NuFlo

NuFlo™

Scanner 1131

Electronic Flow Measurement Remote Telemetry Unit (RTU)

- **Powerful, fast and flexible**
- **Reduces operational costs and maximizes profits**

A functionally and computationally superior EFM/RTU that provides custody transfer measurement data and control functions to production, transmission and distribution markets.

Powerful, fast, and flexible, the NuFlo Scanner 1131 reduces operation costs and maximizes profits by providing accurate information for monitoring, measurement, and control of your natural gas or hydrocarbon liquid process.

Field Mount & Rack Mount Configurations

To accommodate cost effective operations in both hazardous and general purpose areas, the Scanner 1131 is offered in field mount and rack mount configurations.

Field Mount – designed specifically for Class 1 Division 1 and Division 2 hazardous areas adjacent to pipeline or production equipment. Housed in a weather proof cast aluminum enclosure, the unit can be either wall or pipe mounted. Solar panel charges a sealed, air transportable, gelled, lead-acid battery ensuring an intrinsically safe, low powered operating system.

Rack Mount – designed for general purpose applications, requires conventional 24 VDC power and can be mounted in any non-hazardous area.

Accurate

Although optimized for both measurement and control, the strength of the Scanner 1131 lies in its ability to provide custody transfer measurement.

- Auto-calibration of analog inputs for component and temperature effects
- Up to 12 user defined calibration points
- Hysteresis correction and static pressure shift correction to DP zero and span for external transmitter inputs
- Automatically estimates flow during calibrations, plate changes, and power outages

Application Flexibility

- Supports all common primary devices:
  - Differential Producers- orifice fitting, pilot sensor (annubar), v-cone, wedge, nozzle
  - Linear Pulse Output Meters - turbine, positive displacement, ultrasonic
- Natural gas algorithms follow North American (AGA) and International (ISO) Standards
  - AGA3-92, 5, 7, 8-94 (Detailed and Gross Methods), Redlich-Kwong, Standard-Katz and a 5x5 pressure vs. temperature "Z" matrix method
  - ISO 5167-1, 12213-1, -2, -3, and SGERG
- Liquid algorithms follow API Manual of Petroleum Measurement Standards (MPMS)
  - API 2540 Table 34, 53A, 53B, 54A and 54B
  - MPMS Chapter 11.2.1(M), 11.2.2(M), 11.2.3(M)
- Communications protocols
  - ScanCom (ADEPT)
  - Modbus (Gould and Enron implementations)
  - BSAP (Bristol Babcock)
- Control
  - Proportional and Integral with Second Variable Override
  - Nomination
  - Run Switching
  - Emergency Shut Down

Simple & Powerful

Secure & Reliable

- Five configurable levels of log-in security
- Single main circuit board designed to minimize connections and potential points of failure
- System diagnostics perform on-going watchdog, memory, program integrity and battery checks
- On-board battery backup to maintain history data storage and real-time clock for up to 10 years
- All units environmentally tested as a completed assembly prior to shipment

Energy Efficient

- Sophisticated power management system optimizes low power (usually solar) operation of the RTU, communications devices (radios, modems, etc.), and end devices (transmitters, field switches)
- Battery system designed to provide a minimum of 14 days autonomy

Easy to Configure & Use

- Common user interface throughout entire Scanner Family of products
- Easy to use, software prompted routines for day-to-day operations (i.e. plate changes, calibrations, downloading data)
- Configuration SAVE/RESTORE function minimizes duplicate or similar configuration time for 'standard load' type applications

Dual Pressure Electronic 'DPE' Sensor

- Provides simultaneous pressure and differential pressure measurement and can easily be direct mounted to the existing flow run, eliminating electrical wiring and instrument tubing installation costs
- Designed for the high accuracy, low power requirements of today's EFM/RTU applications and industry requirements

Faster & Stronger

Additional I/O

More flow runs, broader controls

- (12) single ended 4-20mA/1-5V analog inputs or 6 differential 4-20mA / 1-5V channels
- (2) RTD inputs, (2) high speed frequency inputs
- (2) isolated 4-20 mA/1-5V analog outputs
- (6) multi-function digital I/O, configurable as status input /status output or pulse output ports

Enhanced Communications

More ways to transmit data

- (2) RS232C multi-function serial ports on main board
- (2) User selectable RS232C/RS485/RS422 serial ports on main board
- (1) User selectable RS232C/RS485/RS422 serial port on expansion board
- All ports configurable for network communications, gas chromatograph interface, multi-variable transmitter interface, alarm call-out, remote console or serial report printer functions
- Unit supports multiple concurrent protocols, including Modbus, ScanCom and BSAP. Call Barton for a complete list of supported commands, record formats and protocols.

Expanded System Board

More memory for increased speeds

- Intel 386™ EX processor operates at 16 Mhz
- Intel 387™ SX coprocessor speeds floating point computations by another order of magnitude
- 1024 Kbytes of code space, up to 96 Kbytes of volatile ram, and up to 448 Kbytes of non-volatile ram

Optimized Power

More data for less cost

- Processing of low level I/O by dedicated micro-controller allows for unit to scan keypad, generate pulse outputs, sample status inputs, and manage A/D conversion of all inputs
- Micro-controllor functions as a low-powered real-time clock with 32 kHz crystal
- DMA logic allows up to 32 bytes to be 'spooled' into memory without interrupting 386™EX

Cross Functional Applications

More help to more people

- Operators: optimize production, daily balances
- Gas Control: meet daily and intraday nominations
- Gas Marketing: optimize spot sales, contracts
- Engineering: monitor reserves, evaluate economics
- Financial Accruals: production and revenue accounting

Scanner 1131 Specifications

Following is a detailed description of the capabilities and specifications for the Scanner 1131. Please note that more I/O is available on a number of different expansion boards that were originally developed for the Scanner 1130 and can now be used on the Scanner 1131. They are listed after the main board specifications.

Main Circuit Board

Computer Section	Microprocessor	Intel™ 386EX 16/32 bit embedded processor
	Coprocessor	Optional Intel™ 387SX (DC powered version only)
	Clock speed	16 MHz.
	Program memory	Up to 1024 Kbyte FLASH memory
	Scratchpad memory	Up to 96 Kbyte of static ram
	Non-volatile memory	Up to 448 Kbytes of battery backed static ram
	Real time clock	Battery backed real time clock/calendar
	Backup battery	Single cell lithium battery, replaceable in safe area
	Data retention	1 year minimum (unpowered) including clock
A/D System	Resolution	16 bits
	Linearity error	±0.015% typical
	Throughput	All inputs converted in less than 1.0 second (DC powered model only)
Display / Keypad	Display	4 line x 20 character alphanumeric LCD Optional LED Backlighting
	Keypad	Standard 8 button read-only keypad Optional extended numeric keypad
Serial Communications Ports	Quantity	4
	Port #1 & Port #2	RS-232C
	Port #3 (optional)	RS-232C or optional switch selectable RS-232C/RS-422/RS-485
	Port #4 (optional)	Switch selectable- RS-232C / RS-422 / RS-485
	Baud rates	110, 150, 300, 600, 1200, 2400, 4800, 9600, or 19,200 baud, software selectable
	Parity	Even, odd, or none, software selectable
	Stop bits	1 or 2, software selectable
	Modem power output	+8.0V ±10% @ 10 mA
Pulse Inputs	Quantity	2
	Pulse signal types	Preamplified square wave, open collector, contact closures, Pepperl & Fuchs inductive proximity sensor, or turbine magnetic pickup coil, configured via on board DIP switch.
	Over voltage protection	±40VDC
Status In/Status Out/ Pulse Outputs	Quantity	6
	Maximum voltage	±40 Vdc
	Status/pulse out	
	Max. onstate current	100 mA
	Maximum pulse output rate	5 counts/second @ 50% duty cycle
Analog Inputs	Quantity	6 differential / single ended (switch selectable) (optional 12 single ended input version available with external termination resistors)
	Type	1-5 V or 4-20 mA
	Under/over range	-25%, +5% of span nominal
	Accuracy	1-5V: ±0.03% of span max. error @ 25°C (75°F) 4-20 mA: ±0.045% of span max. error @ 25°C (75°F)
	Average temperature effect	1-5V: ±0.0025% of span/°C max. 4-20 mA: ±0.0030% of span
	Impedance	> 10KΩ (1-5V input), ~ 250Ω (4-20 mA input)
	Common mode range	0 - 6 Vdc minimum (differential inputs)
	Common mode rejection ratio	> 60 db (DC) (differential inputs)
	Over voltage protection	±40VDC steady state overvoltage, plus 300W surge for 1 msec
RTD Inputs	Quantity	2
	Type	100Ω 2 or 3-wire with lead compensation
	Range:	-45°C to +120°C (-50°F to +250°F)
	Accuracy:	±0.20°C @25°C ambient including RTD linearization
	Average temperature effect:	±0.0065°C measurement error / °C ambient change
	Overvoltage protection:	±40VDC steady state overvoltage, plus 300W surge for 1 msec

Analog Outputs	Quantity	2
	Type	Optically isolated, externally powered
	Accuracy	±0.1% of FS max. error @ 25°C (after factory calibration)
	Temperature effect	±1% of FS max. error over temperature
	Liftoff voltage	< +10.0 Vdc

DPE™ Dual Pressure Electronics Sensor

Quantity	2 (Optional)
DP ranges	0-150'' and 0-300'' and 0-500''wc (0-37, 0-75 and 0-124 kPa)
Static pressure ranges	0-300, 0-1000, 0-1500, 0-2500 and 0-3000 psi (0-2069, 0-3448, 0-6895, 0-10343, 0-17238 and 0-20685 kPa)
Safe working pressure	2500 psi on all ranges except 0-3000 psi (17238 kPa on all ranges except 0-20685 kPa) 3750 psi on 0-3000 psi range (25856 kPa on 0-20685 kPa range)
Operating temperature	-40°F to +175°F (-40°C to +80°C)
Accuracy	±0.1% of span
Stability	±0.1% of span/6 months
Temperature effect	±0.25%/100°F (40°C)
Static pressure effect-zero	±0.1%/2500 psig (17238 kPa)
Cell material	316 SS
Process cover material	Carbon Steel (316 SS optional)
Bolting	Carbon Steel (17-4 PH optional)

Power Supplies

DC Power Supply	Input voltage :	19.2 to 28.8 Vdc
	Input isolation:	Optionally available (500VAC for 1 minute)
	Transmitter supply:	24 Vdc ±10%, 240 mA (max) (Vin-0.3V on non-isolated version)
	Area classification:	Class 1, Division 2, Non-incendive
Rechargeable Battery Power Supply	Input voltage:	12 to 28 Vdc
	Input isolation:	None
	Battery charger:	14 Vdc nominal with temperature compensation 750mA current limit with 75mA float charging circuit
	Modem/Radio supply:	Battery voltage output with short circuit protection 2.0A (max) with software controlled low voltage cutoff
	Transmitter supply	10 Vdc, 15mA (max)
	Area classification:	Class 1, Division 1, Intrinsically safe with approved solar panel or I.S. barrier device Class 1, Division 2, Non-incendive

Expansion Boards

1) Analog and Status Output (ASO1)

Analog Outputs	Quantity:	3 (maximum)
	Type:	Optically isolated, externally powered
	Signal type:	4-20 mA current loop, externally powered
	Allocation:	User-selectable
Status / Pulse Outputs	Quantity:	3 (maximum)
	Type:	Optically isolated
	Count rate (pulse mode):	0 to 8 Hz, 50 % duty cycle maximum
	Max on-state current:	100 mA (fused at 250mA)
	Max off-state voltage:	40 Vdc
	Function:	User-assignable

2) Communications and Analog Output (CAO1)

Serial Communications	Quantity	1 (maximum)
	Interface	Switch selectable as RS-232C / RS-422 / RS-485
	Baud rates	110, 150, 300, 600, 1200, 2400, 4800, or 9600 baud, software selectable
	Parity	Even, odd, or none, software selectable
	Stop bits	1 or 2, software selectable
	Function	Printer, remote console, or gas chromatograph port
	Protection	Surges to 300 W @ 1 msec. plus DC overload to ±40 V

Analog Outputs	Quantity:	4 (maximum)
	Type	Optically isolated, externally powered
	Function	User assignable (Flow rate, temperature, etc.)

3) Communications and Status (Digital) Input / Output (CD01)

Serial Communications	Quantity	1 (maximum)
	Interface	Switch selectable as RS-232C / RS-422 / RS-485
	Baud rates	110, 150, 300, 600, 1200, 2400, 4800, or 9600 baud, software selectable
	Parity	Even, odd, or none, software selectable
	Stop bits	1 or 2, software selectable
	Function	Printer, remote console, or gas chromatograph port
	Protection	Surges to 300 W @ 1 msec. plus DC overload to ±40 V
Status Inputs and Status/ Pulse Outputs	Quantity	4 (maximum)
	Input voltage	+40 Vdc maximum
	On-state current	100 mA Maximum (status or pulse output)
	Maximum pulse rate	8 counts/second at 50% duty cycle (pulse output)
	Function	User-assignable
	Protection	Optically isolated, polartiy protected, surge protected to 500W for 1 msec.

4) Status Input / Output Pulse Input/ Output Digital Channels (DIO1)

Status / Pulse Input	Quantity	5 (maximum)
	Input voltage	+40 Vdc Maximum
	Input current	Current limited @ 2.5 mA nominal
	Pulse input frequency	0 to 10 kHz
	Protection	Optically isolated, polarity protected & surge protected to 300 W for 1 msec.
Phase Discriminator	Quantity	2 (maximum)
	Function	Compares phase relationship of inputs 1 vs.2 and 3 vs.4
	Phase accuracy	± 15°
	Operating frequency	1 Hz to 10 kHz
Pulse Comparators	Quantity	2 (maximum)
	Function	Continuous comparison of two pulse trains for sequence phase, as well as detection of simultaneous pulses, with a latched alarm generated if an error detected. Programmable low frequency cutoff prevents false alarms during flow startup or shutdown.
	Operating frequency	1 Hz to 10kHz
Status / Pulse Output Specifications	Quantity	5 (maximum)
	Input voltage	+40 Vdc Maximum
	On-state current	100 mA Maximum @ 25°C (75°F)
	Maximum pulse rate	8 pulses/second @ 50 % duty cycle
	Off-state leakage	< 100µA @ +40 V and 25°C (75°F)
	Protection	Optically isolated and surge protected to 300 W for 1 msec.

[1] Average temperature effect is defined as the (maximum - minimum) divided by the operating temperature range, expressed in terms of % of span.

[2] The common mode range defines the common mode voltage of the external signal over which the common mode rejection ratio applies. The 6V specification allows for a 20 mA current loop signal into 300Ω of impedance external to the 1131 (in addition to the voltage dropped by the 1131 input).

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