

Instromet[®]

MODEL 333

ELECTRONIC VOLUME CORRECTOR



The INSTROMET MODEL 333 ELECTRONIC VOLUME CORRECTORS are high performance low power volume correctors. Advanced technology allows the user to configure the correctors to the operational requirements.

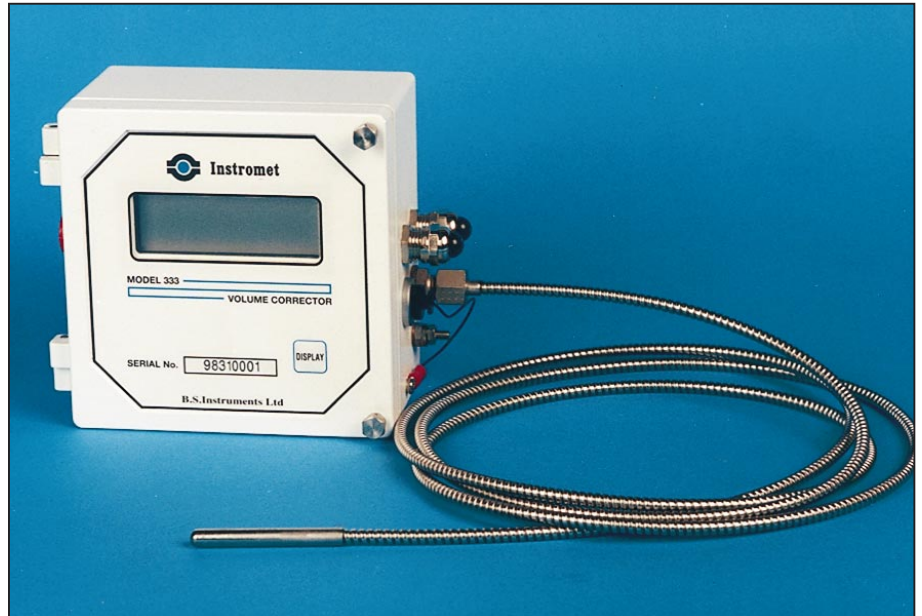
GENERAL

The Series 333 Correctors are designed to adjust the uncorrected volume derived from a gas meter to corrected volume using active inputs for pressure and temperature. A fixed compressibility factor can be used. The Correctors are low power microprocessor based units which can be wall or meter mounted.

The Model 333 Volume Corrector is powered from a standard replaceable lithium battery housed in a removable battery unit. Non-volatile memory provides configuration data retention during battery changes.

The Correctors are designed to be intrinsically safe and can be located in either the hazardous area or safe area. Optional accessories are available to provide interfaces with the hazardous area to safe area.

The pressure sensor is characterised for ambient temperature effects to give maximum accuracy in volume measurement over a wide pressure and temperature range. The characterisation constants are stored within the non-volatile memory.



The temperature sensor is a linearized positive coefficient resistance element.

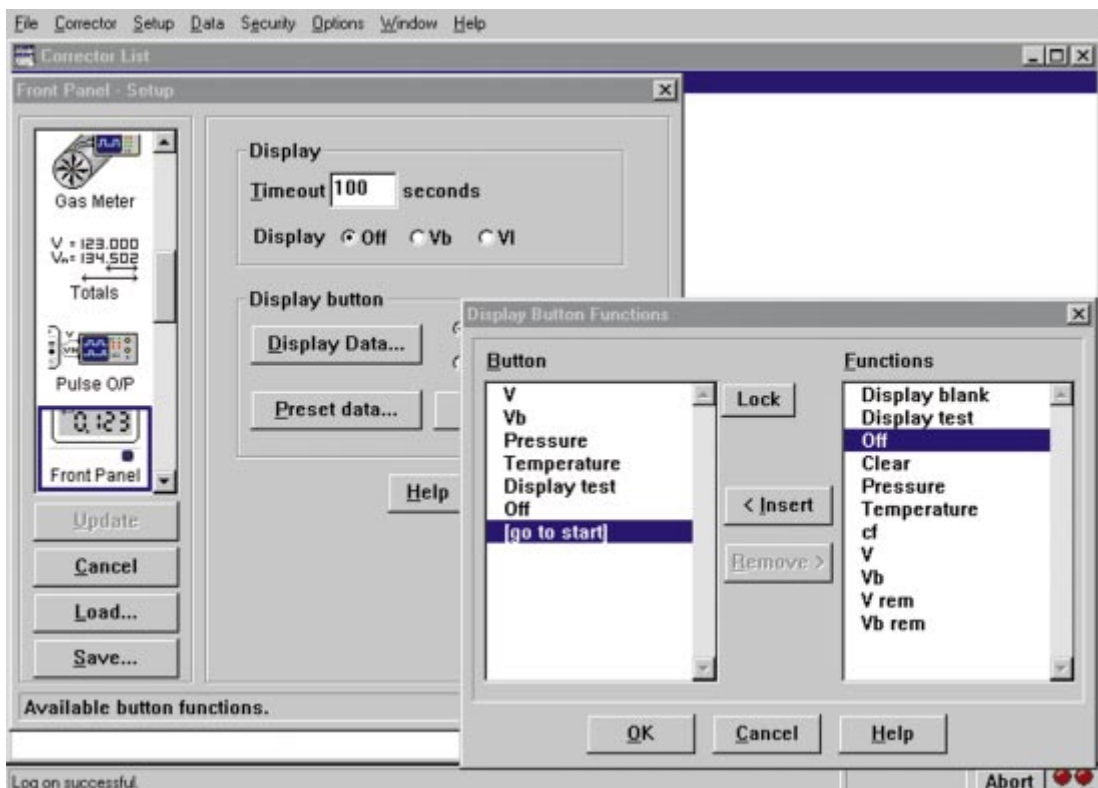
The Corrector is configurable to operate in units of bar.a, Pa., kg/cm² or PSI. for pressure and °C, °K, °F for temperature. Pressure is measured with an absolute pressure sensor.

The LCD is an 8 digit numeric display which can display any of the required operating parameter and

alarm conditions. The display is blanked after a selected period to conserve battery power.

Data can be accessed through the serial port.

The corrector is housed in an polyester coated aluminium weather-proof enclosure with silicone rubber seals and is weatherproof to IEC.144:1P66.



INSTROMET MODEL 333 CORRECTOR OUTSTANDING FEATURES

High Operating Accuracy

± 1.0% of reading for a five to one pressure range.

Battery Powered

Lithium battery powered by a replaceable battery giving an operating battery life of ten years

Intrinsically Safe Approval

Intrinsically safe approval allows safe operating in a hazardous gas environment.

Calibration

Electronic calibration capability using only two points as sensors are fully characterised for temperature. Single point calibration option for use in field condition is also available.

Serial Communications

A serial port for communications is built-in for remote use.

INPUT SIGNALS

The Model 333 Corrector accept inputs from gas meters equipped with a low frequency (LF) pulse output (voltage free contacts, transistor or mosfet) with a maximum frequency of 1 Hz. One input pulse defines the quantity of gas from the meter which can be scaled by the uncorrected volume factor giving the quantity of gas indicated on the display.

TEMPERATURE INPUT

The temperature sensor is a positive temperature coefficient resistance element embedded in a stainless steel probe with a maximum pressure rating of 20 bar (300 PSI). The standard probe has 2 meters of stainless steel flexible sheath attached. The gas temperature range is -30° C to +60° C (-20° F to +140° F).

PRESSURE INPUT

The pressure is measured by a stain gauge diaphragm pressure sensor mounted internally in the Corrector.

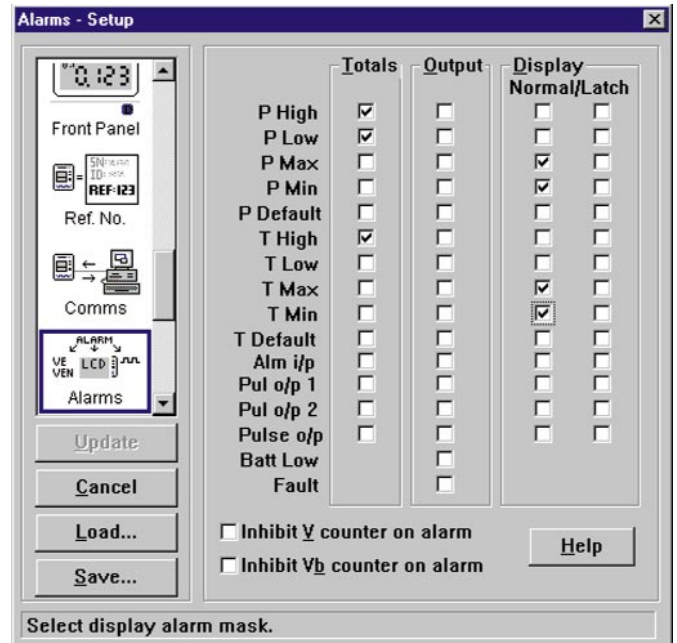
The sensor is fully characterised for ambient temperature effects. Available with the following pressure ranges:

0- 1.5 bar.a	0- 25 psia
0- 3bar.a	0- 50 psia
0- 7 bar.a	0- 100 psia
0- 10 bar.a	0- 150 psia

The maximum overload pressure is 1.25 times the maximum working range of the sensor. The Pressure connection is a 1/8" NPT female threaded stainless steel connector. All wetted parts are stainless steel.

DISPLAY

The 8 digit numeric display can indicate parameters determined by the functions of the display button. The totalised line and corrected volumes are shown to 8 digits. The totals can also be pre-set enabling the mechanical index of the meter to indicate the same value as the



Corrector index The display will blank after a pre-selected time if the display button is not operated. Legends show which parameter is displayed.

The display button can be configured to display any of the active operating parameters. Each press steps the display to the next parameter. When the end of the list is reached the display will return to the first item.

DATA ENTRY

The Model 333 can be set to user requirements using the serial port connected to a laptop PC to provide the operating and configuration data.

Programming software which operates in a windows environment is provided with the Corrector.

Data can be entered or read from the Model 333 Corrector. Security of the pre-set data is maintained by the use of passwords and/or a security switch located inside the Corrector and by a unique software protocol used to load the data.

All of the data entry parameters are stored in non-volatile memory.

CALIBRATION

The Corrector will meet its specified accuracy without the need for calibration. If it is required to make adjustments to accommodate the uncertainty in the measuring system then a software calibration facility is provided. The pressure and temperature sensors can be software calibrated with a PC computer connected to the serial communications port.

The software allows a choice of calibration method of either single point calibration or two point calibration.

Single point calibration allows only the zero value (offset) to be changed. Two point calibration allows both zero and range to be calibrated independently.

ALARMS

The alarm output can be programmed to operate if any one or combination of the following conditions occurs:

- Pressure is above the pressure high alarm setting.
- Pressure is below the pressure low alarm setting.
- Temperature is above the temperature high alarm setting.
- Temperature is below the temperature low alarm setting.
- A gas meter input pulse occurs before the last output pulse routine has been completed.
- A fault condition has been detected

The output is an optically isolated open collector transistor used as a passive switch and rated as follows:

Maximum continuous voltage = 6 Vdc
Maximum continuous current = 0.5 mA.

ALARM AND FAULT

ALARM is indicated when the input signal for either pressure or temperature is outside its operating range or if a gas meter pulse has occurred before the previous computing cycle has completed.

FAULT is indicated if a failure is detected during the self checking procedures. The programme and data memory are tested by using checksum methods. All entered data is checked for corruption. A watchdog circuit tests for correct microprocessor operation.



Instromet SM-R1-X turbine gas meter with 333 volume corrector.

SERIAL PORT

The serial port is used for the initial configuration and data entry to the Corrector and give access to the active and running data. To enter or extract data from the Corrector it is necessary to use the software provided with the Corrector and a PC computer. The software works in a windows environment.

The port is connected through a Fischer connector at the side of the Correctors. The serial port is passive and can be interfaced to a PC computer using the Model 999 Programming Cable which also provides the safety barrier when the Corrector is located in a hazardous area.

MOUNTING

The Model 333 Corrector can be supplied for either wall or pole mounting or with an integral index adaptor. The adaptor has an 8 digit mechanical counter and a reed switch contact to provide a pulse to the Corrector. The adaptor mounting plate is drilled with a standard pattern for mounting on most meters made in the U.S.A. and Canada.

PULSE OUTPUTS

The Model 333 Corrector has two optically isolated passive open collector outputs which are configured for uncorrected and corrected volume. The transistors have a rating of a maximum continuous voltage of 6 Vdc and continuous current of 0.5 mA. (These values may be limited by local safety requirements). The uncorrected volume output gives a pulse per gas meter pulse and for the corrected volume the number of output pulses is given by the integer of:

$$\frac{\text{correction factor}}{\text{totalising factor}}$$

for each gas meter pulse. The residual is retained and added to the next volume calculation and put out when the accumulation is greater than 1.

The 'on' period for each pulse can be selected to have a nominal duration of 10 mS, 40mS or 320 mS. The maximum number of pulses per gas meter pulse is 15.

DATA ENTRY PARAMETERS

- High pressure alarm and low pressure alarms.
- Maximum temperature.
- High temperature alarm and low temperature alarms.
- Pressure and temperature default values.
- Base pressure and base temperature.
- The totalising factor defining the quantity of gas shown on display.
- Compressibility factor.
- The uncorrected volume factor defining the volume of gas represented by a gas meter pulse.
- Pre-set line and corrected volume register.
- Pre-set line corrected error volume register.
- Set pulse output totalising factor.

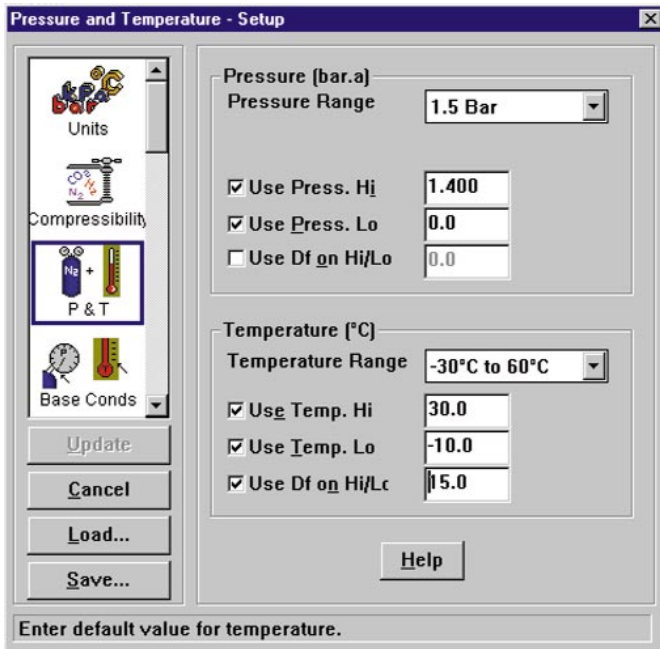
BATTERY POWER SUPPLY

The power for the Corrector is provided by a battery unit which contains a single replaceable "C" size lithium cell which will provide a nominal ten years operation when the gas meter frequency is 0.5 Hz or less and the output pulse length is not greater than 40 mS.

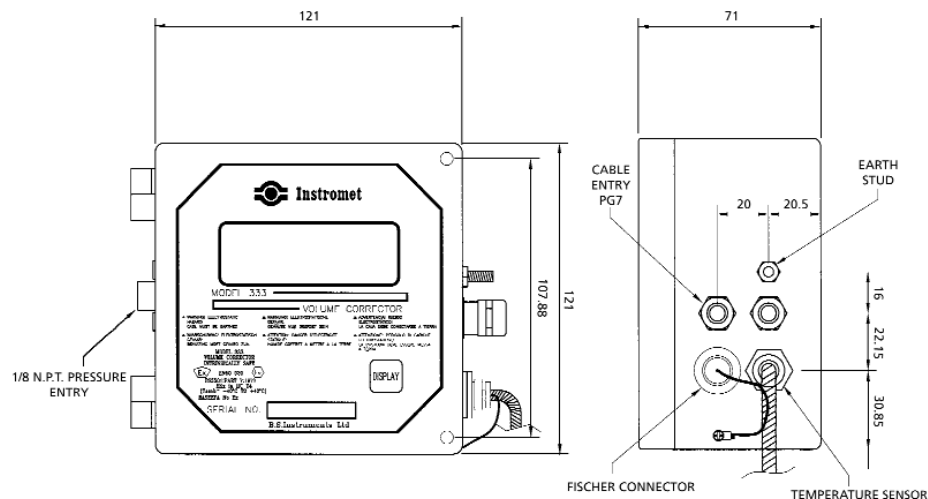
A battery symbol is shown on the upper LCD display when the battery requires replacing; the indication is given when power for approximately 1 month's operation remains.

SELECTABLE DISPLAY PARAMETERS

- Corrected Volume Total
- Corrected Volume Remainder
- Uncorrected Volume Total
- Uncorrected Volume Remainder
- Pressure
- Temperature
- Correction Factor
- Current Alarm Status



OVERALL DIMENSIONS



TERMINAL CONNECTIONS

External wiring to the Corrector is by screw terminal assemblies.

MODEL 999 PROGRAMMING CABLE

A Programming cable is available for use with the Corrector and PC Computer. The interface derives its power from the PC computer to provide power for the passive optically isolated local serial output from the Corrector. Consideration must be given to safety before a computer is used in the hazardous area.

MODEL 999 SERIAL INTERFACE UNIT

The Serial Interface Unit converts the passive optically isolated serial output of the Corrector to an active RS 232 output. The unit is powered from an external Power Supply for continuous operation. The Serial Interface Unit provides the function of a safety barrier to the hazardous area and is mounted in the non-hazardous area.

The unit conforms to CENELEC standards and is approved to EExiaIBT4.

MODEL 500 RELAY UNIT

The Model 500 Relay Unit is used to convert the passive transistor pulse outputs for line and corrected volume of the Corrector to voltage free contacts and provide isolation between the Corrector located in the hazardous area and other apparatus in the non-hazardous area.

The Model 500 Relay Unit conforms to CENELEC Standards and is approved to [EEx ia] IIC. The Relay Unit is located in the non-hazardous area, the circuits from the Corrector are protected by current and voltage limiting circuits and isolation is provided by intrinsically safe relays. Additional zener barriers and earthed circuits are not required.

The Relay Unit is powered by three D size Lithium Thionyl-chloride batteries.