 100 litres and the Prestop quantity is 2 litres, Output 2 will switch off after 98 litres.).

CAL 6   **Signal Timeout.**

> A time period between 0-99 seconds during which, if there is no flow measured, the Outputs will both switch "off" and the PAUSE message will be displayed.

SOFT   **Software Version.**

4-2   Example

A flowmeter produces 20.538 pulses per litre and has a maximum flowrate of 150 litres/minute. It is required to batch quantities in batches of around 300 litres and to alarm if there is no flow once the batch has started.

To increase the accuracy of the batch, a two stage valve will be used and the flow will be slow prior to the end of the batch to enable a more accurate cutoff.

It has also been decided to reduce the flowrate 10 litres prior to the end of the batch. The instrument is then programmed as follows:

Step	Parameter Value	Description
CAL 01	00020	Scaling factor (Whole numbers).
CAL 02	5380	Scaling factor (Decimals).
CAL 03	1	One decimal place.
CAL 04	1	One second delay on full flow to stop pipe hammer.
CAL 05	10	10 litre preset.
CAL 06	2	Two second signal timeout.
SOFT	1.XX	Software Version.

5. VALVE CONTROL & DC POWER

The Model 314d*i* will operate from an external power source between 9-28Vdc and draws no more than 4mA. This enables the instrument to be powered from AC voltage adaptors and eliminate the need to run AC voltage in the field.

As the instrument has an internal battery backup it will power the instrument if DC power is interrupted, but these batteries are not capable of powering the solenoids or sensors if they require external power (see Section 6 for a further description of operation with battery backup.)

Solid state relay outputs provide control to solenoids or relays and can sink up to 200mA. The outputs are internally protected against voltage spikes caused by relays and coils.   Connections for a dual stage applications is given on the following page.

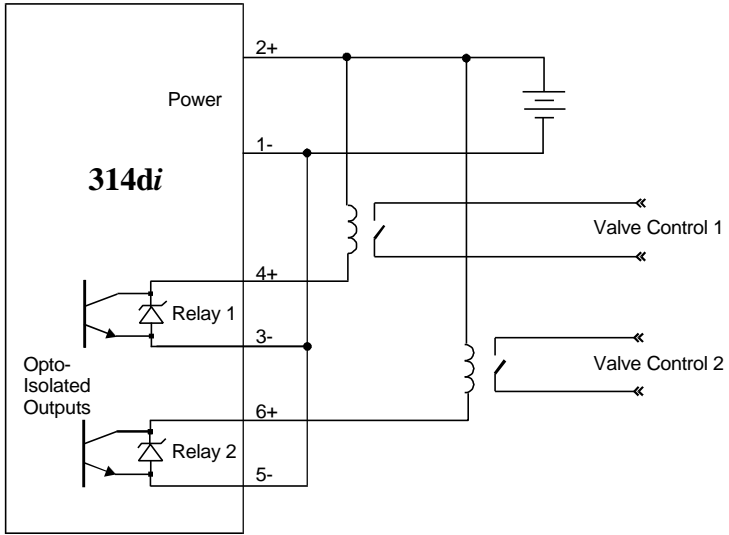For single style applications, only Output 1 is required.

Specification for Outputs

Maximum Current (sink):	200mA.
Maximum Voltage:	30VDC.
Saturation Voltage:	0.8VDC max across the outputs in the "on" state.
Isolation:	Both outputs are separately isolated.

Relays with DC Coils

6. BATTERY BACKUP VERSION

The battery backup version of the Model 314d*i* is designed to provide power backup for the instrument if the supply has been interrupted. The two lithium battery packs provide sufficient capacity to power the instruments for up to 5 years and the operator is warned of a low power condition by a message on the LCD display.

Note: No low battery warning will be displayed while there is external DC power connected.

New batteries can be purchased from Hoffer Flow Controls, Inc. and replaced in the field without compromising the IS approvals. *There are two battery packs in each instrument and care must be taken to replace only one pack at a time so that there is always power connected to the memory.* Failure to do this may result in loss of totals and preset value.

6-1   Power Interruption

With the battery backup the Model 314d*i* has the ability to resume a batch if the DC power is interrupted during a delivery. The 314d*i* will also totalize any incoming pulses while power is unavailable.

If a batch is in progress and the external DC power is lost, both relay outputs will be deactivated and the batch will be paused. The paused batch can only be restarted when the DC power returns. However, the paused batch will be terminated if the STOP key is pressed or if any totalizing of pulses causes the Batch Total to exceed the Preset Value.

7. FLOWMETER INPUT

7-1   General Connections

The Model 314d*i* has an input conditioning circuit which will accept signals from most pulse or frequency producing flowmeters. Links on the rear panel enable the input circuit to be configured for different signal types.
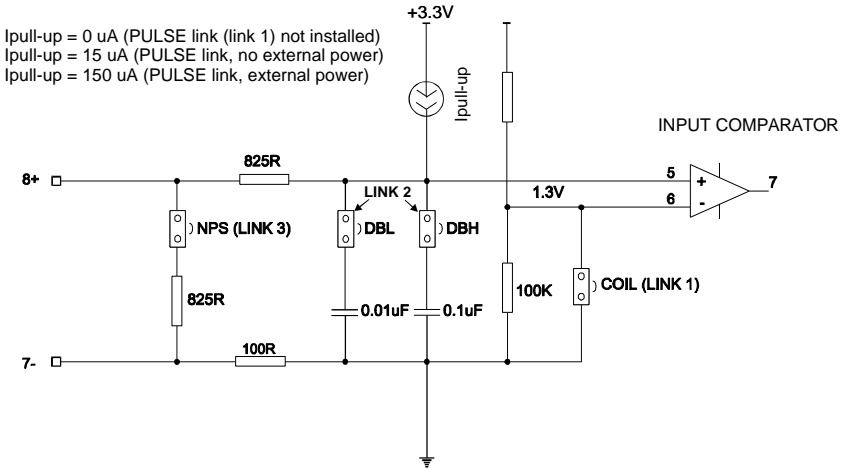
The input will interface directly to:

- − Turbine Flowmeters
- − Open Collector Outputs
- − Reed Switches
- − Logic Signals
- − Two Wire Proximity Switches

The following pages give examples of interconnection to various signal outputs and a circuit diagram of the input is also provided.

For pulse or logic type signals, the input switching threshold is 1.3 volts. Hence, the input signal must have a "low" voltage of less than 1.2 volts and a "high" voltage of greater than 1.4 volts.

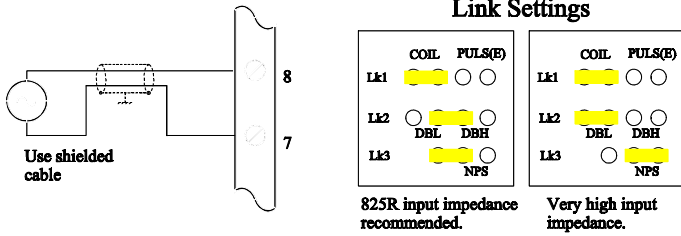For flowmeters with coils, the minimum input voltage is 15mV P-P.

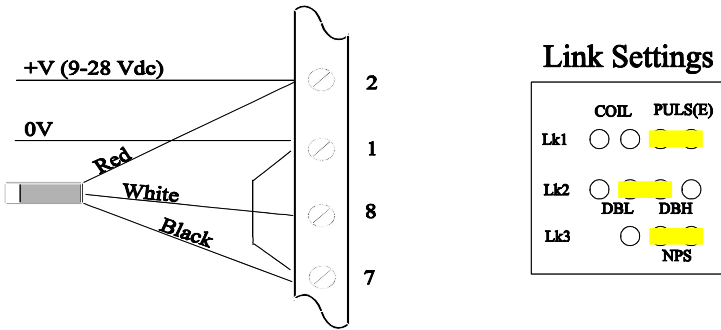All inputs are protected for over voltage up to 28 volts.

Ipull-up = 0 uA (PULSE link (link 1) not installed)
Ipull-up = 15 uA (PULSE link, no external power)
Ipull-up = 150 uA (PULSE link, external power)

+3.3V

Ipull-up

INPUT COMPARATOR

8+

825R

LINK 2

NPS (LINK 3)

DBL   DBH

1.3V

5

6

+

-

7

825R

0.01uF   0.1uF

100K

COIL (LINK 1)

7-

100R

Simplified Frequency Input Circuit

1.   MAG Coil

Link Settings

825R input impedance recommended.

Very high input impedance.

2.   Redi-Pulse Pick-up (Pulse output)

+V (9-28 Vdc)

0V

Red
White
Black

2
1
8
7

Link Settings

Note: If a 4-20mA output is installed, the supply to the Redi-Pulse must be isolated.

3.   Redi-Pulse Pick-up (Open Collector)

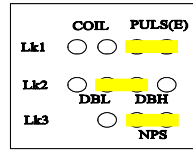with 15μA internal pullup current

+V (12-28 Vdc)

0V

Red
White
Black

2
1
8
7
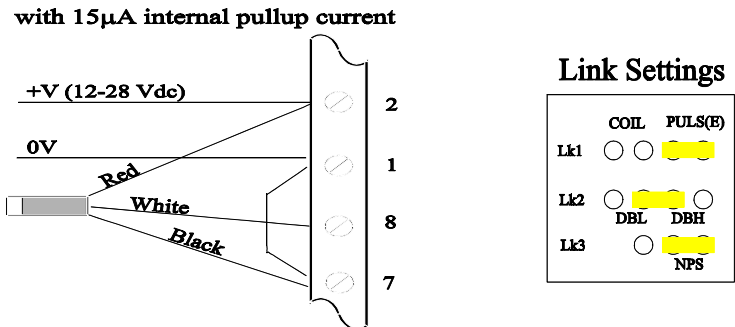
Link Settings

Note: If a 4-20mA output is installed, the supply to the Redi-Pulse must be isolated.

4.   Squarewave, CMOS or Pulse
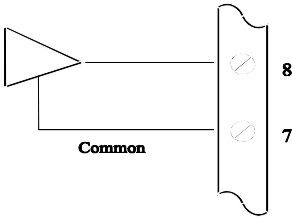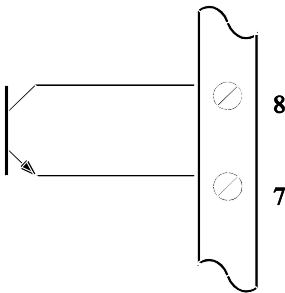

Link Settings

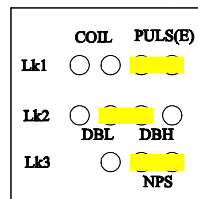Switching threshold voltage 1.3 voltsl

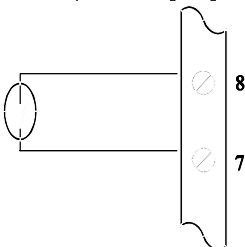### 5.   Open Collector

with 15μA/150μA internal pullup current

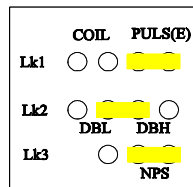

Link Settings

6   Reed Switch - Battery Powered

with 15μA internal pullup current

Link Settings

Note: **For a switch or reed input with contact bounce link DBL can be installed. This will eliminate the effect of switch bounce, while limiting the input frequency to 200Hz.**

8. INTRINSIC SAFETY CONNECTIONS

When installing the Model 314d*i* in hazardous areas, the wiring and installation must comply with local installation standards.

8-1   Coils

The Model 314d*i* will connect directly to a turbine flowmeter or paddlewheel with a certified I.S. coil or other certified I.S. sensors which produce a pulse output, provided they do not exceed the following input parameters:

$$U_i = 24V$$
$$I_i = 20mA$$
$$P_i = 320mW$$

The maximum allowed capacitance and inductance of the pulser or coil, including cabling is:

$$C_{ext} = 60uF$$
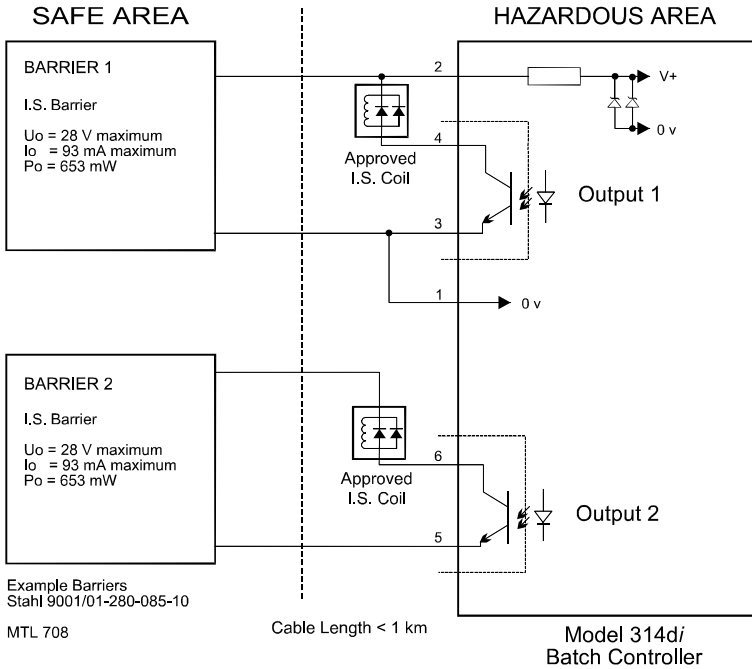$$L_{ext} = 1.5H$$

The internal capacitance and inductance of the Model 314d*i* seen on the input are negligibly small with $C_i = 0.02$ uf and $L_i = 0mH$. The maximum voltage and current produced by the Model 314d*i* on its inputs (terminals 8 & 7) are:

$$U_o = 10.0 \text{ volts} \qquad \text{(open circuit)}$$
$$I_o = 9.0mA \qquad \text{(short circuit)}$$

8-2   Simple Apparatus

Devices such as reed switches, which can be classed as "Simple Apparatus" as defined in the CENELEC standard EN50020, can be connected to the Model 314d*i* without certification.

SAFE AREA   HAZARDOUS AREA

BARRIER 1

I.S. Barrier

Uo = 28 V maximum
Io = 93 mA maximum
Po = 653 mW

2

4

Approved
I.S. Coil

3

1   0 v

V+

0 v

Output 1

BARRIER 2

I.S. Barrier

Uo = 28 V maximum
Io = 93 mA maximum
Po = 653 mW

6

Approved
I.S. Coil

5

Output 2

Example Barriers
Stahl 9001/01-280-085-10

MTL 708   Cable Length < 1 km

Model 314d*i*
Batch Controller

8-3   Relay outputs

The relay outputs can be connected to suitably certified devices providing the circuit is protected with the maximum safety parameters:

$$Ui = 28V$$
$$Ii = 93mA$$
$$Pi = 653mW$$

Maximum allowed internal capacitance is 0.1 µF.
Maximum allowed internal inductance is 0 mH.

Note that the two relay outputs must be kept as independent IS circuits via a common barrier.

Solenoid

Only certified intrinsically safe solenoids may be used for I.S. applications. Because these solenoids have a relatively small coil, they are only usually suitable for small line sizes and non viscous products.

Generally, it is preferable to use a pneumatic system with the solenoid valves controlling air to a larger pneumatically controlled valve.

9. INSTALLATION

9-1   Wall Mounting

A wall mounting bracket is supplied with each instrument. The bracket should be attached to the wall using round head screws (do not use countersunk screws). The bracket is mounted with the "tray" section at the bottom.   The instrument is then attached to the bracket at the bottom with two screws (see diagram below).
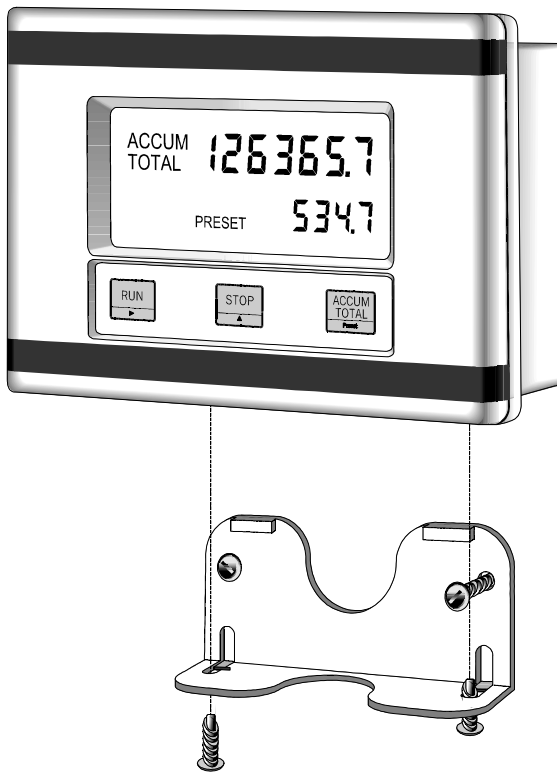
9-2   Panel Mounting

The panel mount version of the Model 314d*i* is supplied with two panel mount brackets and plug-in terminals which are accessible from the rear of the instrument.

A diagram of the rear panel is shown below:
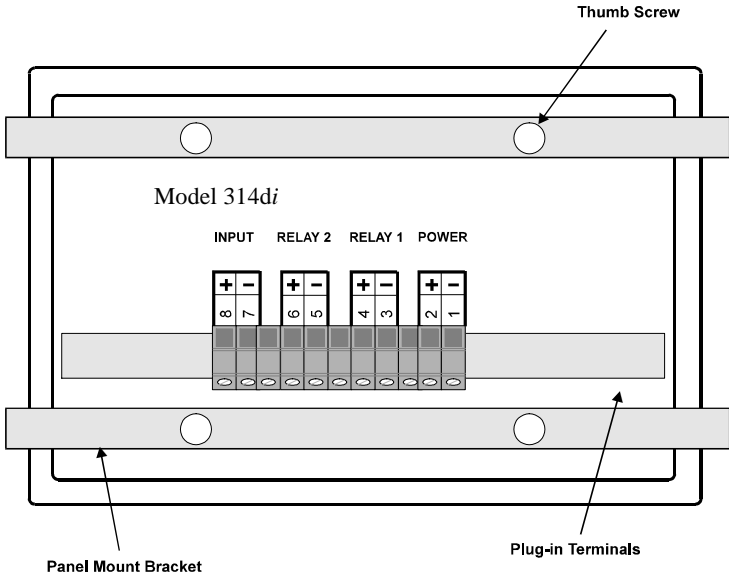

Rear View of 314d*i* Panel Mount Case

The cutout for the panel mount version is 142mm (5.6") wide x 88mm (3.5") high.

9-3   Removing The Front Panel

The front of the instrument is removed as follows:

1. Remove both the top and bottom cover strips (i.e., the dark plastic strips on the front) by levering a screwdriver under one end.

2. Undo the seven screws retaining the front. *Note that the screws should not be removed from the front panel as they are retained by O-rings.*

3. Pull the front panel free from the housing.

Replacing the front panel of the instrument is the reverse procedure. However, ensure that the front panel is aligned at both connector points before tightening the screws.
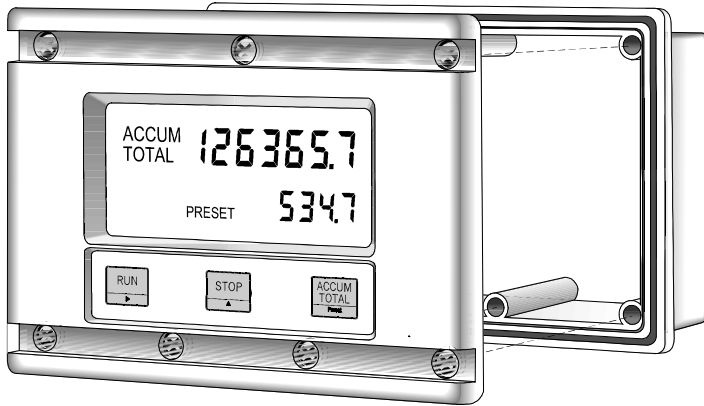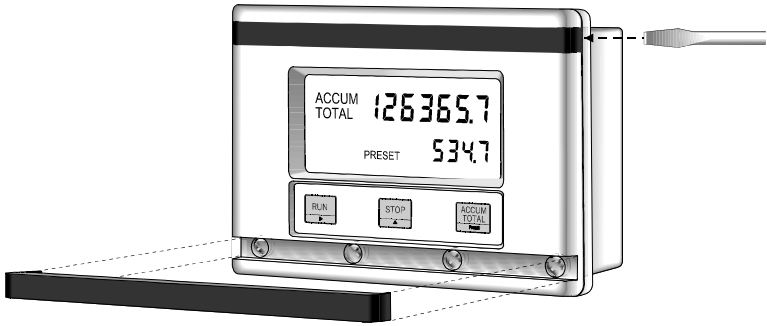
9-4   The Main Electronics

The front section of the housing contains the microprocessor, display and the batteries if fitted. It is possible to adjust the display contrast via a small potentiometer on the board. The **Display Contrast** is shown below and this can be adjusted for optimum contrast.

Adjacent to this control is a **RESET** switch which can be used to reset the microprocessor. *Note that pressing this button will set the totals to zero and set the preset value to a default figure of 10.*

The Main Electronics

DISPLAY CONTRAST   RESET   BATTERY CONNECTOR

BATTERY

BATTERY

BATTERY CONNECTOR
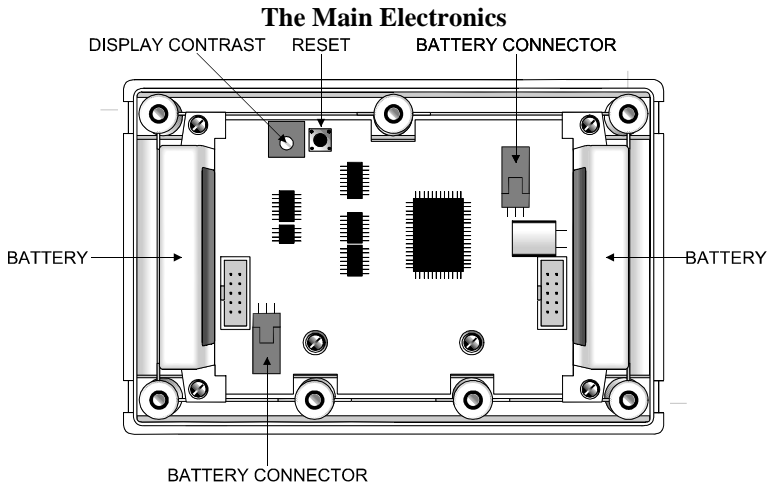
9-5   Wiring

When connecting the Model 314d*i*, it is good practice to use shielded cable. The shield should be connected to earth at one end of the cable. The other end of the shield should not be connected.

This wiring practice is mandatory in order to comply with the requirements for Electromagnetic Compatibility as per EMC-Directive 89/336/EEC of the Council of the European Community.

9-6   Terminal Designations

All versions

8	Pulse (+) / Coil Input	
7	Pulse (-) / Coil Input	
6	Output 2 (+)	
5	Output 2 (-)	
4	Output 1 (+)	
3	Output 1 (-)	
2	DC Power	+9 to 28V
1	DC Power	0V

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