

## NUFLO Scanner 1140

### Single & Dual Stream Measurement Remote Telemetry Unit (RTU)



Sensia's Measurement Systems Division, manufacturer of BARTON® Chart Recorders, the most rugged and reliable chart recorders in the world, continues to lead the way in accurate and easy to use gas measurement and control instrumentation. The NUFLO Scanner 1141 is a single and dual stream measurement RTU designed specifically to provide flow monitoring and control for oil and gas gathering and production operations.

Featuring a full range of operator-configurable mass, energy, and volume algorithms, the Scanner NUFLO 1141 simplifies the collection, processing and transmitting of data.

Economical

Easy to install and use

Field-configurable and programmable

Low-power operations

## User Interface

ScanWin Lite's effective "wizards" guide operators through the setup of hardware, flow runs, and primary devices as well as the collection of hardware, system and flow run data. ScanWin Lite also facilitates the upload and download of configuration settings.

ScanWin standard, an optional upgrade from ScanWin Lite combines all of the functionality of ScanWin Lite with a flowrun catalog and relational database that stores historical information for off-line review. Other features allow configuration of the Scanner's advanced control and data capture functions. ScanWin also supports various connection methods for communicating with the Scanner remotely.

## Built-In Features

While the Scanner 1141 can accept inputs from low-power transmitters, RTDs and pulse-producing devices, an optional highly accurate and stable MVT (multi-variable transducer) provides low-cost measurement of static and differential pressure. Factory-integrated devices such as the MVT reduce capital and installation costs.

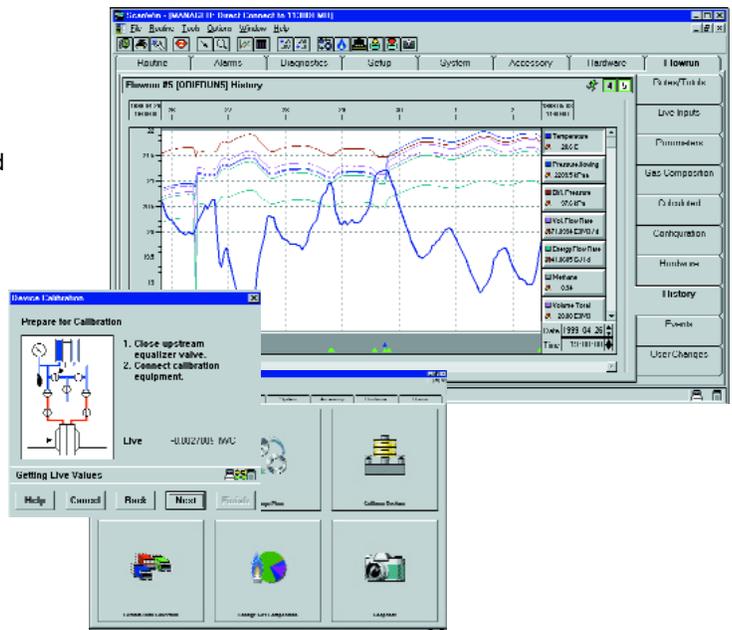
Significant features of the Scanner 1141 include:

- A field-retrofitable expansion board provides additional inputs/ outputs for system expansion.
- Serial ports can be configured as Modbus® masters for communicating with devices like NuFlo's MVX series transmitters, enabling dual-stream measurement
- Local displays are clear and large for unequaled viewing.
- A broad selection of units of measure makes the Scanner a true global EFM solution.
- Energy-efficient power management system controls measurement, calculations, communications, and end devices for solar-powered operation.

## Production Optimization and Control Tools

To facilitate logic and control, the Scanner supports multiple proportional control loops as well as discrete logic. For PID control and sophisticated logic sequences, the Scanner optionally features the ScanPLC software module, which is programmable using IEC 61131 programming languages. With these tools, the Scanner can perform the following operations:

- Proportional + integral control with second variable override
- Emergency shutdown
- Run switching
- Nomination control
- Artificial lift control
- Pig launching



ScanWin Lite Windows interface is used to configure, maintain and manually retrieve data from the Scanner.

## Application Flexibility

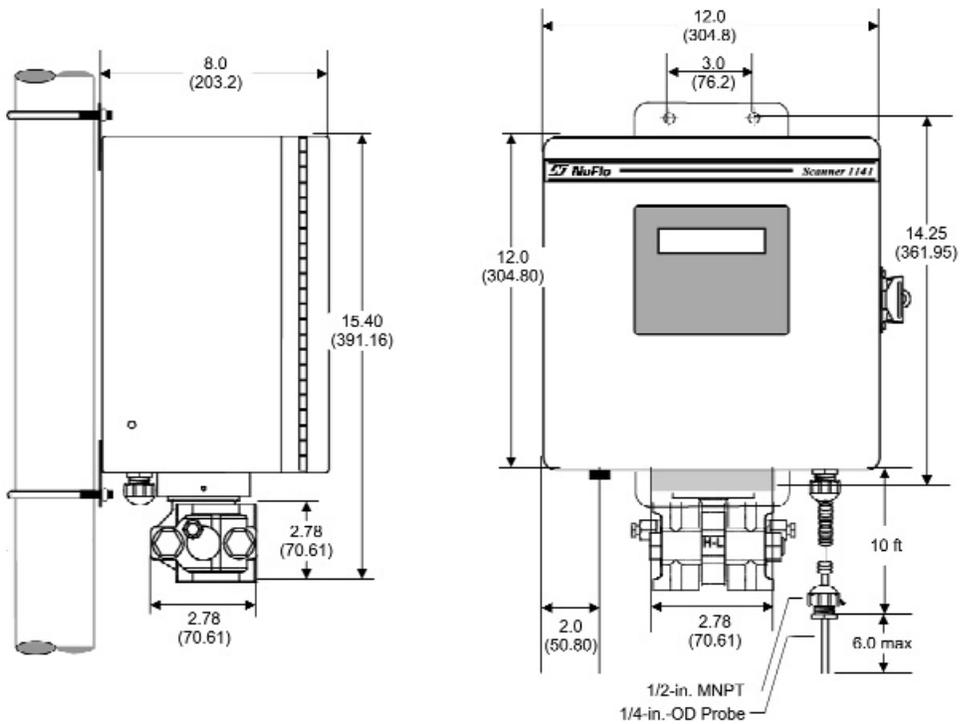
- Supports all common primary devices including:
  - Differential Producers – orifice fitting, pitot sensor (annubar), NuFlo Cone, and wedge, plus nozzle and venturi in Igas firmware set.
  - Linear Pulse Output Meters – turbine, positive displacement, ultrasonic and coriolis (mass or volume only)
- Natural gas algorithms for mass, energy and volume calculations follow North American (AGA) and International (ISO) Standards:
  - AGA3-92, 7, 8-94, (Detailed and Gross Methods), plus other alternate methods.
  - ISO 5167-1 thru 4, 12213-1, -2, -3
- 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)
- ScanPLC's IEC 61131 optional module may be used to program the Scanner to perform specialized computations such as wet gas corrections, saturated steam or user-proprietary methods and techniques.
- Communications protocols
  - ScanCom (ADEPT)
  - Modbus (Standard and Enron implementation) with user-definable map which allows the Scanner to match existing hosts.

## Accuracy and Security

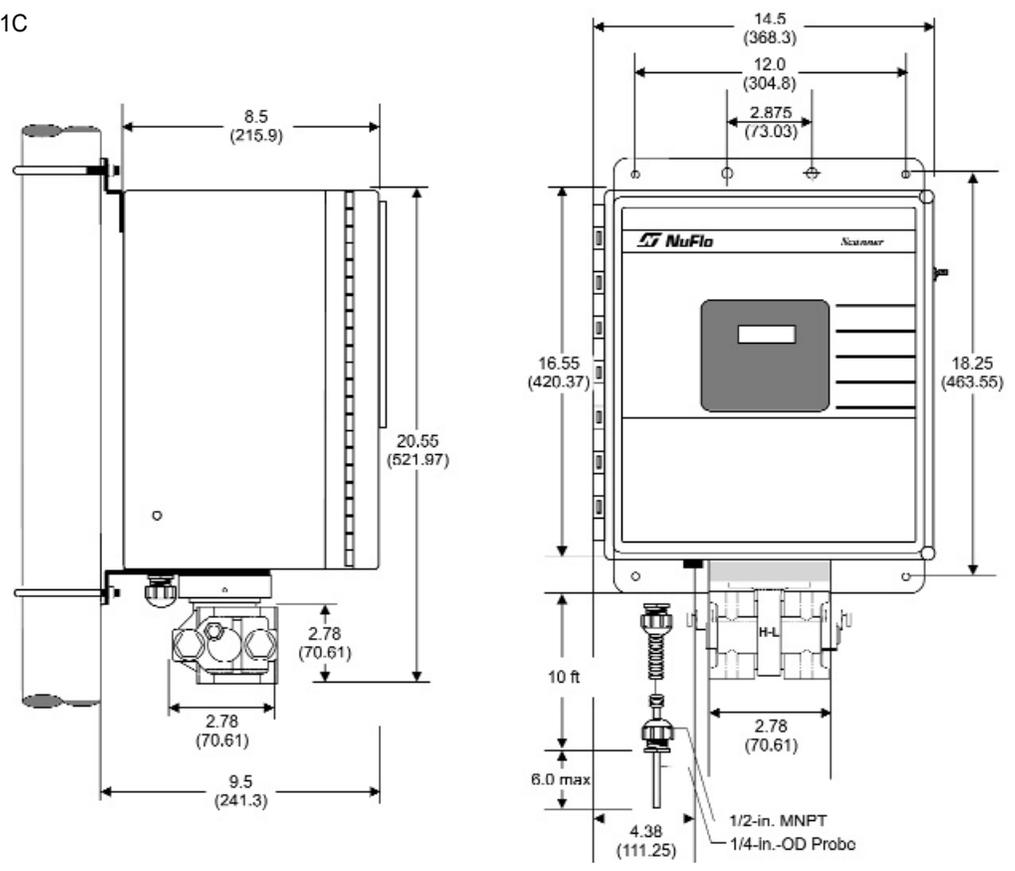
- Custody transfer approvable by Measurement Canada
- API 21.1 and 21.2 compliant
- AEUB Directive 17 compliant
- Multi-level password security
- Assembly is performance-tested prior to shipment.

## Scanner 1141 Dimensions

Scanner 1141L



Scanner 1141C



## Scanner 1141 Specifications

Environmental	CSA certified for Class I, Division 2, Groups A, B, C & D (Radios, modems, relays and other accessories require special acceptance)	
	ATEX/CE, Zone 2 certification pending	
	Operating Temperature	Standard SLA battery                      -40°C to +40°C (-40°F to 104°F) High-temperature SLA battery              -40°C to +60°C (-40°F to 140°F)
	Relative Humidity	0% to 95% non-condensing
Enclosures	1141L Enclosure 3 (NEMA 3)	Dimensions: 12 in. wide x 12 in. high x 8 in. deep Painted steel
	1141C Enclosure 4 (NEMA 4 or optional 4X)	Dimensions: 14 1/2 in. wide x 16 1/2 in. high x 8 1/3 in. deep Fiberglass-reinforced plastic
	1141G Enclosure	Dimensions: 9.6 in. wide x 10.1 in. high x 2.5 in. deep Chassis for mounting in other enclosures or cabinets
Computer	CPU speed:	7 MHz.
	Real-Time Clock:	Battery-backed time clock /calendar
	NVRAM:	2 flowruns of hourly history for 35 days each
	New application programs (firmware) can be loaded to the FLASH ROM using Scan Flash or Winsload utility programs on a Microsoft Windows® compatible PC. A memory backup battery powers the clock and maintains the contents of the memory for 1 year minimum with no power.	
Display	The "autoscroll" alphanumeric display provides quick access to current readings; parameters shown are user-assignable. The display can be activated by a push button on the main board, or it can be configured to always be on. The manual contrast adjustment is factory-set to optimize the display contrast and automatically adjusts for temperature variance. Backlighting is available on some hardware configurations. A jumper selection allows the user to turn only the backlight off or to turn the display off to conserve power.	
	Type	LCD, 2 line x 16 alphanumeric characters
	Viewable Area	99 x 24 mm (3.9 x 0.9 in.)
	Operating Temperature	-20°C to +70°C (-4° to 158°F)
	Storage Temperature	-40°C to +80°C (-40° to 176°F)
	System Board I/O Summary	The system board contains the central processing unit, FLASH EPROM memory, RAM, NVRAM, interface circuitry for the display, and up to four serial ports. The system board provides analog I/O and status/pulse I/O to support up to two natural gas or liquid flowruns with proportional/integral control.

### Hazardous Location, Division 2

A02 Serial Port	Analog RTD Input	Analog Input	Pulse Input	Analog Output	Discrete I/O	Charge Controller	Transmitter Supply	Notes	Order Code
RS-232/TTL	0	0	0	0	2	10A	CL & 12VL		B1
RS-232/TTL	2	1 (2)	1	1	4	10A	CL & 12VL		M1
RS-232/485/TTL	2	2 (4)	2	1	4	10A Dual Stage	CL & 12VL Step-up	1, 2, 3	FL

- Notes: 1. Includes a configuration lock switch (Measurement Canada) and display backlighting capability.  
2. Analog inputs have sockets on the main board for inserting precision resistors for 4-20 mA inputs.  
3. 6V System power- low cutoff is 5.6V. Without low cutoff option, cutoff is 6V.

(CL) Current Limited Transmitter Supply:

Current limited output that is powered from the battery or power input voltage (whichever is higher). Approximately 50 mA.

(12VL) 12V, 30 mA Voltage Limited Transmitter Supply:

Outputs the higher of the battery and power input voltages, from less than 0.25V to a maximum of 12V.

(12V Step-up) 12V, 30 mA Step-up Transmitter Supply:

Outputs 12V regardless of battery and power input voltages, recommended for 6V systems with 12V transmitters.

Power Supply & Battery Charge Controller Options	For Division 2 applications, the main board includes an integrated 10-amp temperature-compensated battery charger. The charge controller can be firmware-configured to work with either 6V or 12V sealed lead acid batteries. The input supply must be limited to 10A DC. Input is 6 to 28 VDC.	
Peripheral Power Supplies	<p>Two separate short-circuit protected outputs are available for powering radios and other devices:</p> <ul style="list-style-type: none"> <li>• a +5V @ 200 mA output that can be used to directly power +5V radios or to act as a logic-level control signal for +12V radio systems; FL configurator only</li> <li>• a protected switch that outputs the same voltage as the battery, maximum 18 watts, example 1A @ 18V</li> </ul> <p>Both supplies can be scheduled to turn on and off in firmware to conserve power, and to shut off when the low battery alarm is active.</p>	
Communications Port	Quantity	4 serial ports
	1st port (A01):	RS-232C local console port, c/w TX, RX, and GND
	2nd port (A02):	RS-232C, RS-485 or TTL, firmware-configured
	3rd port (A21):	RS-485 (H0 configuration also has RS-232C)
	4th port (A22):	MVT/RTD transducer input, serial TTL
	Baud Rates	110, 150, 300, 600, 1200, 2400, 4800, 9600, or 19200 bps, firmware-configured
	Bits per Character	7 or 8, firmware-configured
	Stop Bits	1 or 2, firmware-configured
	Parity	even, odd, or none, firmware-configured
	RS-232C ports:	TX, RX, RTS, CTS, GND (flow control software or hardware)
	RS-485 ports:	2 wire, AC-coupled, with selectable biasing resistors and separate terminals from the RS-232C
	TTL ports	8-pin molex connector, with TX, RX, RTS, CTS, GND, and earth GND. With 3.3V TX, and 3.3V or 5V RX. Firmware-configurable for normal or inverted signal level
MVT/RTD Input	A serial TTL interface to the MVT/RTD Multi-Variable Transducer measures differential pressure, static pressure, and temperature (via an RTD).	
MVT Inputs	Quantity	1 sealed gage pressure input and 1 differential pressure input
	Accuracy	± 0.05 % of URL @ 25°C (77°F)
	Ambient Temperature Effect	± (0.03 % of URL + 0.06% of reading) for a 28°C (50°F) change in operating temperature. For 30 in. wc DP, ± (0.18 % of URL + 0.025% of reading)
	Effect on differential pressure for a 7-Mpa (1000-psi) change in pressure	Zero shift ± 0.05 % of URL Span shift ± 0.1 % of reading
	Stability	Long-term drift is less than ± 0.05 % of URL per year over a 5-year period.
	Ranges available in standard and NACE-compliant models:	<ul style="list-style-type: none"> <li>• 100 psia static pressure with 30 in. wc differential pressure</li> <li>• 300 psia static pressure with 200 or 840 in. wc differential pressure</li> <li>• 500 psia static pressure with 200 in. wc differential pressure</li> <li>• 1500, 3000 or 5300 psia static pressure with 200, 400 or 840 in. wc differential pressure</li> </ul>

RTD Input with MVT

**Pressure Limits and Bolt Material**

Static Pressure Range (URL) <sup>1</sup>		Safe Working Pressure (SWP) <sup>2</sup>		Standard Bolt Material <sup>3</sup>	
psia	Mpa (absolute)	psia	Mpa (absolute)	Standard	NACE
100	0.7	450	3.1	B7	B7M
300	2.1	450	3.1	B7 or SS	B7M
500	3.4	750	5.1	B7	B7M
1500	10	2250	15	B7 or SS	B7M
3000	20	4500	31	17-4 PH	718 Inconel
5300	36	5800	40	17-4 PH	718 Inconel

- Notes: 1. URL is the highest pressure the transducer can measure.  
 2. SWP is the highest pressure that can be applied to the transducer without damage.  
 3. Materials: 316 SS body, 316L SS diaphragm.

	Quantity	1			
	Type	100Ω 4-wire lead compensation			
	Range	-200°C to +850°C (-325°F to +1560°F)			
	Accuracy	± 0.28°C (± 0.5°F) @ 25°C (77°F) ambient including RTD linearization			
<b>RTD Element</b>	A 1/2-in. FNPT field-adjustable fitting adapts to thermowells with up to 5 in. (127 mm) U-dim. Longer elements are also available. The 1/4-in. diameter element has 10-ft (3m) or 30-ft (9m) leads sheathed in stainless steel armour. RTD accuracy: ± 0.1 ohm @ 0°C.				
<b>RTD (Analog) Inputs</b>	Quantity	up to 2 on the main board (each configurable as two analog inputs) plus 1 with MVT/RTD			
	Type	100Ω, 3-wire lead compensation			
	Range	Default: -45° to +120°C (-50° to +250°F), user-enterable up to +210°C (410°F) if lead compensation is less than 1Ω			
	Accuracy	± 0.25°C (± 0.45°F) @ 25°C (77°F) ambient including RTD linearization			
	Temperature Effect	± 1.0°C over entire Scanner operating range			
<b>Analog Inputs</b>	Quantity	2 to 6 (each RTD input can be jumper-configured as two analog inputs)			
	Type	1-5V or 4-20 mA with 250Ω load resistor			
	Accuracy	± 0.050% of span max. error @ 25°C (77°F)			
	Temperature Effect	± 0.3% over entire Scanner operating range			
	Impedance	>10 MΩ (1-5V input); approximately 250Ω (4-20 mA input)			
	Over Voltage Protection	± 30 VDC			
	A/D Resolution	16 bit			
	Linearity Error	± 0.020% max.; ± 0.010% typical			
<b>Pulse Inputs</b>	Quantity	1 or 2 configured using DIP switch settings			
	<b>Pulse Type</b>	<b>Maximum Low Level Signal</b>	<b>Minimum High Level Signal</b>	<b>Frequency Range</b>	<b>Input Impedance</b>
	Square Wave	0.8 V	2.2 V	0.8 kHz	> 100 kΩ
	Open Collector	2 kΩ	200 kΩ	0-10 kHz	n/a
	Contact Closure	2 kΩ	200 kΩ	0-15 kHz	n/a
	Magnetic Pickup	-	20 mV p-p	0-5 kHz	10 kΩ @ 1 kHz

Status Inputs/Status Outputs/ Pulse Outputs	Quantity	up to 4, user-configurable
	Maximum Voltage	± 30 VDC
	Maximum On-State Current	100 mA
	Maximum Pulse Output Rate	64 counts/second @ 50% duty cycle
	Function	Signal alarms, control valves, interface to counters
	Threshold	The status input determines the guaranteed limits within which the input will detect a changed state. In a typical operation, the trip transition points are within 0.5 volts of the nominal threshold.

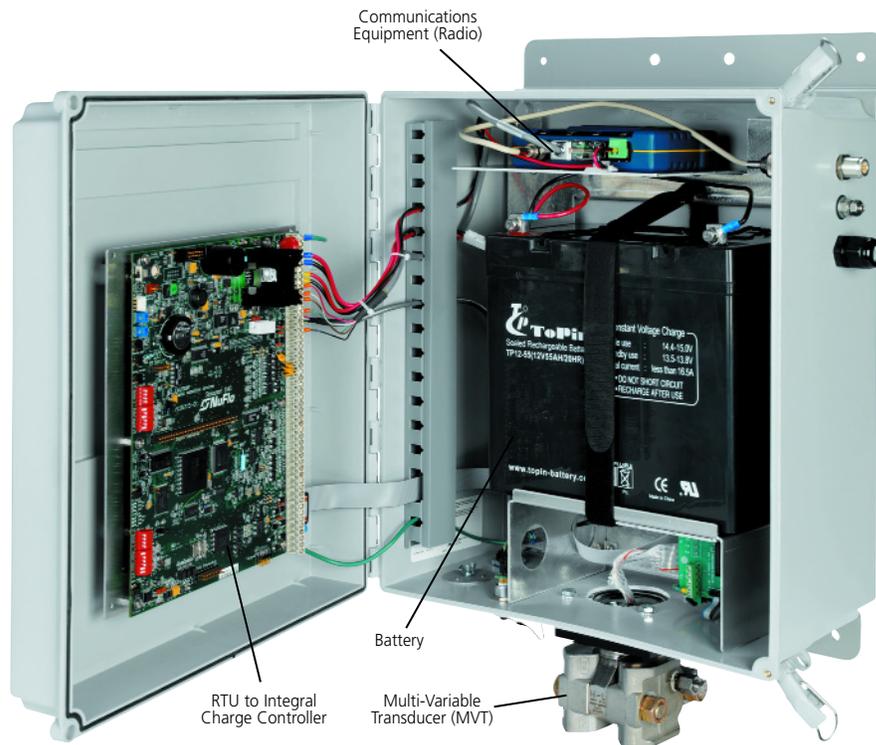
Normal Threshold	Maximum Low Level Signal	Minimum High Level Signal
2.0 V	0.5 V	3.5 V
7.0 V	5.0 V	9.0 V
10.0 V	8.0 V	12.0 V
Contact In	2 kΩ	200 kΩ

Analog Output	Quantity	1, user-configurable
	Type	4-20 mA, optically isolated, externally powered
	Accuracy (after calibration)	± 0.1% of span max. error @ 25°C (77°F)
	Output Load	$R \text{ (ohms)} = \{\text{Supply (volts)} - 5.5\} / 0.02$
	Maximum Voltage	± 30 VDC
	D/A Resolution	12 bits
	Calibration	Zero and full-scale via software
	Supervisory circuit	On loss of power to RTU, jumper-select analog output will go to minimum level of 2 mA or retain last value.

**Expansion Board Interface** The Scanner 1141 has a provision for an expansion board with the following inputs and outputs:

- MVT/RTD, serial TTL port for communications
- 4 status inputs/status outputs/pulse outputs
- 1 optically isolated analog output, 4- 20 mA
- 1 pulse input for volume accumulation

The specifications for the expansion board are the same as those for the main board. Boards may be ordered with fewer I/O.



*The 1141C and the 1141L offers integral radio, cellular, or dial-up modem capabilities.*

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