ROMET

Adem® - PTZ

ADVANCED ELECTRONIC MODULE

P/N 17-MN-CA

OPERATING MANUAL

GAS METERS AND ELECTRONIC INSTRUMENTS 5030 Timberlea Blvd, Mississauga, Ontario, Canada, L4W 2S5
Phone: 905-624-1591 USA: 1-800-387-3201 FAX: 905-624-5668 romet@rometlimited.com www.rometlimited.com

May 2019 Rev.13

TABLE OF CONTENTS

1. INTRODUCTION TO AdEM®-PTZ

AdEM®-PTZ is an electronic gas volume conversion device, which provides corrected volume that is temperature and pressure corrected to standard conditions; applying compressibility correction factor according to NX-19 or AGA8 or SGERG88 formula (see Correction Equation for details). Romet combines the power of its field proven gas measurement technology and integration of computer-based software to come with the product AdEM®-PTZ. The device can be mounted on Romet rotary meters or other manufacturers' pressure bodies. AdEM®-PTZ can be used either as a stand-alone device or linked to a computer running **RometLink** software. **RometLink** is a powerful tool for device management and advanced data collection/energy management system.

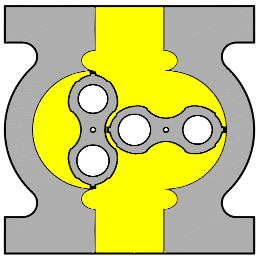


Fig.1 Rotary meter principle

Characteristic and What's New

- ✓ Compact, light and user friendly
- ✓ Optional portable keyboard eliminates need of integrated pushbuttons, for enhanced security
- ✓ External Scroll button to view parameters of the Custom Display and alarms.
- ✓ Optional to Scroll button the Internal magnetic sensor activated by sweeping magnetic tool to view parameters of the Custom Display and alarms
- ✓ New firmware with user friendly menus and improved configuration
- ✓ Compatible with new Romet RMT meters
- ✓ B3 compatibility, which can be mounted directly to the meter or with the addition of an AdEM Backup Counter
- ✓ RS-232 or RS485 local and remote communication capability for device management and data collection
- ✓ Audit-trail, Daily Logger, Event Logger/Event Logger Type A, Alarm Logger and Interval data collection features
- ✓ Upgraded Romet **RometLink** communication software providing a complete data collection system
- ✓ Variety of communication ways
- ✓ 3V 8 Digits 14-segment LCD display operable from -40 ˚F to +158 ˚F (-40 ˚C to +70 ˚C)
- ✓ Flash memory makes upgrading firmware easy
- ✓ High and Low pressure, temperature, flow rate and memory error alarms
- ✓ Long life replaceable battery (10 to 20 years in most applications)
- ✓ Battery life indicator for remaining months is based on real battery energy usage calculations
- ✓ Percentage of Battery capacity left
- ✓ External power connection (optional)
- ✓ Pigtail options for Pulse Output connections
- ✓ Selectable output pulse width and spacing to save power
- ✓ Previous Day and Daily Volumes
- ✓ Unc Backup volume reading, the value is same as mechanic Backup Counter
- ✓ AGA8, NX-19 or SGERG88 compressibility calculation method
- ✓ Modbus protocol capable (type RTU) - see Appendix for details

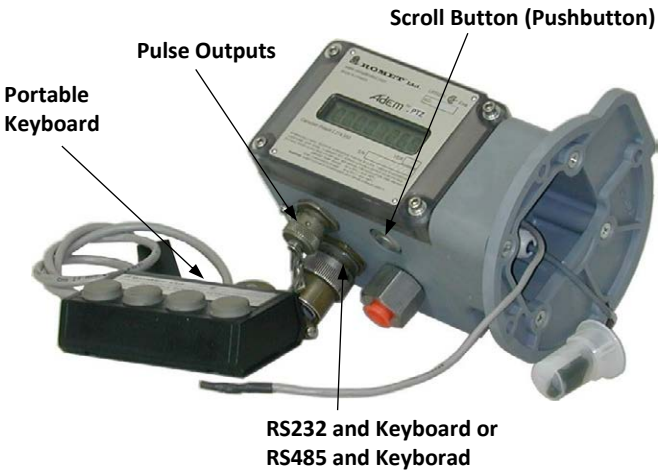


Fig.2 AdEM®-PTZ overview

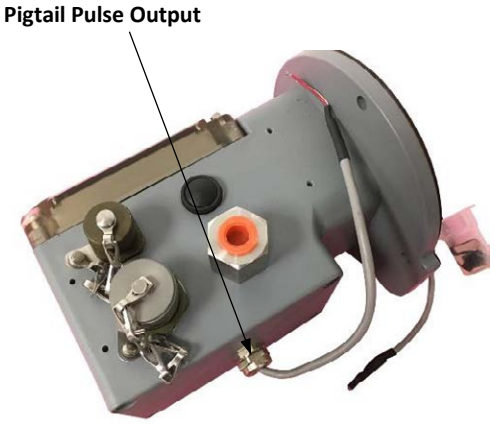
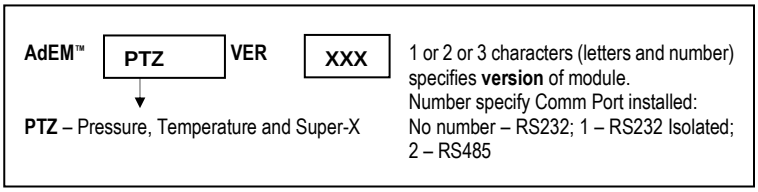


Fig.3 AdEM®-PTZ Pigtail Output Pulse connection

How to Specify Model



How it works

The AdEM®-PTZ is a solid-state electronic volume conversion module that is directly coupled to the magnetic housing of the Romet meter body. The AdEM®-PTZ employs a magnetic sensing device to sense the rotation of the meter's outer magnet which produces a high-resolution input that represents the non-converted (UNC - uncorrected) metered gas volume. The volumetric input pulses are converted to base measurement conditions (COR - corrected) by compensating for temperature, pressure (live or fixed) and super-compressibility NX-19 or AGA8 or SGERG88 (live or fixed).

$COR = UNC \times P_F \times T_F \times (Fpv)^2$ or $COR = UNC \times P_F \times T_F \times F_Z$

Where:

COR	=	Corrected volume (ft^3 or m^3)
UNC	=	Uncorrected volume (ft^3 or m^3)
P_F	=	Pressure correcting factor
T_F	=	Temperature correcting factor
$(Fpv)^2$	=	Super-compressibility correcting factor (Live Z factor for NX-19 method)
F_Z	=	AGA8 or SGERG88 compressibility factor (Live)

The pressure and temperature correction factors are calculated by the formulas as mentioned in section 8. The temperature is measured by an RTD or IC (optional) temperature sensor located in the temperature well or inlet differential port (optional) of the meter. Pressure transducer is mounted inside enclosure of AdEM®-PTZ (¼ inch NPT connector is available for pressure piping arrangement). The optional external temperature sensor location is recommended for mating the AdEM®-PTZ module to Romet meter bodies that do not have an internal temperature well.

Both parameter description and values that are integrated by the algorithms of the AdEM®-PTZ firmware (UNC volume, COR volume, flow rate, date, time, etc.) are displayed on an 8 digit 14-segment semi alphanumeric liquid crystal display (LCD).

A non-volatile EEPROM memory stores key parameter values, AdEM®-PTZ setup configuration, temperature sensor calibration data and Audit Trail data in the event of power loss.

AdEM®-PTZ key parameters:

- ✓ Current values of uncorrected and corrected volumes and measured parameters
- ✓ Under/Over limit violation monitoring of Pressure, Temperature and Flow.
- ✓ Present and Previous Day Volumes.
- ✓ Averages, Maximum and Minimum values for pressure, temperature and flow.
- ✓ Peak Flow stamped by date and time.
- ✓ Battery status.
- ✓ Last Hour Indexes stamped by date and time.
- ✓ Malfunctions.
- ✓ Uncorrected Volume Since Malfunction.

In addition to compensating for live pressure and temperature conditions, the AdEM®-PTZ has a low flow volumetric linearization feature that enhances the rangeability of the Romet meter to 200:1 or better with an error of less than ±1.0%. This feature, if activated, is automatically initiated at flow rates below 10% of the Qmax rating for the meter.

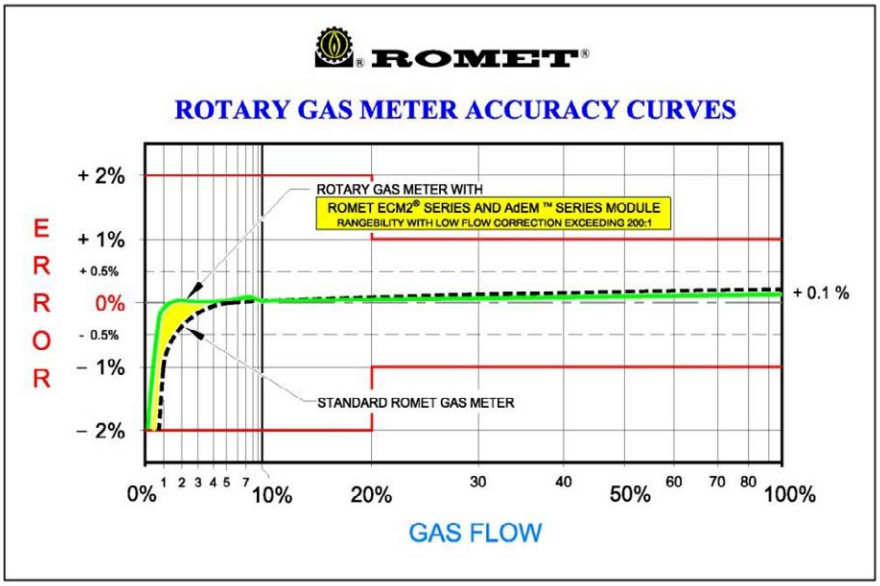


Fig.4 Accuracy Curves

RometLink Software

Romet has developed a Windows based user-friendly software tool, **RometLink,** that runs on a Microsoft Windows based computer. This software tool enables users to take full advantage of AdEM®-PTZ device's advance features and makes it easy to operate, configure and manage the device and data.

☞ **RometLink** software is the primary user interface and tool for Setup/Configuration, Calibration and Data/Parameter retrieval.

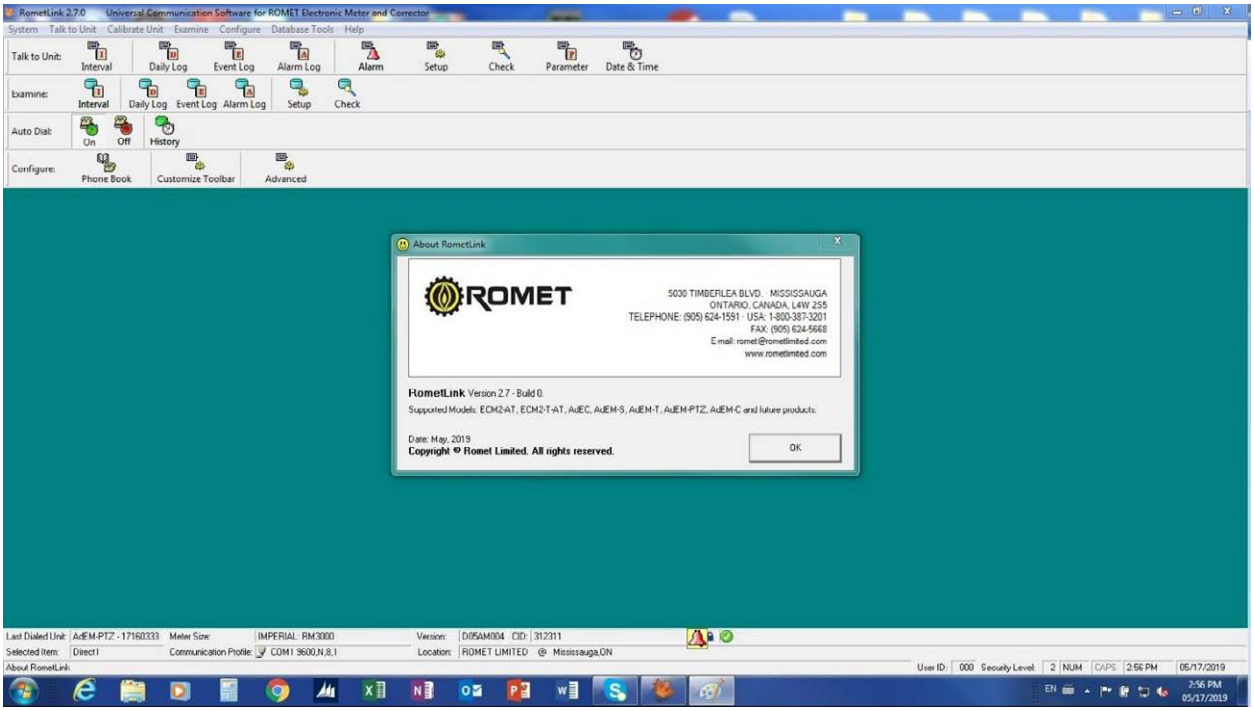


Fig.5 RometLink software Main window

Highlights of RometLink software are:

- ✓ Microsoft Windows based.
- ✓ Use either as device management (configuration and calibration) tool or combine with advance features to make a powerful device and data management system
- ✓ Local or remote communication with Hayes command set compatible modems, Cellular modems
- ✓ One-way communication with automated dial out capability.
- ✓ Communication error log.
- ✓ Events and alarm logger functions.
- ✓ Interval and Daily logger functions.
- ✓ Data export to Microsoft Excel or as PDF file for use by different departments as per individual requirements.
- ✓ Multilevel user passwords for security
- ✓ Online help files for quick reference and use of software

☞ The "LOG ON" password to **RometLink** software is different than the keyboard password. For default software "LOG ON" password, please refer to "READ ME" file on CD or the *"**RometLink** software password and module access code"* document.

Audit Trail:

- ✓ INTERVAL Log: 256 days of hourly Intervals with 4 items configured or 64 days of hourly intervals with 21 items configured. Other configurations of 5 to 10 items are available. See **RometLink** Help files and Intervals Log window below for details (Fig.6).

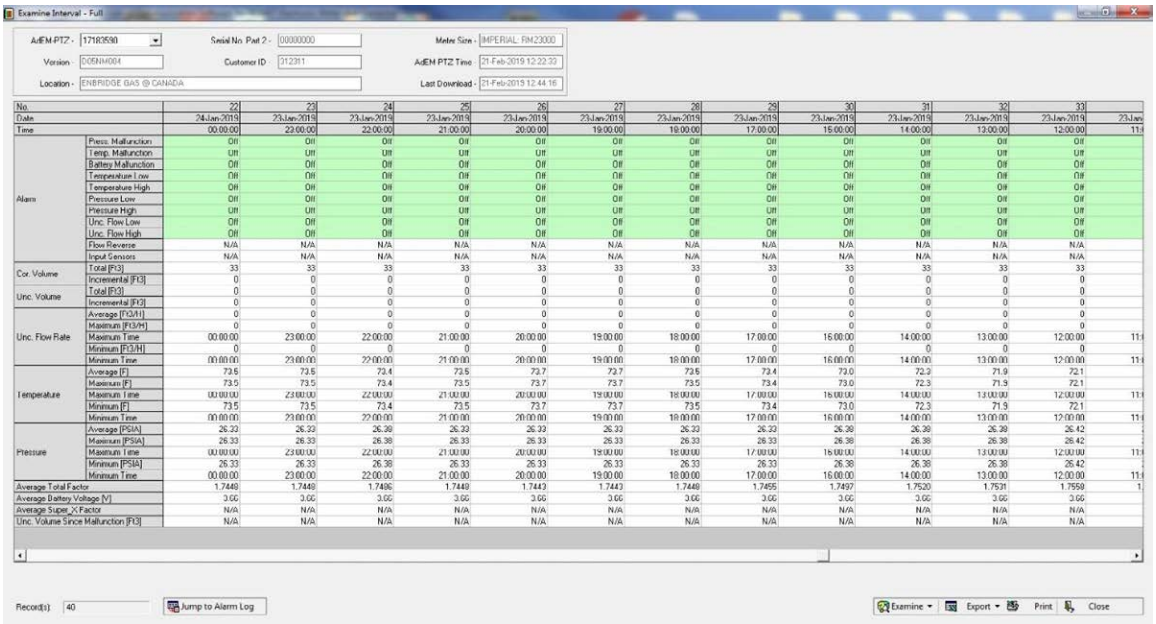


Fig.6 Interval Log window

☞ **WARNING!**
WHEN CHANGING INTERVAL ITEMS, OLD AUDIT TRAIL WILL BE DELETED AND CLEARED. DOWNLOADING OF AUDIT TRAIL MUST BE DONE BEFORE CHANGING AUDIT TRAIL CONFIGURATION IN ORDER TO SAVE PREVIOUS DATA.

✓ DAILY Log: 1024 days with fixed 8 items. See **RometLink** Help files and Daily Log window below for details (Fig.7).

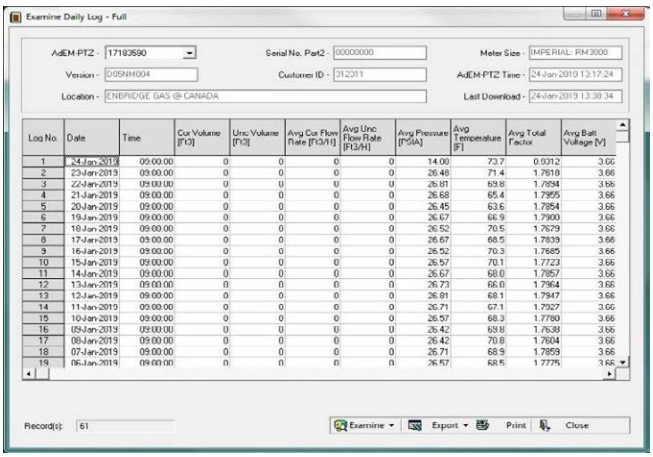


Fig.7 Daily Log window

✓ EVENT Log: 166 events. See **RometLink** Help files and Event Log window below for details (Fig.8).

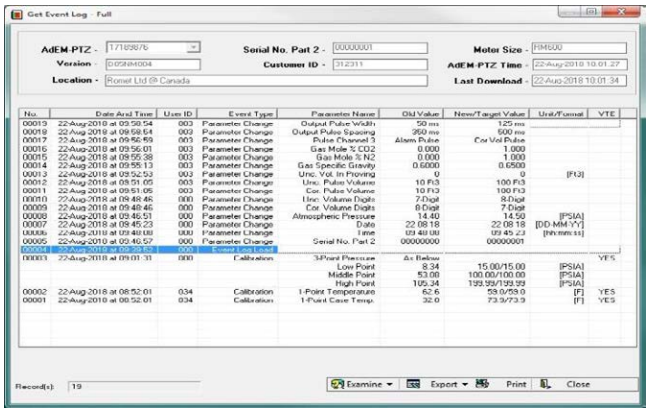


Fig.8 Event Log window

✓ ALARM Log: 102 alarm events. See **RometLink** Help files and Alarms Log window below for details (Fig.9).

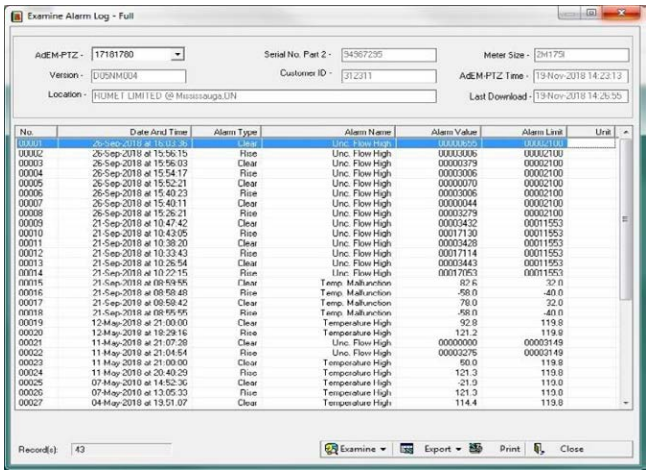
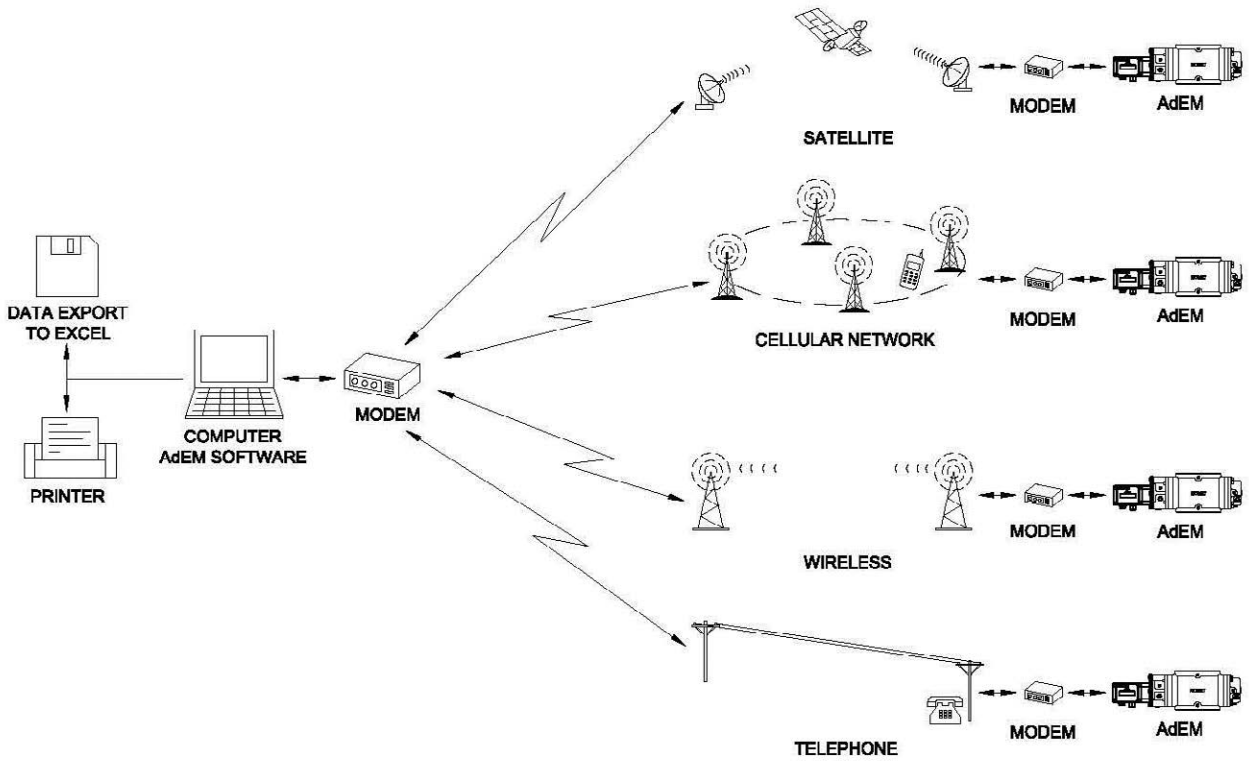


Fig.9 Alarm Log window

☞ For more details of software functions, please refer to online help.

AdEM®-PTZ Typical Application

AdEM®-PTZ can be used in a variety of ways. It can be used as a stand-alone device which can be configured or evaluated by portable keyboard. For ease of operation and advance functions, it is recommended to use Romet **RometLink** communication software either through using direct cable connection to the computer (RS232 or RS485), or remotely by using a Hayes compatible modem connection (including wireless modem).
A typical application scheme is given below.



- ☞ Implemented Modbus protocol (type RTU) makes AdEM®-PTZ available for other communication and control systems, e.g.: SCADA.
- ☞ Communication link equipment is third party equipment and is the responsibility of the user.
- ☞ Downloaded data can either be further investigated using **RometLink** software or can be exported to Microsoft Excel application/PDF for customer's own way of utilizing it.

2. GETTING STARTED

AdEM®-PTZ is usually supplied fully calibrated/preprogrammed and mounted to pressure body as per specifications of each customer. The AdEM®-PTZ modules can be supplied for Romet pressure bodies as well as other manufacturers' pressure bodies. The module, when removed from the box, will be in Normal Display mode only.

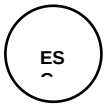
☞ When removing loose AdEM®-PTZ modules from the box, never lift by the Magnetic Input Sensor P/N 46-124-0/49-124-0/46-124-120/49-124-120 or Temperature Sensor Cable P/N 46-303-0.

In Normal Display mode, the display will show the value for the converted (COR VOL) or unconverted (UNC VOL) as per user specifications.

Keyboard Operation

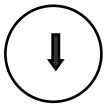
☞ How parameter display works:
There are two stages of displaying parameters:
- As first, parameter description is displayed – up to 8 characters.
- Secondly, (next press of keyboard scroll buttons ↓↑ or SB), value of the parameter is displayed – up to 8 digits with decimal point if applied.

AdEM®-PTZ comes with a Scroll Button in standard; the portable keyboard is available as an option. The details of the keyboard are as below:

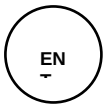


ESCAPE or **CANCEL** — Normally used to wake up the unit, cancel a dialog or escape a menu or parameter.

UP — Used to scroll up menu items, a parameter list, available parameter options or increment digit value.



DOWN — Used to scroll down menu items, a parameter list, available parameter options or decrement digit value.



ENTER — Used to select a menu, validate a digit value or to select a parameter option in Setup and Calibration Modes.

When operating in the Normal Display mode the COR VOL or UNC VOL appears on the display. Press the **ESC** button to wake up the AdEM®-PTZ and access the first parameter of the Custom Display mode (refer to Section 3, Modes of Operation). If an alarm or malfunction is present, it will be displayed instead of the Custom Display Mode. To move to the Custom Display if an alarm or malfunction is displayed, press the **ENT** button once. While in Custom Display Mode, the **↑/↓** buttons may be pressed to scroll through the parameters or at any time press the **ENT** button to gain access to the main menu. Once in the main menu, the **↑/↓** buttons are used to scroll the program modes. Press the **ENT** button to enter a mode or the **ESC** button to return to Normal Display mode.

Program protection against unauthorized access to the metrological programming (Set Up, Calibration & Proving) of the AdEM®-PTZ is assured by the combination of a Password and sealable En/Dis Switch (Jumper). Refer to Section 4, Security for further information). A D-size lithium battery produces the intrinsically safe power.

Scroll-button Operation

A scroll button (**SB**) has been provided on the bottom of the AdEM®-PTZ module. When the **SB** is pressed once, the module wakes up and enters the Custom Display mode. By repeatedly pressing **SB**, the user can scroll through the menu of parameters. If an alarm or malfunction has been activated, it will be shown as the first displayed item. If the **SB** is not pressed for approximately 60 seconds, the AdEM®-PTZ will return to the Normal Display mode. For more details, please refer to **Custom Display mode** in Section 3, **Modes of Operation**.

Example of letters: **A =** A
B = B
C = C

Scroll-Magnetic Sensor

As an option to Scroll Button (SB) can be used Scroll Magnetic Sensor installed inside of enclosure, therefore invisible to public. Sensor is activated by dedicated magnetic tool eg. magnetic pen, screwdriver or other.

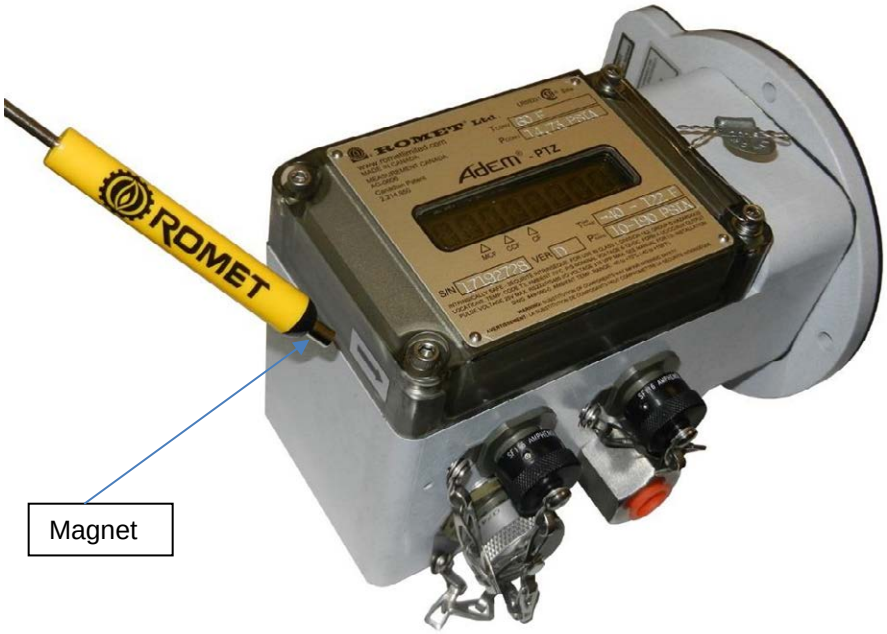
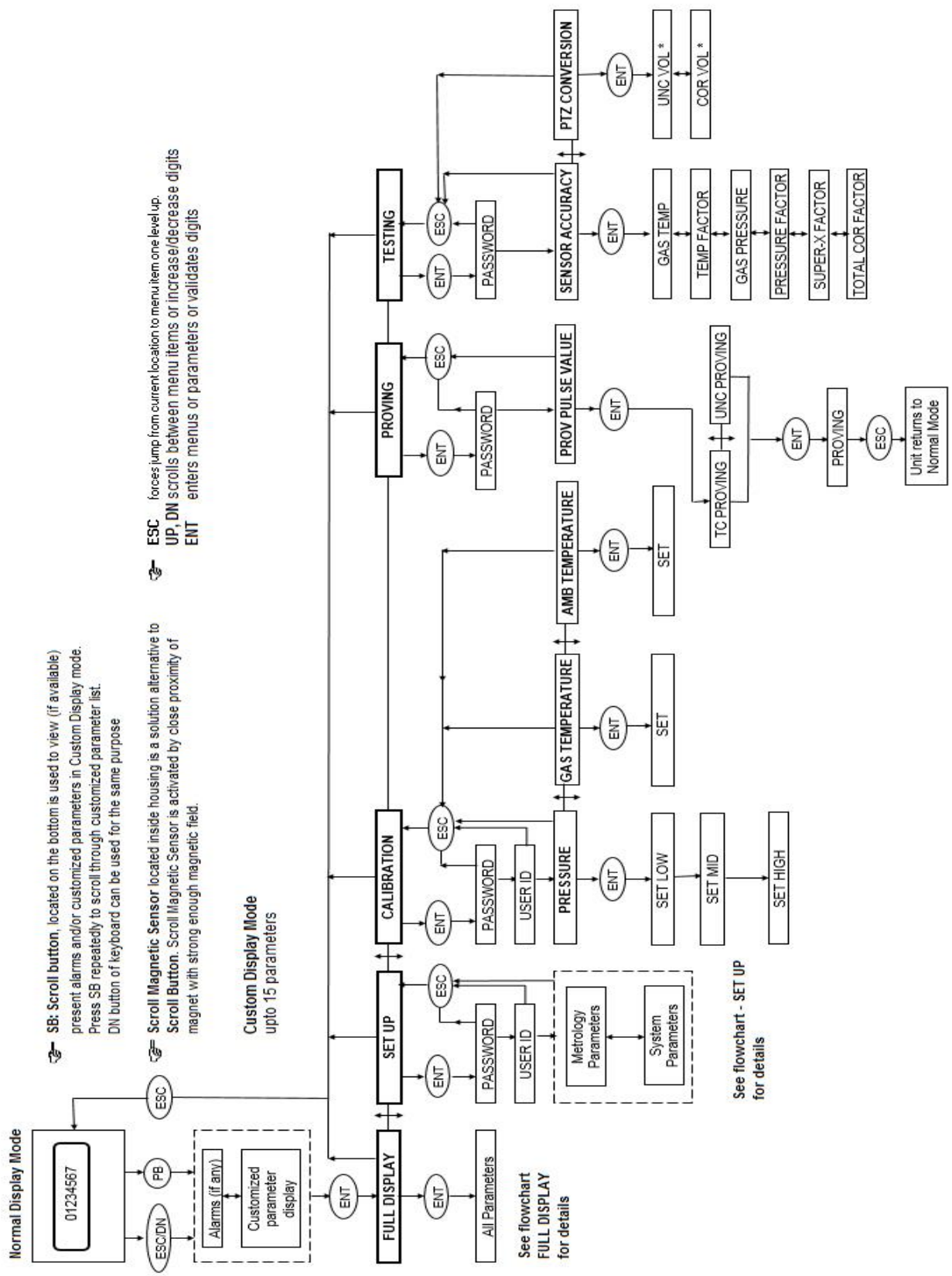


Fig.10 AdEM with hidden magnetic sensor as Scroll Button



AdEM®-PTZ Operation Menu Structure

3. MODES OF OPERATION

AdEM®-PTZ has the following 7 modes of operation:

Normal Display Mode

In Normal Display Mode, the AdEM®-PTZ:

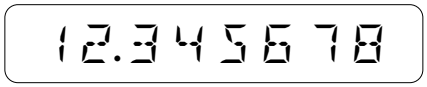
- ✓ processes the unconverted volumetric input pulses at specific volume intervals
- ✓ measures the gas pressure and temperature at specific volumetric intervals
- ✓ converts the metered volume to specific units of measurement (UNC VOL)
- ✓ converts the UNC VOL to the base measurement conditions (COR VOL)
- ✓ adds the unconverted (UNC VOL) and converted volumes (COR VOL) to the appropriate registries
- ✓ generates the volumetric output pulses (COR VOL, UNC VOL and/or alarm)
- ✓ determines limit violations, alarms
- ✓ on hourly basis saves in non-volatile memory current UNC VOL and COR VOL
- ✓ determines Peak Flow and saves it stamped with time and date in non-volatile memory
- ✓ processes audit trail data and saves it in non-volatile memory

Depending on the selection made in the Set up Mode under "**SET DISP**" either the COR VOL or UNC VOL will appear on LCD. If the display is blank, a critical alarm condition exists, or the battery power has expired (refer to section 9, **ALARMS & MALFUNCTIONS**).

The display will always automatically revert to the normal display. Password or En/Dis Switch (Jumper) protection does not apply to this mode.

Latest models of AdEM can have volume units/multipliers indicators visible on a Nameplate in a form of arrows pointing towards the specific locations of the display. While Uncorrected or Corrected volume, one of three locations has a dot lighted up correlating with an arrow marked by the appropriate multiplier: CF or CCF or MCF.

Example:



Δ Δ Δ
MCF CCF CF

The dot associated with CCF arrow is lit up, therefore, the unit/multiplier for displayed volume is CCF (x100CF).

☞ **This feature applies only to Imperial configuration under Normal Mode.**

Custom Display Mode

The Custom Display mode allows the user to scroll a customized menu of up to 15 parameters selected from the Full Display Mode and any activated alarms. To enter the Custom Display mode from the Normal Display Mode, press the **ESC** button or Scroll button **(SB)**. Press the ↑/↓ buttons or the **SB** repeatedly to scroll through the list. The AdEM®-PTZ will revert to the Normal Display Mode after approximately 60 seconds if no buttons are pressed. The Custom Display menu is configurable in the Set Up Mode (refer to Section 5, Set Up) Configuration of this mode is protected by Password. Password or Program Switch protection does not apply to access this mode.

Full Display Mode

The FULL DISPLAY Mode provides a comprehensive menu of the parameters that are stored by the AdEM®-PTZ. FULL DISPLAY mode is accessible through keyboard. When FULL DISPLAY mode is accessed and active, AdEM®-PTZ will revert to the Normal Display Mode after approximately 60 seconds if no buttons are pressed. Password or Program Switch protection does not apply to access this mode.

☞ Refer to flowchart Full Display in appendix for complete list of parameters.

Set Up Mode

The Set Up mode allows the user to change some parameters of the AdEM®-PTZ from the factory default settings (refer to Section 5, **SET UP** mode). Access to this mode is protected by a password and sealable program switch (refer to Section 4, **SECURITY**). A 3-digits employee identification code is also needed as a requirement of the Event Logger function. When Set up mode is accessed and active, AdEM®-PTZ will revert to the Normal Display Mode after approximately 60 seconds if no buttons are pressed.

Calibration Mode

The Calibration mode allows the user to calibrate the accuracy of the temperature and/or pressure sensors (refer to Section 6, **CALIBRATION**). Access to this mode is protected by a password and sealable Program Switch (refer to section 4, **SECURITY**).

Proving Mode

The Proving Mode permits an accurate and efficient proving of a meter by providing a precise, selectable pulse output (refer to section 7, **PROVING**). The output unit defaults to be ft^3 or m^3, based on the selection (imperial or metric) programmed from the "**SET MET**" menu in the Setup Mode. Since the Proving Mode allows the user to choose the pulse weight resolution (single displacement) in combination with the precise volumetric pulse, the proof of the meter accuracy can be verified with a reduced test volume. Access to this mode is protected by a password (refer to section 4, **SECURITY**). Proving can be also performed using pushbutton – see chapter 7 **PROVING**.

Testing Mode

The Testing Mode verifies both the sensors (temperature and pressure), volume conversion accuracy (refer to section 8, **TESTING**), and Output Pulse physical connection. In addition, the Testing Mode checks the functionality of several key program routines and therefore, provides a diagnostic test. Access to this mode is protected by a password (refer to section 4, **SECURITY**).

Communication Mode

Communication Mode is triggered by RS232 or RS485 signal from connected computer or modem. Message “LINK” is displayed on Display until communication is finished. If by any occasion communication between AdEM®-PTZ and computer/modem is broken, corrector will revert to Normal Mode after timeout.

☞ Access by keyboard and Scroll-Button is disabled under Communication Mode. Input Pulse collection and processing, Volume Index updates and Output Pulse generation continues as normal.

4. SECURITY

The AdEM®-PTZ module is protected with an access code and the software is protected by a password.

Password

To enter software:

- Default password for limited level user is: **55555**.
- Default password for standard Administrator level user is: **ROMET.**
- Default password for Service level user is: **SERVICE**.
- Default password for full Administrator/ Superuser level: available for Authorized users only.

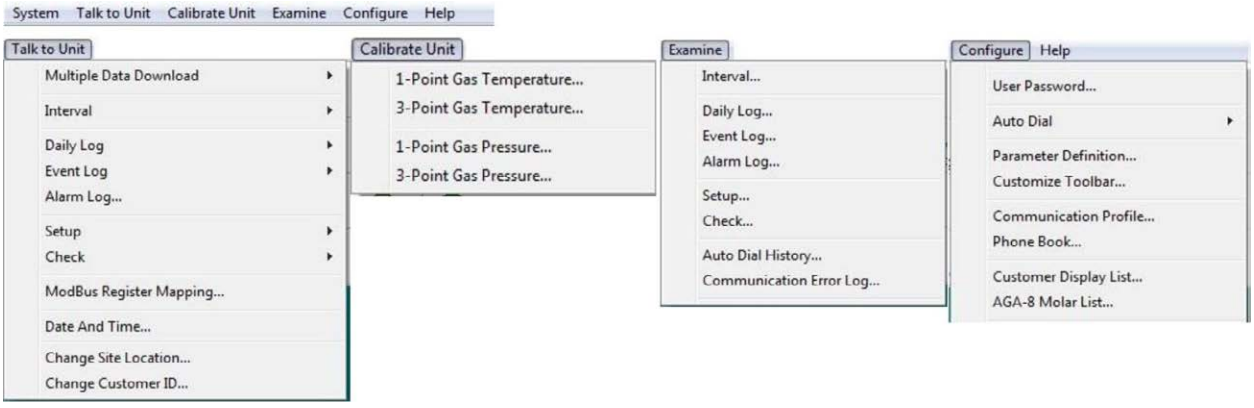
To download update data (except Event Log update) from module (corrector) default access code is: **33333**.

Above passwords and access codes can be changed by RometLink software.

The following menu item can be accessed with different level of Passwords,

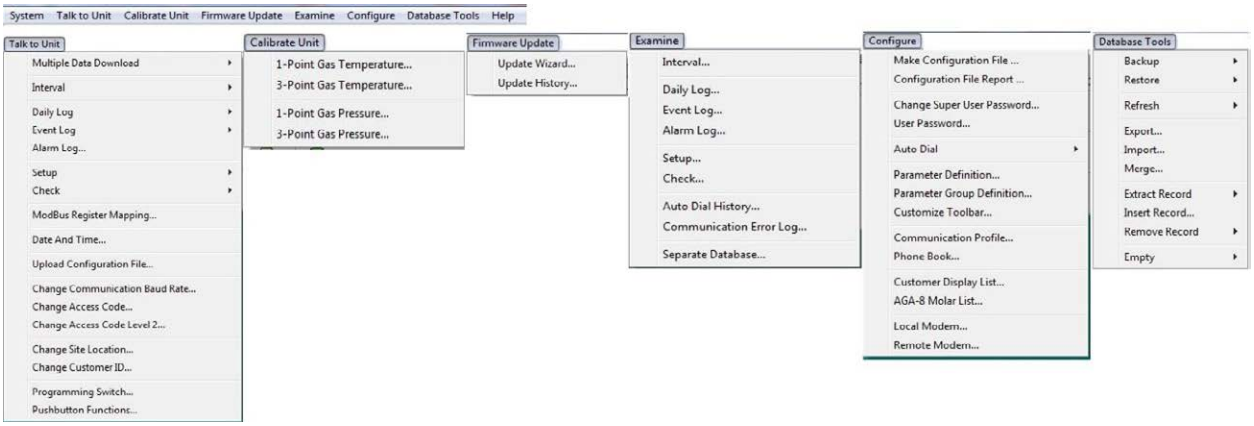
Limited level User

The following menu items are available with the limited user password.



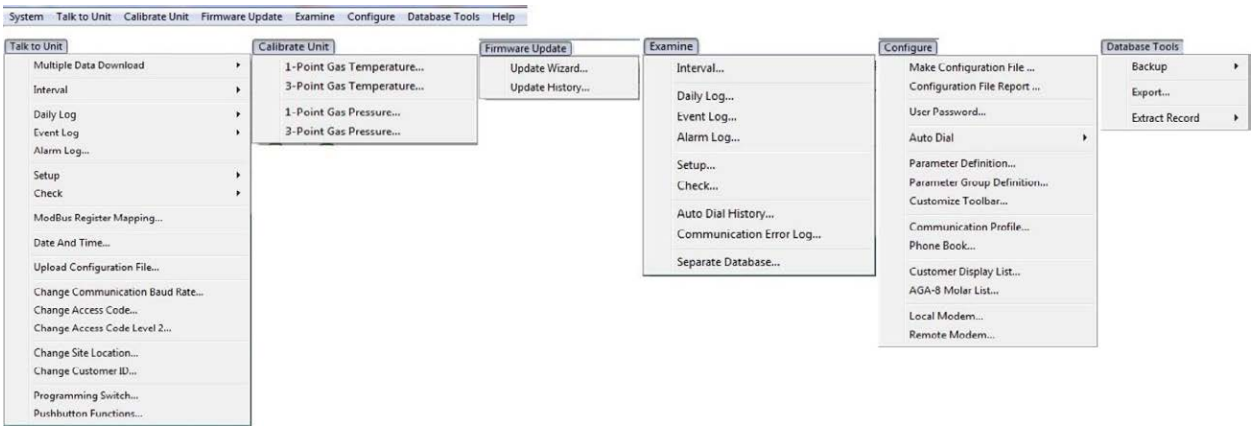
Standard Administrator level User

The following menu items are available with the Standard Administrator user password.



Service level User

The following menu items can be accessed with the service level user password.



Module Access code

The module can be accessed with the help of a Keypad for Setup Mode, Calibration Mode, Proving Mode and Testing Mode (the word **PASSWORD** appears on the display). The password is a five-digit number (default value of 33333 or pre-customized) that is entered in the following manner:

			PASSWORD
Press	↑ ↑	(Up key) three times	**3**
Press	**ENT**	to move to the next digit	
Press	↑	(Up key) three times	**3**
Press	**ENT**	to move to the next digit	
Press	↑ ↑	(Up key) three times	**3**
Press	**ENT**	to move to the next digit	
Press	↑	(Up key) three times	**3**
Press	**ENT**	to move to the next digit	
Press	↑ ↑	(Up key) three times	**3**
Press	**ENT**	to complete the password	

☞ 33333 Password is preset by factory. It can be changed using **RometLink** software by user logged on administrative level. Otherwise, the password must be specified at the time of ordering.

While using **RometLink** software the same password must be entered to change Setup, Calibrate or download restricted data. Refer to software Help files for more information.

☞ The "LOG ON" password to **RometLink** software is different than the keyboard password. For default software "LOG ON" password, please refer to "README" file on CD or the *"**RometLink** software password and module access code"* document.

Program Switch (Jumper)

To protect the AdEM-PTZ module from unwanted changes to Metrological parameters, there are two options.

I) By Jumper

The sealable Program Switch (sometimes referred as Program Jumper) is located on Main Board (refer to Fig.12) available after opening of module's lid. When cover/module's lid is installed and sealed (with two sealable screws plus wire seal) on Program Switch Jumper in the "**Disable**" position, keyboard access to the Calibration Mode and most of the Setup Mode parameters is prevented, even after entering a password.

Program Switch performs the same function for software Calibration, firmware update, proving by pushbutton, and pulses generation for AMR testing, preventing uncontrolled change of these metrological sensitive parameters if Jumper is in "**Disable**" position.

☞ For Firmware version D05 and later Program Switch in "Disable" position configures Event Logger to Event Logger Type A, making available to user only limited metrological parameters for configuration. See next chapter for further details.

II) By Software

Alternatively, while Jumper is placed in Enable position, the same "Disable" flag can be set by RometLink Software using its "Disable Switch" function. Once Disable flag is set, Enable position of En/Dis Jumper (Switch) **become irrelevant**. Such Software way of locking of AdEM simulates perfectly locking by physical means.
At this point, AdEM can be metrological sealed by physical seal on Housing screws or optionally on En/Dis Switch protective cap.

☞ ***Unlocking of the AdEM by external Software is not possible, there is no such implementation in AdEM internal software (firmware).***

Once the Program Switch is in Disable position (also by Software means), only the following can be changed in AdEM-PTZ:

- ✓ **From Keyboard:**

SETUP MENU:

SET DATE	
SET TIME	
SET CUST	Set customer display
SET U ID	Set Unit ID for Modbus protocol only

CALIBRATE MENU:
No Access

PROVING MANU:
Access with Password

TESTING MANU:
Access with password
Sensor
Convert

- ✓ **From Software for firmware versions prior to D02:**

GAS DAY START TIME
PRESSURE HIGH LIMIT
PRESSURE LOW LIMIT
TEMP HIGH LIMIT
TEMP LOW LIMIT
UNC FLOW HIGH LIMIT

UNC FLOW LOW LIMIT	
ATMOSPHERE PRESSURE	
PEAK UNC FLOW	reset
MAX GAS PRESSURE	reset
MIN GAS PRESSURE	reset
MAX GAS TEMP	reset
MIN GAS TEMP	reset
MAX CASE TEMP	reset
MIN CASE TEMP	reset
INTERVAL SETTINGS	5 Minute to 24-hour interval period
INTERVAL TYPE	Full fields, fixed 4 fields and selectable fields.
INTERVAL FIELD	
CUSTOM DISPLAY	
DATE AND TIME	
SITE LOCATION	
CUSTOMER ID	

- ✓ D versions prior to D05 are not approved to use in Canada for legal metrology purpose.
- ✓ From Software, for firmware versions D05 and higher, some of the parameters are protected by Event Logger, Password and Hardware Switch. Other metrologically significant parameters are protected by Event Logger Type A and Password, therefore they are available for change when Hardware Switch is set in Disable position. These parameters can be configured by RometLink software only. Refer to Measurement Canada document S-EG-06 for Event Logger Type A (self-contained Event logger) information.
- ✓ See Table 1 – Romet products Standard Setup Parameters for parameters monitored by Event Logger overall and protected by Event Logger type A.

How to ENABLE/DISABLE Program Switch

To gain full access to Setup Mode or Calibration Mode, Program Switch Jumper must be located on “En” position. Following is the procedure how to En/Dis Program Switch.

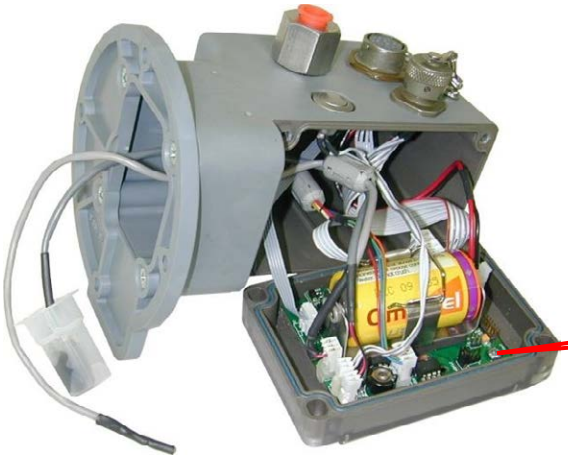


Fig.11 Location of Program Switch (Jumpers) – overview

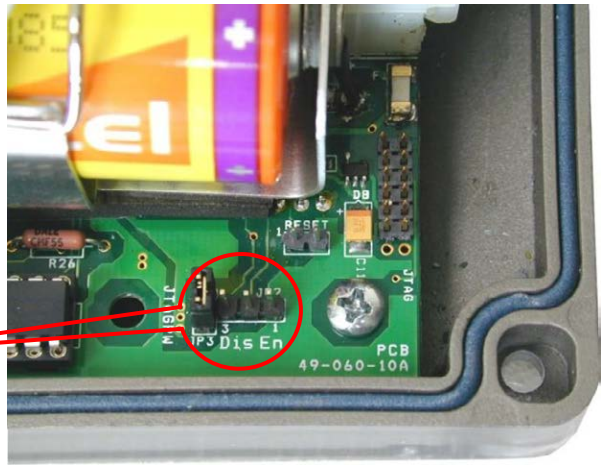


Fig.12 Location of Program Switch (Jumpers) – close-up view
Right side connection: Enable (En)
Left side connection: Disable (Dis)

☞ **WARNING!**
SERVICE PERSON MUST BE STATIC FREE PRIOR TO SERVICING THE UNIT

Tools and parts required for servicing Program Switch:

- Screwdriver Phillips No. 2
- Cutter Pliers
- 440-nut driver

☞ **Care should be taken to not damage the cables.**

☞ **If AdEM-PTZ was metrological sealed, the seal must be broken to perform the Program Switch service.**

Procedure to "Enable" Program Switch disabled by Jumper:

1. Remove the seal screws and switch protector plate if installed.
2. Connect the jumper to the "**Enable**" position.
3. Full access to Calibration and Set Up modes is now available.

Procedure to "Disable" Program Switch by Jumper (hardware method):

1. Connect the jumper to the "**Disable**" position.
2. Install switch protector plate and seal screws along with wire seal (if required).

Procedure to "Enable" Program Switch disabled by Software

1. Remove the seal screws and switch protector plate if installed.
2. Set hardware switch (Jumper) to **"Disable"** position in order to make **"Enable"** position relevant
3. Reset hardware switch back to **"Enable"** position and metrological changes can be done
4. AdEM®-PTZ is ready again for using **"Software Disable Switch"** procedure or for hardware method.

Procedure to "Disable" Program Switch by Software (alternative to hardware method):

1. Initial position of the Jumper of Program Switch must be in **"Enable"**. This is a Standard Factory Setting.
2. Using **RometLInk** perform **"Disable Switch"** from **"Talk to Unit"**. **"Enable"** position to become irrelevant.
3. AdEM-PTZ is ready for metrological sealing.

Event Log Type A

AdEM-PTZ with Firmware version D05 and higher provides Event Logger Type A approved by Measurement Canada as a Metrological Sealing feature.
Selected set of metrological parameters can be modified even hardware Program Switch is set to **"Disable".**
Once Event Logger Type A is full, it becomes locked and no any changes can be register in. Therefore, no changes to parameters can be performed as well. Further changes to the parameters can be done only if Logger itself is open for changes.
Opening of Event Logger Type A is considered as Verification Triggering Event. Metrological Seal must be broken and Program Switch must be set **"Enable"** in order to perform Event Logger UPDATE function, which will open it for further changes. New Event Logger records will be registered as per FIFO (First In First Out) rule. UPDATE function is protected by dedicated password. After opening Event Logger Type A, AdEM-PTZ must undergo Metrological Verification followed with setting Program Switch **"Disable"** and installation of Metrological seal.

		Configurations of Pressure and Supercompressibility set by factory or during verification.							
Event Log Metrological Parameter	**VTE**	Pressure Fixed Super-x fixed Configuration	Super-X fixed	NX-19	AGA8 Detailed	Aga8_G1	Aga8_G2	SGERG88	P-Only
Serial Number	VTE								
Serial # part 2		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Firmware Update	VTE								
Event Log Loaded	VTE								
Date		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Time		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Meter Type									
AGA-8 Molar List					**CFG**				
Atmosphere Pressure		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Base Pressure									
Base Temperature									
Unc. Volume Digits		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Unc. Volume Unit									
Uncorrected Volume	VTE								
Unc. Pulse Weight		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Cor. Volume Digits		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Cor. Volume Unit									
Corrected Volume	VTE								
Cor. Pulse Weight		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Unc. Vol. Since Malf.		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Proving Volume		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Proving Mode Access by PB	N/A								
Press. Trans. SN	VTE								
Pressure Tranducer Type	VTE								
Pressure Factor Type									
Fixed Pressure Factor		**CFG**							
Super_X Algorithm									
Gas Mole % CO2				**CFG**		**CFG**	**CFG**	**CFG**	
Gas Mole % H2								**CFG**	
Gas Mole % N2				**CFG**			**CFG**		
Gas Specific Gravity				**CFG**		**CFG**	**CFG**	**CFG**	
Gas heating Value						**CFG**		**CFG**	
Super_X Factor Type									
Super_X Factor		**CFG**	**CFG**						
Temp. Factor Type									
Pressure Unit									
Case Temp Calibration	VTE								
Pressure Calibration	VTE								
1 Point Pressure Calibration	VTE								
Pressure Compensation	VTE								
1 Point Temperature calibration	VTE								
Pulse Channel 3		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Out Put Pulse spacing		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Out Put Pulse Width		**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**	**CFG**
Output Pulse Verification Enable/Disable	N/A								
Output Pulse Verification Tested	N/A								
Total number of configurable parameters		**15**	**14**	**16**	**14**	**16**	**16**	**17**	**13**

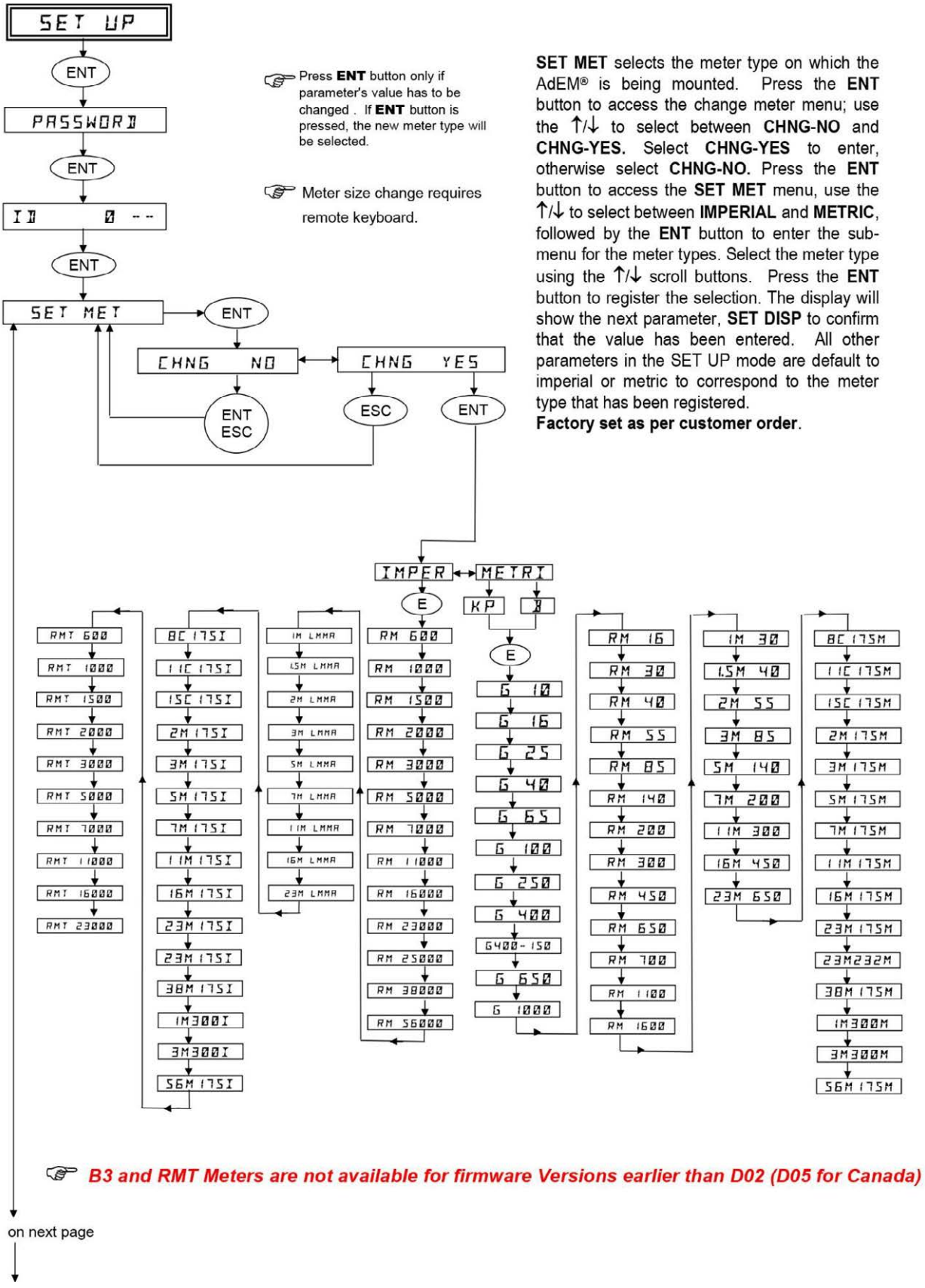
NOTE: CFG means Configurable

Table 1. Event Logger Parameters. Parameters marked CFG are configurable, registered in Event Logger Type A, while Program Switch is set **"Disable".**

5. SET UP

The Setup Mode is employed to alter the factory default configuration of the AdEM®-PTZ program parameters to match the individual specifications of each customer. The AdEM®-PTZ module would normally be shipped from Romet with the Setup configuration fully programmed to a customer's specifications. The exception would be an order for a loose AdEM®-PTZ module where the customer may not have specified the meter type. In such an instance, the meter type and some of the associated parameters would need to be programmed by the customer during the installation of the AdEM®-PTZ module to the meter body. Access to Setup Mode is protected by a sealable En/Dis Jumper (switch) and a password (refer to section 4, **SECURITY**). The flow chart on the following pages provides a guide to accessing and programming the Set Up mode using Keypad. The same parameters and more can be changed by Software Setup.

FLOWCHART - SET UP



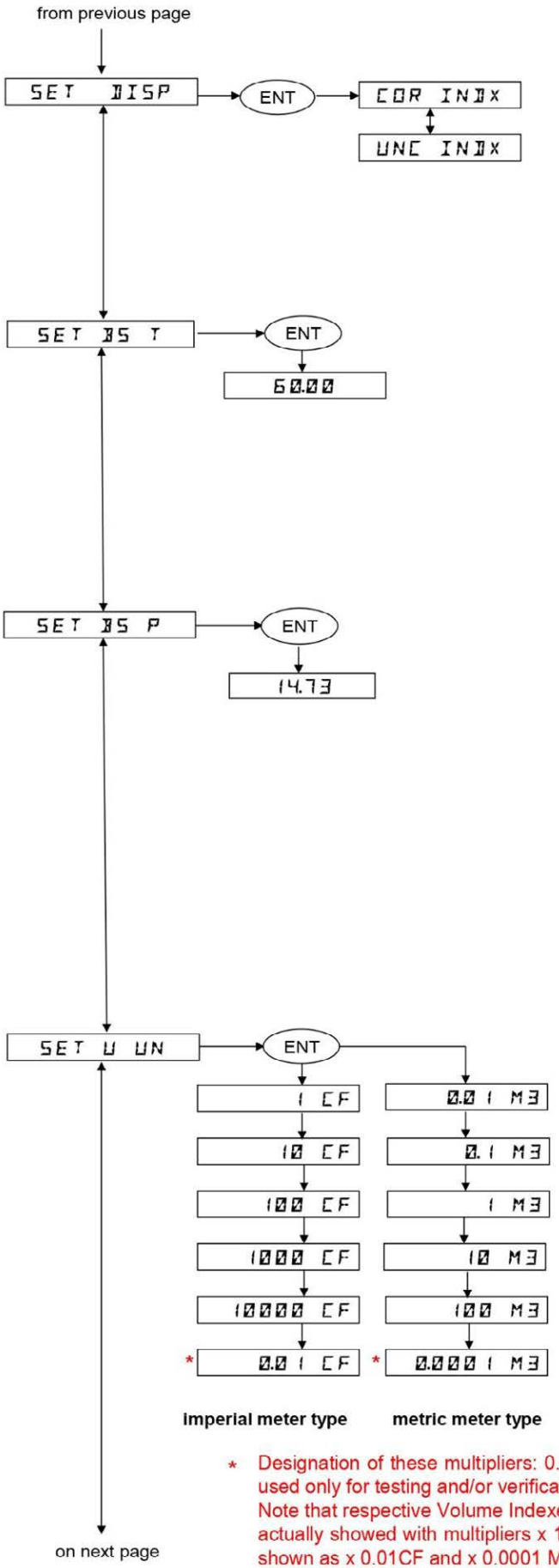
☞ Press **ENT** button only if parameter's value has to be changed . If **ENT** button is pressed, the new meter type will be selected.

☞ Meter size change requires remote keyboard.

SET MET selects the meter type on which the AdEM® is being mounted. Press the **ENT** button to access the change meter menu; use the ↑/↓ to select between **CHNG-NO** and **CHNG-YES.** Select **CHNG-YES** to enter, otherwise select **CHNG-NO.** Press the **ENT** button to access the **SET MET** menu, use the ↑/↓ to select between **IMPERIAL** and **METRIC**, followed by the **ENT** button to enter the sub-menu for the meter types. Select the meter type using the ↑/↓ scroll buttons. Press the **ENT** button to register the selection. The display will show the next parameter, **SET DISP** to confirm that the value has been entered. All other parameters in the SET UP mode are default to imperial or metric to correspond to the meter type that has been registered.
Factory set as per customer order.

☞ ***B3 and RMT Meters are not available for firmware Versions earlier than D02 (D05 for Canada)***

on next page



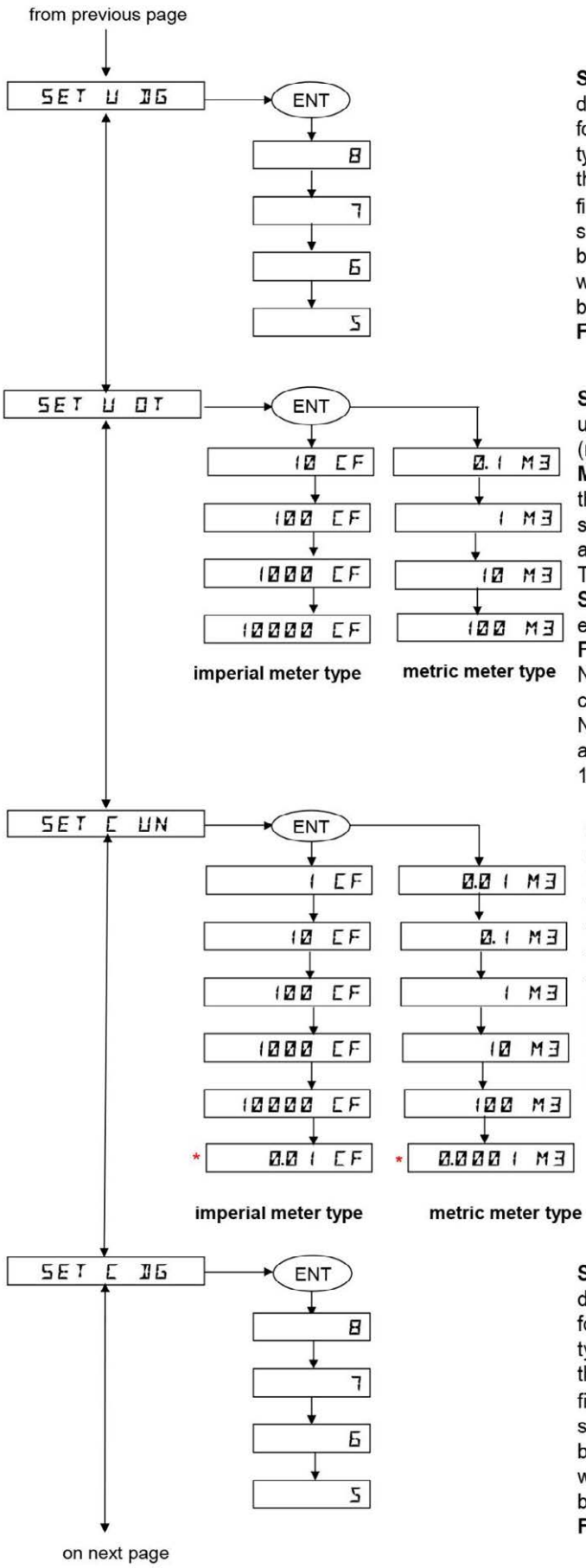
SET DISP selects between the COR (default) and UNC volume, as to which will be shown in the Normal Display Mode. Press the **ENT** button to access the **SET DISP**, first the LCD will show current setting, scroll to the required volume to be displayed and press the **ENT** button to enter the selection. The display will show the next parameter, **SET BS T** to confirm the selection has been entered.

SET BS T input the base temperature value to be displayed and used in the calculation of the temperature factor. The base temperature defaults to the imperial or metric units of measurement based on the meter type registered in **SET MET**. Press the **ENT** button to access the **SET BS T** menu, the LCD will show current values and first digit will flash, using↑/↓ buttons to scroll to the required value and press the **ENT** button to it. The next digit will flash, do the same operation till last digits. The display will show the next parameter,
SET BS P to confirm that the value has been entered.
Factory set as per customer order.

SET BS P, input the base pressure value to be displayed and used in the calculation of the pressure factor. The base pressure defaults to the imperial or metric units of measurement based on the metr type registered in **SET MET**. Press the **ENT** button to access the **SET BS P** menu, The LCD display will show current value, and first digits will flash. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit until the last digits. The LCD display will show the next parameter, **SET U UN,** to confirm that the **SET BS P** value has been fully entered.
Factory set as per customer order.

SET U UN selects the unit of value to be displayed for the UNC VOL. The units default to imperial (CF) or metric (m^3) based on the meter type registered in **SET MET**. In order to change the default value, press the **ENT** button to access the **SET U UN**, first show current setting, scroll to the required value and press the **ENT** button to register the value. The LCD display will show the next parameter, **SET U DG**, to confirm that the value has been entered.
Factory set as per customer order.

* Designation of these multipliers: 0.01 CF (Imperial) and 0.0001 M3 (Metric) is to be used only for testing and/or verification purpose.
Note that respective Volume Indexes in Last Storage registers and Event Logger are actually showed with multipliers x 1 CF and x 0.01 M3 even if in Event Log units are shown as x 0.01CF and x 0.0001 M3.



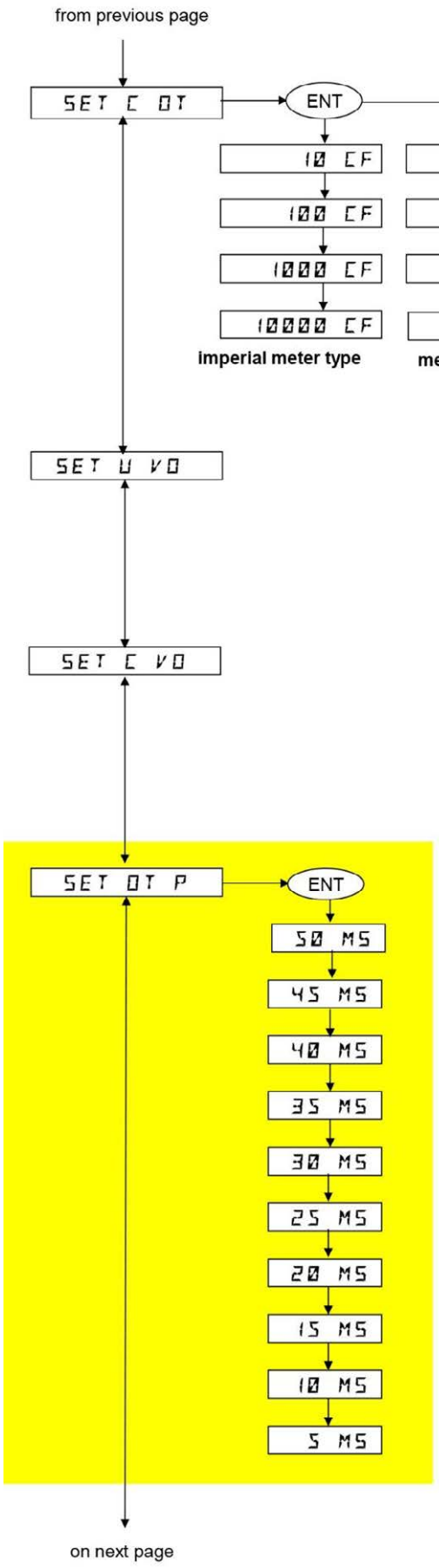
SET U DG selects the number of digits to be displayed for the UNC VOL. The default value is 6 for imperial meter types and 8 for metric meter types. In order to change the default value; press the **ENT** button to access the **SET U DG** menu, first show current setting, press the↑/↓ buttons to scroll to the required value, followed by the **ENT** button to register the selection. The LCD display will show **SET U OT**, to confirm that the value has been entered.
Factory set as per customer order.

SET U OT selects the output pulse weight. The units of value default to imperial (CF) or metric (m^3) based on the meter type registered in **SET MET**. In order to change the default value, press the **ENT** button to access the **SET U OT**, first show current setting, scroll to the required value and press the **ENT** button to register the value. The LCD display will show the next parameter, **SET C UN**, to confirm that the value has been entered.
Factory set as per customer order.
Note: For RM16000 to RM56000 and 16M LMMA can not be less than 100 CF.
Note: For G100 and above, RM140 and above and LMMA 5M and above can not be less than 1.00 m^3.

SET C UN selects the unit of value to be displayed for the COR VOL. The units default to imperial (CF) or metric (m^3) based on the meter type registered in **SET MET.** In order to change the default value, press the **ENT** button to access the **SET C UN**, first show current setting, press the ↑/↓ buttons to scroll the required value and press the **ENT** button to register the value. The LCD display will show the next parameter, **SET C DG**, to confirm that the value has been entered.
Factory set as per customer order.

*Designation of these multipliers: 0.01 CF (Imperial) and 0.0001 M3 (Metric) is to be used only for testing and/or verification purpose.
Note that respective Volume Indexes in Last Storage registers and Event Logger are actually showed with multipliers x 1 CF and x 0.01 M3 even if in Event Log units are shown as x 0.01CF and x 0.0001 M3.

SET C DG selects the number of digits to be displayed for the COR VOL. The default value is 6 for imperial meter types and 8 for metric meter types. In order to change the default value; press the **ENT** button to access the **SET C DG** menu, first show current setting, press the ↑/↓ buttons to scroll to the required value, followed by the **ENT** button to register the selection. The LCD display will show **SET C OT**, to confirm that the value has been entered.
Factory set as per customer order.



SET C OT selects the output pulse weight. The units of measurement default to imperial (CF) or metric (m^3) based on the meter type registered in **SET MET**. In order to change the default value, press the **ENT** button to access the **SET C OT**, first show current setting, press the ↑/↓ buttons to scroll to the required value and press the **ENT** button to register the value. The LCD display will show the next parameter, **SET U VO**, to confirm that the value has been entered.
Factory set as per customer order.
Note: For RM16000 to RM56000 and 16M LMMA can not be less than 100 CF.
Note: For G100 and above, RM140 and above and LMMA 5M and above can not be less than 1.00 m^3.

SET U VO selects a value for the UNC VOL. Press the **ENT** button to access the **SET UNC** menu. The "0" will show for the first digit in the value. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET C VO,** to confirm that the UNC VOL value has been fully entered.

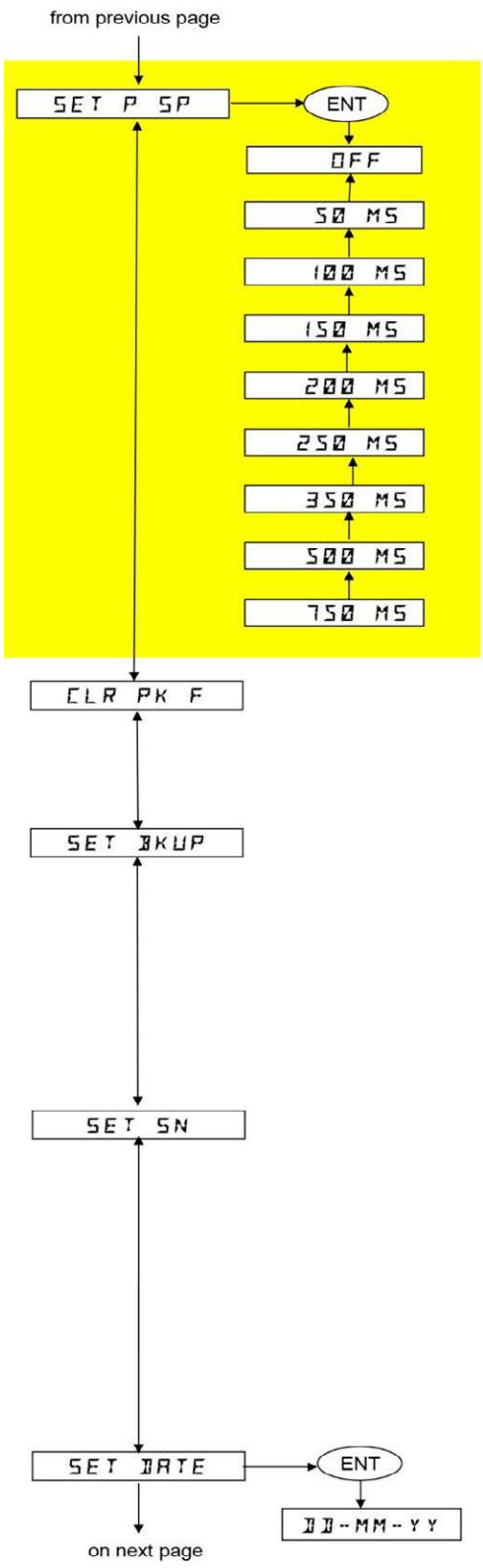
SET C VO selects a value for the COR VOL. Press the **ENT** button to access the **SET COR** menu. The "0" will show for the first digit in the value. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET OT P,** to confirm that the COR VOL value has been fully entered.

☞ **SET OT P** allows selecting the width of output pulse in milliseconds. Press **ENT** key if value is to be changed. Preset value appears on display. Use ↑/↓ scroll buttons to display the desired option. Press **ENT** to register the value. The display will show the next parameter, **SET P SP** to confirm that the SET OU P value has been fully entered.
Factory set as per customer order.

☞ Carefully select this value; select value as small as possible to save power. The standard setting is 50ms, consult AMR device documentation to see if AMR device can detect smaller value.

☞ Other values of Output Pulse width: 65, 120, 125, 250, 500ms can be set using RometLink software.

☞ ***Colored items are available from Keypad menu only for firmware versions earlier than D02 (D05 for Canada)***



☞ ***Colored items are available from Keypad menu only for firmware versions earlier than D02 (D05 for Canada)***

SET P SP allows to select corrected output pulse spacing in milli-seconds. Press **ENT** key if value to be changed. Use ↑/↓ scroll buttons, to display the desired option. Press **ENT** to register the value. The display will show the next parameter, **CLR PK F,** to confirm that the SET P SP value has been fully entered.
Factory set as per customer order.

☞ Carefully select this value; select value as small as possible to save power. The standard setting is 50ms, consult AMR device documentation for recommended value. When selecting higher value make sure the output pulses have enough time to generate. When not using AMR device, it is recommended to use the OFF settings to turn off output pulses.

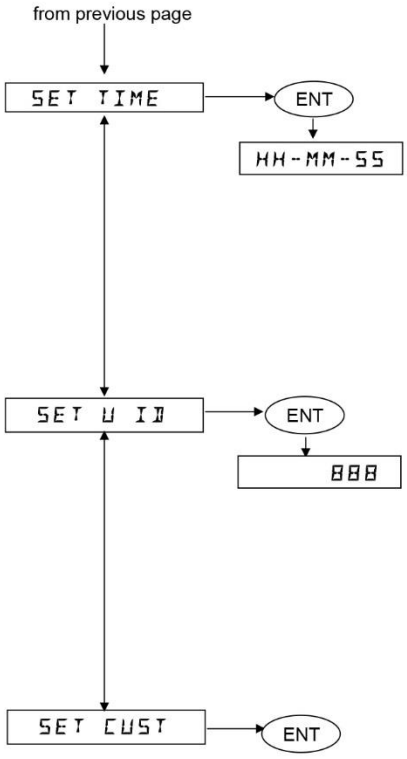
CLR PK F resets peak flow to 0. Pressing the **ENT** button will reset this register to zero. The LCD display will show the next parameter **SET BKUP** to confirm that the parameter has been initialized.

SET BKUP selects a value for the BACK UP COUNTER. Press the **ENT** button to access the **SET BKUP** menu. The "0" will show for the first digit in the value. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET SERN,** to confirm that the COR BKUP value has been fully entered.

☞ The **SET BKUP** value is 10 times higher than value of the respective mechanical backup counter.

SET SN selects the serial number that will be displayed in the Full Display. In order to enter a value, press the **ENT** button to access the **SET SN** menu. The "17" will show for the first two digits in the value.
From the third digit, select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET DATE,** to confirm that the serial number of the AdEM-PTZ has been fully entered.

☑ **SET DATE** selects the date for the microprocessor of the AdEM-PTZ. In order to enter a value; press the **ENT** button to access the **SET DATE** menu. The display will show DD-MM-YY. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET TIME,** to confirm that the date for the AdEM-PTZ has been fully entered.



☑ **SET TIME selects** the time for the microprocessor of the AdEM-PTZ. In order to enter a value; press the **ENT** button to access the **SET TIME** menu. The display will show HH-MM-SS. Select the required value using the ↑/↓ scroll buttons, followed by pressing the **ENT** to register the value and move to the next digit. The display will show the next parameter, **SET CUST,** to confirm that the time for the AdEM-PTZ has been fully entered.

☑ **SET U ID – SET UNIT ID** – 3 digits parameter used by Modbus protocol only. Valid value is from 0 to 255.
Press **ENT** button to access SET U ID menu. Zero (0) will show for the first digit in the value, select the required value using ↑/↓ scroll buttons, followed by pressing **ENT** button to register the value and move to the next digit. The display will show **SET CUST** to confirm that UNIT ID value has been fully entered.

☑ **SET CUST** configures the customized list of parameters to be displayed in CUSTOM DISPLAY MODE. Parameters will be displayed in the order of selection. Scroll to the parameter that has to be added then pressing **ENT** button adds displayed parameter to the list and moves to the next parameter. Pressing **ESC** closes the list. The display will show the **SET CUST** again to confirm that the Custom Display list has been set.

☞ ***Parameters marked with ☑ are visible and configurable irrespective of the positon of enable jumper.***

Setup by Software

Most of Setup parameters can be change only by software, contrary to most of previous Romet products where complete Setup was fully or almost fully available through keyboard operation. Under **RometLink's *Talk to Unit/Setup*** drop down menu, there are available the following options:

- ✓ Configure Default set of parameters
- ✓ Configure Customer Display list of parameters
- ✓ Configure predefined or user defined Group of parameters
- ✓ Configure single parameter

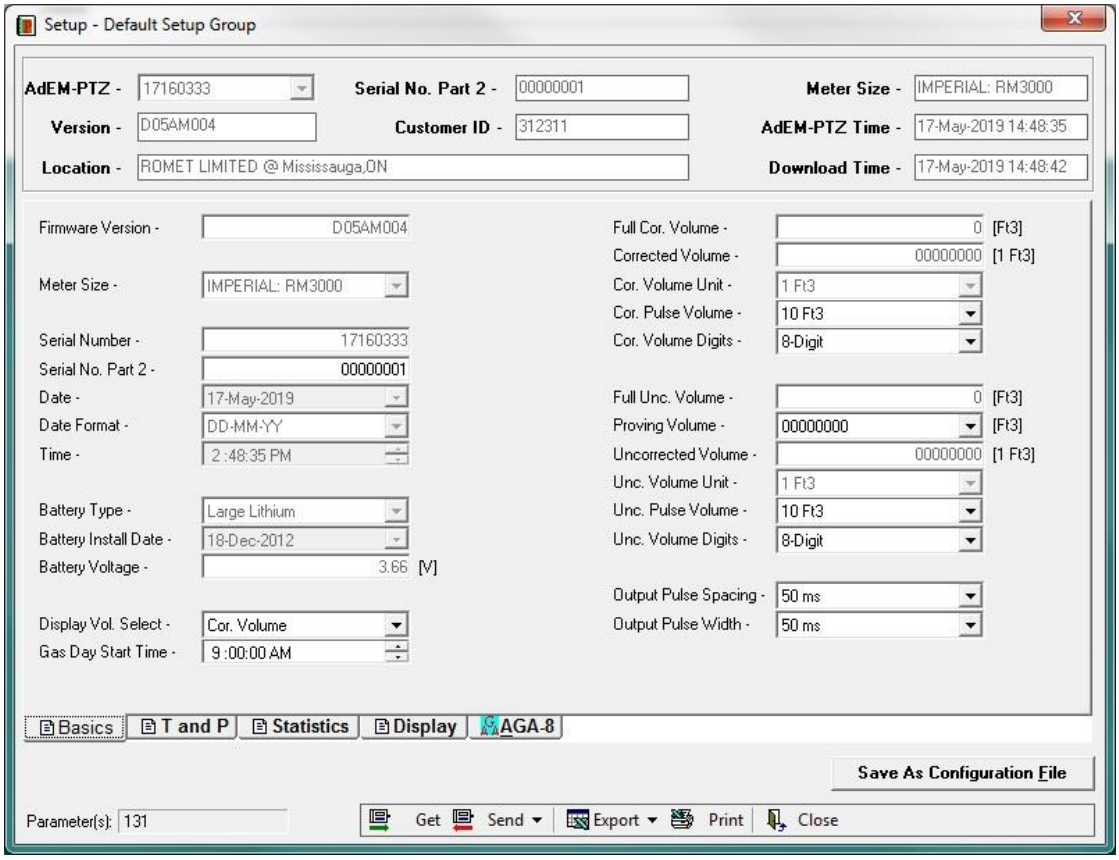


Fig.13 Setup window

☞ Access to configuration of default set of parameters is available also using Toolbar ***Talk: Setup*** button.

There are three types of parameters under software setup:

- ✓ Read only- Parameter Cannot be modified
- ✓ Read/Write – Read Only after Sealing (Program Switch in **"Disable"** position)
- ✓ Read/Write – Parameter can be freely modified with or without protection by Event Logger.

There are available approx. 161 parameters which can be read or "read and Write" under the software Setup.
This number includes 21 AGA8 Gas Components which can be modified as a separate group of parameters. Modifications are protected by password.
For list of parameters see the following Table 2 and Fig. 13a.

Table 2 – Romet Products Standard Setup Parameters

Parameter Name	Description	Authorization	Product		
			AdEM-T	AdEM-PTZ	AdEM-S
AGA-8 Molar List	AGA-8 Molar List 21 Items	Read Only after Sealing/ ELogA	-	ElogA	-
Alarm Output	Alarm Output	Read Only	√	√	√
Atmosphere Pressure	Atmosphere Pressure	Read/Write/ ELogA	-	ELogA	-
Backup Index Counter	Backup Index Counter	Read Only after Sealing/ R/W	√	R/W	√
Base Pressure	Base Pressure	Read Only after Sealing/ElogSW	-	ElogSW	-
Base Temperature	Base Temperature	Read Only after Sealing/ElogSW	ElogSW	ElogSW	-
Battery Install Date	Battery Install Date	Read Only	√	√	√
Battery Life	Battery Remaining Months	Read Only	√	√	√
Battery Malf. Date	Battery Malfunction Occurred Date	Read Only	√	√	√
Battery Malf. Time	Battery Malfunction Occurred Time	Read Only	√	√	√
Battery Malfunction	Alarm: Battery Malfunction	Read Only	√	√	√
Battery Remaining %	Battery Capacity Remaining Percentage	Read Only	√	√	√
Battery Type	Battery Type	Read Only	√	√	√
Battery Voltage	Battery Voltage	Read Only	√	√	√
Baud Rate	Serial Communication Baud Rate	Read Only	√	√	√
Case Temp Calibration	Case Temperature Calibration	Not Available after Sealing	-	Elog SW	-
Case Temperature	Case Temperature	Read Only	-	√	-
Cor. Pulse Weight	Corrected Output Pulse Weight	Read Only after Sealing/ElogSW/ ElogA	ElogSW	ElogA	-
Cor. Volume Digits	Number of Display Digits for Cor. Volume	Read Only after Sealing/ ElogA	√	ElogA	-
Cor. Volume Unit	Corrected Volume Unit	Read Only after Sealing/ ElogSW	ElogSW	ElogSW	-
Corrected Flowrate	Live Corrected Flowrate	Read Only	√	√	-
Corrected Volume	Corrected Volume	Read Only after Sealing/ElogSW	ElogSW	ElogSW	-
Customer Display 1	Customer Selectable Display Parameter 1	Read/Write	√	√	√
Customer Display 10	Customer Selectable Display Parameter 10	Read/Write	√	√	√
Customer Display 11	Customer Selectable Display Parameter 11	Read/Write	√	√	√
Customer Display 12	Customer Selectable Display Parameter 12	Read/Write	√	√	√
Customer Display 13	Customer Selectable Display Parameter 13	Read/Write	√	√	√
Customer Display 14	Customer Selectable Display Parameter 14	Read/Write	√	√	√
Customer Display 15	Customer Selectable Display Parameter 15	Read/Write	√	√	√
Customer Display 2	Customer Selectable Display Parameter 2	Read/Write	√	√	√
Customer Display 3	Customer Selectable Display Parameter 3	Read/Write	√	√	√
Customer Display 4	Customer Selectable Display Parameter 4	Read/Write	√	√	√
Customer Display 5	Customer Selectable Display Parameter 5	Read/Write	√	√	√
Customer Display 6	Customer Selectable Display Parameter 6	Read/Write	√	√	√
Customer Display 7	Customer Selectable Display Parameter 7	Read/Write	√	√	√
Customer Display 8	Customer Selectable Display Parameter 8	Read/Write	√	√	√
Customer Display 9	Customer Selectable Display Parameter 9	Read/Write	√	√	√
Daily Cor. Volume	Today's Daily Corrected Volume	Read Only	√	√	-
Daily Unc. Volume	Today's Daily Uncorrected Volume	Read Only	√	√	√
Date	Date	Read/Write/Elog/ ElogA	Elog	ElogA	Elog
Date Format	Date Format	Read Only	√	√	√
Displacement	Displacement (Factory Set)	Read Only	√	√	√
Display Test Pattern	Display Test Pattern	Read Only	√	√	√
Display Vol. Select	Normal Display Volume Selection	Read Only after Sealing/ R/W	√	R/W	-
Event Log Enabled	Event Log Enabled	Read Only	√	√	√
Firmware Version	Firmware Version	Read Only	√	√	√
Full Cor. Volume	Full Corrected Volume	Read Only	√	√	-
Full Unc. Volume	Full Uncorrected Volume	Read Only	√	√	√
Gas Day Start Time	Start Time for Gas Day	Read/Write	√	√	√
Gas Gauge Pressure	Gas Gauge Pressure	Read Only	-	√	-
Gas Heating Value	Gs Heating Value (SGERG-88,AGA-8 Gross 1))	Read Only after Sealing/ElogA	-	ElogA	-
Gas Mole % CO_2	Gas Mole of CO_2 (NX-19,SGERG-88,AGA-8 Gross 1&2)	Read Only after Sealing/ElogA	-	ElogA	-
Gas Mole % H_2	Gas Percent of H_2 Molecules (SGERG-88)	Read Only after Sealing/ElogA	-	ElogA	-
Gas Mole % N_2	Gas Mole % N_2 (NX-19 and AGA-8 Gross 2)	Read Only after Sealing/ ElogA	-	ElogA	-
Gas Pressure	Gas Pressure	Read Only	-	√	-
Gas Specific Gravity	Specific gravity (NX-19,SGERG-88,AGA-8 Gross 1&2)	Read Only after Sealing/ElogA	-	ElogA	-
Gas Temperature	Gas Temperature	Read Only	√	√	-
High Res Cor Volume	High Resolution Corrected Volume	Read Only	√	√	√
High Res Unc Volume	High Resolution Uncorrected Volume	Read Only	√	√	-

Parameter Name	Description	Authorization	Product		
			AdEM-T	AdEM-PTZ	AdEM-S
Interval Field 10	Selectable Interval Field 10	Read/Write	-	√	-
Interval Field 5	Selectable Interval Field 5	Read/Write	-	√	-
Interval Field 6	Selectable Interval Field 6	Read/Write	-	√	-
Interval Field 7	Selectable Interval Field 7	Read/Write	-	√	-
Interval Field 8	Selectable Interval Field 8	Read/Write	-	√	-
Interval Field 9	Selectable Interval Field 9	Read/Write	-	√	-
Interval Setting	Interval Setting	Read Only After Sealing/ R/W	√	R/W	√
Interval Type	Interval Type	Read Only/ R/W	√	R/W	√
Last Save Date	Last Save Occurred Date	Read Only	√	√	√
Last Save Time	Last Save Occurred Time	Read Only	√	√	√
Last Saved Cor. Vol.	Last Saved Corrected Volume	Read Only	√	√	-
Last Saved Unc. Vol.	Last Saved Uncorrected Volume	Read Only	√	√	√
Max. Case Temp.	Maximum Case Temperature since Last Reset	Read/Write	-	√	-
Max. Gas Pressure	Maximum Gas Pressure since Last Reset	Read/Write	-	√	-
Max. Gas Temp.	Maximum Gas Temperature since Last Reset	Read/Write	√	√	-
Max. Pressure Date	Maximum Pressure Occurred Date	Read Only	-	√	-
Max. Pressure Time	Maximum Pressure Occurred Time	Read Only	-	√	-
Max. Temp. Date	Maximum Temperature Occurred Date	Read Only	√	√	-
Max. Temp. Time	Maximum Temperature Occurred Time	Read Only	√	√	-
Memory Error	Alarm: EEPROM Memory Missing or Defect	Read Only	√	√	√
Memory Error Date	EEPROM Memory Error Occurred Date	Read Only	√	√	√
Memory Error Time	EEPROM Memory Error Occurred Time	Read Only	√	√	√
Meter Size	Meter Size	Read Only after Sealing/ElogSW	ElogSW	ElogSW	ElogSW
Min. Case Temp.	Minimum Case Temperature since Last Reset	Read/Write	-	√	-
Min. Gas Pressure	Minimum Gas Pressure since Last Reset	Read/Write	-	√	-
Min. Gas Temp.	Minimum Gas Temperature since Last Reset	Read/Write	√	√	-
Min. Pressure Date	Minimum Pressure Occurred Date	Read Only	-	√	-
Min. Pressure Time	Minimum Pressure Occurred Time	Read Only	-	√	-
Min. Temp. Date	Minimum Temperature Occurred Date	Read Only	√	√	-
Min. Temp. Time	Minimum Temperature Occurred Time	Read Only	√	√	-
Output Pulse Spacing	Output Pulse Spacing	Read Only after Sealing/ElogA	√	ElogA	√
Output Pulse Width	Output Pulse Width	Read Only after Sealing/ElogA	√	ElogA	√
Peak Flow Reset Date	Peak Uncorrected Flowrate Reset Occurred Date	Read Only	√	√	√
Peak Flow Reset Time	Peak Uncorrected Flowrate Reset Occurred Time	Read Only	√	√	√
Peak Unc. Flow	Peak Uncorrected Flowrate since Last Reset	Read/Write	√	√	√
Peak Unc. Flow Date	Peak Uncorrected Flowrate Occurred Date	Read Only	√	√	√
Peak Unc. Flow Time	Peak Uncorrected Flowrate Occurred Time	Read Only	√	√	√
Press. Display Res.	Pressure Display Resolution	Read Only	-	√	-
Press. Malf. Date	Pressure Transducer Malfunction Occurred Date	Read Only	-	√	-
Press. Malf. Time	Pressure Transducer Malfunction Occurred Time	Read Only	-	√	-
Press. Trans. SN	Pressure Transducer Serial Number	Read Only after Sealing/ElogSW	-	ElogSW	-
Program Disable	Setting OFF Programming Switch	Read/Write	√	√	√
Proving Volume	Proving Volume	Read Only after Sealing/ElogA	√	ElogA	√
Pulse Channel 1	Pulse Type of Output Channel 1	Read Only	√	√	√
Pulse Channel 2	Pulse Type of Output Channel 2	Read Only	√	√	√
Pulse Channel 3	Pulse Type of Output Channel 3	Read Only /ElogA	√	ElogA	√
Serial Link Mode	Serial Link Mode	Read Only	√	√	√
Serial Number	Unit Serial Number	Read Only after Sealing/ElogSW	ElogSW	ElogSW	ElogSW
Serial Number part2	Unit Serial Number part2	Read Only after Sealing/ElogA	-	ElogA	-
Super_X Algorithm	Supercompressibility Calculation Algorithm	Read Only after Sealing/ElogSW	-	ElogSW	-
Super_X Factor	Super_X Factor	Read Only after Sealing/ElogA	-	ElogA	-
Super_X Factor Type	Super_X Factor Type	Read Only after Sealing/ElogSW	-	ElogSW	-
Temp. Factor Type	Temperature Factor Type	Read Only after Sealing/ElogSW	**ElogSW**	ElogSW	-
Temp. High Limit	Temperature High Limit	Read/Write	√	√	-
Temp. Low Limit	Temperature Low Limit	Read/Write	√	√	-
Press. Trans. Range	Pressure Transducer Upper Range	Read/Write	-	R/W	-
Press. Trans. Type	Pressure Transducer Type	Read Only	-	√	-
Pressure Calibration	Pressure Calibration	Not Available after Sealing	-	ElogSW	-
Temperature Calibration	Temperature Calibration	Not Available after Sealing	ElogSW	ElogSW	-
Pressure Factor	Pressure Factor Fixed	Read Only after Sealing/ElogSW/ ElogA	ElogSW	ElogA	ElogSW

Parameter Name	Description	Authorization	Product		
			AdEM-T	AdEM-PTZ	AdEM-S
Pressure Factor	Pressure Factor Live	Read Only	-	√	-
Pressure Factor Type	Pressure Factor Type	Read Only after Sealing/ElogSW	-	ElogSW	-
Pressure High	Alarm: Pressure High	Read Only	-	√	-
Pressure High Limit	Pressure High Limit	Read/Write	-	√	-
Pressure Low	Alarm: Pressure Low	Read Only	-	√	-
Pressure Low Limit	Pressure Low Limit	Read/Write	-	√	-
Pressure Malfunction	Alarm: Pressure Transducer Malfunction	Read Only/ Reset	-	Reset	-
Pressure Trans. SN	Pressure Trans. SN	Read Only after Sealing/ElogSW	-	ElogSW	-
Pressure Unit	Pressure Unit	Read Only after Sealing/ElogSW	-	ElogSW	-
Prev. Day Cor. Vol.	Yesterday's Daily Corrected Volume	Read Only	√	√	-
Prev. Day Unc. Vol.	Yesterday's Daily Uncorrected Volume	Read Only	√	√	√
Temp. Malf. Date	Temperature Transducer Malfunction Occurred Date	Read Only	√	√	-
Temp. Malf. Time	Temperature Transducer Malfunction Occurred Time	Read Only	√	√	-
Temp. Malfunction	Alarm: Temperature Transducer Malfunction	Read Only/ Reset	Reset	Reset	-
Temperature Factor	Temperature Factor	Read Only	√	√	-
Temperature High	Alarm: Temperature High	Read Only	√	√	-
Temperature Low	Alarm: Temperature Low	Read Only	√	√	-
Temperature Unit	Temperature Unit	Read Only	√	√	-
Time	Time	Read/Write/Elog/ ElogA	Elog	ElogA	Elog
Total Cor. Factor	Total Correction Factor	Read Only	√	√	-
Unc. Vol. Since Malf.	Uncorrected Volume since Last Malfunction	Reset/Elog/ElogA	Elog	ElogA	-
Unc. Flow High	Alarm: Uncorrected Flowrate High	Read Only	√	√	√
Unc. Flow High Limit	Uncorrected Flowrate High Limit	Read/Write	√	√	√
Unc. Flow Low	Alarm: Uncorrected Flowrate Low	Read Only	√	√	√
Unc. Flow Low Limit	Uncorrected Flowrate Low Limit	Read/Write	√	√	√
Unc. Pulse Weight	Uncorrected Output Pulse Weight	Read Only after Sealing/ElogA	ElogSW	ElogA	ElogSW
Unc. Volume Digits	Number of Display Digits for Unc. Volume	Read Only after Sealing/ElogA	√	ElogA	√
Unc. Volume Unit	Uncorrected Volume Unit	Read Only after Sealing/ElogSW	ElogSW	ElogSW	ElogSW
Uncorrected Flowrate	Live Uncorrected Flowrate	Read Only	√	√	√
Uncorrected Volume	Uncorrected Volume	Read Only after Sealing/ElogSW	ElogSW	ElogSW	ElogSW

Where:

ElogSW means the parameter is protected by event log and by physically sealed by the Program Switch/jumper.

Elog or ElogA means parameter is protected respectively by Event log only or Event Log type A.

☞ ElogSW, ElogA and R/W marking to be consider as "√" for firmware versions prior to D02 (D05 in Canada)

☞ ElogSW, ElogA for D02 and D03 are items controlled by Event Logger only – open for change regardless of Enable/Disable Switch position with exception of Serial Number. (Not applicable for Canada).

☞ Meter size change requires remote keyboard for firmware versions prior to D02. The meter size can be changed with remote keyboard and RometLink software for firmware version D03 (D05 in Canada) and above

☞ Date and Time parameters under ***Setup*** menu are also available as Read/Write unconditionally under separate ***Date and Time*** menu

☞ Parameters listed above are also available for review under ***Talk to Unit/Check*** menu.

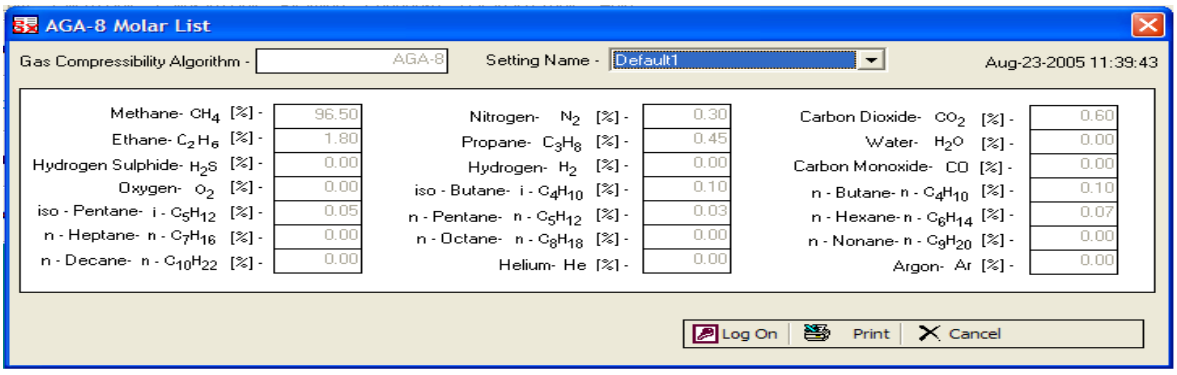


Fig.13a AGA8 Gas Components (21 items) Window

6. CALIBRATION

The Calibration mode is provided to compensate offsets and gains of pressure and temperature sensors:

- during manufacturing process;
- if a significant error (>0.5%) is found during testing/verification (refer to Section 7, **TESTING**);
- in the event of a sensor replacement.

It is assumed that this procedure is performed in the controlled environment of a meter or instrument shop.

☞ Access to the Calibration mode requires that the Program Switch be in the "**ENABLE**" position and that the access password be entered (refer to Section 4, **SECURITY**).

Temperature and Pressure Calibration can be performed two ways: using Keypad or RometLink software.
Ambient temperature can be performed by Keyboard operation only. Usually it is done only during factory initial configuration.

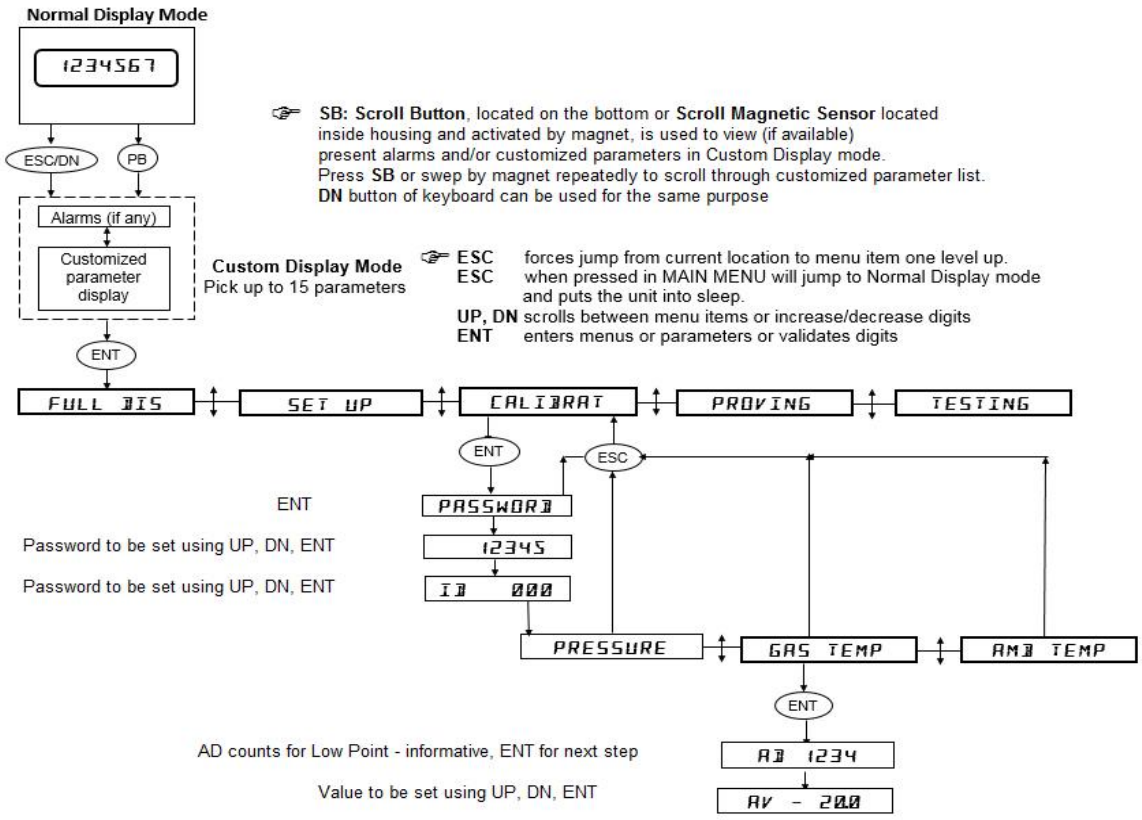
Gas Temperature Calibration

Place the temperature sensor into a stable temperature bath (reference) for at least 3 minutes to stabilize. Temperature calibration is performed at one test point. To achieve the best results, calibration should be performed at a reference bath temperature, which is close to average gas temperature at location of meter.

☞ If calibration is aborted due to any reason, the unit will revert to old saved data that is still valid.

Calibration by Keypad

The flowchart below shows how to calibrate Gas Temperature sensor.



Gas temperature Calibration by Keyboard - Flowchart

After completing the calibration of the AdEM®-PTZ, and if other configuration procedures are concluded, return the Program Switch to the "**Disable**" position as per procedure in section 4, **SECURITY**, to prevent access to the Calibration and Setup Modes.

Calibration by software

Temperature calibration by **RometLink** software is fully available under ***Calibrate Unit/1-Point Gas Temperature.***

See Fig.14 for **1-Point Temperature Calibrate** windows.
Refer to **RometLink** Help for further calibration details.

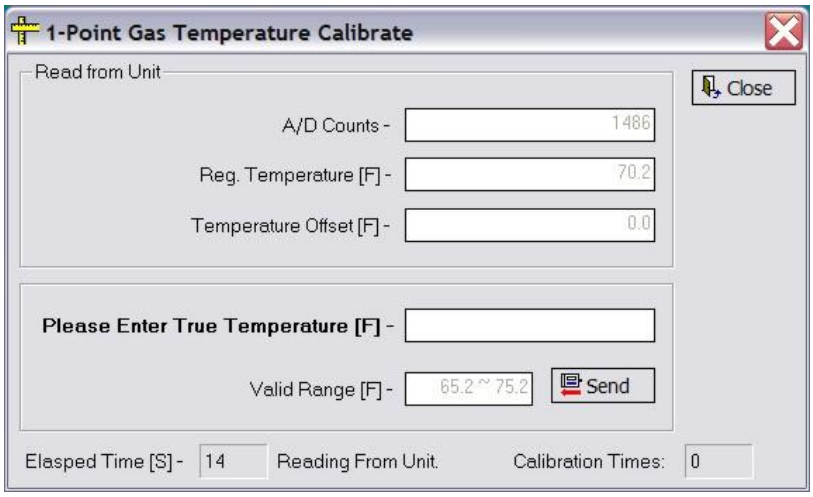


Fig.14 Software 1-Point Temperature Calibrate Window

Ambient Temperature Calibration

Ambient Temperature sensing is needed for Software compensation of Pressure Sensor. Accuracy of ambient temperature (offset) is not critical for such purpose. Nevertheless, it is strongly recommended to perform Ambient Temperature Calibration. 1-Point Temperature calibration method is implemented for this parameter. See Ambient Temperature Calibration flowchart below.

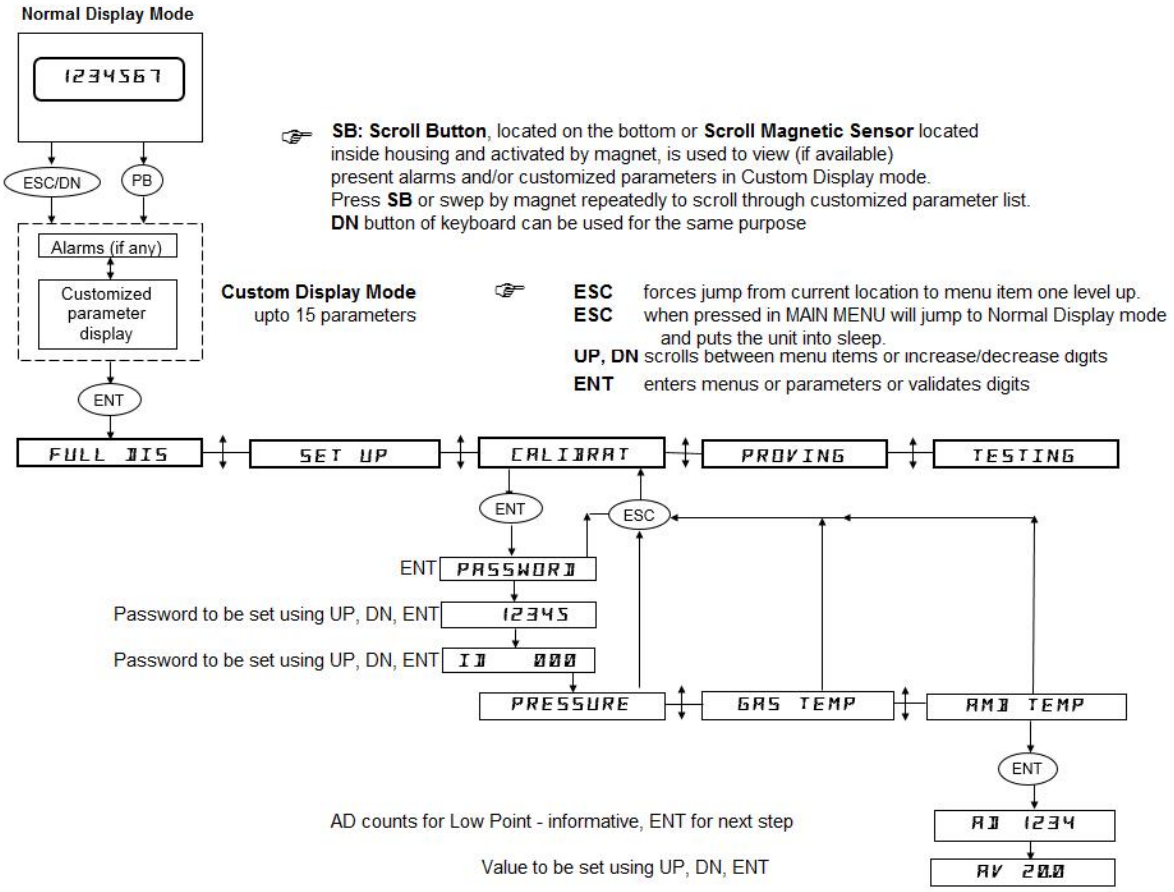


Fig.15 Ambient Temperature Calibration by Keyboard - Flowchart

Pressure Calibration

Three points of calibration are used for AdEM®-PTZ pressure calibration. It is recommended that prior to calibration first remove AdEM®-PTZ from service and leave in service shop for at least 24 hours to acclimatize the unit. Calibration should be performed at room temperature. Setup the calibration equipment (pressure controller, hosepipes etc.). In order to perform calibration, the Program Switch on the Main Board must be moved to the "**Enable**" position (refer to section 4, **SECURITY**). Connect the pressure supply to the unit. Check for any leakage. If confirmed OK, set the pressure controller to the LOW pressure point (approximately 20% of the range).

Calibration by Keypad

Access Calibration (**CALIBRAT**) menu, enter password and user ID. Once, the Calibration Mode has been accessed, select **PRESSURE** sub-menu. Unit will show the A/D counts for LOW point. When stabilized, press **ENT** key and enter the value displayed by the pressure controller. Repeat the same for MID and HIGH pressure points applying pressure accordingly. When calibration has been done, apply the pressure anywhere in the applicable range and verify under Customer Display or Full Display that the unit reads correctly.

☞ If calibration is aborted due to any reason, the unit will revert to old saved data that is still valid.

☞ The calibration values entered must be in absolute pressure only.

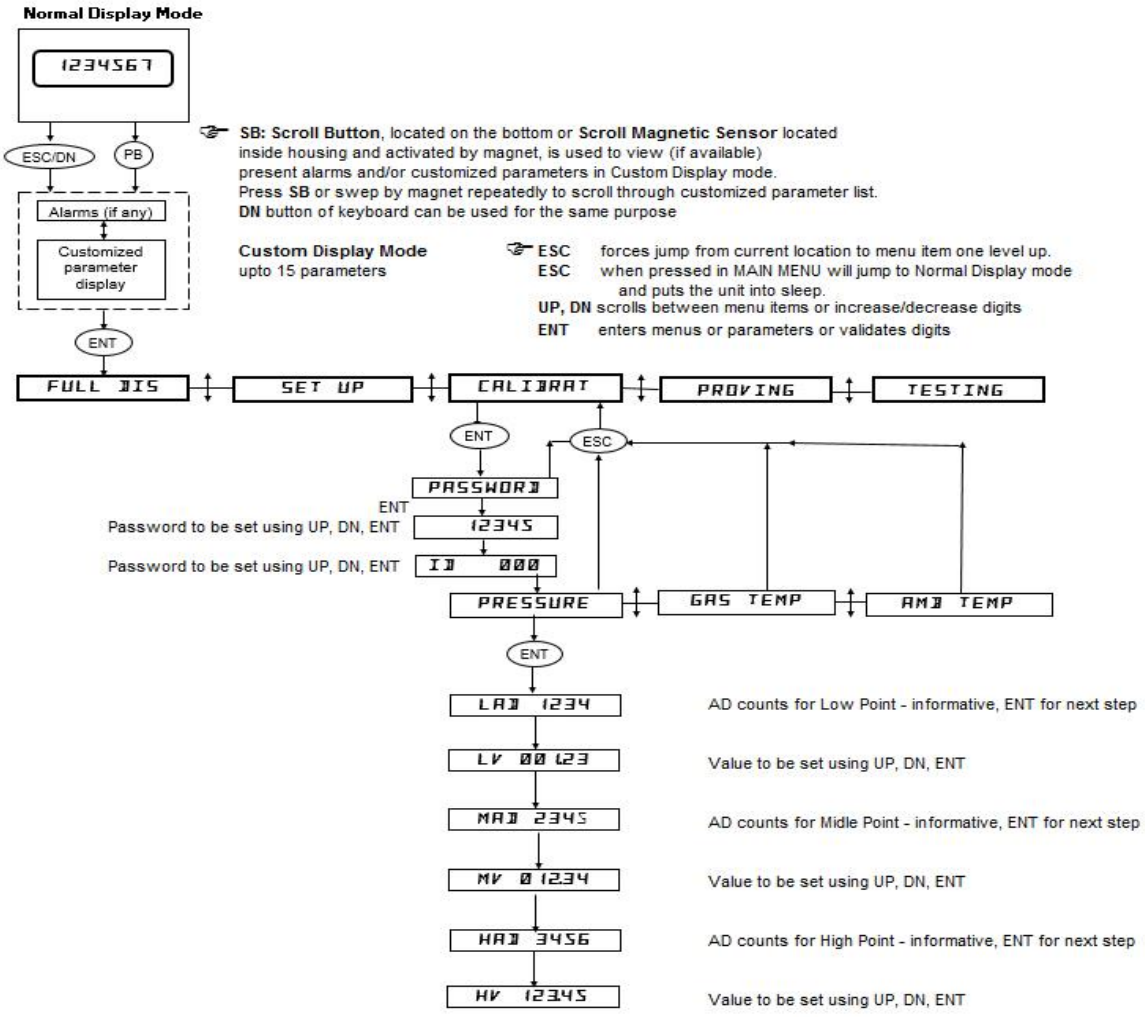


Fig.16 Pressure Calibration by Keyboard - Flowchart

Calibration by software

3-points pressure calibration

Calibration is accessed under Calibration (***Calibrate Unit***) drop down menu of RometLink software after entering ***3-Point Gas Pressure…***. Once Calibration window is open (see Fig. 16, *3-Point Gas Pressure Calibrate* window), after stabilizing of A/D counts enter ***True Pressure*** (value displayed by the pressure controller) for LOW pressure point, then select ***Low Point*** from ***Capture As:*** selection. Repeat sequence for MIDDLE and HIGH pressure points.

After completion of all three points ***Send*** button is activated, ready to use for sending calibration data to AdEM®-PTZ unit. Proper access code must be entered to send it successfully. For more details refer to Help files of RometLink software.

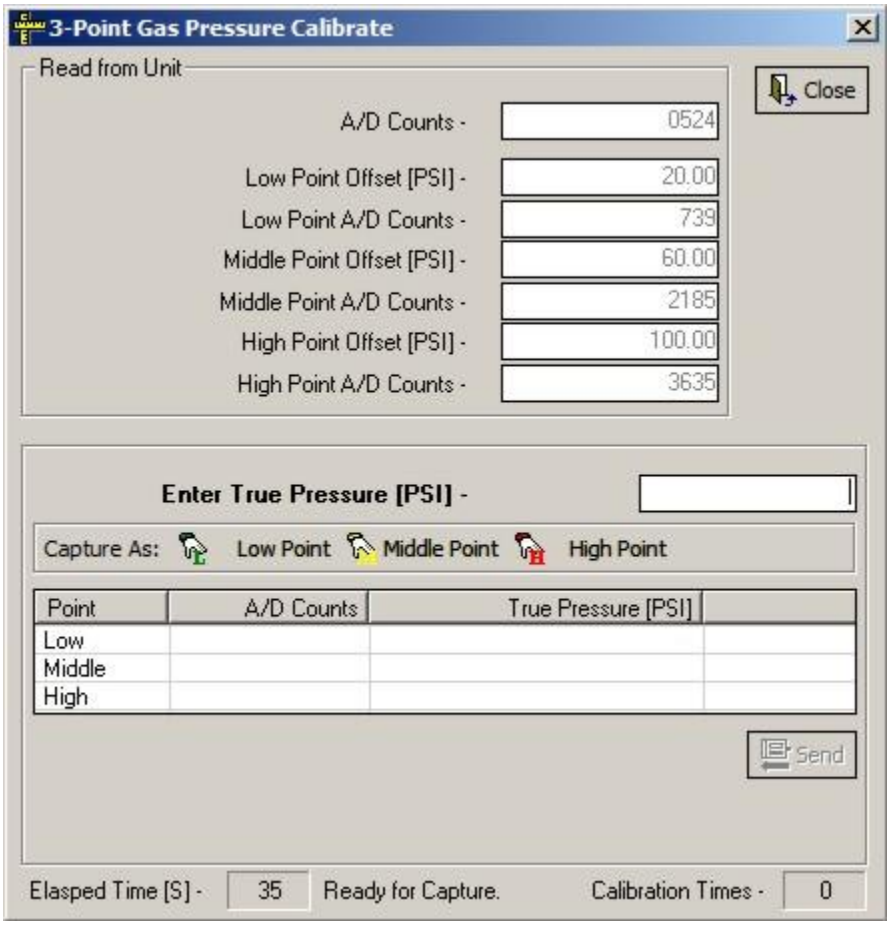


Fig.17 Software 3-points Pressure Calibration Window

☞ If calibration is aborted due to any reason, the unit will revert to old saved calibration data that is still valid.

☞ The calibration values entered must be in Absolute pressure only.

After completing the calibration of the AdEM®-PTZ, return the Program Switch to the "**Disable**" position following procedure on page 14, to prevent access to the Calibration and Setup Modes.

Selection of pressure Calibration points

Usually pressure points are established as: 20% (Low Point), 60% (Middle Point), 100% (High Point), of full pressure range. However, points can be chosen differently if needed (e.g. for very low-pressure ranges of AdEM®-PTZ)

1-point pressure calibration

Calibration is accessed under Calibration (***Calibrate Unit***) drop down menu of RometLink software after entering ***1-Point Gas Pressure…***. Once Calibration window is open (see Fig. 18, *1-Point Gas Pressure Calibrate* window), after stabilizing of A/D counts enter ***True Pressure*** (value displayed by the pressure controller).

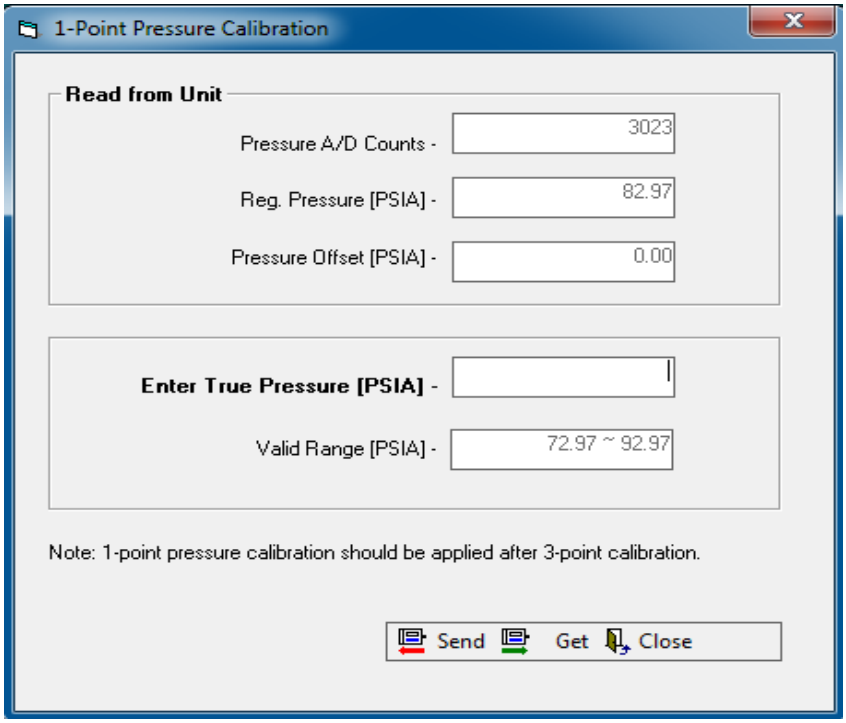


Fig.18 Software 1-point Pressure Calibration Window

☞ If calibration is aborted due to any reason, the unit will revert to old saved calibration data that is still valid.

☞ The calibration values entered could be in Absolute pressure or Gauge pressure, which is based on the pressure option implemented. Presently Absolute option is approved for Canada.

☞ Once 1-point pressure calibration is used, future 3-point calibration must be performed by Software to automatically cancel 1-point calibration. Cancelation is necessary for correct performance of 3-points calibration by Keypad.

7. PROVING

To access the Proving Mode, a password must be entered when prompted. Once the **PROV VAL** menu has been entered, the display will indicate the first pulse weight (1CF or 0.01m^3). Press scrolling keys ↑/↓ to view the other available pulse weight options, press **ENT** key to select the desired pulse weight. Then the AdEM®-PTZ will show **"TC PROV"** or **"UNC PROV"**, based on what was used last time. Press scrolling keys ↑/↓ to choose proving type, then press **ENT** key (TC proving option is not applicable for Canada). The AdEM®-PTZ is ready for proving if the display shows "**PROV**". Where possible, the minimum pulse weight should be employed to minimize the proving volume and time.

During proving of a meter, the AdEM®-PTZ will indicate on the display with " **. . .** ", signifying the output duration of a volumetric pulse to the proving system. This means "ON" for one pulse and "OFF" for another. Proving Mode will time out after one hour with flow or 5 minutes without flow (no input pulses), and automatically return to the Normal Display Mode.

☞ To conserve battery life, press the ESC button after completing proving to escape the Proving mode and return to the Normal Operating mode.

For Imperial sizes, the selectable proving pulse weights available are 1 CF, 10 CF, 100 CF, 1000 CF, 10000 CF and Displacement. For Metric sizes, the selectable proving pulse weights available are 0.01m³, 0.10m³, 1.00m³, 10.0m³, 100.0m³, and Displacement.
To utilize this mode, the proving system being employed must be capable of accepting a high-speed pulse input from the AdEM®-PTZ (5 ms pulse width).

Alternative Push Button Proving

To enter the Proving mode, the PUSH button should be pushed and hold. After 2 seconds the display will show **"CLR—SAVE"**, continue holding the button over 2 seconds until display shows **"PROV MOD"**, and then release it. The LCD will show **"TC PROV"**. Under this condition, if you push button again momentarily, it will change to **"UNC PROV"**, then after another 2 seconds LCD will show the Proving Unit such as 1 CF or 0.01 m^3, which is **NOT** changeable. Wait for 2 more seconds, the AdEM®-PTZ will display **"PROV"**, being ready for proving. Return to Normal Display Mode happens by another push of the button momentarily or after Timeout by the unit itself.
Pushbutton proving is protected by hardware switch, registered in Event Log, and can be factory disabled.

☞ Timeout is 60 minutes if entered by keyboard, or 15 minutes if entered by Push Button. Timeout will happen even if the input pulses are still applied (meter is still running).

☞ TC proving option is not applicable in Canada

The accuracy of a meter with an AdEM®-PTZ can be checked on a variety of proving systems.

Bell Prover

Since bell prover systems have a finite displacement, the AdEM®-PTZ provides a selectable pulse output resolution in the Proving Mode. To utilize this mode, the bell prover system being employed must be capable of accepting a high-speed pulse input from the AdEM®-PTZ (5 ms pulse width).

Transfer Prover

Depending on the transfer prover being employed to test the AdEM®-PTZ meter, the procedure will vary accordingly. To utilize this mode, the prover system being employed must be capable of accepting a high-speed pulse input from the AdEM®-PTZ (5 ms pulse width).

Model 5 Prover

A Romet cable assembly (Romet P/N 34-097-40) is required to connect the unconverted (UNC VOL) pulse output (6 pin Cannon) of the AdEM®-PTZ to the Model 5 Prover. Other cable assemblies are available to accommodate different pin arrangements and other connector types. Please contact Romet for assistance. To utilize this mode,

the prover system being employed must be capable of accepting a high-speed pulse input from the AdEM®-PTZ (5 ms pulse width).
The following procedures can be followed for testing meters with Romet AdEM®-PTZ module:

Romet RM Imperial, LMMA Imperial and B3 Imperial AdEM®-PTZ Meters:

1. Install the appropriately sized flange connections on the prover hose
2. Connect the hose assembly to the meter flanges with a gasket to ensure an air tight fit
3. Connect the AdEM®-PTZ to the interface box on the prover with the appropriate Romet cable connector assembly.
4. Access the Test Configuration menu and set the test parameters as follows:

Romet RM600-RM2000 LMMA 2M, B3 2M		**Romet RM3000-RM11000 LMMA 3M-11M, B3 3M-11M**		**Romet RM16000-RM56000 LMMA 16M, B3 16M**	
Prover:	2M	Prover:	10M	Prover:	10M
Test connection:	opto	Test connection:	opto	Test connection:	opto
Meter output:	UNC	Meter output:	UNC	Meter output:	UNC
Pulse/test: select:	50	Pulse/test: select:	10	Pulse/test: select:	10
Test volume: select	50	Test volume: select	100	Test volume: select	1000
AdEM®-PTZ pulse	1 cf	ADEM®-PTZ pulse	10 cf	AdEM®-PTZ pulse	100 cf

The remainder of the Test Configuration menu can be completed in the normal manner.

5. Enter the Proving mode (refer to Section 4, Security for entering the access password) and select the pulse weight to match the pulse weight for the prover test configuration.
6. Perform the proving test in the normal manner with AdEM®-PTZ in Proving Mode.
7. Disconnect the Romet cable assembly and the flange connections after completing the test.

Romet G & RM Metric AdEM®-PTZ Meters:

1. Install the appropriately sized flange connections on the prover hose
2. Connect the hose assembly to the meter flanges with a gasket to ensure an air tight fit
3. Connect the AdEM®-PTZ to the interface box on the prover with the appropriate Romet cable connector assembly.
4. Access the Test Configuration menu and set the test parameters as follows:

Romet RM16-RM55 Romet G10-G40		**Romet RM85-RM200 Romet G65-G160**		**Romet RM300-RM1600 Romet G250-G1000**	
Prover:	2M	Prover:	10M	Prover:	10M
Test connection:	opto	Test connection:	opto	Test connection:	opto
Meter output:	UNC	Meter output:	UNC	Meter output:	UNC
Pulse/test:	select 10	Pulse/test:	select 10	Pulse/test:	select 10
Test volume:	select 1	Test volume:	select 1	Test volume:	select 10
AdEM®-PTZ pulse	0.1 m^3	AdEM®-PTZ pulse	0.1 m^3	AdEM®-PTZ pulse	1 m^3

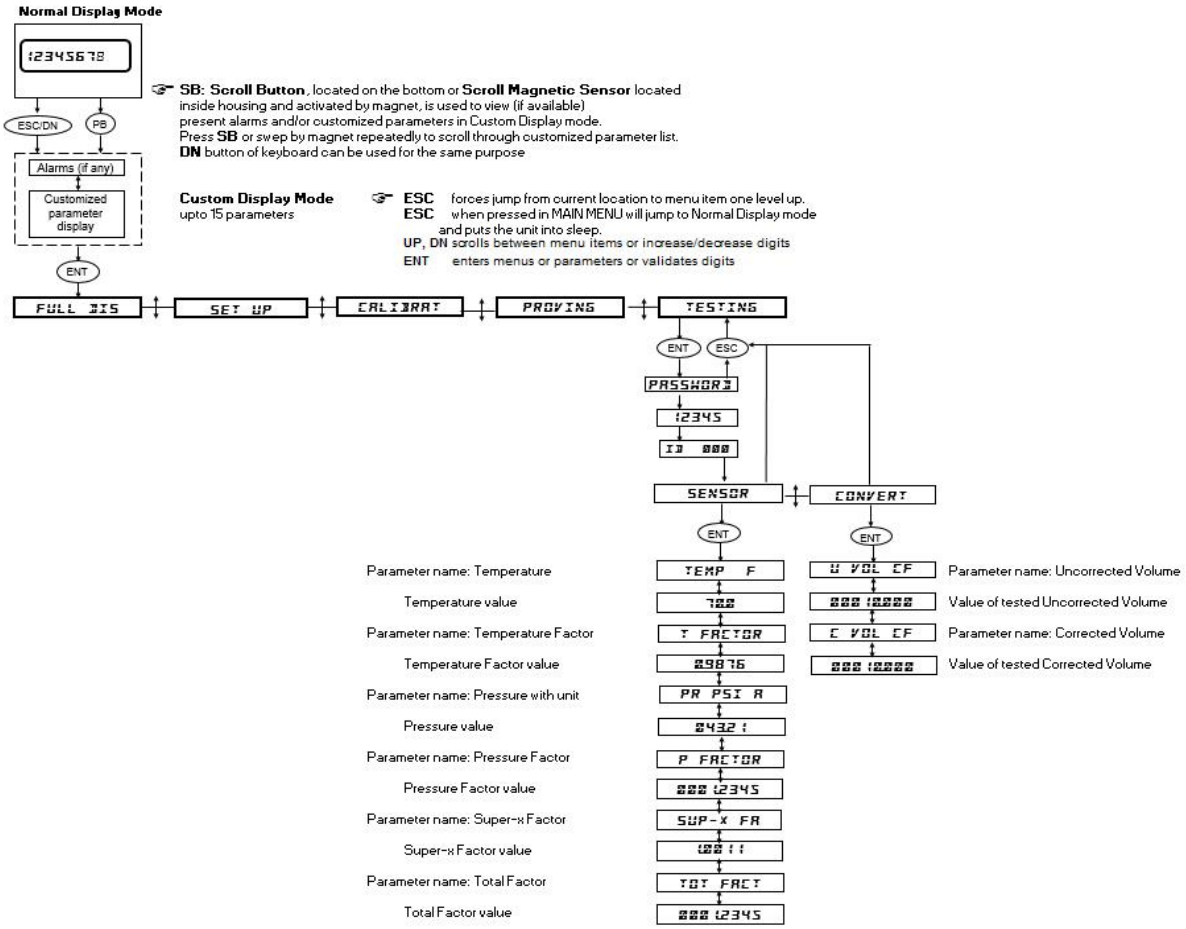
The remainder of the Test Configuration menu can be completed in the normal manner.

5. Enter the Proving mode (refer to Section 4, Security for entering the access password) and select the pulse weight to match the pulse weight for the prover test configuration.
6. Perform the proving test in the normal manner with AdEM®-PTZ in Proving mode.
   Disconnect the Romet cable assembly and the flange connections after completing the test.

8. TESTING

The verification of the pressure and temperature sensor and PTZ conversion accuracy and Output Pulses function and connection are performed within the **TESTING** mode. Access to the **TESTING** mode is protected by the password and is accessible with the Program Switch in either ENABLE or DISABLE position. Incoming pulse processing is not affected during staying in **TESTING** mode. Therefore, **TESTING** mode is suitable for using with AdEM®-PTZ installed in the field applications.

The TESTING mode has volume registries that operate exclusively of the normal volume registries for the AdEM®-PTZ. The normal **UNC VOL** and **COR VOL** registry values are saved in memory when the **TESTING** mode is accessed. When the **TESTING** mode is exited, the normal **UNC VOL** and **COR VOL** registry values revert to the saved values with the addition of the applied test volumes. The additional COR test volume is calculated using the last saved pressure and temperature measurements (last values before entering the **TESTING** mode). Also, the regular Output Pulses for the test volume are generated during the **TESTING** mode. Those output pulses are not related to tested parameters (temperature and pressure) under **TESTING** mode.



Testing Mode Flowchart

PTZ Conversion

In **PTZ CONVERSION (CONVERT)** test, the **UNC VOL** and **COR VOL** test registries are automatically initialized to zero when entering this menu. The test registries are displayed to four (metric) or three (imperial) digits after decimal points to deliver a high-resolution reading and, thereby, reduce the required test volume for completing the conversion test. During a test the total conversion factor for the AdEM®-PTZ is calculated live from measured values of pressure and temperature references.

Uncorrected volumes collected during **PTZ Conversion (CONVERT)** are equal to three Input Pulse Volumes (equivalents to L.F. Pulse Resolution of Standard Meter)

The following formulas can be employed to calculate the conversion error of the AdEM®-PTZ in relation to the theoretical or true value. A suitable reference temperature and pressure standards will be required.

$$\% \text{ True Error} = \frac{(\text{Registered} - \text{True})}{\text{True}} \times 100 \text{ ---------- Eq. 1}$$

Where:
Registered is the converted volume (COR VOL) indicated by the AdEM®-PTZ under test and true is the calculated volume (Eq. 2) derived from the gauge values of the reference pressure and temperature standards.

The true converted volume is calculated by:

$$\text{True COR VOL} = \text{UNC VOL} \times \text{Total Conversion Factor} \text{ ---------- Eq. 2}$$

Where:
UNC VOL is the registered unconverted volume displayed by the AdEM®-PTZ
Total Conversion Factor is calculated using Eq. 3:

$$\text{Total Conversion Factor} = T_F \times P_F \times (F_{pv})^2 \quad \text{(NX-19) ---------- Eq. 3}$$

or

$$= T_F \times P_F \times F_Z \text{ (AGA8 or SGERG88)}$$

Where:
T_F Temperature Factor calculated by Eq. 4 using the value of the reference temperature standard value at the start of the test for T_{gas}
P_F Pressure Factor calculated by Eq. 5 using the value of the reference pressure standard value at the start of the test for P_{abs}

$(F_{pv})^2$	Super Compressibility Factor calculated using the NX-19 method and employing the temperature and pressure values at the start of the test for the reference standards
$F_Z = Z_b/Z$	Compressibility Factor calculated using AGA8 or SGERG88 Method and employing the temperature and pressure values at the start of the test for reference standards.

$(F_{pv})^2$ =Function of (P_{gas}, T_{gas}, d, MN_2, MCO_2) for NX-19

Z_b = function of (P_{base}, T_{base}, Gas Molar list*)
Z = function of (P_{gas}, T_{gas}, Gas Molar list*) } for AGA8 Detailed

Zb = function of (P_{base}, T_{base}, d, Hs, MCO_2)
Z = function of (P_{gas}, T_{gas}, d, Hs, MCO_2) } for AGA8 Gross1

Zb = function of (P_{base}, T_{base}, d, MN_2, MCO_2)
Z = function of (P_{gas}, T_{gas}, d, MN_2, MCO_2) } for AGA8 Gross2

Zb = function of (P_{base}, T_{base}, d, Hs, MCO_2, MH_2)
Z = function of (P_{gas}, T_{gas}, d, Hs, MCO_2, MH_2) } for SGERG88

P_{base} - base absolute pressure (10.00 to 16.00 psi, 0.70000 to 1.10000 bar, 70.000 to 110.000 kPa)
T_{base} - base temperature (32°F to 86°F, 0°C to 30°C)
P_{gas} - flowing gas absolute pressure
T_{gas} - flowing gas temperature
Hs - gas calorific value (combustion heat)
d - specific gravity

MCO_2 - Mol fraction CO_2
MN_2 - Mol fraction N_2
MH_2 – Mol fraction H_2

* Gas Molar list - detailed gas composition.

Temperature Factor Calculation

$$T_F = \frac{(T_{base} + 459.67\ °R)}{(T_{gas} + 459.67\ °R)} \text{ (Imperial) or } \frac{(T_{base} + 273.15\ °K)}{(T_{gas} + 273.15\ °K)} \text{ (Metric) -------- Eq. 4}$$

Where:
T_{base} Base Temperature (32°F to 86°F, 0°C to 30°C)
T_{gas} Flowing gas temperature

Pressure Factor Calculation

$$P_F = \frac{P_{abs}}{P_{base}} \text{--------- Eq. 5}$$

☞ In case of using gauge type of pressure sensor $P_{abs} = P_{gauge} + P_{atmospheric}$.

P_{abs} Flowing gas pressure: psia (imperial); kPa or bara (metric)
P_{base} Base Pressure: psia (imperial); kPa or bara (metric)

PTZ Conversion Test Steps

1. After entering **TESTING** mode, temporary reinstall pressure and temperature sensors to measure reference pressure and temperature.

2. Enter **CONVERT**, testing is being started. Scrolling down to **UNC CF** or **COR CF** display shows zeroes or numbers respective to collected already input volumes up to three – depends of stage of test. Number has three (imperial) or four (metric) digits after decimal point for high resolution of reading.

3. Test runs until Uncorrected volume of 3 Input Volumes is reached, then it stops displaying Uncorrected (**UNC CF**) and Corrected (**COR CF**) Volumes, which are ready for writing down and accuracy calculations.

4. After exiting from **PTZ Conversion** continue with **Sensor Accuracy** or reinstall pressure and temperature sensors in original application **before** exiting **TESTING** mode (to return AdEM®-PTZ to Normal Mode).

5. Upon exiting **TESTING** Mode, regular Volume Indexes are updated, and unit exits to its Normal Mode

Sensor Accuracy

The sensor accuracy test menu provides an effective method for verifying the accuracy of the temperature and pressure sensor. The menu displays the live gas temperature, pressure and supercompressibility factor for comparison with a pressure and temperature reference standard. Eq. 1 can be used to calculate true error, whereas: Registered is the value of pressure, temperature or supercompressibility factor displayed by the AdEM®-PTZ under test and true is the value of temperature or pressure factor calculated with Eq. 4 and 5 respectively for the pressure and temperature from reference standards. The true value for the supercompressibility factor would be calculated using the values of the reference pressure and temperature standards. It is recommended that two to three pressure and temperature values across the operating range of the sensors are verified. In the event, that a sensor is found have a significant error (> 0.5%), refer to Section 6, **CALIBRATION**.

Testing Output Pulse using Pushbutton

The Output Pulse test menu provides an effective method for verifying the output pulses circuitry and their connection device. The AdEM®-PTZ have 3 channels of output pulse. When doing the test, the pulses will be generated from channel 1, 2, 3 step by step. Each channel will generate 3, 4, 5 pulses respectively. The pulse width and space are based on the respective setting of the AdEM®-PTZ.
This function is very useful when AdEM®-PTZ is connected with ERT or other AMR devices. It can test whether the entire system as well as the connections are working properly. This function is protected by hardware Program Switch. It can be factory disabled.

To test output pulse, the following procedure needs to be performed:

- Press and hold pushbutton for about 8 seconds until LCD shows “OUTPUT”
- Upon “OUTPUT” release pushbutton promptly
- Pulses are automatically generated

▪ ALARMS & MALFUNCTIONS

In the event when the temperature, pressure or battery malfunction occurs, the display will turn "**OFF**" while in Normal Display Mode. If the **ESC** key is pressed or the scroll button used, the display on the AdEM®-PTZ will indicate one of the alarm conditions listed below.

During the temperature or pressure malfunction, the display will show all segments and dots **ON** (shown below) when COR VOL parameters are accessed.

(The display with malfunction)

The following are the possible alarms:

Battery Malfunction and Low Battery Alarm

☞ Battery life is expected to exceed 10 years. In many cases it is long enough to last during expected product's lifetime. However, if needed, battery can be replaced after gaining access to electronics. Replacement can be done only by an authorized service technician on the field. The procedure follows next.

Battery malfunction (Low Battery) alarm is a critical alarm that occurs if the main battery supply voltage drops below 2.7 VDC, or calculated capacity will be sufficient for less than 6 months. The battery needs to be changed. Under this condition the display is "**OFF**" while in Normal Display Mode and remaining battery life 6 months is reset to 0 months. An alarm output pulse is generated on an hourly basis, along with the flow if exists. Also, an alarm is registered in Alarm Logger as a **Battery Malfunction**, which can be read through software. The other functions of the unit work like normal. **"LOW BAT"** is displayed on the screen if AdEM®-PTZ is awaked by pressing Scroll Button or ESC on the keyboard. The alarm detail information can be accessed by software. This alarm must be cleared manually using AdEM®-PTZ pushbutton or keyboard.

Temperature or Pressure Malfunction Alarm

This alarm condition occurs if the AdEM®-PTZ temperature or Pressure sensor has malfunctioned. When this condition occurs, the display will turn "**OFF**" while in Normal Display Mode and the alarm output begins pulsing every hour while flows occurs, the COR output pulse stops pulsing and the UNC pulse output continues to pulse normally. **"TE MALF"** or **"PR MALF"** is displayed if AdEM®-PTZ is awaked by pressing Scroll Button or ESC of keyboard. The AdEM®-PTZ continues to integrate the UNC volume, and starts to record this volume in the FULL DISPLAY under "**UNC SINM**". The COR volume since the malfunction occurred can be calculated by applying an estimated Total Correction to the "**UNC SINM**" value. The hourly UNC and COR volumes prior to the temperature or Pressure malfunction are stored in the FULL DISPLAY under "**LAST UNC**" and "**LAST COR**" respectively, along with the corresponding date and time under "**LAST DAT**" and "**LAST TIM**".

Estimation of Corrected Volumes

☞ "UNC SINM" – Uncorrected Volume since Malfunction – Unit (multiplier) is CF or 0.01M3 based on meter attached.

After malfunction, corrected volumes can be calculated as per following formulas:

For the estimated Corrected Volume (COR VOL):

LAST COR + (TOTAL COR FACTOR x **UNC SINCE MALF**) = Current COR VOL

How to Clear Malfunction(s) and Install New Battery

☞ Clearing **P** or **T** malfunction(s) automatically clears value stored in parameter **"UNC SINM"**. The value of this parameter is shown in the FULL DISPLAY mode and must be recorded before clearing a malfunction. The value can also be retrieved from Event Logger that is read by software.

The malfunctions must be cleared manually. When you push/hold Scroll Button for 2 to 4 seconds to wake up the unit, the LCD will show **"CLR – SAVE"**. After releasing the button, the firmware will go into clear malfunctions procedure.

1. If display shows "**INST BAT**" it means that there is a Low Battery alarm that must be cleared first after power restoration. If display shows "**TE MALF**" or "**PR MALF**" go to step 5.
2. Press the Scroll Button again and the display will show current day "**DD-MM-YY**".
3. Press the Scroll Button again and the display will show "**SAVE**" which means that the current date has been saved and transferred to Battery Install Date. This date is stored in the FULL DISPLAY under "**BAT INST**".
4. Press the Scroll Button again. If the display goes back to Normal Mode, go to step 8.
5. The display will show "**TE MALF**" or "**PR MALF**" for temperature malfunction condition.
6. Press the Scroll Button again, the display will show "**CL T MAL**" or "**CL P MAL**" to clear malfunction.
7. If display shows "**STIL T M**" or **"STIL P M"**, the malfunction still exists and must be repaired.
8. If display shows normal mode, the unit is ready for operation.

☞ Tools needed for installing a new battery: Cutter and Pliers.
Battery and two-wire splice connector can be obtained from Romet; P/N 46-092-40 and 2019.

Limit Violation Monitoring/Alarms

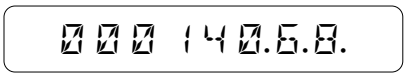
AdEM®-PTZ firmware has been designed to monitor the set-point limit (except Low Battery) violations of the following parameters:

- Low/High Pressure
- Low/High Temperature
- Low/High Flowrate
- Memory Error

Low and High set-points for Pressure, Temperature and Flowrate can be set using **RometLink** software. Low and High set-points for Flowrate are also set automatically when the meter size changed (0% and 105% of Qmax).

Every wakeup the AdEM®-PTZ will check the **EEPROM**, the Memory Error will be set when an **EERPOM** reading is corrupt, and this alarm is cleared automatically if the reading is correct.

Whenever limit is violated, warning condition is generated, and 3 dots will show on **NORMAL DISPLAY**.



Also, an alarm message will be displayed as the first item/s in **CUSTOM DISPLAY** whenever **CUSTOM DISPLAY** is accessed.

"**LO T ALM**" - for Low Temperature Alarm
"**HI T ALM**" - for High Temperature Alarm
"**LO P ALM**" - for Low Pressure Alarm
"**HI P ALM**" - for High Pressure Alarm
"**LOW FLW**" - for Low Flow Alarm
"**HIGH FLW**" - for High Flow Alarm
"**MEM ERR**" - for Memory Error Alarm

Warning message will be cleared automatically when the parameter comes into normal range.
However, these limit violation occurrences are recorded in the Alarm Logger (except Memory Error).
Alarms data can be downloaded by **RometLink** software for investigation and export to Excel.

10. PULSE OUTPUTS

The AdEM®-PTZ has three (four - optional) form "A" outputs that can be configured at the factory to provide any combination of the following three outputs:

- UNC VOL
- COR VOL
- Alarm (Malfunctions and Low Battery Alarm), can be configured as UNCORRECTED or CORRECTED)

The pulse weight for the volumetric outputs is configured in the Set up Mode under menu items: "**SET U OT**" and "**SET C OT**". The pulse outputs are solid state, open collector and are optically isolated to protect the AdEM®-PTZ from electrical surges. The current rating is 3 mA at 25 VDC with a pulse width of 5ms to 50ms selectable by 5ms and 65, 120, 125, 250, 500ms. Pulse width can be set using RometLink software. For firmware versions earlier than D02 (D05 in Canada) pulse width up to 50ms can be set using Keypad under menu item **SET OU P**. Depending on the AMR device being connected to the AdEM®-PTZ, the pulse spacing can be selected using RometLink software or by Keypad, in the Set Up mode, under menu item "**SET P SP"** (for firmware versions prior to D02). Consult with AMR device manufacturer for the suitable pulse width and spacing.

☞ To prolong the AdEM®-PTZ work life, select the lower value, especially for Pulse Width.

The alarm output is for Malfunctions and Low Battery Alarms only.

Refer to Appendix, **AdEM®-PTZ PULSE OUTPUT CONNECTIONS** for output connector configurations for the AdEM®-PTZ and **AdEM®-PTZ BARRIERS INSTALLATION FOR CONNECTORS** for Intrinsically safe connections arrangements to the AdEM®-PTZ.

Romet's standard 6 pin Cannon connector with 6 ft cable and ferrule ends is **P/N # 43-035-40** and is available for ordering (other connections available).

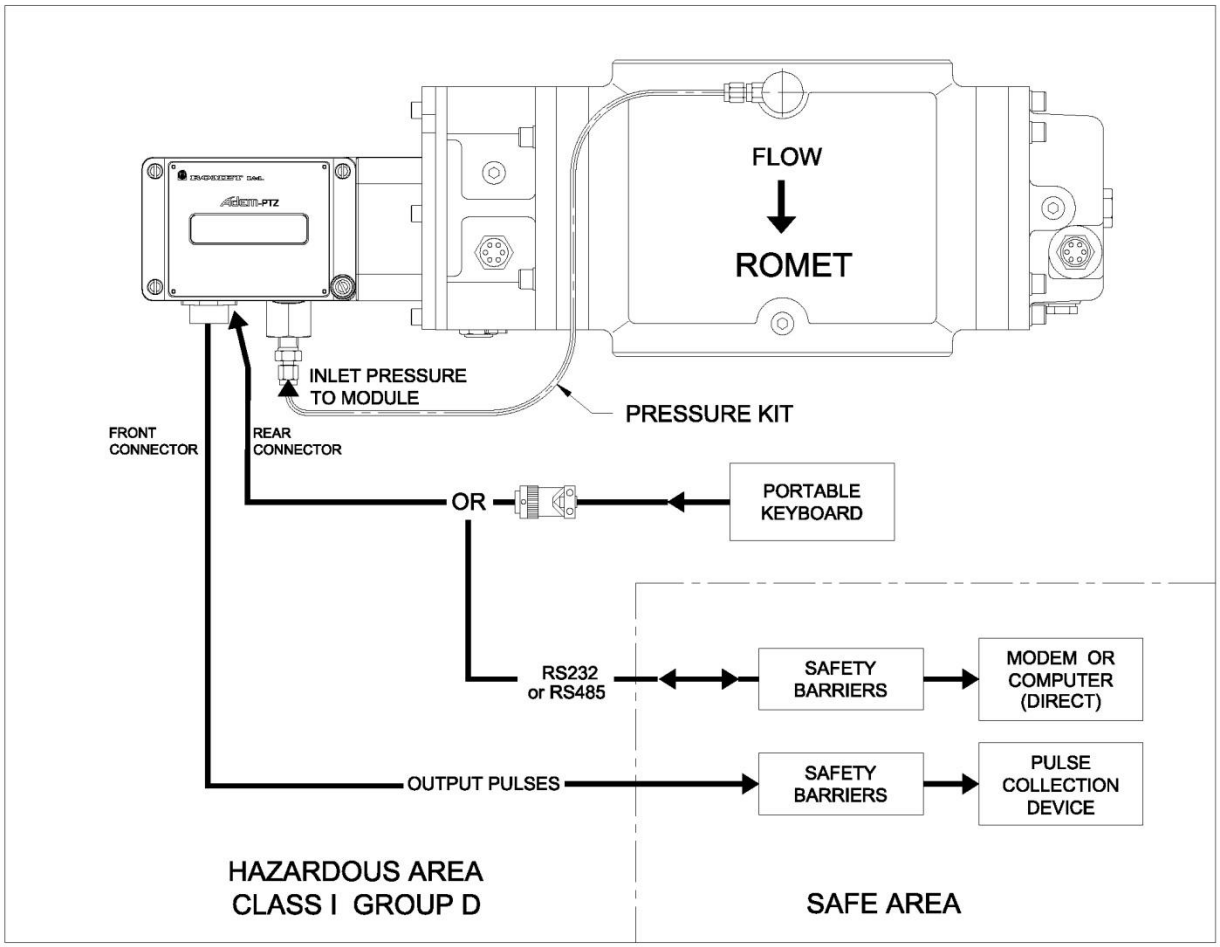
Refer to Appendix, **AdEM®-PTZ OUTPUT PULSES CIRCUIT** for more technical information and specifications.

☞ **WARNING!**
The incorrect connection of an external device(s) to the AdEM®-PTZ **could damage the** AdEM®-PTZ **or present a safety hazard.**

11. INSTALLATION AND MAINTENANCE

The AdEM®-PTZ has been ruggedly designed to deliver reliable service. Proper handling and installation of the AdEM®-PTZ will permit full measurement performance. The mechanical installation and maintenance of the AdEM®-PTZ meter body is addressed in the ROMET Installation and Maintenance Bulletin 601. Please also refer to Electronic Meter Mounting Positions in Appendix.

Typical Installation Arrangement



Note: Barriers **must have Safety Parameters as specified in Installation Drawings 49-090-0.**

Installation to Romet Meter Body (when replacing mechanical module)

Pre 1994 Romet TC Meter Body design (with a TEMPERATURE WELL)

The AdEM®-PTZ can be installed on any Romet TC meter body design that has been manufactured before 1994 (the first two digits of the Romet meter serial number signify the year of manufacture, e.g. SN#931234 was manufactured in 1993). However, one of the following must be done:

a. Magnetic housing would have to be replaced.
b. Magnetic housing would have to be upgraded.
c. An adapter plate kit to be used that would eliminate the need to replace or upgrade magnetic housing.

For pressure bodies mounted horizontally, it is recommended to rotate the AdEM®-PTZ module to a vertical position.

1994 and later Romet TC Meter Body design (with a TEMPERATURE WELL)

The AdEM®-PTZ can be installed on any Romet TC meter body design that has been manufactured after 1994 (the first two digits of the Romet meter serial number signify the year of manufacture, e.g. SN#951234 was manufactured in 1995).

For pressure bodies mounted horizontally, it is recommended to rotate the AdEM®-PTZ module to a vertical position.

Each loose AdEM®-PTZ module is shipped with installation instruction and the required mounting hardware:

- Housing Gasket P/N 34-140-1
- Cap Screws (2 required) 1126 (Imperial) or 1319 (Metric)
- Seal Screws (2 required) 1-341-9 (Imperial) or 34-141-1 (Metric)
- Lock Washers (4 required)
- Flat Washers (4 required)

☞ Do not substitute the above hardware with the existing mounting hardware from the old mechanical meter module.

1994 and later Romet STD Meter Body design (without a TEMPERATURE WELL)

When mounting AdEM®-PTZ module to a STD pressure body design (with no TEMPERATURE WELL) (e.g. the RM25000/G400-150/RM700 and RM38000/G650/RM1100/RM56000/G1000/RM1600), an external temperature probe will be supplied.

For pressure bodies mounted horizontally, it is recommended to rotate the AdEM®-PTZ module to a vertical position.

☞ The pressure body RM25000/G400-150/RM700, pressure body RM38000/G650/RM1100 and RM56000/ G1000/RM1600 are only available as a STD pressure body design (without a TEMPERATURE WELL).

Installation to Romet RMT Meters

The AdEM PTZ module can be installed on the Romet RMT Meters using standard Romet adaptor kit as for RM and G series.

Installation to LMMA/B3 Meter Body

The AdEM®-PTZ module can be installed on the LMMA/B3 Meter Body by installing an adapter plate kit or B3 back up counter unit (see Appendix) and selecting the required LMMA/B3 meter model.

Contact Romet Ltd. for further information.

For pressure bodies mounted horizontally, it is recommended to rotate the AdEM®-PTZ module to a vertical position.

Considerations for Installation at Site

Have prepared an electrical installation as per Drawings: 49-090-0 Sheet1 and 2: AdEM®-PTZ INSTALLATION WITH BARRIERS/ISOLATORS FOR HAZARDOUS LOCATIONS (See appendix).

Tools and equipment required for installation:

- General purpose tools (screwdrivers, pliers, 8" adjustable wrench, multimeter, masking tape etc.)
- One Laptop with installed **RometLink** software (optional).
- One RS232 or RS485 communication cable compatible with Barriers Installation for Hazardous Locations arrangement (optional).

Temperature sensing points should be available on meter (STD pressure body) or make necessary arrangement before proceeding with installation.

Check/set different parameter settings:

- In Safe Area use laptop connected directly to AdEM®-PTZ or
- If AdEM®-PTZ is already installed, use laptop connected through barriers arrangement

Check the value of gas temperature and pressure on AdEM®-PTZ and compare it with the reference values measured by temperature and pressure gauges etc.

Start metering and check for corrected total volume on AdEM®-PTZ display. It must be increasing as the meter has gas flow through.

Check the correction factor by comparing it with calculated theoretical factor.

Servicing

Servicing should be carried out by authorized personnel only. Contact supplier for more information about servicing, including sensors replacement procedures and conditions. Access to temperature and pressure sensors is restricted. After servicing sensors, sealing procedure must be performed (if required) by authorized person.

12. SPECIFICATIONS

Correction

- Temperature (live or fixed)
- Pressure (live or fixed)
- Supercompressibility (live or fixed)
- Low flow compensation if applicable (Romet meters only) expands meter rangeability to 200:1

Accuracy

- Total conversion error ± 0.5% max for reference conditions

Temperature

- Flowing gas temperature: -40°F to 122°F (-40°C to 50°C)
- Standard ambient operating temperature: -40°F to 158°F (-40°C to 70°C)
- Resolution: 0.2°F (0.1°C)
- One-point calibration
- Temperature error: ± 0.5°F (0.3°C) typical; less than ± 0.9°F (0.5°C) for reference conditions

Pressure

- Measurement in absolute or gauge
- Display in absolute or gauge (psia or psig)
- Transducer digitally compensated
- Three-point calibration
- Standard operating ranges

IMPERIAL	METRIC	
(10 to 25) psia	(90 to 150) kPa	(0.9 to 1.5) bar
(10 to 40) psia	(90 to 250) kPa	(0.9 to 2.5) bar
(10 to 50) psia	(100 to 500) kPa	(1.0 to 5.0) bar
(10 to 65) psia	(150 to 700) kPa	(1.5 to 7.0) bar
(10 to 190) psia	(200 to 1000) kPa	(2.0 to 10.0) bar
(15 to 100) psia	(200 to 1300) kPa	(2.0 to 13.0) bar
(20 to 100) psia		
(30 to 150) psia		
(50 to 190) psia		

IMPERIAL	METRIC	
(0 to 25) psig	(0 to 150) kPag	(0 to 1.5) barg
(0 to 30) psig	(0 to 250) kPag	(0 to 2.5) barg
(0 to 50) psig	(0 to 500) kPag	(0 to 5.0) barg
(0 to 100) psig	(0 to 700) kPag	(0 to 7.0) barg
(0 to 150) psig	(0 to 1000) kPag	(0 to 10.0) barg
(0 to 175) psig	(0 to 1200) kPag	(0 to 12.0) barg
(0 to 200) psig		

- GAUGE ranges not available in Canada until MC Approved
- ¼ " NPT female pipe thread connection
- Pressure measurement error: ± 0.3% typical; less than ±0.5% for reference conditions

Input pulses

- High frequency solid state sensor

Output pulses

- Form "A" opto-isolated solid-state out of 4 output options — 3 (4-optional)
- Corrected volume — 2 outputs
- Uncorrected volume — 1 output
- Alarm — 1 output - can be configured as Uncorrected or Corrected
- Operating voltage: 25 VDC max.
- Sinking Current: 3 mA typical.
- Standard pulse width: changeable from 5 to 50ms by 5ms step with addition of 65, 120, 125, 250, 500ms, all with selectable pulse spacing: OFF ,50ms, 100ms, 150ms, 200ms, 250ms, 350ms, 500ms, 750ms
- Output pulses can be switched off by select pulse spacing OFF

Security

- Five digits password on menus that can affect metrology
- Sealable internal En/Dis switch (Jumper) for selected parameters
- Sealable screws on the enclosure
- Sealable by Event Logger Type A (Firmware Revision D05 and up)

Alarms

- Low battery
- Battery malfunctions
- Temperature sensor malfunction
- Temperature under/over range
- Pressure sensor malfunction
- Pressure under/over range
- Uncorrected Flow rate under/over range
- Memory Error

Data Storage

- Last hourly corrected and uncorrected volume indexes
- Previous day, Present Day corrected and uncorrected volumes
- Backup Uncorrected volume (#displacements)
- Uncorrected Proving volume
- Calibration data
- Set up parameters
- Malfunctions and alarms together with date and time
- Uncorrected Peak flow value along with date and time
- Max/min Temperature along with date and time
- **Audit Trial**
  - ✓ Event logger 166 events
  - ✓ Alarm logger 102 alarms
  - ✓ 1024 days daily records of 8 items with date and time
  - ✓ 256 days hourly interval records of 4 items with date and time
  - ✓ Data exportable to Excel, PDF format

User interface

- Display: LCD 14 segment, 8 digit semi alphanumeric
- Scroll button to read Custom Display parameters (max 15 items) and any alarms
- Optional portable keyboard
- External computer

RS232 Communication

- ROMET Link software to take full advantage of RS232 or RS485 port (Windows based)
- Direct connection or link through modem

Upgrading firmware

- Flash memory programmed through JTAG connector
- Flash memory optionally programmed through RS232 or RS485 communication port

Electrical

- Powered by lithium battery (up to 20 years life) with external power supply option
- Circuitry: 3.3V surface mount technology
- Intrinsically safe (CSA LR59221)

Mounting

- Romet, LMMA or B3 TC pressure body
- Option to mount to Romet standard pressure body using an external temperature probe
- Horizontal mounting option available on specified models
- Option to mount on B3 meters with dedicated Romet B3 Backup Counter unit

Physical characteristics

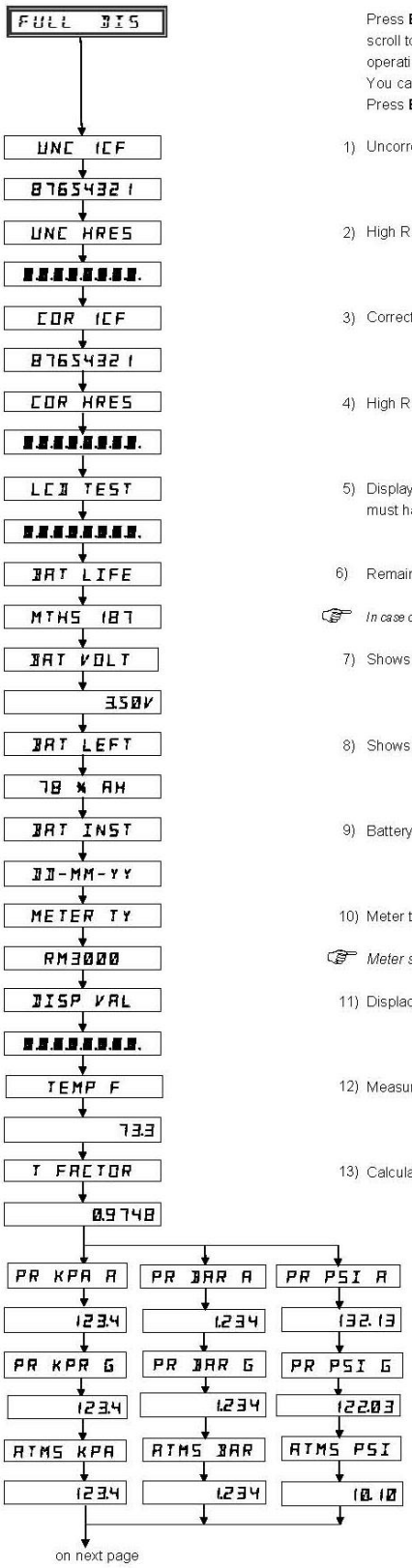
- Dimensions: 5.49” x 6.66” x 5.24” (139 mm x 169 mm x 133 mm)
- AdEM®-PTZ module weight: 1.6 lb. (0.73 kg)

APPENDIX

FLOWCHART - FULL DISPLAY

☞ *Unit will return to Normal Display automatically when key-timeout is reached and no user action had been taken.*

☞ *Values shown are examples only.*



Press **ESC** or **DN** key to awake the unit, press **ENT** to enter Main Menu, scroll to Full Display. Press **ENT** key to select this mode of operation. Use **UP/DOWN** keys to scroll through parameters. You can return to menu (Full Display) any time by pressing **ESC.** Press **ESC** repeatedly to quit and return to Normal display mode.

1) Uncorrected volume index. Units depends on meter attached.

2) High Resolution Uncorrected Volume Index.

3) Corrected volume index. Units depends on meter attached.

4) High Resolution Corrected Volume Index.

5) Display Test. This is test for LCD display. A good working LCD must have all working dots, colons and segments as shown here.

6) Remaining months of battery life (depends on battery type).

☞ *In case of low battery alarm, resets to zero automatically.*

7) Shows battery voltage.

8) Shows battery capcity left percentage.

9) Battery installation/reinstallation date (D.M.Y).

10) Meter type, e.g.: RM3000.

☞ *Meter size change requires remote keyboard.*

11) Displacement value.

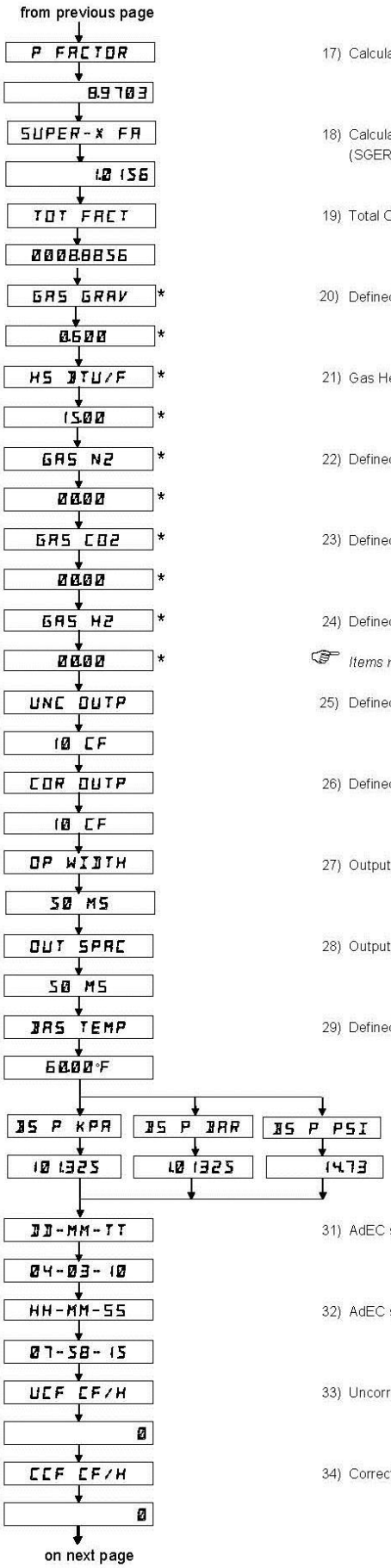
12) Measured value of gas temperature.

13) Calculated value of temperature factor.

14) Measured value of applied gas pressure (Absolute).

15) Calculated value of gauge pressure. (Not a metrological parameter). This value will read 88.8.8.8.8.8.8 if the gauge pressure is less then equal to zero (the absolute pressure is less then equal to fixed atmospheric pressure).

16) Fixed atmospheric pressure. Used to calcualte value of gauge pressure.



17) Calculated value of pressure factor.

18) Calculated value of supercompressibility (NX-19) or compressibility (SGERG88) factor.

19) Total Correction Factor according to above conditions.

20) Defined value of specific gravity of gas.

21) Gas Heat value for AGA8 Gross1 and SGERG88

22) Defined value of mole % of Nitrogen (NX-19).

23) Defined value of mole % of Carbon Dioxide contents in gas.

24) Defined value of mole % of Hydrogen for SGERG88.

☞ *Items marked by * are not present for AGA8 Detailed.*

25) Defined uncorrected output pulse weight (unit).

26) Defined corrected output pulse weight (unit).

27) Output pulse weight.

28) Output pulse spacing.

29) Defined value of base temperature

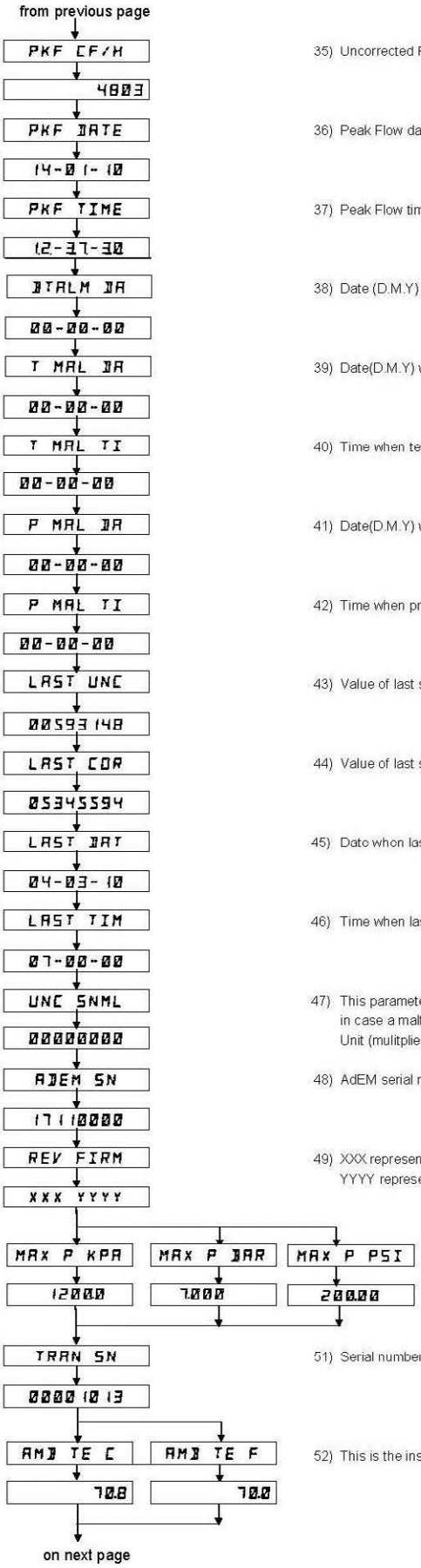
30) Defined value of base pressure.

31) AdEC system date in format of (DD-MM-YY).

32) AdEC system time in format of (HH:MM:SS).

33) Uncorrected flow rate.

34) Corrected flow rate.



35) Uncorrected Peak Flow recorded.

36) Peak Flow date.

37) Peak Flow time.

38) Date (D.M.Y) when low battery alarm triggered otherwise 00-00-00

39) Date(D.M.Y) when temperature malfunction occurred otherwise 00-00-00.

40) Time when temperature malfunction occurred otherwise 00:00:00.

41) Date(D.M.Y) when pressure malfunction occurred otherwise 00-00-00.

42) Time when pressure malfunction occurred otherwise 00:00:00.

43) Value of last stored uncorrected volume index in memory.

44) Value of last stored corrected volume index in memory.

45) Date when last volume indexes were saved to memory.

46) Time when last volume indexes were saved to memory.

47) This parameter shows recorded uncorrected volume since malfunction in case a malfunctions occurs. In normal condition, it is zero. Unit (mulitplier) is identical to UNC VOL unit.

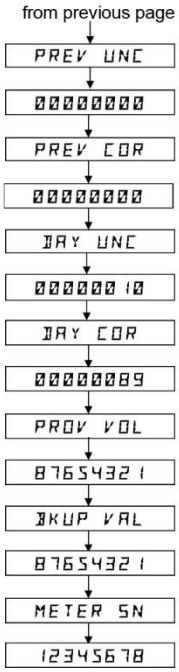
48) AdEM serial number.

49) XXX represent the latest version of firmware. YYYY represent the compressibility.

50) Maximum operating pressure of the transducer.

51) Serial number of installed pressure transducer.

52) This is the inside temperature of the AdEC enclosure.



53) Previous Day Uncorrected Volume.

54) Previous Day Coorrected Volume.

55) Daily Uncorrected Volume.

56) Daily Corrected Volume.

57) Proving Value. Units depends on meter attached.

58) Backup index counter.

59) Meter serial number.

AdEM-PTZ MODBUS 16 BIT STANDARD

REGISTERS MAPPING

	Name	Type(H, L)	Definition	Register
0	Pressure 1	16 bits	Gas pressure - High 16 bits *	40000
1	Pressure 2	16 bits	Gas pressure - Low 16 bits *	40001
2	Temperature	16 bits INT	Gas Temperature **	40002
3	Case Temperature	16 bits INT	Case Temperature **	40003
4	Pressure Factor 1	16 bits	Pressure Factor - High 16bits ***	40004
5	Pressure Factor 2	16 bits	Pressure Factor - Low16 bits, ***	40005
6	Temperature Factor	16 bits	Temperature Factor ***	40006
7	Super_x Factor	16 bits	Super compressibility Factor ***	40007
8	Convertion Factor 1	16 bits	Total Correction Factor - High 16 bits ***	40008
9	Convertion Factor 2	16 bits	Total Correction Factor - Low 16 bits ***	40009
10	Ql 1	16 bits	Uncorrected Flow Rate - High 16 bits ****	40010
11	Ql 2	16 bits	Uncorrected Flow Rate - Low 16 bits ****	40011
12	Qn 1	16 bits	Corrected Flow Rate - High 16 bits, ****	40012
13	Qn 2	16 bits	Corrected Flow Rate - Low 16 bits, ****	40013
14	Status	16 bits	Alarms and malfunctions *****	40014
15	VH 1	16 bits	Uncorrected Volume - High 16 bits ******	40015
16	VH 2	16 bits	Uncorrected Volume - Middle 16 bits ******	40016
17	VH 3	16 bits	Uncorrected Volume - Low 16 bits ******	40017
18	VnH 1	16 bits	Corrected Volume - High 16 bits ******	40018
19	VnH 2	16 bits	Corrected Volume - Middle 16 bits ******	40019
20	VnH 3	16 bits	Corrected Volume - Low 16 bits ******	40020
21	Unc Sinc MalF 1	16 bits	Uncorrected Volume Since P/T Malfunction - High 16 bits	40021
22	Unc Sinc MalF 2	16 bits	Uncorrected Volume Since P/T Malfunction - Low 16 bits	40022
23	Vn Curr Day 1	16 bits	Daily Corrected Volume - High 16 bits ******	40023
24	Vn Curr Day 2	16 bits	Daily Corrected Volume - Low 16 bits ******	40024
25	V Curr Day	16 bits	Daily Uncorrected Volume ******	40025
26	Vn Prev Day 1	16 bits	Previous Day Corrected Volume - High16 bits ******	40026
27	Vn Prev Day 2	16 bits	Previous Day Corrected Volume - Low16 bits ******	40027
28	V Prev Day	16 bits	Previous Uncorrected Volume ******	40028
29	BatV	16 bits	Battery Voltage *******	40029
30	BatLife	16 bits	Battery Shelf Remaining Months	40030
31	Serial Number 1	16 bits UINT	Unit Serial Number - High 16 bits	40031
32	Serial Number 2	16 bits UINT	Unit Serial Number - Low 16 bits	40032
33	Base Pressure 1	16 bits UINT	Base Pressure for pressure factor calculation - High 16 bits ^	40033
34	Base Pressure 2	16 bits UINT	Base Pressure for pressure factor calculation - Low 16 bits ^	40034
35	Base Temperature	16 bits UINT	Base Temperature for temperature factor calculation **	40035
36	Reserved	16 bits UINT		40036
37	Reserved	16 bits UINT		40037
38	Reserved	16 bits UINT		40038
39	Modbus Unit ID	16 bits UINT	^^	65535

NOTE: The firmware supports single and Multi-register (Maximum 21) reading.
The registers addresses are fixed, can not be changed.

☞ **Contact manufacturer if needs further information regarding protocol details**

32BIT ROMET MODBUS

PARAMETERS TABLE

	Name	Data Type (High to Low)	Definition	R/W	Register
0	Pressure	Float	Gas pressure	R	2000
1	Temperature	Float	Gas Temperature	R	2001
2	Case Temperature	Float		R	2002
3	Pressure Factor	Float	*no write function in ECM2-AT*	R/W*	2003
4	Temperature Factor	Float		R	2004
5	Z	Float	Live Compress Factor, *AGA8*	R	2005
6	Zn	Float	Compress Factor in Standard T and P,*AGA8*	R	2006
7	Super_x Factor	Float	Zn/Z , *no write function in ECM2-AT*	R/W*	2007
8	CF	Float	Total Corrected Factor	R	2008
9	Ql	Float	Uncorrected Flow Rate	R	2009
10	Qn	Float	Corrected Flow Rate	R	2010
11	Status	32 UINT	Alarms and malfunctions	R	2011
12	VH	32 UINT	High Byte Uncorrected Volume(8 7 6 5)	R	2012
13	V	32 UINT	Uncorrected Volume(4 3 2 1)	R/W**	2013
14	VnH	32 UINT	High Byte Corrected Volume(8 7 6 5)	R	2014
15	Vn	32 UINT	Corrected Volume (4 3 2 1)	R/W**	2015
16	Vs	16ChStr	Totalizer of Corrected Volume	R	2016
17	Vns	16ChStr	Totalizer of Uncorrected Volume	R	2017
18	Vd	Double	Totalizer of Corrected Volume	R	2018
19	Vnd	Double	Totalizer of Uncorrected Volume	R	2019
20	Unc Sinc MalF	Double		R	2020
21	Vn Curr Day	Float	Daily Corrected Volume	R	2021
22	V Curr Day	Float	Daily Uncorrected Volume	R	2022
23	Vn Prev Day	Float	Previous Day Corrected Volume	R	2023
24	V Prev Day	Float	Previous Uncorrected Volume	R	2024
25	V Last Hour	Float	Last hour of Corrected Volume, *ECM2-AT only*	R	2025
26	Vn Last Hour	Float	Last hour of Uncorrected Volume, *ECM2-AT only*	R	2026
27	Date Last Hour	32 UINT	The Date of Last Hour Save, *ECM2AT only*	R	2027
28	Time Last Hour	32 UINT	The time of Last hour save, *ECM2AT only*	R	2028
29	BatV	Float	Battery Voltage	R	2029
30	BatLife	Float	Remaining Shelf Battery Months	R	2030
31	Battery Type	8ChStr		R	2031
32	Meter Size	8ChStr	*for AdEC, this item is Input Pulse Unit*	R	2032
33	Serial Number	32 UINT	*no write function in ECM2-AT*	R/W	2033
34	Firmware Version	8ChStr		R	2034
35	Unit Date	32 UINT		R/W	2035
36	Unit Time	32 UINT		R/W	2036
37	Battery Install Date	32 UINT		R	2037
38	Unc Peak Flow	32 Float		R/W**	2038
39	Unc Peak Flow Date	32 UINT		R	2039
40	Unc Peak Flow Time	32 UNIT		R	2040

41	Max Pressure	32 Float		R/W**	2041
42	Max Pressure Date	32 UINT		R/	2042
43	Max Pressure Time	32 UINT		R	2043
44	Min Pressure	32 Float		R/W**	2044
45	Min Pressure Date	32 UINT		R	2045
46	Min Pressure Time	32 UINT		R	2046
47	Max Temperature	32 Float		R/W**	2047
48	Max Temperature Date	32 UINT		R	2048
49	Max Temperature Time	32 UINT		R	2049
50	Min Temperature	32 Float		R/W**	2050
51	Min Temperature Date	32 UINT		R	2051
52	Min Temperature Time	32 UINT		R	2052
53	Max Case Temperature	32 Float		R/W**	2053
54	Min Case Temperature	32 Float		R/W**	2054
55	Gas Density	32 Float	*AGA8 only*	R/W	2055
56	Gas Calorific Value	32 Float	*AGA8 only*	R/W	2056
57	Total Energy	Double	*AGA8 only*	R	2057
58	Current Day Energy	32 Float	*AGA8 only*	R	2058
59	Previous Day Energy	32 Float	*AGA8 only*	R	2059
60	Gas N2 %	32 Float	*NX19 only, not in ECM2-AT*	R/W	2060
61	Gas CO2 %	32 Float	*SGERG88 and NX19, not in ECM2-AT*	R/W	2061
62	Gas H2 %	32 Float	*SGERG88 only, not in ECM2-AT*	R/W	2062
63	Specific Gravity	32 Float	*SGERG88 and NX19, not in ECM2-AT*	R/W	2063
64	AGA8 Molar List	106ChStr	21 items, every items use "," separator. For components order see separate Molar List as follow, all of them are percentage value. *No write function in ECM2-AT.*	R/W	2064
65	Interval Logger Type	8bit UINT	0 is 4 items, 1 is Full (21) items. *Not in ECM2-AT*	R	2065
66	Base pressure	32 Float	*Not in ECM2-AT*	R/W	2066
67	Base Temperature	32 Float	*Not in ECM2-AT*	R/W	2067
68	Unc Backup counter	32 UINT	*AdEM-PTZ and ECM2-AT*	R/W**	2068
69	Daily volume Start time	32 UINT		R/W	2069
70	Output Pulse Space	8bit UINT	Code: 0 – 50ms, 1 – 750ms, 2 – 150ms, 3– 200ms, 4 – 250ms, 5 –350ms, 6– 500ms, 7 – OFF. *Not in ECM2-AT*	R/W	2070
71	Output Pulse Width	8bit UINT	5,10,15,20,25,30,35,40,45,50 ms. *Only AdEM-PTZ*	R/W	2071
72	Normal Display Volume Sel	8bit UINT	0 - Cor Vol, 1- Unc Vol	R/W	2072
73	Super_X factor type	8bit UINT	0 - Live, 1- fixed. *Not in ECM2-AT*	R/W	2073
74	Pressure factor type	8bit UINT	0 - Live, 1- fixed. *Not in ECM2-AT*	R/W	2074
75	Temperature factor type	8bit UINT	0 - Live, 1- fixed. *Not in ECM2-AT*	R/W	2075
76	Super_X calculation type	8bit UINT	0-NX19, 1-AGA8, 2-SGERG88. *Not in ECM2-AT*	R/W	2076
77	Daily Logger Data Set	85ChStr	Max 1025 records, *in AdEC only.* The register address is 3000(default), and uses the No. of Point bytes to recognize which record will be read. 0 is the newest, 9 is the 10th record from the newest, and so on. Each record is a data string that includes 8 items: Cor Vol Daily, Unc Vol Daily, Ave Pressure Daily, Ave Temperature Daily, Ave Total Factor Daily, Ave Unc Flow Rate Daily, Ave Cor Flow Rate Daily, Ave Battery Voltage Daily, plus Time and Date of Log. Each item is separate by "," separator.	R	3000

78	Interval Logger Data - 4 Items	49ChStr	Max 9829 records, *in AdEC only.* The register address is 3001(default) and uses the No. of Point bytes to recognize which record will be read. 0 is the newest, 9 is the 10th record from the newest, and so on. Each record is a data string that includes 4 items: Cor Vol in Interval, Unc Vol in Interval, Ave Pressure in Interval, Ave Temperature in Interval, plus Time and Date of Log. Each item is separated by ",".	R	3001
79	Interval Logger Data - 21 Items Only available when Interval Logger Type is 1(21 Items)	210ChStr	Max 2519 records, *in AdEC only.* The register address is 3002(default), and uses the No. of Point bytes to recognize which record will be read. 0 is the newest, 9 is the 10th record from the newest, and so on. Each record is a data string that includes 21 items: Cor Vol in Interval ,Unc Vol in Interval, Ave Pressure in Interval, Ave Temperature in Interval, Cor Total Vol(12Char),Unc Total Vol (12Char), Ave Total Factor in Interval, Ave Unc Flow in Interval, Max Unc Flow in Interval, Max Unc Flow Time in Interval, Max Pressure in Interval, Max Pressure Time in Interval, Min Pressure in Interval, Min Pressure Time in Interval, Max Temperature in Interval, Max Temperature Time in Interval, Min Temperature in Interval, Min Temperature Time in Interval, Min Unc Flow in Interval, Min Unc Flow Time in Interval, Ave Battery in Interval, plus Time and Date of Log. Each items separate by "," separator.	R	3002
80	Event Logger Data Set	String	Max 200 -AdEC only. The register address is 3003(default) and uses the No. of Point bytes to recognize which record will be read. 0 is the newest, 9 is the 10th record from the newest, and so on. Each record is a data string that includes 4 items: Event No, Event Maker (User ID), Event Time and Date, Event Item Name. Each item has "," as separator.	R	3003
81	Alarm Logger Data Set	String	Max 101 records, *in AdEC only.* The register address is 3004(default) and uses the No. of Point bytes to recognize which record will be read. 0 is the newest, 9 is the 10th record from the newest, and so on. Each record is a data string that includes 3 items: Alarm Time and Date, Alarm Type, Alarm Name. Each item has "," as separator.	R	3004
82	AGA8 Molar List (Alternative)	Float	In *AdEC* only. This is starting address of registers group. The default is 4000, which means the address of Ch4 (Methane) is 4000, and N2 (Nitrogen) is 4001,... and Ar (Argon) is 4020. Only the first address can be set, the others follow it. All components can be read in-group or single, but only single register writing is supported. Values are fractures of 1 (no percentage). *Not in ECM2-AT*	R/W	4000
			R/W* , write is enable under certain condition		
			R/W**, write is only means clear(reset) the value		

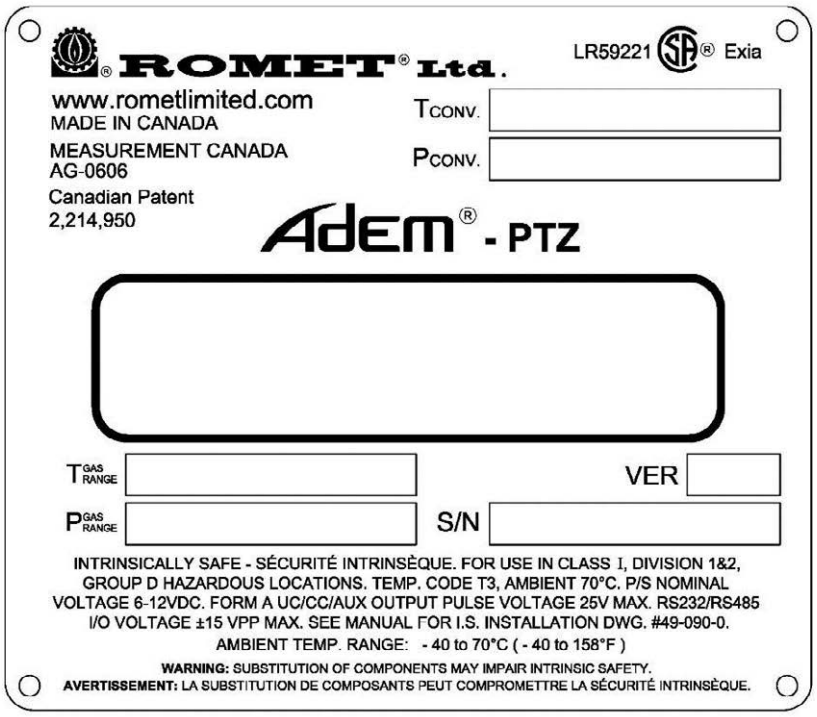
The components in the Molar List:

Methane CH4, Nitrogen N2, Carbon Dioxide CO2, Ethane C2H6, Propane C3H8, Water H2O, Hydrogen Sulfide H2S, Hydrogen H2, Carbon Monoxide CO, Oxygen O2, iso-Butane C4H10,
n-Butane C4H10, iso-Pentane C5H12, n-Pentane C5H12, n-Hexane C6H14, n-Heptane C7H16,
n-Octane C8H18, n-Nonane C9H20, Helium He, Argon Ar.

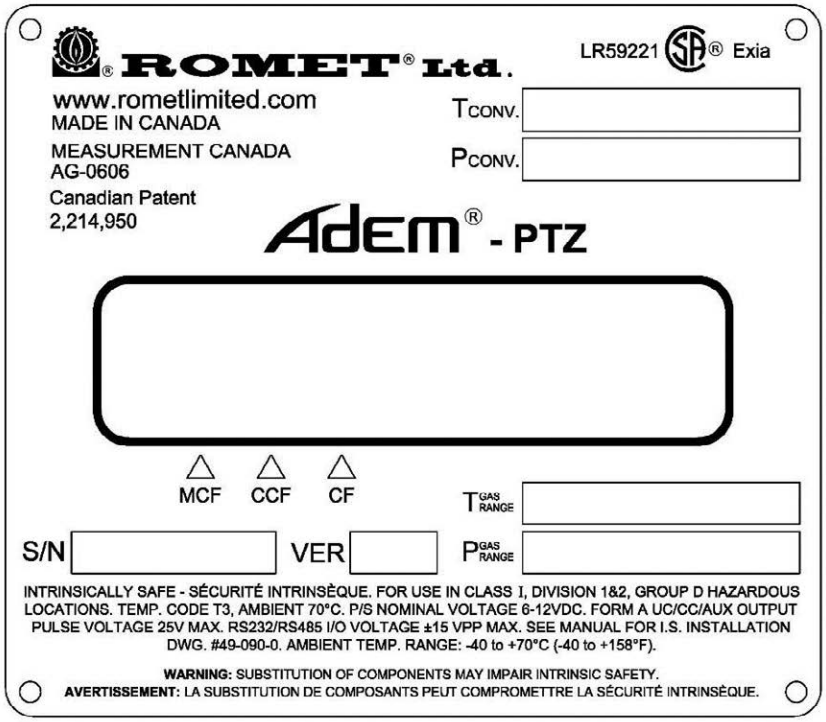
☞ **Note that some parameters and data are not available for AdEM PTZ**

☞ **Contact manufacturer if needs further information regarding protocol details**

AdEM- PTZ Nameplates



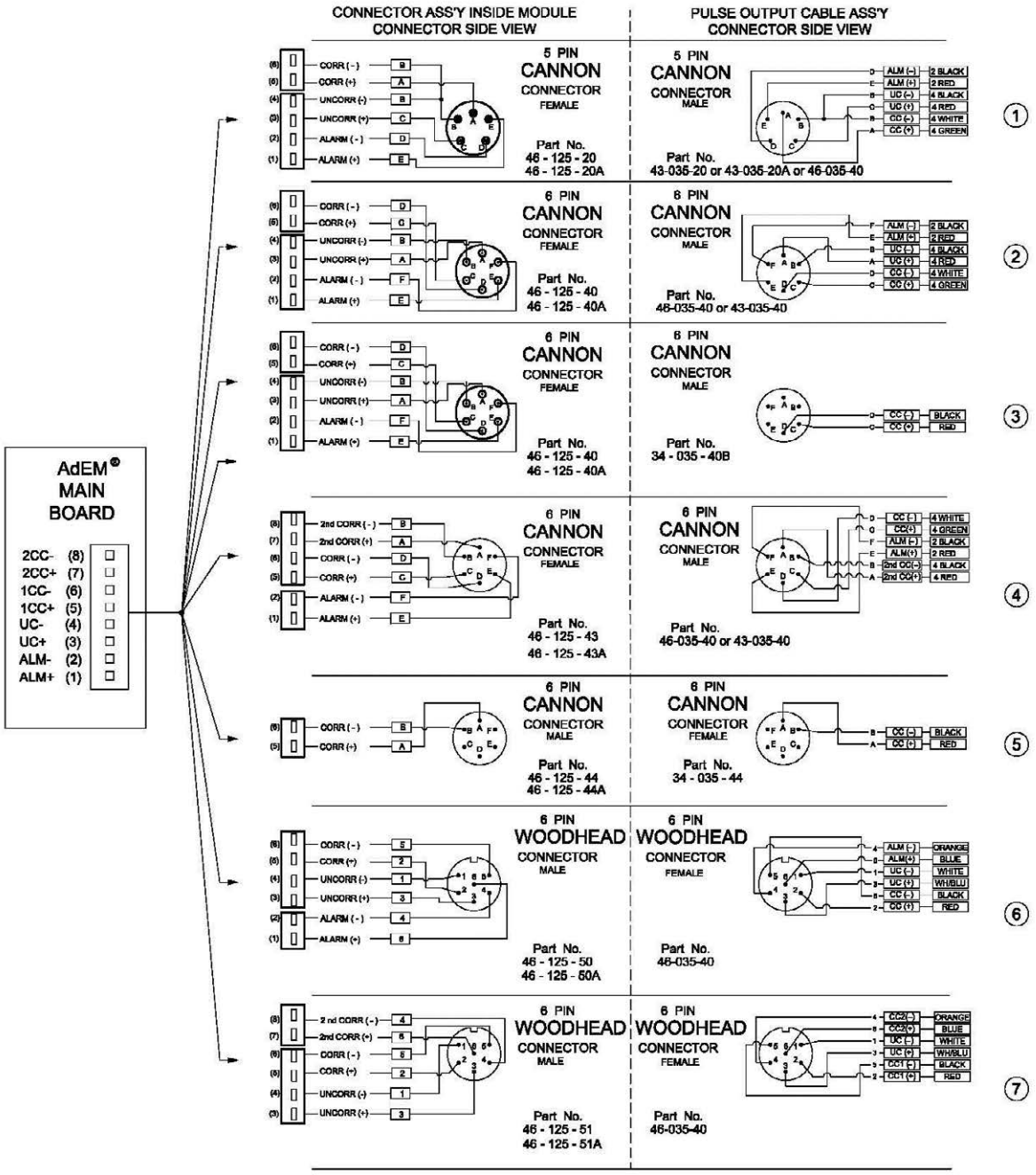
49-100-6C Nameplate for Metric and Imperial configuration



49-100-6GC Nameplate for Imperial configuration only (in Canada)

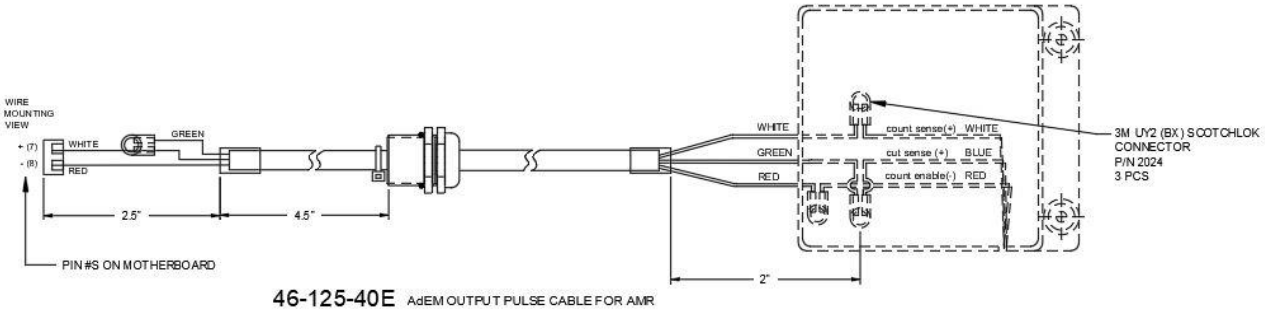
ROMET LTD.
DWG. NO. 46-035-00
REVISED: FEB 2, 2017

AdEM®
PULSE OUTPUT CONNECTIONS

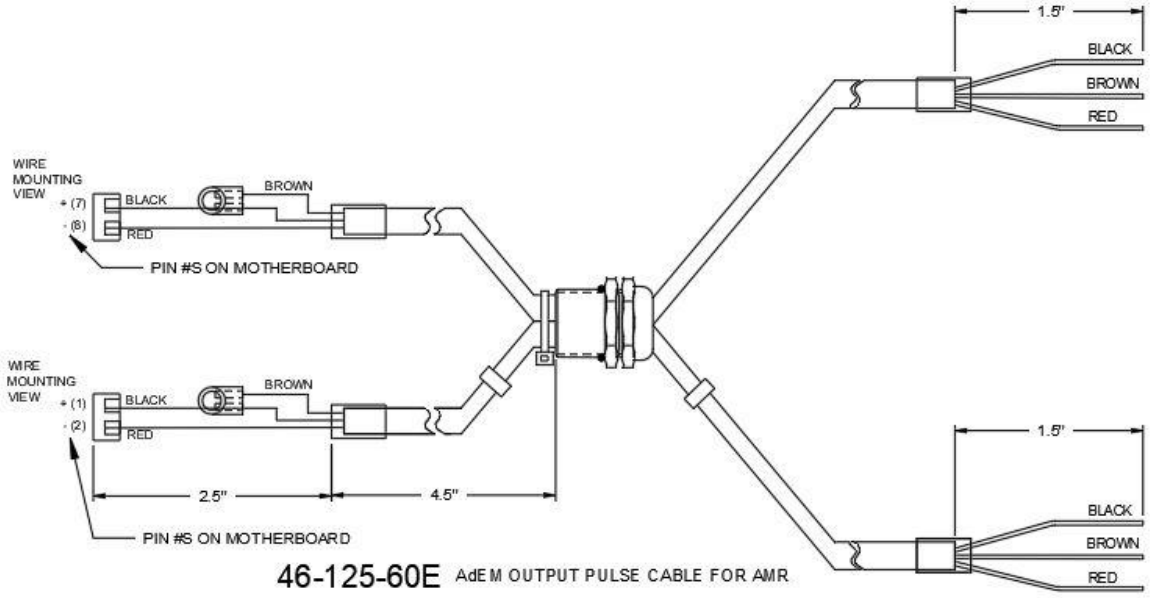


NOTE: FOR OTHER WIRE COLOR CODING CONTACT ROMET LTD.

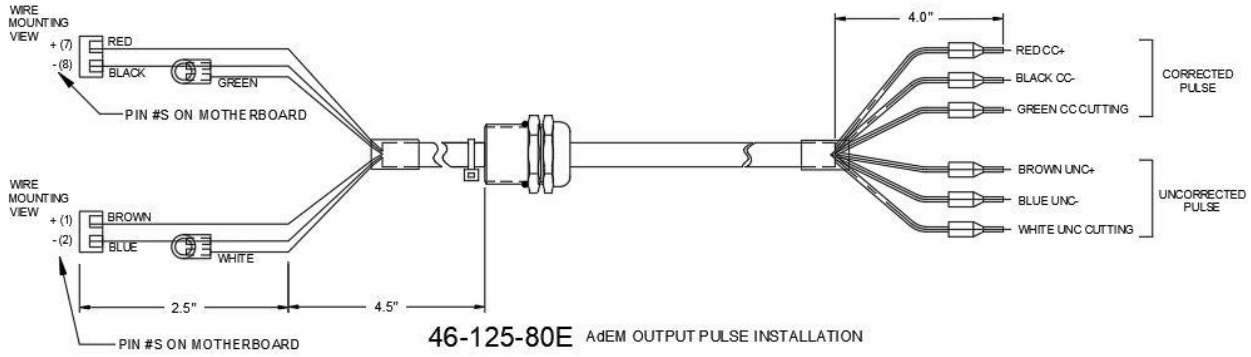
PULSE OUTPUT CONNECTIONS - PIGTAIL OPTIONS



46-125-40E AdEM OUTPUT PULSE CABLE FOR AMR

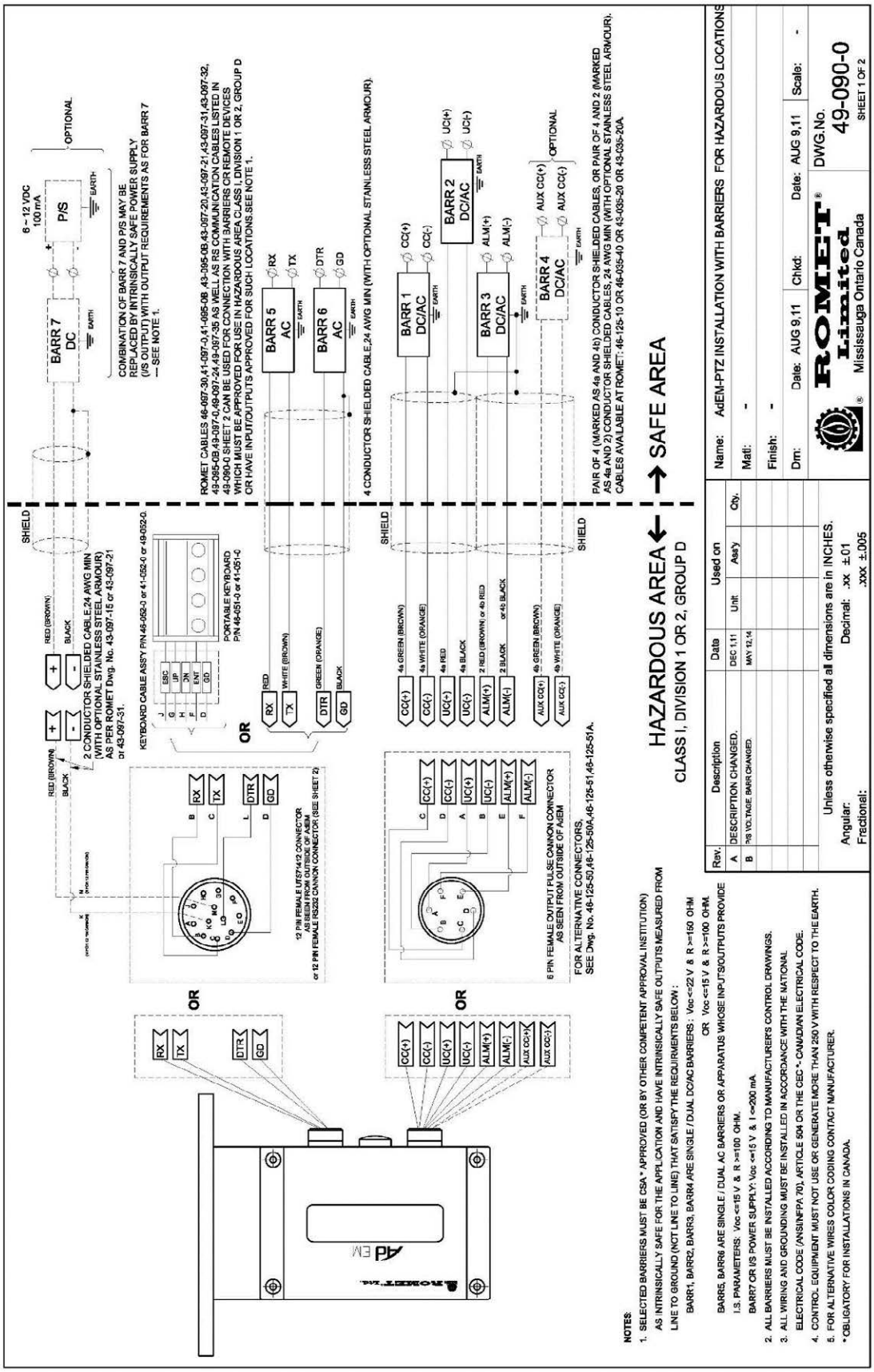


46-125-60E AdEM OUTPUT PULSE CABLE FOR AMR

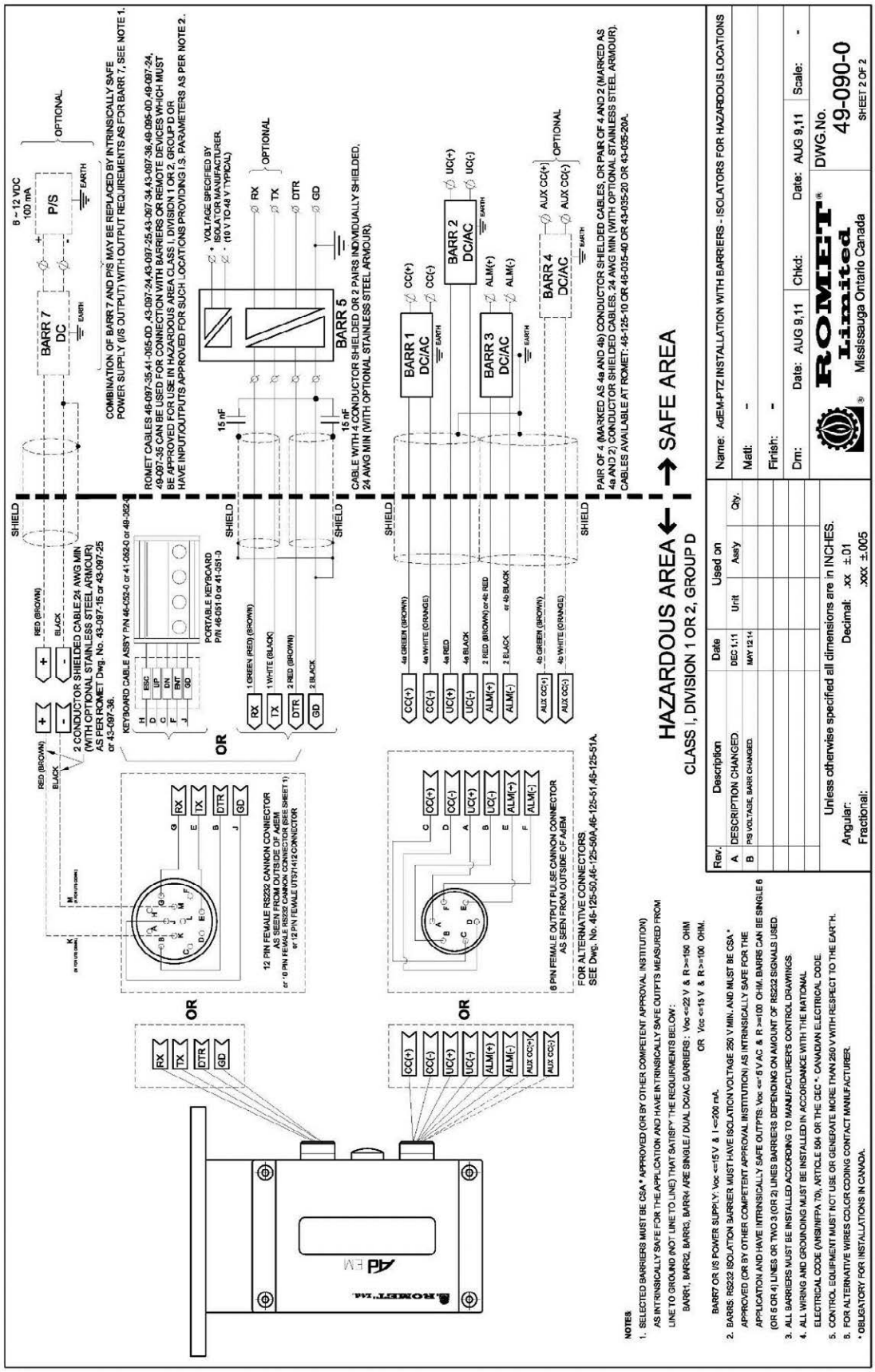


46-125-80E AdEM OUTPUT PULSE INSTALLATION

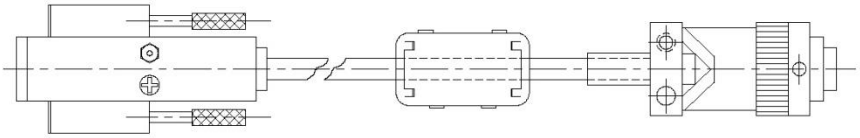
AdEM®-PTZ INSTALLATION WITH BARRIERS FOR HAZARDOUS LOCATION

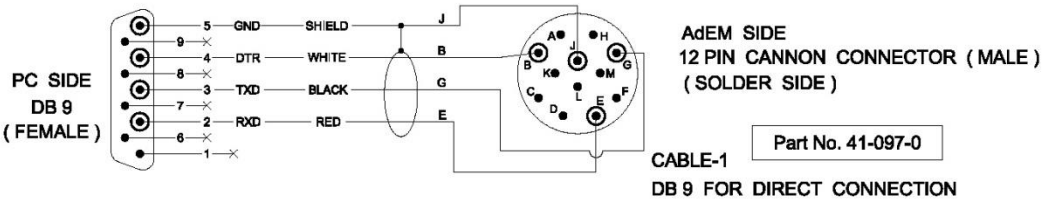


AdEM®-PTZ INSTALLATION WITH BARRIERS - ISOLATORS FOR HAZARDOUS LOCATION

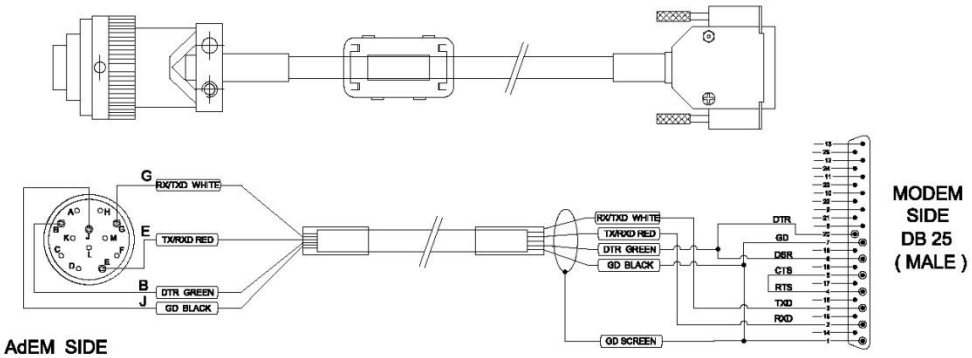


AdEM® - PTZ TO PC (DIRECT) COMMUNICATION CABLES



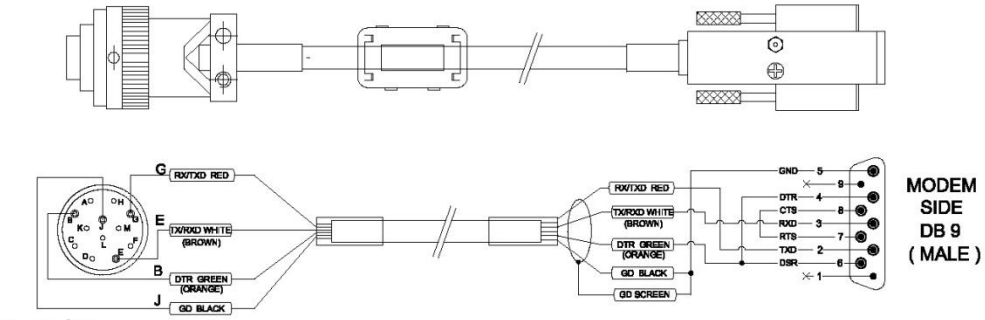


AdEM® - PTZ TO MODEM
STANDARD COMMUNICATION CABLES



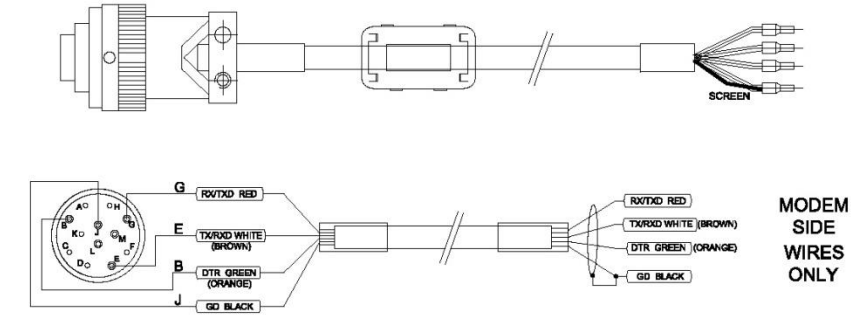
AdEM SIDE
12 PIN CANNON CONNECTOR (MALE)
(SOLDER SIDE)

CABLE-1 **Part No. 41-095-0A**
DB 25 FOR MODEM CONNECTION



AdEM SIDE
12 PIN CANNON CONNECTOR (MALE)
(SOLDER SIDE)

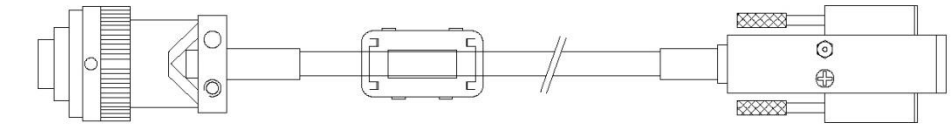
CABLE-2 **Part No. 43-095-0B**
DB 9 FOR MODEM CONNECTION.

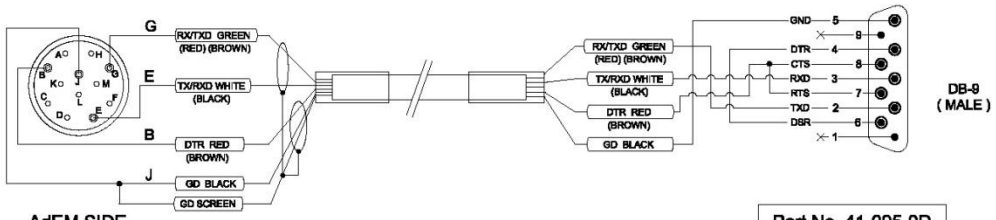


AdEM SIDE
12 PIN CANNON / AMPHENOL CONNECTOR (MALE)
(SOLDER SIDE)

CABLE-3 **Part No. 43-097-20**
WIRES ONLY FOR MODEM CONNECTION
AS PER INSTALLATION DWG. NO. 49-090-0 SHEET 1

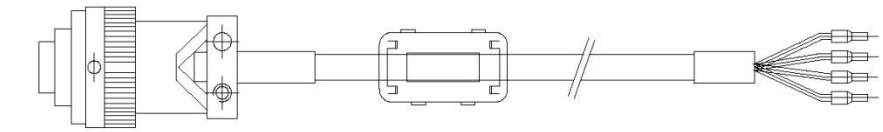
AdEM® - PTZ TO MODEM
STANDARD COMMUNICATION CABLES

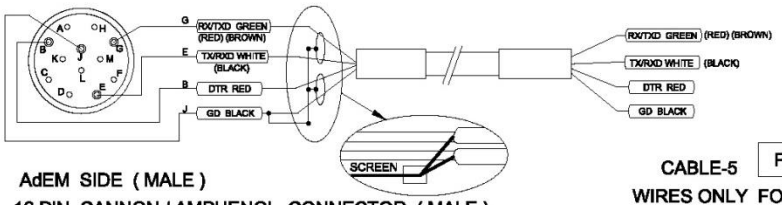




AdEM SIDE
12 PIN CANNON CONNECTOR (MALE)
(SOLDER SIDE)

CABLE-4 Part No. 41-095-0D
DB 9 FOR MODEM CONNECTION
AS PER INSTALLATION DWG. NO. 49-090-0 SHEET 2



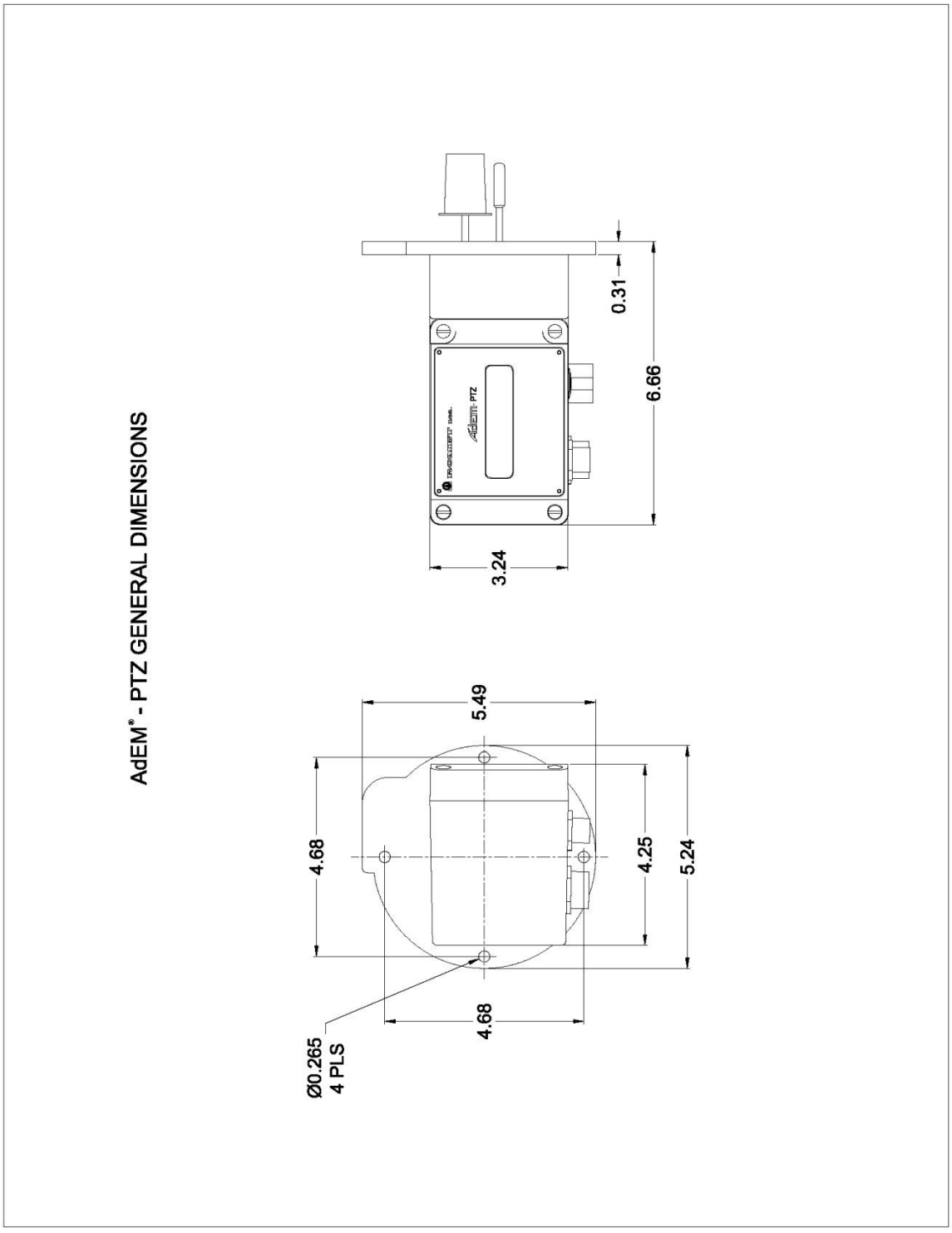


AdEM SIDE (MALE)
12 PIN CANNON / AMPHENOL CONNECTOR (MALE)
(SOLDER SIDE)

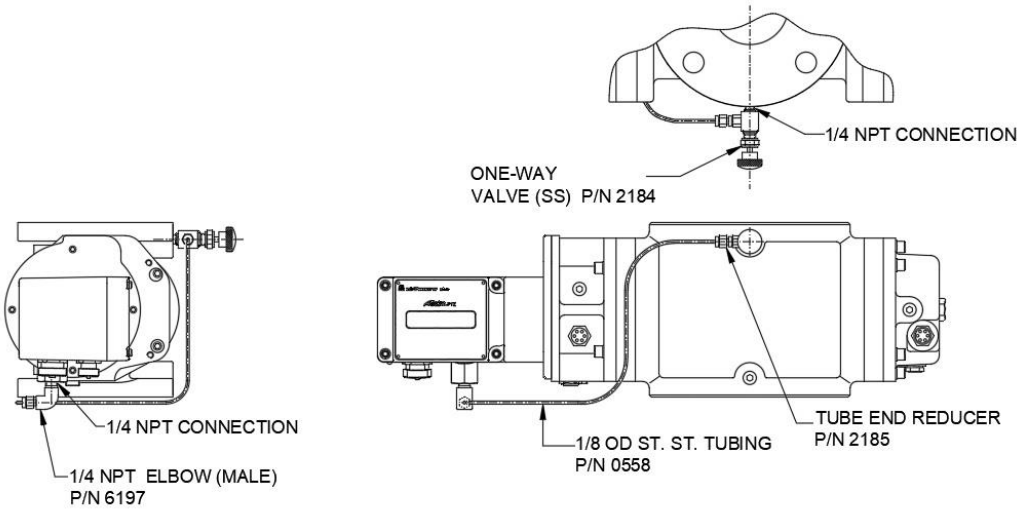
CABLE-5 Part No. 43-097-24
WIRES ONLY FOR MODEM CONNECTION
AS PER INSTALLATION DWG. NO. 49-090-0 SHEET 2

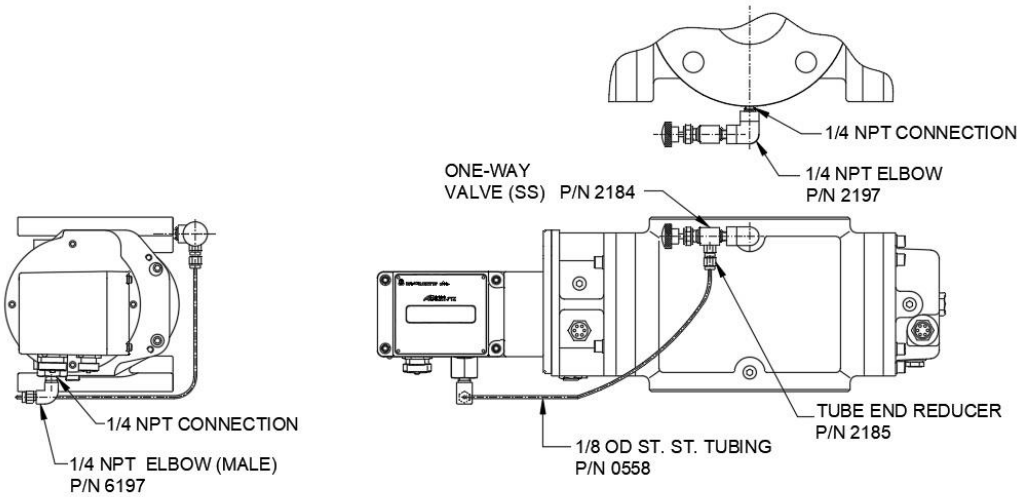
NOTE:
1. FOR MOST CASES:
   (a) CTS MUST BE CONNECTED TO RTS ON MODEM;
   (b) DTR MUST BE CONNECTED TO DSR ON MODEM.
2. STANDARD CABLE LENGTH IS 2m,
   OTHER LENGTH IS AVAILABLE ON REQUEST.

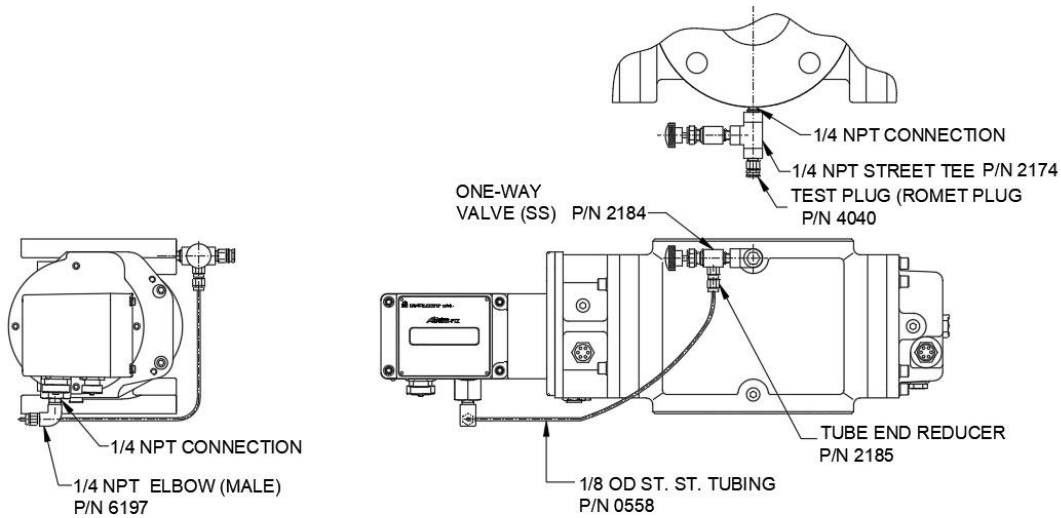
PAGE 2 OF 2


AdEM® - PTZ GENERAL DIMENSIONS
0.31
6.66
3.24
5.49
4.68
4.25
5.24
4.68
Ø0.265
4 PLS

TYPICAL PRESSURE KIT INSTALLATION



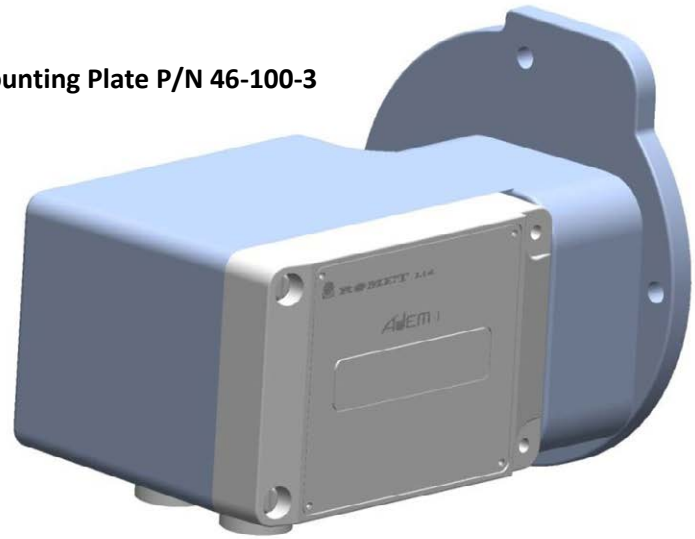




AdEM Modules Installation on Romet Meters

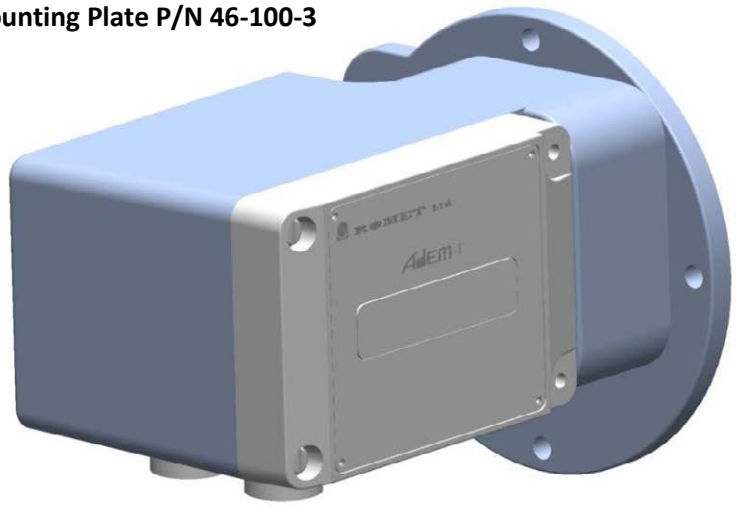
For Vertically Mounted Romet Meters:

Use Mounting Plate P/N 46-100-3



For Horizontally Mounted Romet Meters:

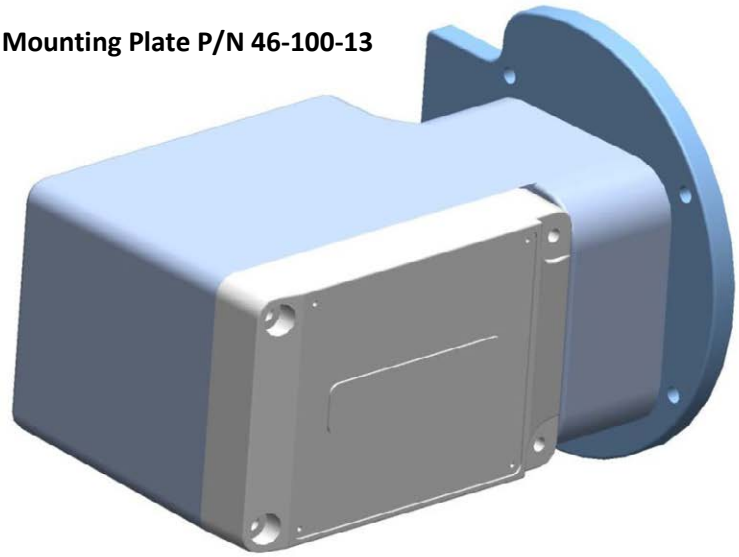
Use Mounting Plate P/N 46-100-3



AdEM Modules Installation on LMMA Meters

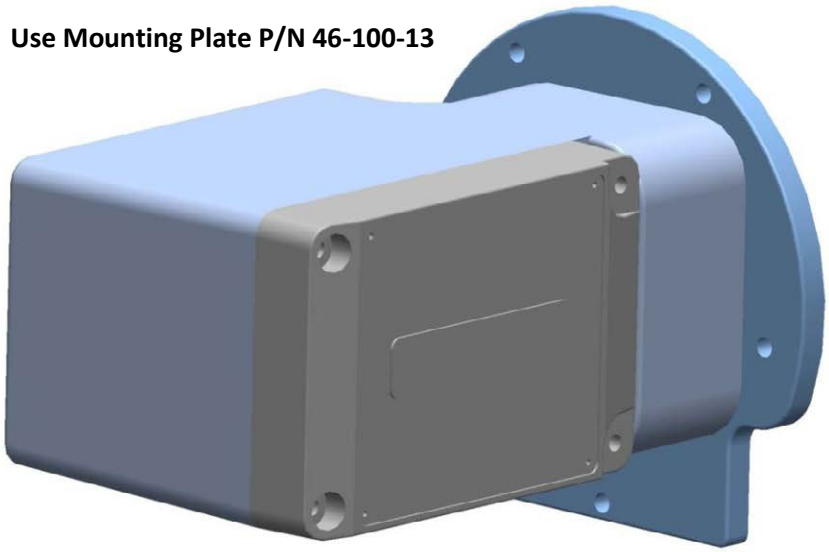
For Vertically Mounted LMMA 2M to 5M Meters:

Use Mounting Plate P/N 46-100-13



For Horizontally Mounted LMMA 2M to 5M Meters:

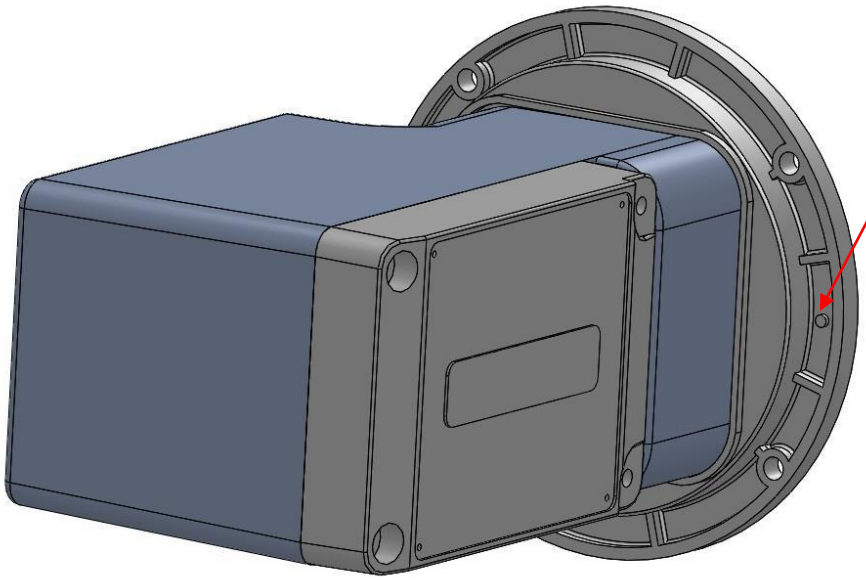
Use Mounting Plate P/N 46-100-13



AdEM Modules Installation on B3 Meters

For Vertically Mounted B3 Meters:

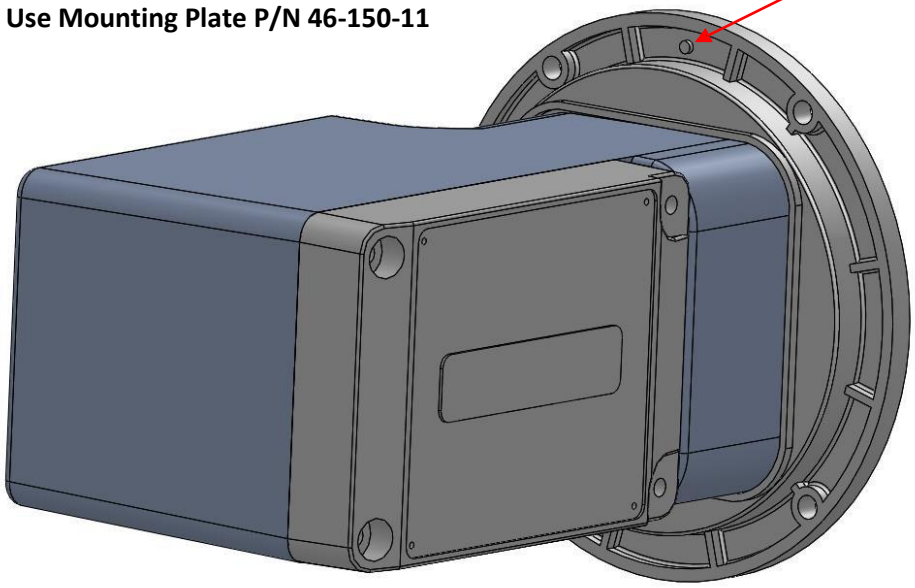
Use Mounting Plate P/N 46-150-11



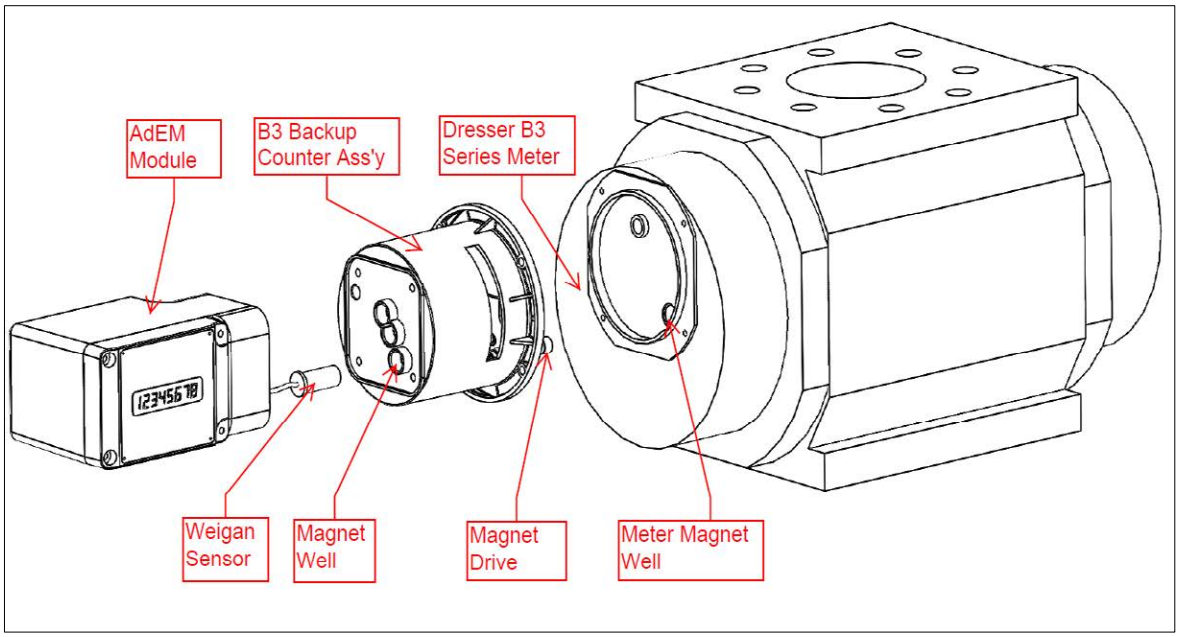
For Horizontally Mounted B3Meters:

Orientation mark

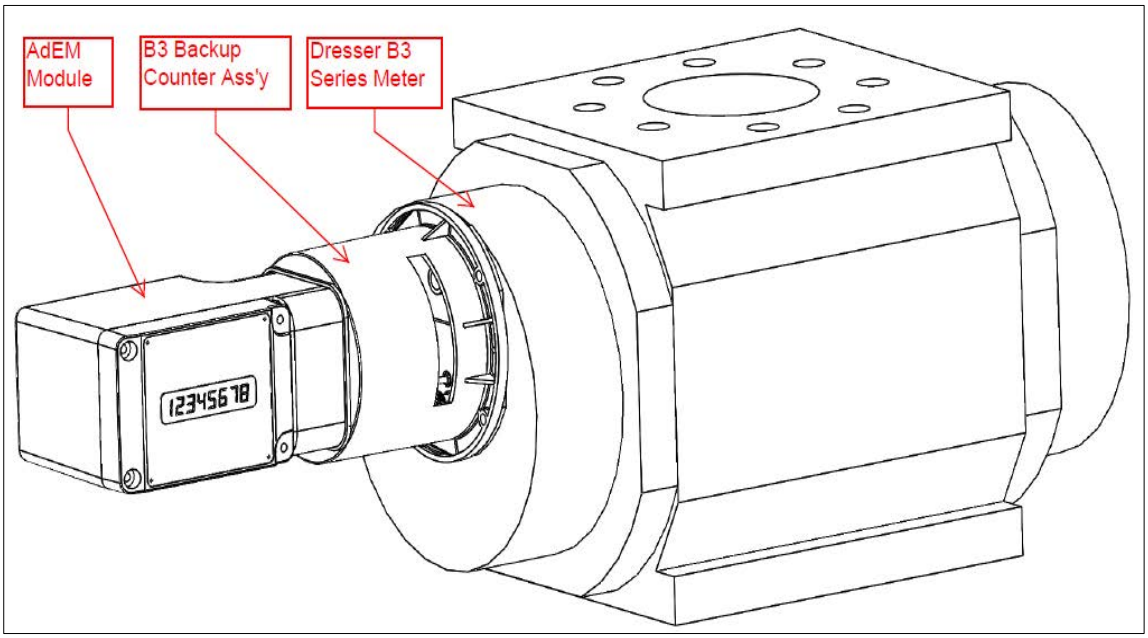
Use Mounting Plate P/N 46-150-11



AdEM Modules Installation on B3 Meters with Romet Backup Counter Unit



Explored View of Installation



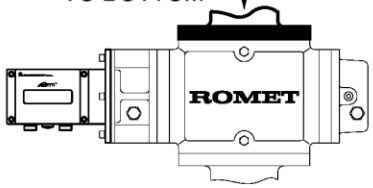
B3 Meter with Installed AdEM PTZ with Backup Counter Unit

ELECTRONIC METER MOUNTING POSITIONS

STANDARD FLOW

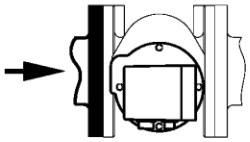
VERTICAL MOUNTING

FLOW FROM TOP TO BOTTOM



HORIZONTAL MOUNTING

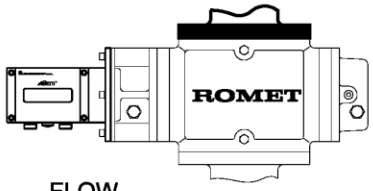
FLOW FROM LEFT TO RIGHT



GROUND SURFACE

REVERSED FLOW

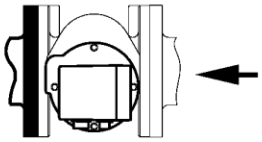
VERTICAL MOUNTING



FLOW FROM BOTTOM TO TOP

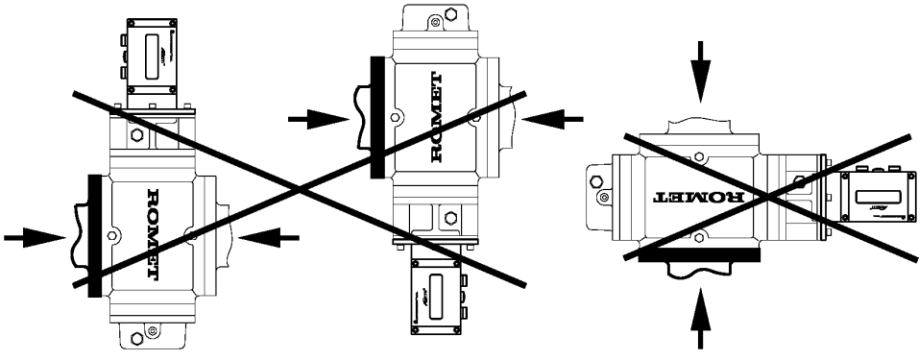
HORIZONTAL MOUNTING

FLOW FROM RIGHT TO LEFT



GROUND SURFACE

INCORRECT MOUNTING



GROUND SURFACE

NOTE: REFER TO BULLETIN 601
FOR OIL & MOUNTING INSTRUCTIONS.

AdEM®-PTZ Audit Trail – Variable Intervals - Explanation

Below is an explanation of variable intervals from 4 to 21 items, based on 1 hour interval setting.

1. Selectable Items in Audit Trail*

*refer to 2. – Audit Trail Configuration Options

Item

Date
Time
Alarms:
- Pressure malfunction
- Temperature malfunction
- Battery malfunction
- Pressure low
- Pressure high
- Temperature low
- Temperature high
- Flow low
- Flow high

Note: *These items are non-selectable (i.e. always activated) in any configuration.*

1. COR Volume Total
2. COR Volume per Interval
3. UNC Volume Total
4. UNC Volume per Interval
5. Average Flow
6. Max Flow
7. Max Flow Time
8. Min Flow
9. Min Flow Time
10. Average Temperature
11. Max Temperature
12. Max Temperature Time
13. Min Temperature
14. Min Temperature Time
15. Average Pressure
16. Max Pressure
17. Max Pressure Time
18. Min Pressure
19. Min Pressure Time
20. Average Total Factor
21. Average Battery Voltage

Audit Trail Configuration Options

4 items = 4 fixed
5 items = 4 fixed + 1 selectable
6 items = 4 fixed + 2 selectable
7 items = 4 fixed + 3 selectable
8 items = 4 fixed + 4 selectable
9 items = 4 fixed + 5 selectable
10 items = 4 fixed + 6 selectable

Third party compatible

11 to 21 items – not available

21 items = all 21 items fixed, non-selectable

2. 4 Items (only) configuration which gives 256 days hourly intervals

Date
Time
Alarms

Note: *Always activated*

COR Volume per Interval
UNC Volume per Interval
Average Temperature
Average Pressure

3. 21 Items configuration which gives 64 days hourly intervals

Date
Time
Alarms

Note: *Always activated*

1. COR Volume Total
2. COR Volume per Interval
3. UNC Volume Total
4. UNC Volume per Interval
5. Average Flow
6. Max Flow
7. Max Flow Time
8. Min Flow
9. Min Flow Time
10. Average Temperature
11. Max Temperature
12. Max Temperature Time
13. Min Temperature
14. Min Temperature Time
15. Average Pressure
16. Max Pressure
17. Max Pressure Time
18. Min Pressure
19. Min Pressure Time
20. Average Total Factor
21. Average Battery Voltage

4. Minimum days of hourly intervals for various configurations

(Depends on chosen parameters)

Interval Items	Calculated Days
4 items give minimum	256 days hourly intervals
5 items give minimum	128 days hourly intervals
6 items give minimum	128 days hourly intervals
7 items give minimum	128 days hourly intervals
8 items give minimum	128 days hourly intervals
9 items give minimum	128 days hourly intervals
10 items give minimum	128 days hourly intervals
21 items give minimum	64 days hourly intervals

Warning: ***When changing interval items, old Audit Trail will be deleted and cleared so downloading of Audit Trial must be done before changing audit trial configuration in order to save previous data.***

These items are configured in setup by software only under "Interval Type":

"Interval Field 5"
"Interval Field 6"
"Interval Field 7"
"Interval Field 8"
"Interval Field 9"
"Interval Field 10"

AdEM®-PTZ DAILY LOG EXPLANATION

Listed below are the items in Daily Log.

They are:

1. Daily Corrected Volume
2. Daily Uncorrected Volume
3. Daily Average Corrected Flowrate
4. Daily Average Uncorrected Flowrate
5. Daily Average Pressure
6. Daily Average Temperature
7. Daily Average Total Factor
8. Daily Average Battery Voltage

Note: These items are saved daily at specific time configured in setup by software only, named “Gas Day Start Time”.

Note: Capacity is 1024 days of storage.

AdEM®-PTZ ALLOWABLE RANGE OF APPLICATION FOR SOME PARAMETERS

Allowable Base Pressure and Avg. Atmospheric		Typical Base Pressure	Typical Avg. Atmospheric
Imperial =	10.00 Psia to 16.00 Psia	14.73 Psia	14.73 Psia
Metric =	0.70000 bar to 1.10000 bar	1.01325 bar	1.01325 bar
Metric =	70.000 kPa to 110.000 kPa	101.325 kPa	101.325 kPa

Allowable Base Temperature		Typical Base Temperature
Imperial =	32°F to 122°F	Imperial = 60°F
Metric =	0°C to 50°C	Metric = 0°C, 15°C, 20°C

Allowable NX19 Composition of Gas

Gravity = 0.550 to 0.900
CO2 = 0.00% to 15.00%
N2 = 0.00% to 15.00%

Allowable SGERG88 Composition of Gas

Gravity = 0.550 to 0.900
Hs = 15.00 to 48.00 MJ/CM
(400.00 to 1300.00 BTU/CF)
CO2 = 0.00% to 30.00%
H2 = 0.00% to 10.00%

Allowable AGA8-D2 Range of Application	
Methane	50.00-100.00
Nitrogen	0.00-50.00
Carbon Dioxide	0.00-30.00
Ethane	0.00-20.00
Propane	0.00-10.00
Water	0.00-0.05
Hydrogen Sulphide	0.00-0.05
Hydrogen	0.00-10.00
Carbon Monoxide	0.00-3.00
Oxygen	0.00-0.05
iso-Butane	0.00-3.00
n-Butane	0.00-3.00
iso-Pentane	0.00-1.00
n-Pentane	0.00-1.00
n-Hexane	0.00-0.20
n-Heptane	0.00-0.20
n-Octane	0.00-0.05
n-Nonane	0.00-0.05
n-Decane	0.00-0.05
Helium	0.00-0.50
Argon	0.00-0.50

AGA-G1

Gravity = 0.550 to 0.900
CO2 = 0.00% to 30.00%
Hs = 15.00 to 48.00MJ/CM
(400.00 to 1300.00 BTU/CF)

AGA-G2

Gravity = 0.550 to 0.900
CO2 = 0.00% to 30.00%
N2 = 0.00% to 50.00%

Allowable index and output pulses for AdEM®-PTZ

Imperial (cf)

Index: 0.01, 1, 10, 100, 1000, 10000
Output: 1, 10, 100, 1000, 10000

Metric (m^3)

Index: 0.0001, 0.01, 0.10, 1.00, 10.00, 100.00
Output: 0.01, 0.10, 1.00, 10.00, 100.00

Note: Output cannot be less than Input.

AdEM®-PTZ CUSTOM DISPLAY CONFIGURATION OPTIONS

Listed below are the available parameters that can be programmed for custom display:

UNC VOL	**COR PULSE VOLUME**	**LAST SAVED TIME**
HIGH RESOLUTION UNC VOL	**OUTPUT PULSE SPACING**	**UNC SINCE MALF**
COR VOL	**BASE TEMP**	**SERIAL #**
HIGH RESOLUTION COR VOL	**BASE PRES**	**FIRMWARE VERSION**
DISPLAY TEST	**DATE**	**PRESSURE TRANSDUCER RANGE**
BATTERY LIFE	**TIME**	**PRES TRANS SERIAL #**
BATTERY VOLTAGE	**UNC FLOW RATE**	**CASE TEMP**
BATTERY INSTALL DATE	**COR FLOW RATE**	**PREVIOUS DAY UNC VOLUME**
METER SIZE	**UNC PEAK FLOW**	**PREVIOUS DAY COR VOLUME**
DISPLACEMENT VALUE	**UNC PEAK FLOW DATE**	**DAILY UNC VOLUME**
GAS TEMP	**UNC PEAK FLOW TIME**	**DAILY COR VOLUME**
TEMPERATURE FACTOR	**BAT MALFUN DATE**	**UNC IN PROVING**
GAS ABSOLUTE PRES	**TEMP MALFUN DATE**	**BACKUP INDEX COUNTER**
GAS GAUGE PRES	**TEMP MALFUN TIME**	**OUTPUT PULSE WIDTH**
ATMOSPH. PRES	**PRES MALFUN DATE**	**SPEC GRAV** (NX19, AGA8-G1, AGA8-G2, SGERG88)
PRESSURE FACTOR	**PRES MALFUN TIME**	**MOL% N_2** (NX19, AGA8-G2)
SUPER-X FACTOR	**LAST SAVED UNC VOL**	**MOL% CO_2** (NX19, AGA8-G1, AGA8-G2, SGERG88)
TOTAL COR FACTOR	**LAST SAVED COR VOL**	**MOL% H_2** (SGERG88 only)
UNC PULSE VOLUME	**LAST SAVED DATE**	**Hs** (SGERG88 and AGA8-G1)

Note: Maximum of 15 selections from the list.

These parameters are configured in setup (by software only) under names:

"Customer Display 1"
"Customer Display 2"
"Customer Display 3"
"Customer Display 4"
"Customer Display 5"
"Customer Display 6"
"Customer Display 7"
"Customer Display 8"
"Customer Display 9"
"Customer Display 10"
"Customer Display 11"
"Customer Display 12"
"Customer Display 13"
"Customer Display 14"
"Customer Display 15"

METER SELECTION AND APPLICATION

ROMET offers a variety of measuring instruments to meet the diverse requirements posed by the natural gas industry. The following guidelines are offered to assist in the selection of a suitable mechanical or electronic measuring device for a specific gas application.

MECHANICAL METER TYPES

STANDARD COUNTER (STD CTR)

STD CTR meters are intended for use where compensation to standard base condition is not required. STD CTR meters do not have any gas compensating features. When stable gas temperatures and pressures are significantly higher or lower than standard base condition, predetermined temperature and/or pressure factors can be independently applied to correct the STD CTR index readings to a base condition. Alternatively, it can be paired with a standalone electronic volume corrector.

STD-RM2000
SIDE INDEX

STD-RM16000
END INDEX

STANDARD INSTRUMENT DRIVE (STD ID) AND DIGITAL COUNTER INSTRUMENT DRIVE (DCID)

When temperature, pressure or supercompressibility factors are a matter for concern, STD ID and DCID meters permit the mounting of a variety of gas recording or correcting instruments to handle the require factor(s) needed for further processing. The STD ID and DCID are similar in design and function, however, the DCID meter has a built in non-compensated mechanical index counter.

DCID RM1500

TEMPERATURE COMPENSATED (TC) COUNTER

TC meters are intended for use where temperature compensation to standard base condition is required. At higher fixed pressures, a predetermined pressure factor can be independently applied to correct the TC compensated index reading to the required base condition. TC meters have a non-compensated and a temperature compensated mechanical index counter.

TC-RM5000

TEMPERATURE COMPENSATED INSTRUMENT DRIVE (TCID)

TCID meters are similar in nature to the TC meters. TCID meters are intended for use where temperature compensation to standard base condition is required and the supply pressure requires monitoring by an electronic pressure recorder. The TCID meter may also be used as a mechanical temperature back-up system when paired up to an electronic temperature/pressure recorder or volume corrector.

TCID-RM11000

ELECTRONIC METER/INSTRUMENT TYPES

ADVANCED ELECTRONIC MODULE (AdEM®-S)

AdEM®-S is an electronic replacement for mechanical STD CTR, to also include audit trail and communications. AdEM®-S meters are intended for use where compensation to standard base condition is not required. The AdEM®-S has a built-in audit trail which will store certain metrological information over a predetermined time period.

- Interval 100 days hourly reads (6 items)
- Daily Logger 672 days
- Alarm Logger 102 events
- Event Logger 200 events

The AdEM®-S also has the capability to generate other parameters, such as: flow rate, peak flow, previous day volume, daily volume, various alarms, battery level, and voltage readings. Scroll button or optional remote keyboard or RometLink computer software ensure reliable, quick access to this information.

Since the AdEM®-S being of electronic type doesn't have any mechanical parts that could cause drag, the rangeability of the meter is increased. Low flow volumetric linearization feature enhances the rangeability even further up to 200:1 or better, with an error of less than ± 1.0%.

This new compact design module offers up to 20 years battery life in a service-free, weather resistant enclosure. This device has fully developed one-way communication features using RometLink computer software.

ADVANCED ELECTRONIC MODULE (AdEM®-T)

AdEM®-T is an electronic replacement for mechanical TC and a technological advancement of ECM2® to also include audit trail and communications. AdEM®-T meters are intended for use where temperature compensation to standard base conditions is required. At higher fixed pressures, a predetermined pressure factor can be implemented into the unit to correct the AdEM®-T index to the required base condition. The AdEM®-T has a built-in audit trail which will store certain metrological information over a predetermined time period.

- Interval 100 days hourly reads (6 items)
- Daily Logger 672 days
- Alarm Logger 102 events
- Event Logger 200 events

The AdEM®-T also has the capability to generate other parameters, such as: flow rate, peak flow, previous day volumes, daily volumes, various alarms, battery level and voltage, temperature readings, fixed pressure factor, etc. Scroll button or optional remote keyboard or RometLink computer software ensure reliable, quick access to this information.

Since the AdEM®-T being of electronic type doesn't have any mechanical parts that could cause drag, the rangeability of the meter is increased. Low flow volumetric linearization feature enhances the rangeability even further up to 200:1 or better, with an error of less than ± 1.0%.

This new compact design module offers up to 20 years battery life in a service-free, weather resistant enclosure. This device has fully developed one-way communication features using RometLink computer software.

ADVANCED ELECTRONIC MODULE (AdEM®-PTZ)

AdEM®-PTZ is a technological advancement of AdEM®-T to also include pressure and supercompressibility compensation. When temperature, pressure or supercompressibility factors are a matter for concern, the AdEM®-PTZ is able to calculate and process the required factors for volume compensation. The AdEM®-PTZ has a built-in audit trail which will store certain metrological information over a predetermined time period.

AdEM®-PTZ

- Interval 64 days hourly reads (21 items), 256 days hourly reads (4 items)
- Daily Logger 1024 days
- Alarm Logger 102 events
- Event Logger 166 events

The AdEM®-PTZ also has the capability to generate other parameters, such as: flow rate, peak flow, previous day volumes, daily volumes, various alarms, battery level and voltage, pressure and temperature readings, live or fixed super-x factor, etc. A scroll button or optional remote keyboard or RometLink computer software ensure reliable, quick access to this information.

Since the AdEM®-PTZ being of electronic type doesn't have any mechanical parts that could cause drag, the rangeability of the meter is increased. Low flow volumetric linearization feature enhances the rangeability even further up to 200:1 or better, with an error of less than ± 1.0%.

This new compact design module offers 10 to 20 years battery life in most applications in a service-free, weather resistant enclosure.

This device has fully developed one-way communication features using RometLink computer software or Implemented Modbus RTU protocol that makes this device available for other communication and control systems, e.g.: SCADA.