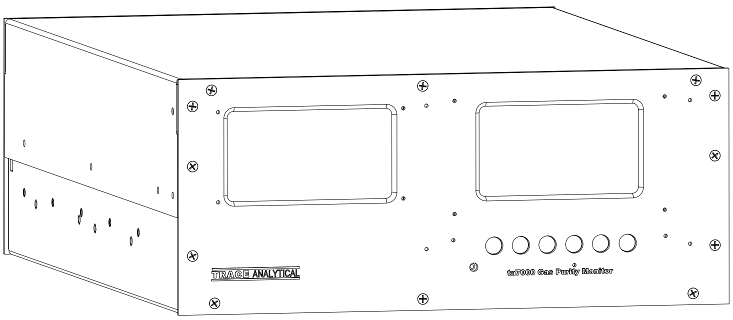
AMETEK®
PROCESS INSTRUMENTS

USER MANUAL

ta7000R Gas Purity Monitor



PN T900-013, Rev A

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Safety Notes

WARNINGS, CAUTIONS, and NOTES contained in this manual emphasize critical instructions as follows:

NOTE

Important information that should not be overlooked.

WARNING

An operating procedure which, if not strictly observed, may result in personal injury or environmental contamination.

CAUTION

An operating procedure which, if not strictly observed, may result in damage to the equipment.

HOT

Burn hazard. Hot surface. Do not touch, allow to cool before servicing.

Grounding

Instrument grounding is mandatory. Performance specifications and safety protection are void if instrument is operated from an improperly grounded power source.

WARNING

Verify ground continuity of all equipment before applying power.

Personnel and Equipment Safety Information

This section describes important safety information to avoid personal injury and damage to the equipment while installing, operating, maintaining, or servicing the equipment. All safety regulations, standards, and procedures at the installation location must be followed.

All personnel involved with the installation, start-up, operation, maintenance, service, or troubleshooting of the ta7000R Gas Purity Monitor must review and follow these Warnings and Cautions.

Before working on the ta7000R Monitor, read and understand the following Notes, Warnings, and Cautions, regarding safety and other required information. Additional Notes, Warnings, and Cautions included in individual procedures in this manual indicate special conditions to consider during installation, before opening the ta7000R Monitor and while working on it.

WARNING

Read this manual before beginning the installation and operation of the ta7000R Monitor. Failure to do so, and or use of the equipment in a manner not specified in this manual or accompanying documents, may impair the protection against fire, electrical shock and injury originally provided by this equipment. In addition, failure to follow the installation and start-up instructions may void the instrument warranty.

WARNING

Improper installation, operation, or service of the ta7000R may result in permanent damage

WARNING

If an electrical fire occurs on or inside the ta7000R, extinguish it using Class A, B, or C extinguishers.

WARNING

Do Not Operate without Covers
To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

WARNING

Use Caution When Lifting
Use caution when lifting the ta7000R from its crate.

WARNING

Use Proper Attire
Equipment is hot, user should wear protective groves while handling the equipment.

WARNING

All electrical connections, adjustments, or servicing of the ta7000R should be performed only by properly trained and qualified personnel.

All electrical connections, materials, and methods (plus all safety standards and procedures) must be made in compliance with local wiring regulations and electrical code for the hazardous area, as specified by the Owner Company, local electrical-inspection authority, and National/EU regulations.

Follow appropriate regulatory and/or company procedures to lock out the ta7000R while working on its electronics.

WARNING

Verify ground continuity of all equipment before applying power. For electrical shock protection, the ta7000R must be operated from a grounded power source that has a securely connected protective ground contact.

CAUTION

The ta7000R must have electrical power, instrument air pressure, and applicable gas pressure for proper operation. If proper electrical power, instrument air pressure, or applicable gas pressure are not supplied, the ta7000R could be permanently damaged and the warranty will be void.

CAUTION

Operators should not attempt to repair the ta7000R. Any repairs made without first consulting AMETEK Customer Service shall void the manufacturer's warranty

CAUTION

Use Proper Wiring
To avoid fire hazards, use only the wiring specified in the "Installation and Start-Up" chapter of this manual.

CAUTION

Avoid Electrical Overload
To avoid electrical shock or fire hazard, do not apply a voltage to a terminal that is outside the range specified for that terminal.

Ground the Product
Follow the grounding instructions provided in the "Installation and Start-Up" chapter of this manual. Before making connections to the input or output terminals of this product, ensure that the product is properly grounded.

Use Proper Fuse
To avoid fire hazard, use only the fuse type and rating specified for this product.

Use Proper Power Source
Do not operate this product from a power source that applies more than the voltage specified.

Do Not Operate with Suspected Failures
If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Explosive Atmosphere
To avoid injury or fire hazard, do not operate this product in an explosive atmosphere unless you have purchased options that are specifically designed for these environments.

General Safety Considerations

Components and Functions

The following safety items must be observed to avoid personal injury and to prevent damage to the ta7000R Monitor. All personnel involved in installation, operation or service of the ta7000R should be thoroughly familiar with these items. These considerations are in addition to all site specific safety procedures.

Mercury Vapor

WARNING

In RGD-equipped instruments, be sure the Mercury vapor scrubber is connected before operating the analyzer and plan on replacing the scrubber after 6 months of continuous operation or with each HgO bed replacement.

UV Light

WARNING

In RGD-equipped instruments, do not look directly at the ultraviolet lamp. Since UV light causes eye damage, use appropriate safety glasses whenever the UV lamp is exposed.

Electrical Hazard

WARNING

Be sure that the top cover is securely in place before operating the analyzer. Since some service procedures require the cover to be removed while the power is on, be aware that electric shock can occur. Therefore, only trained or otherwise qualified personnel should service the analyzer. The analyzer is supplied with a 3-conductor power cord providing a protective earth ground connection when plugged into a properly wired receptacle. Proper receptacle grounding must be verified.

Electromagnetic Compatibility (EMC)

Read and follow the recommendations in this section to avoid performance variations or damage to the internal circuits of this equipment when installed in harsh electrical environments.

The various configurations of the ta7000R should not produce, or fall victim to, electromagnetic disturbances as specified in the European Union's EMC Directive. Strict compliance to the EMC Directive requires that certain installation techniques and wiring practices are used to prevent or minimize erratic behavior of the ta7000R or its electronic neighbors. Below are examples of the techniques and wiring practices to be followed.

In meeting the EMC requirements, the various ta7000R configurations described in this manual rely heavily on the use of metallic shielded cables used to connect to the customer's equipment and power. Foil and braid shielded I/O and DC power cables are recommended for use in otherwise unprotected situations. In addition, hard conduit, flexible conduit, and armor around non-shielded wiring also provides excellent control of radio frequency disturbances. However, use of these shielding techniques is effective only when the shielding element is connected to the equipment chassis/earth ground at both ends of the cable run. This may cause ground loop problems in some cases. These should be treated on a case-by-case basis. Disconnecting one shield ground may not provide sufficient protection depending on the electronic environment. Connecting one shield ground via a 0.1 microfarad ceramic capacitor is a technique allowing high frequency shield bonding while avoiding the AC-ground metal connection. In the case of shielded cables the drain wire or braid connection must be kept short. A two-inch connection distance between the shield's end and the nearest grounded chassis point, ground bar or terminal is highly recommended. An even greater degree of shield performance can be achieved by using metallic glands for shielded cable entry into metal enclosures. Expose enough of the braid/foil/drain where it passes through the gland so that the shield materials can be wrapped backwards onto the cable jacket and captured inside the gland, and tightened up against the metal interior.

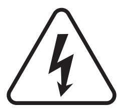
Inductive loads connected to the low voltage "Alarm Contacts" are not recommended. However, if this becomes a necessity, adhere to proper techniques and wiring practices. Install an appropriate transient voltage suppression device (low voltage MOV, "Transzorb," or R/C) as close as possible to the inductive device to reduce the generation of transients. Do not run this type of signal wiring along with other I/O or DC in the same shielded cable. Inductive load wiring must be separated from other circuits in conduit by using an additional cable shield on the offending cable.

In general, for optimum protection against high frequency transients and other disturbances, do not allow installation of the ta7000R where its unshielded I/O and DC circuits are physically mixed with AC mains or any other circuit that could induce transients into the ta7000R or the overall system. Examples of electrical events and devices known for the generation of harmful electromagnetic disturbances include motors, capacitor bank switching, storm related transients, RF welding equipment, static, and walkie talkies.

Warning Labels

These symbols may appear on the instrument to alert you of existing conditions.

Protective Conductor Terminal
(BORNIER DE L'ECRAN DE PROTECTION)
Schutzerde



Caution – Risk of electric shock
(ATTENTION – RISQUE DE DÉCHARGE ÉLECTRIQUE)
Achtung – Hochspannung Lebensgefahr

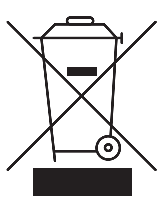
Caution – Refer to accompanying documents
(ATTENTION – SE RÉFERER AUX DOCUMENTS JOINTS)
Achtung – Beachten Sie beiliegende Dokumente

CAUTION – Hot Surface
(ATTENTION – SURFACE CHAUDE)
Achtung – Heiße Oberfläche

Environmental Information – WEEE

This AMETEK product contains materials that can be reclaimed and recycled. In some cases the product may contain materials known to be hazardous to the environment or human health. In order to prevent the release of harmful substances into the environment and to conserve our natural resources, AMETEK recommends that you arrange to recycle this product when it reaches its "end of life."

Waste Electrical and Electronic Equipment (WEEE) should never be disposed of in a municipal waste system (residential trash). The Wheelie Bin marking on this product is a reminder to dispose of the product properly after it has completed its useful life and been removed from service. Metals, plastics, and other components are recyclable and you can do your part by doing one of the following steps:



- When the equipment is ready to be disposed of, take it to your local or regional waste collection administration for recycling.
- If you need further assistance in recycling your AMETEK product, contact us through our Customer Support page at https://www.AMETEKpi.com/customersupport/requestsupport.

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Overview

This manual is intended as a guide for operation of the AMETEK ta7000R Gas Purity Monitor. This manual is not intended as a service guide and does not contain service information. The ta7000R should only be operated by personnel who have been properly trained in the procedures required for safe operation of the ta7000R.

NOTE

All photographs included in this manual are for example only, and may not reflect the actual as-purchased configuration of the ta7000R.

Introduction to the ta7000R Gas Purity Monitor

The ta7000R Gas Purity Monitor is a trace level gas chromatograph capable of detecting sub-PPB concentrations of contaminants in Sample gas matrices. The system consists of a microprocessor controlled gas chromatograph utilizing the Unique Reduction Gas Detector (RGD).

Functional Overview of the ta7000R Gas Purity Monitor

To achieve the specified performance, the ta7000R Monitor performs the primary functions described below.

Component	Function
Carrier Gas Purification	A catalytic combustor is included as an integral component of the Carrier gas flow path. Reactive impurities are reduced to a level of less than 100 PPT.
Sample Introduction and Component Separation	Samples are introduced into the instrument via air actuated gas sampling valves. Components of interest are separated in a 1/8-inch Column(s) inside a heated column oven.
Reduction Gas Detector	Species eluting from the Reduction Gas Detector (RGD) column set pass immediately into the heated bed of mercuric oxide (HgO) and the photometric detector. Within the HgO bed, the general reaction occurs: X + HgO (solid) => XO + Hg (vapor) Where X is any appropriate reducing gas. The resulting mercury vapor is quantified by means of an ultraviolet photometer located immediately downstream of the mercuric oxide bed. The relative ease of measuring mercury vapor at low concentrations lends the technique its inherent sensitivity. For carbon monoxide and hydrogen, the equilibrium reactions are as follows: $CO + HgO$ (solid) => $CO_2 + Hg$ (vapor) $H_2 + HgO$ (solid) => $H_2O + Hg$ (vapor) The hydrogen reaction undergoes approximately 20 % conversion to mercury vapor in relation to carbon monoxide. Under continuous operation, the effective life of the mercuric oxide bed is approximately two years. Contamination of Carrier gases with reactive compounds such as sulfides, chlorides, and aromatics will irreversibly impair reactivity and will necessitate bed replacement. Care should be taken to bypass the instrument if these compounds are present in the Sample gas stream. High concentrations of hydrogen and carbon monoxide will use up the active sites in the reaction bed faster than lower level concentrations.

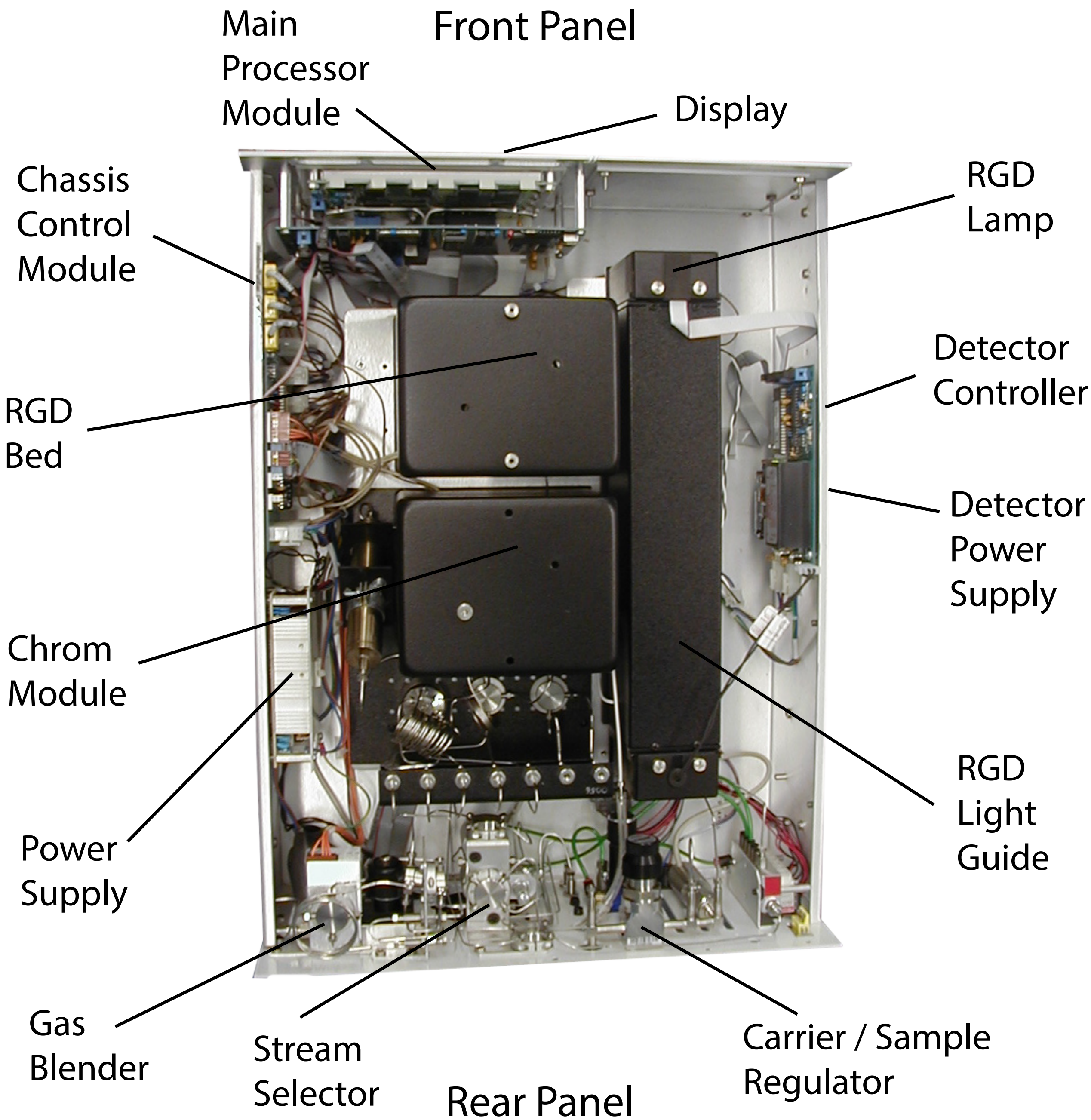

Figure 1-1.
Internal general component layout.

Component	Function
Operating System	The six (6) button keypad allows you to enter commands to the microprocessor, which monitors detector operation, controls heated zones, and operates all internal valve functions. External signal outputs for a data collection system or host computer are located at the ta7000R Rear Panel. The microprocessor control system allows complete unattended operation of the ta7000R. This onboard system performs necessary operational and analytical functions such as: • Analyzer Status Control • Contaminant Identification • Concentration Calculations • Calibration • Sampling Frequency • Data Output • Alarm Output Data is presented via the front display panel. Alternatively data may be obtained through an RS-232 serial computer interface and HP/GL parallel printer interface located on the Rear Panel. With optional interface kits, two components may be assigned to separate Trend channels to provide a continuous signal proportional to the concentration of the assigned component. These Trend signals are updated following each run and can be tracked by a data logger or host computer.

ta7000R Gas Purity Monitor Front Panel

Component	Function
Front Panel and User Interface	The User Interface is located on the front panel. The User Interface is made up of a Display screen and Menu keys. See "Introduction to the User Interface" in Chapter 3 for more information.

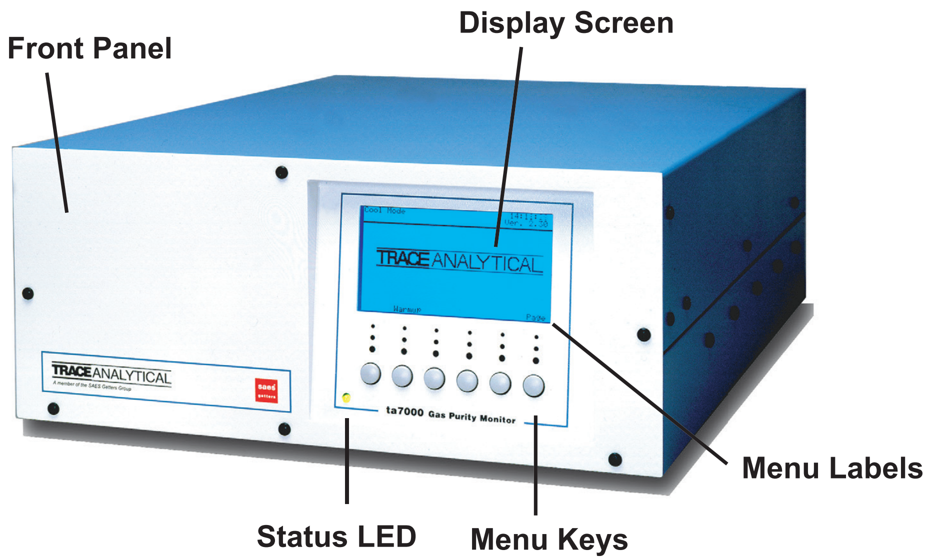

Figure 1-2.
ta7000R Front Panel layout.

Component	Function
Display Screen and Menu Keys	The Display screen displays all current information and options. • The **Status Bar** displays the current status of the ta7000R Monitor. This area also displays the active screen name, the system time and date, and other important Status information. • The **Main Window** displays live data and active configurable parameters, such as information about the last analysis run, calibration, or options for future runs. • The **Menu labels** area displays Main Menu and Sub-Menu names, and system commands for user input. • The **Menu keys** are used to select corresponding Menu items or to initiate system commands, which are listed in the Menu labels area directly above the keys.

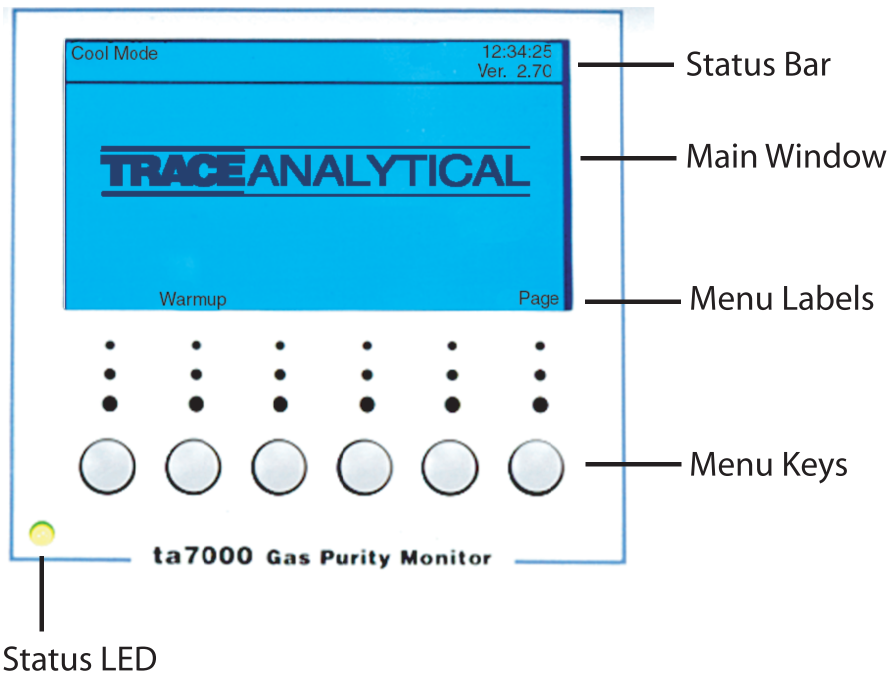

Figure 1-3.
Display screen layout.

Installation and Start-up

Safety Considerations

To ensure a smooth installation of the AMETEK ta7000R Gas Purity Monitor and to get the maximum performance, several aspects should be considered. This guide discusses the important points for a successful installation.

NOTE

Before beginning the installation of the ta7000R and before powering it up, review and follow all safety information following the Table of Contents near the beginning of this manual. This information describes procedures to follow to avoid personal injury and/or damage to the equipment. All regulatory agency and personnel safety procedures for your jurisdiction must be followed.

WARNING

The installation of the ta7000R must be in accordance with all of the customer and local regulatory standards and procedures. There are no operator-serviceable components inside the ta7000R. Refer all servicing to qualified personnel.

CAUTION

Carrier Gas
The Reduction Gas Detector *(RGD) can be destroyed if operated at temperature without flow. The Carrier gas should remain flowing until all heated zones are below 50 °C (2–3 hours).*

CAUTION

Line Voltage
Do not connect the power cord to line voltage without checking the correct operating voltage on the label located on the ta7000R Rear Panel.

CAUTION

Actuator Gas Pressure
Always maintain correct actuator gas pressure. Low pressure (below 70 PSIG) can result in failure of the internal valves and/or stoppage of the gas flow to sensitive instrument components. High pressure (above 150 PSIG) will damage the valve actuators.

Electrical Signal Cables

Turn power Off before connecting or disconnecting electrical signal cables. Damage to circuit boards could result.

Shut Down/Cool Down

Be sure to turn Off all heated zones and shut Off the hydrogen supply to the instrument prior to disconnecting gas supply lines. The Carrier gas should remain flowing until all heated zones are below 50 °C (2–3 hours). After shutting Off Carrier gas, immediately cap all open gas ports on the Rear Panel.

Pre-Installation Requirements

Personnel Technical Level Required for Installation

NOTE

The operations in this section should be performed only by qualified service personnel experienced in electrical safety techniques. Never service the ta7000R unless power to is has been removed, and it has been allowed to cool for at least 90 minutes. Also, always use gloves when working on the ta7000R.

Storage Prior to Installation

If the ta7000R is stored for any period of time prior to installation, store the equipment in an environment where it is not subject to dripping or splashing liquids, corrosive gases, high humidity, or excessive heat or cold. Recommended storage conditions include:

Temperature:	0 °C to 50 °C (32 °F to 122 °F)
Relative Humidity:	<70 %

Failure to comply with these storage conditions will void your warranty.

Unpacking and Inspecting the Equipment

Remove any packing material from the ta7000R Monitor. Check for damage. If equipment is damaged, notify the carrier and contact AMETEK Service (https://www.AMETEKpi.com/customersupport/requestsupport) immediately if parts are missing or damage is found, and to verify if damaged parts will require replacement prior to safely installing and operating the equipment.

Perform the following inspections to ensure that the ta7000R has not been damaged during shipment:

- Inspect the shipping container exterior for evidence of damage or indications of excess moisture before unpacking.
- Carefully open the shipping container and remove the ta7000R. Inspect the exterior of the ta7000R for noticeable damage.
- Do not discard the shipping container until installation is complete.

Check the interior of the shipping container for the following items:

- ta7000R Monitor
- Power Cord
- User Manual

ta7000R Monitor Location Requirements

Observe the following guidelines when selecting an installation location:

- Select a readily accessible position for the ta7000R to allow suitable access to its Rear Panel for easy connections of the gases, and for routine service and maintenance. Allow approximately 30" for service clearance at the rear of the ta7000R. Comfort levels for maintenance personnel should be considered in placement of the ta7000R and Display User Interface.
- The installation location should:
  - Be free from excessive vibrations that can affect the electronics and detectors.
  - Be within the ambient temperature limits listed in the specifications. If the ambient temperature is outside the specified limits or the vibration is excessive, contact your AMETEK representative to discuss solutions and special options to address ambient temperatures.
  - Be clean with minimum particulate matter and dust in the air.
  - Be clear of any draft directly on the instrument from air conditioners or extreme temperature fluctuations in the room.
- Support gases for the instrument should be located near the ta7000R. A uniform temperature environment for cylinders and regulators is essential to maintain a constant pressure and flow rate. Always keep gas containers inside the building where temperature fluctuations are at a minimum.
- Have adequate ventilation around the instrument area without any high flow velocity draft directly onto the ta7000R. Be sure not to block any vent slots in the rear or top of the ta7000R since limited air circulation will cause overheating and poor performance.
- All connections to the instrument should be made with 1/16-inch stainless steel tubing (maximum 0.030-inch ID). Coil some extra 1/16-inch gas lines behind the ta7000R. This allows flexibility when moving or turning the instrument for service and routine maintenance. Supplied by customer, or can be purchased from AMETEK.

Electrical Preparations and Connections

- Always verify that the voltage on the label located on the rear of the instrument matches the supplied power before connecting. The electrical requirements for the ta7000R Monitor can be 100, 115, 220, or 240 VAC, and 50 or 60 Hz, depending on the voltage option ordered. AC power must be free from cyclic RMS voltage variations, spikes or drops greater than 1.5 %. A minimum of 5 amperes current must be available.

- Good grounding of the AC power circuit is required, verify proper receptacle grounding before connecting the instrument.

- AMETEK recommends connecting the ta7000R and low powered accessories to a dedicated electrical circuit. Do not plug the ta7000R into a circuit that is shared with other equipment with large intermittent current loads. Line voltage spikes can have detrimental effects on the analytical capabilities. Where there are noisy circuits, a power line conditioner should be considered to even out spikes and other fluctuations.

- Frequent power failures in the area where the ta7000R is used are best taken care of by installing an uninterruptible power supply (UPS). The UPS will supply power instantly from batteries when the main power is interrupted. Proper power will be supplied for minutes or hours depending upon the size of the battery. Since the ta7000R needs less than 5 A of current, the UPS battery pack can be relatively small.

Support Gas Utilities Preparations

The ta7000R needs several support gases to ensure proper operation. Refer to the Specifications chapter for detailed gas specifications for purchasing gases in cylinders.

General Notes on Regulators and Plumbing

- Ultra High Purity (UHP) regulators and gauges are suggested for all incoming gas streams.
- Carrier gas should always flow through the Reduction Gas Analyzer. Do not use an automatic shut-off valve for the Sample/Carrier gas supply that would stop flow in event of power failure. It is essential to always have flow through the RGD to prevent mercury build-up in the photometer cell and on the Measuring Cell windows. Mercury build-up will decrease sensitivity of the detector. We recommend installing a spare Carrier gas cylinder into the Carrier gas supply line for the RGD. The spare cylinder can be plumbed in through a tee in the line. Use a shut-off valve to isolate the spare cylinder when not in use. This extra cylinder provides a safety margin in order to maintain flow through the analyzer. Immediately order a new cylinder when the spare begins to be used.
- Use Cajon VCR fittings with nickel gaskets to connect to UHP regulators. Do not use pipe thread fittings since they are not clean and are not leak-tight for trace gas analysis.

Tools, Equipment, Hardware, and Supplies Required for Installation

All connections are made using U.S. standard size connectors.

To install the ta7000R you need the following tools, equipment, hardware, and supplies:

Open end wrenches	1/4", 5/16", 3/8", 5/8", 3/4"
Phillips head screwdriver	
Allen keys	1/16", 7/64", 9/64"
Flow Meter (Digital in the SCCM range)	
Mirror	
Magnet	
Detergent-based leak detector	Snoop® or another suitable leak detection agent is permissible.
Support gases	
Suggested Hardware for Gas Connections	
UHP Regulators for Carrier/Sample and Support Gases: Dual-stage stainless steel, 0–150 PSIG outlet with gauges and 1/16-inch VICI female fittings.	
UHP Regulator, Calibration Gas: One (1), dual-stage stainless steel, 0–150 PSIG outlet with gauges and 1/16-inch VICI fittings.	
Adapter, 1/16-inch VICI to 1/4-inch VCR: Four (4), required for gas connections via 1/16-inch tubing umbilical at regulators, AMETEK Part No. 220-091.	
Nut, 1/4-inch VCR Gland, Male: Four (4), required for use with VICI–VCR adapters at regulators.	
Nut and ferrule, 1/8-inch VICI: One (1), required for use in connecting the Actuator gas.	
Gasket, 1/4-inch VCR, Nickel: Eight (8), required for use with VICI-VCR adapters.	
Tubing, 1/16-inch OD x 0.03-inch ID, Stainless Steel: Four (4), approximately 72" lengths for gas supply umbilical.	
Tubing, 1/8-inch OD, for Pneumatic Line (Actuator gas): One (1), approximately 72" length for gas supply umbilical.	

Installing the Mechanical Components

Refer to Figures 2-1, 2-2, and 2-3 while installing the ta7000R Monitor.

CAUTION

The installation instructions must be strictly followed for safe and reliable operation of the ta7000R.

CAUTION

If any inconsistencies are encountered during installation, stop immediately. Do not continue the installation without direction from AMETEK Customer Service.

CAUTION

The ta7000R performance level depends upon the care and attention to proper handling procedures while making gas connections. Exposure to non-UHP environments or physical contact with sealing surfaces will reduce the accuracy of the ta7000R.

CAUTION

The vent must not cause any back-pressure in the ta7000R. Back-pressure can damage the ta7000R.

The analyzer performance level depends upon the care and attention to proper handling procedures during gas connections. Exposure to non-UHP environments or physical contact with sealing surfaces will reduce the accuracy of the analyzers.

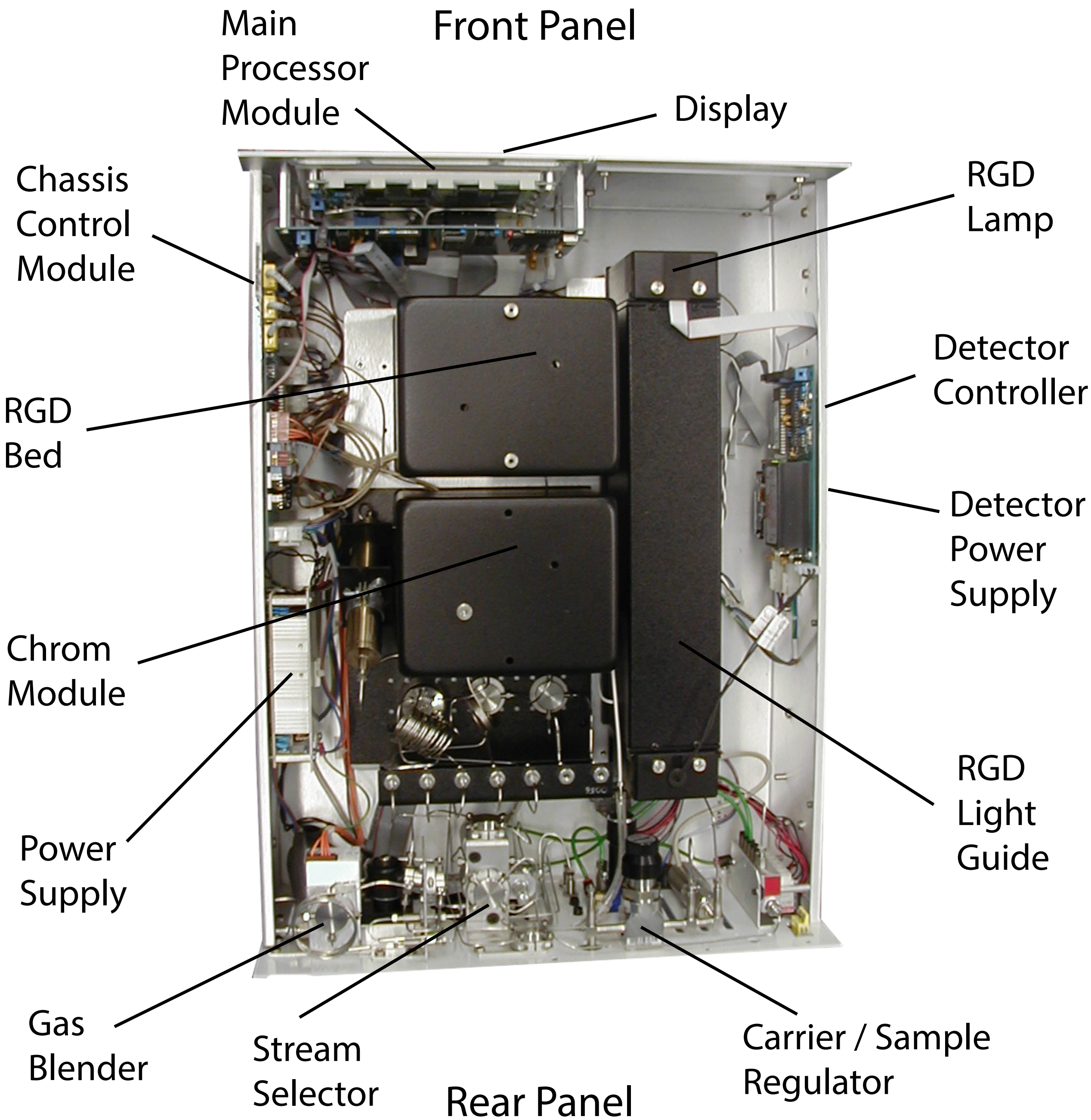

Figure 2-1.
Internal general component layout.

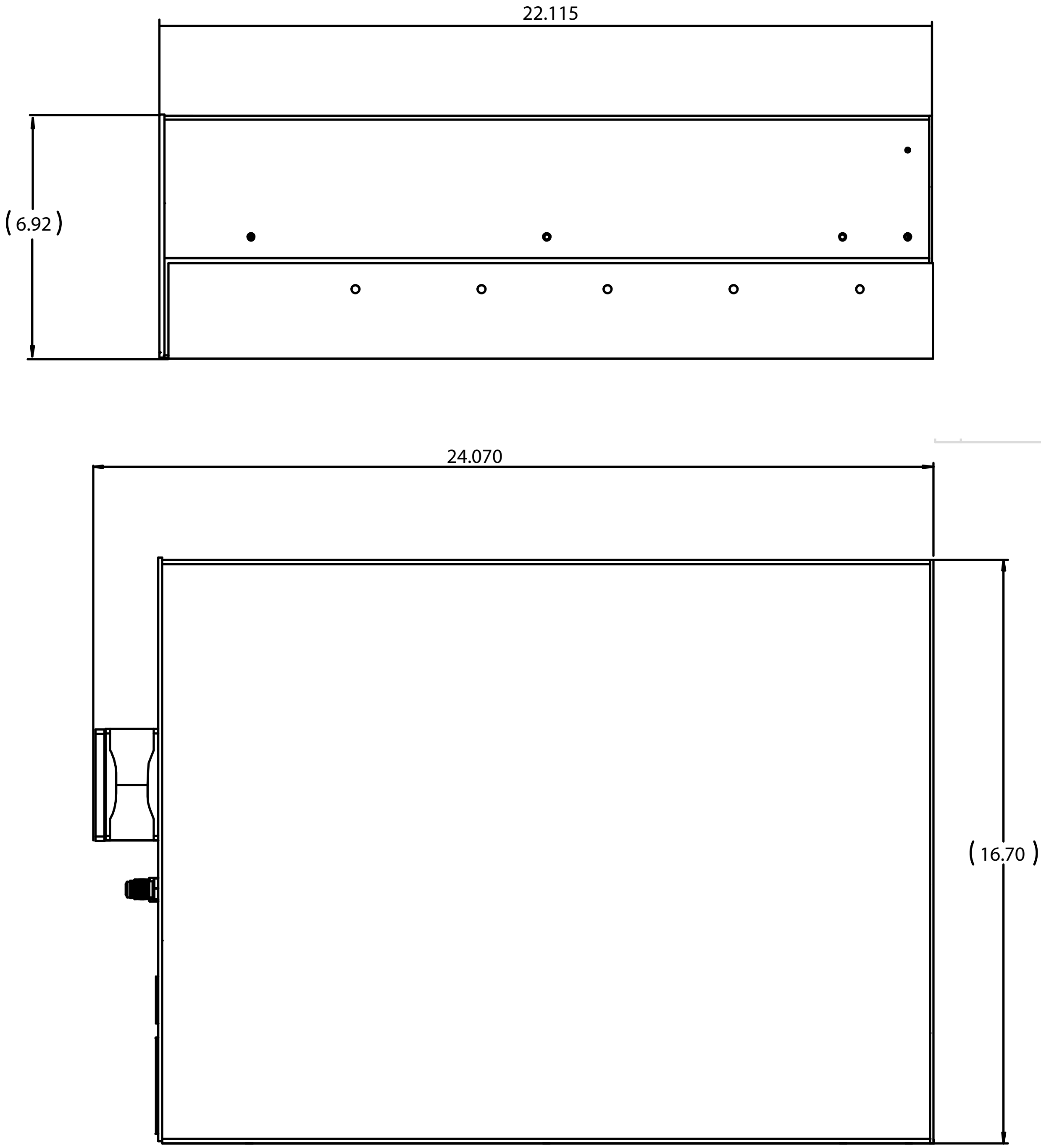

Figure 2-2.
ta7000R dimensions,
Side and Top views.

Making Gas Connections

To prepare for the gas connections:

- Remove any 1/16-inch or 1/8-inch VICI plugs and 1/4-inch VCR caps from the ta7000R Rear Panel.
- Remove all other shipping caps immediately prior to connection of gas supplies.
- Refer to Figure 2-3 for gas connection port locations.

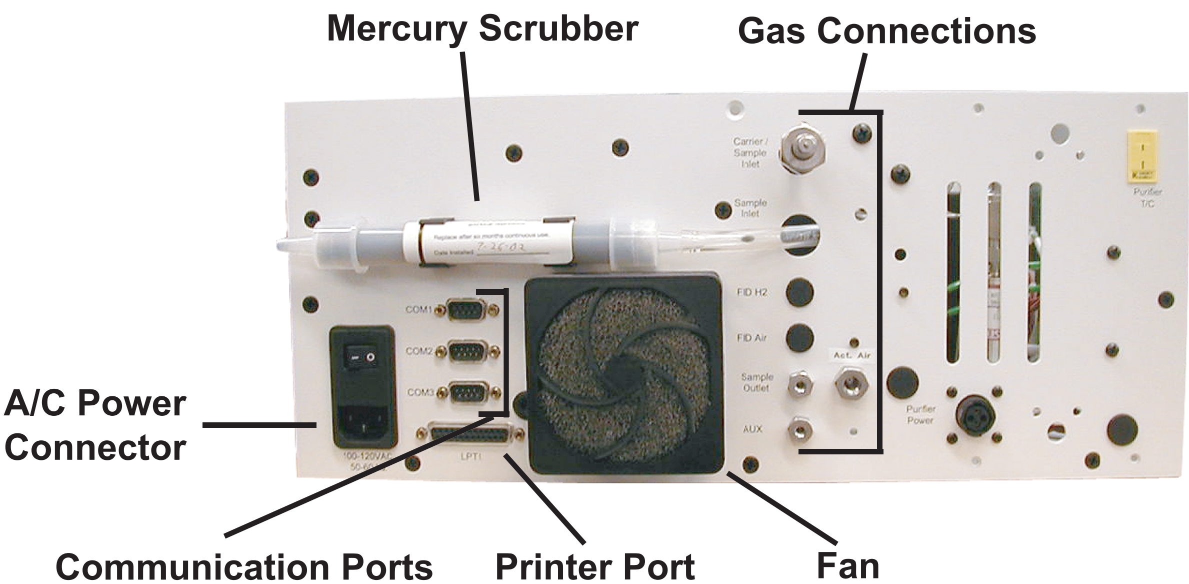

Figure 2-3.
ta7000R Rear Panel layout, gas and power connections.

Connecting the Sample and Carrier Gas

The ta7000R Monitor uses purified Sample gas as a chromatographic carrier. Matching the Carrier gas to the Sample gas will prevent upsets caused by the elution of the extraneous balance peak. The instrument connection is made at the Carrier/Sample Inlet 1/4-inch male VCR port on the ta7000R Rear Panel. Pressurize the external line to 80 PSIG (minimum 70 PSIG, maximum 90 PSIG).

Connecting Actuator Gas

The ta7000R needs high purity inert gas or CDA as valve actuator gas. Refer to the Actuator Gas requirements in the Chapter 5 – Specifications.

The instrument connection is made at the Actuator Gas 1/8-inch VICI port on the ta7000R Rear Panel. Pressurize this external line to 80 PSIG (minimum 70 PSIG, maximum 150 PSIG).

Connecting Span Gas

The ta7000R Monitor uses Span gas for calibration purposes. The instrument connection is made at the “AUX” 1/16-inch VICI port on the ta7000R Rear Panel. Pressurize this external line to 80 PSIG (minimum 80 PSIG, maximum 90 PSIG).

Making the Vent Connections

All vent ports must be connected to a vent that is connected to a safe area. The vent should be at atmospheric pressure.

Making the Electrical Connections

Connecting AC Power

Before making the AC power connections, verify that the operating voltage of the instrument matches the available AC power. The ta7000R does not auto-select for varying power line voltages.

The instrument operating voltage is labeled on the ta7000R Rear Panel directly above the AC Power Connector/Power Switch.

To make the AC power and communication connections:

1. Confirm the instrument power switch is in the Off ("O") position.
2. Connect the DIN AC Power Cord to the DIN AC Power Connector on the ta7000R Rear Panel.
3. Connect the AC Power Cord to an appropriate AC voltage source.

Connecting Peripheral Equipment

All connections to the peripheral equipment are made on the ta7000R Rear Panel.

Connecting Communications Cables

If you will be communicating with the ta7000R via a computer, connect a communication cable between the computer and one of the communication ports on the ta7000R Rear Panel.

The ta7000R has three (3) communication ports (COM 1, COM 2, COM 3), all 9-pin male D-type connectors. The ta7000R uses **Pin 2** is used to *Transmit* data to other equipment and **Pin 3** to *Receive* data. **Pin 5** is a common ground. All other pins are unused.

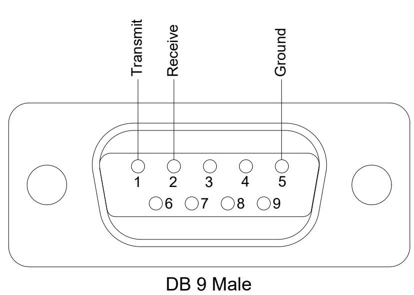

Figure 2-4.
Communication ports.

Connecting to a Printer

If printouts of data are required, connect a communication cable between the computer and the Parallel Printer port on the ta7000R Rear Panel.

The Parallel Printer Port (LPT1) uses a standard 25-pin female D-type connector. The Printer Port follows standard parallel printer protocols. The ta7000R is compatible with Hewlett Packard printers, model numbers HP-6xx, HP-7xx , and HP-8xx. AMETEK recommends using one of these suggested models.

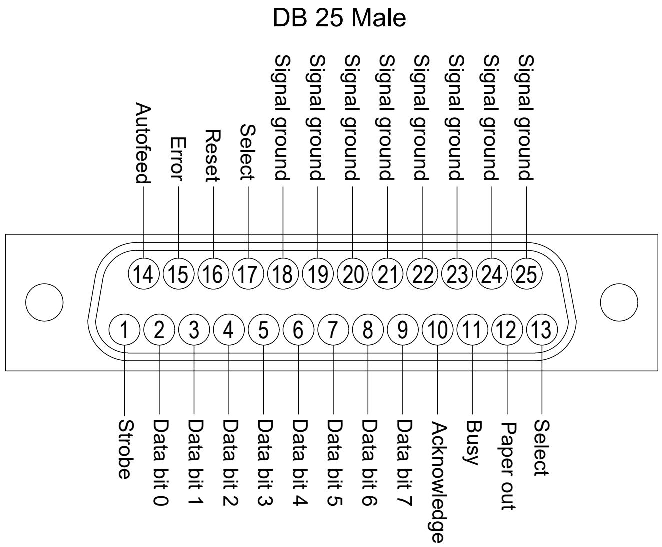

Figure 2-5.
Parallel printer port LPT1.

Powering Up the ta7000R Gas Purity Monitor

NOTE

Do not continue with this procedure until the ta7000R Monitor installation is complete.

Adjust incoming gas supply pressures as specified in Chapter 5 – Specifications (see Inlet Pressure Range).

Power up the ta7000R Monitor by pressing its AC Power Switch (on the Rear Panel) to the On ("**–**") position. The **Power/Status** LED on the front panel will turn On (GREEN) and the rear cooling fan should begin operating. The initial start-up screen should appear within a few seconds. If any of these does not occur, turn the power Off immediately and contact AMETEK Customer Service or your local authorized service agent.

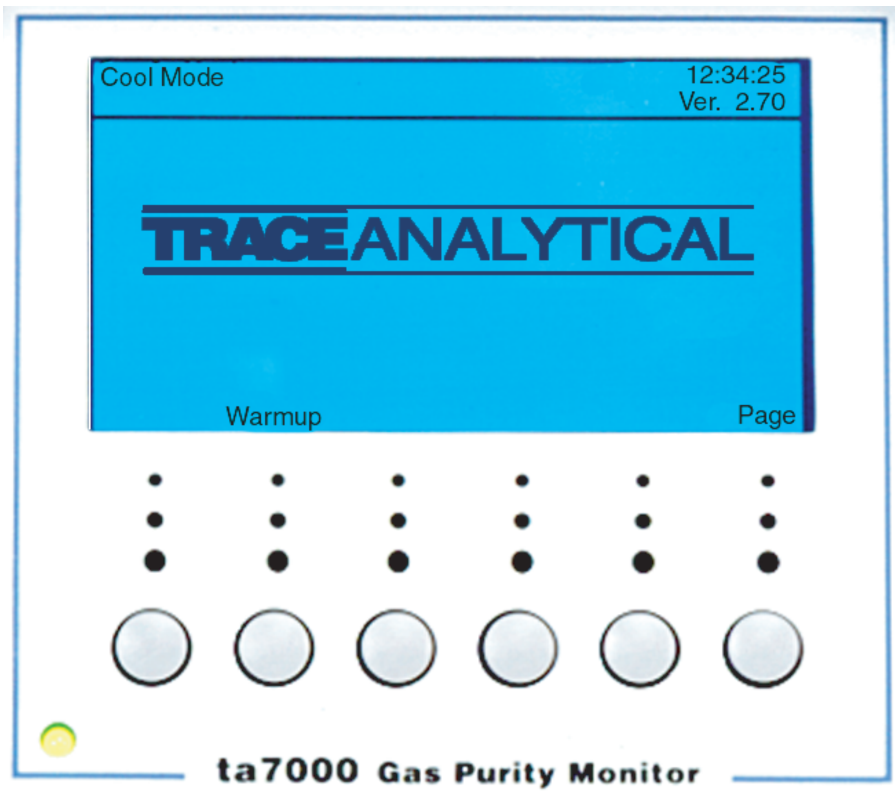

Figure 2-6.
Initial screen at power-up, ta7000R Monitor User Interface.

Starting the ta7000R in the Warm-Up Cycle

The initial start-up screen (Figure 2-6) will display two menu items: **Warmup** and **Page**. Press **Page** to view the first of three (3) system setup pages. Refer to "Working From the Page Screens" in Chapter 3 – User Interface. Press the **Warmup** key to initiate the instrument's **Warm-Up Cycle**. This cycle will place the instrument in a ready state for analysis.

After pressing the **Warmup** key the ta7000R will begin heating critical zones and will perform a series of system tests. The results from these tests will appear on the **Warm-Up** screen. The **Warmup** menu item (bottom of the screen) will change to **Cool** (Figure 2-7.1). If you wish to stop the **Warm-up Cycle**, press the **Cool** key and the instrument begin to cool down, and will return to a completely neutral state. Do not stop the Carrier gas until all of the measured temperatures reach below 50 °C. These temperatures are displayed on the **Temperatures & Status** screen. If any errors occur during the Warm-Up Cycle, refer to "Error Messages" in Chapter 4.

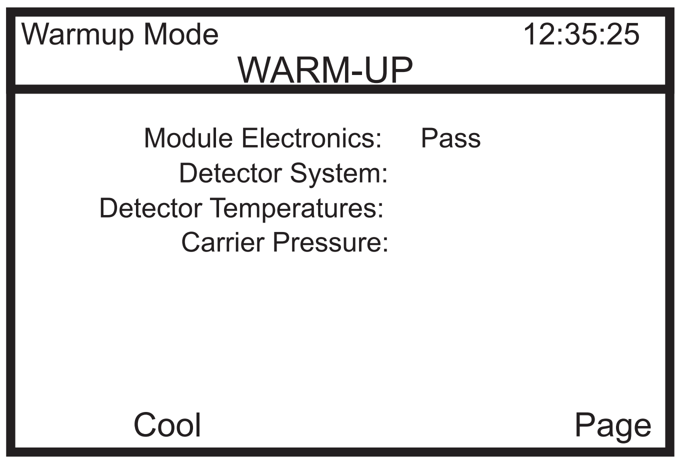

Figure 2-7.1.
Warm-Up Mode screen.

The Warm-Up Cycle typically takes 20–30 minutes. After the Warm-Up Cycle has completed successfully (the "**Successful Warm-up**" message is displayed) the **Run** command will appear (Figure 2-7.2). Press the **Run** key to view the **Main Menu** screen (Figure 2-7.3).

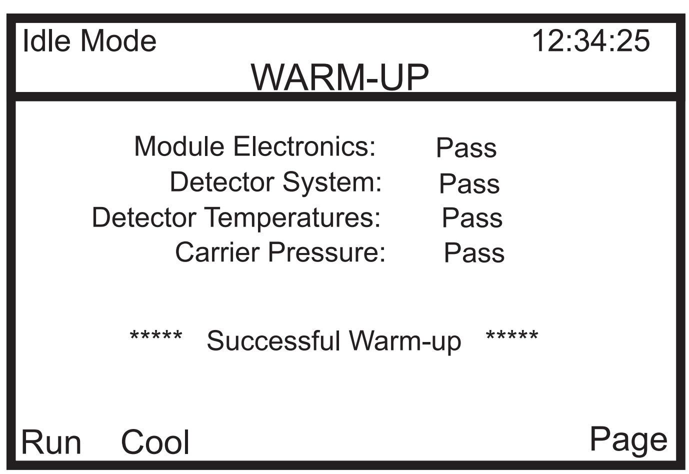

Figure 2-7.2.
Warm-Up "Pass" screen.

Working From the Run Mode Screen

After the ta7000R has warmed up to normal operating temperature, press the **Run** key to view the **Main Menu** screen. The upper-left corner of the screen will display "**Idle Mode**" to indicate the ta7000R is not measuring or performing any other actions.

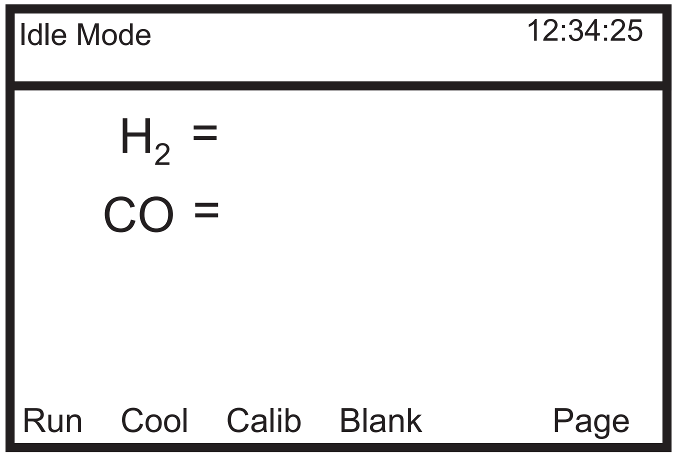

Figure 2-7.3.
Main Menu screen.

Next, to initiate automatic operation of the ta7000R, press the **Run** key again. The upper-left corner of the screen will change to display "**Run Mode**" to indicate the ta7000R is now performing a **Cycle Run**. "**Idle**" is now displayed in the lower-left corner of the screen (Figure 2-8.1).

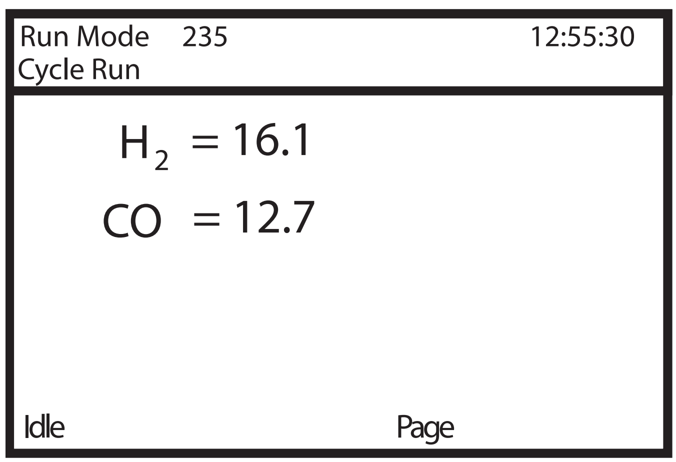

Figure 2-8.1.
Run Mode screen.

The ta7000R will display the time left (in seconds) for the current cycle in the **Status Bar**, next to **Run Mode** (Figure 2-8.2).At the end of each cycle the results will be updated and displayed in the **Main Window** (Figure 2-8.1).

To stop the instrument press the **Idle** key and a ***Pound*** character (' **#** ') will appear next to **Run Mode** in the **Status Bar**. The ' **#** ' character indicates that the instrument will stop running at the end of the next cycle. To continue running the instrument after the **Idle** key has been pressed, simply press the **Idle** key again and the ' **#** ' character will disappear and the instrument will continue to automatically run samples.

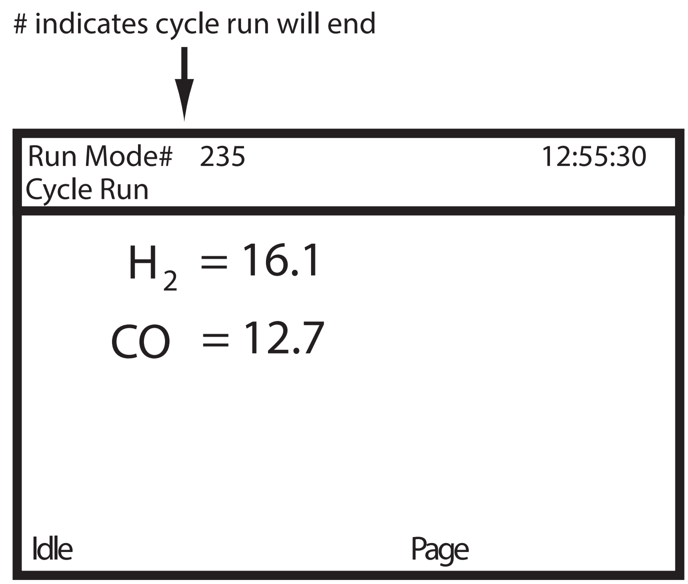

Figure 2-8.2.
Run Mode screen, with ' # ' character, indicating Cycle run will end.

Initiating a Blank Run

Press the **Blank** key to start a *Blank* run. This is a system diagnostic run which tests the internal gas inside the instrument. No external sample will be introduced into the system during this run. This run could help diagnose possible problems with valves or other internal components, or problems with the Carrier gas.

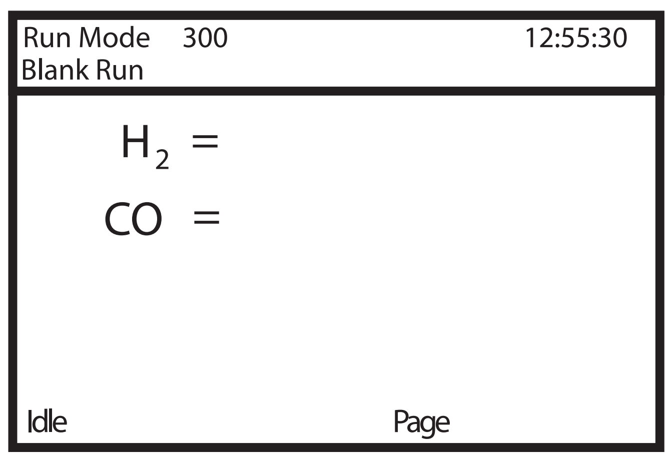

Figure 2-9.
Blank Run screen.

User Interface

Before working from the User Interface, read the entire section "Introduction to the User Interface" to learn how to navigate through the screens to view data, make changes to analyzer settings, and initiate analyzer functions.

This chapter also includes the Operator State Diagram, which is a navigational tool that illustrates the menu structure of the ta7000R Monitor's User Interface.

Introduction to the User Interface

The AMETEK ta7000R Gas Purity Monitor User Interface – which consists of a **Display screen** and **Menu keys** – is located on the ta7000R front panel. The screen displays information and options used to operate the ta7000R. The **Menu keys** correspond with **Menu labels** (names) on the Display screens and are used for all input to the operating system.

The **Status LED** will turn GREEN when the power is On and the system is working properly, and will turn RED when the power is On but system errors exist. Refer to "Error Messages" in Chapter 4.

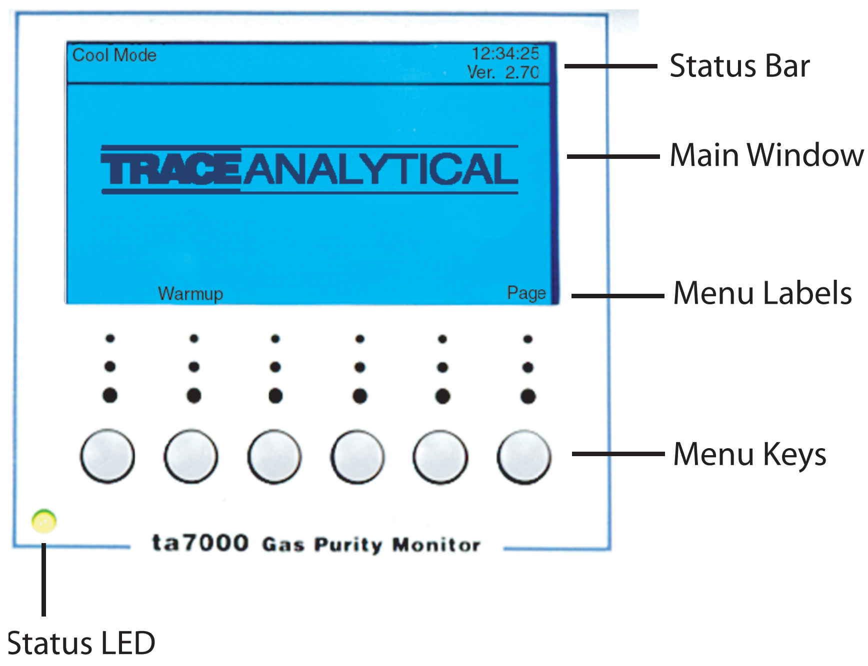

Figure 3-1.
ta7000R Monitor User Interface layout.

Working From the User Interface

While working from the User Interface, the following rules apply:

- From the **Main Window** screen, navigate through the various screens (Menu items) by pressing the corresponding **Menu** keys to select a **Main Menu** option.

- The six (6) push-buttons (called **Menu** keys) the lower portion of the User Interface, correspond with the **Menu** labels (Main Menu items, Sub-Menu items, or commands/functional parameters) at the bottom of the screen. Press the button directly below the Menu item to view information for that screen (to view system information, configure system settings, and initiate system functions).

- Certain screens have **Up** and **Down** arrow keys (press the corresponding button below) that allow you to move the cursor (an asterisk, ' ***** ') to select functions on that screen (Figure 3-4). Selected functions can then be edited or enabled/disabled.

- The *plus* symbol (⊞) next to a function indicates it has been *enabled*, such as the **Print Chromatogram** function (Figure 3-4). These types of functions can be *enabled* or *disabled* using the **Toggle** key (not shown in Figure 3-4).

- The ' **#** ' symbol means that the heater for the corresponding component (i.e., **RGD Bed**) is active,

- Display screen:
  - The LCD Display screen allows you to view all current information and options. The display is separated into three sections.
  - The top portion of the screen is the **Status Bar**, where the instrument displays the current *operating status (current screen being viewed)*, *system time* and *date*, the *system software version*, and other important Status information.
  - The center area is the **Main Window**, where the instrument displays active information and configurable parameters, such as information about the last *analysis run*, *calibration*, or options for *future runs*.
  - The bottom area displays the **Menu labels** (**Menu** items), which either lead to another menu item (or sub-menu item), to access system information and configuration screens, and to initiate system commands. Used with the **Menu** keys. See Figure 3-2 (Operator State Diagram) for an illustration of the menu structure.

Operator State Diagram (Menu Map)

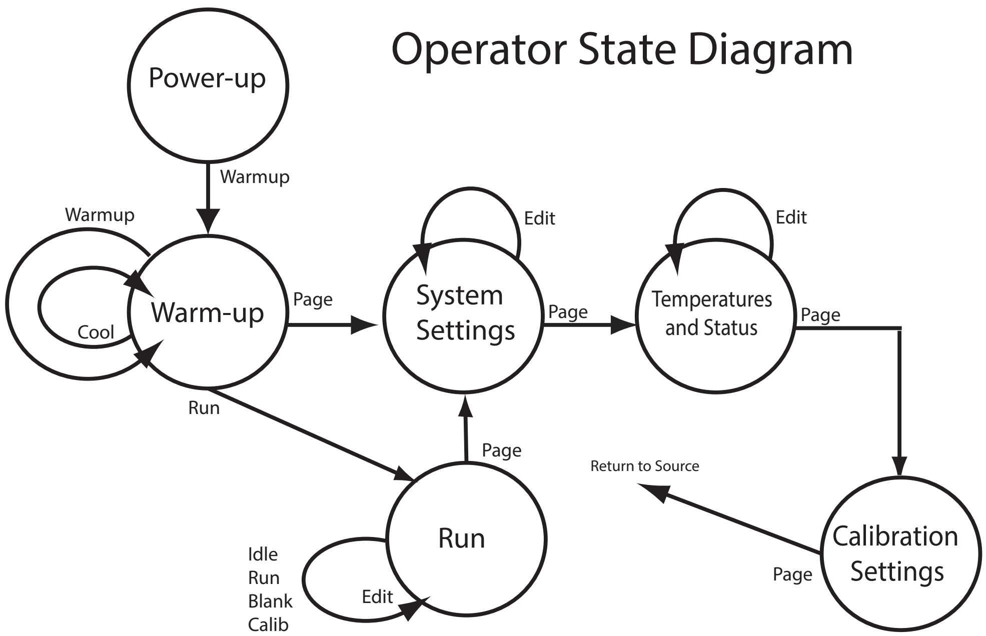

Figure 3-2. Operator State Diagram (Menu Map).

The State Diagram illustrates how the menus are arranged. Each large circle represents a screen that is displayed on the User Interface. The names printed above each arrow represent a Menu label. The arrows indicate the screen that will be viewed next when another Menu label is selected.

Working From the Main Menu

After warm-up has completed successfully the **Main Menu** screen will be displayed. The **Main Menu** is a set of primary choices leading to other menu options.

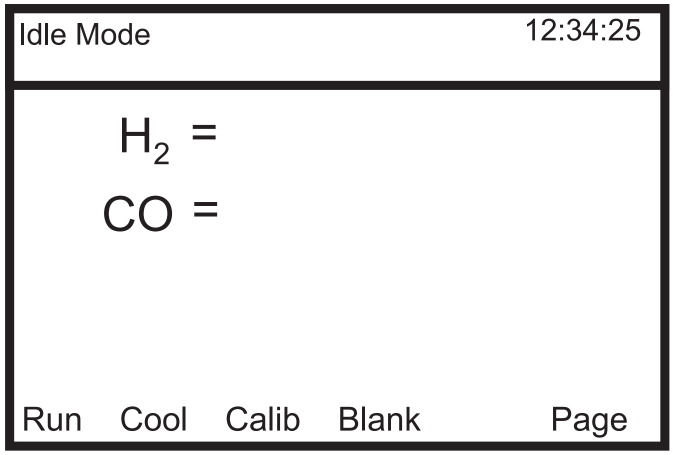

Figure 3-3.
Main Menu screen.

The selections from the **Main Menu** include:

Run
Select this to initiate sample analysis according to event program.

Cool
Select this to reverse the automatic Warm-up cycle and return the instrument to a neutral state.

Calib
Select this to initiate the Calibration gas analysis function (spanning).

Blank
Select this to initiate Zero gas analysis (blanking).

Page
Select this to view the first of three (3) *Information screens*, which display information about the ta7000R, errors, and analytical Trends, and allow you to configure certain ta7000R settings.

Working From the Page Screens

From the **Main Menu**, press the **Page** key to view the **System Settings** screen (Figure 3-4). Press **Page** again to view the **Temperatures & Status** screen, and again to the view the **Calibration Settings** page. Pages that allow changes will show a cursor (' * ') and the **Up**/**Down** arrow keys will be available to use to select the different parameters. An **Edit** command will appear if there are parameters that can be changed.

Some parameter lists have a selection of pre-programmed settings that you can select from. When viewing parameters that have pre-programmed settings, a **Toggle** key will appear (in place of **Print** in Figure 3-4). For example, move the cursor (' * ') to select **Print Chromatograms** and the **Toggle** key will appear. Press the **Toggle** key to toggle between the *enabled* (⊞ is shown) or the *disabled* (⊞ is not shown).

Each screen and its parameters are described in the following pages.

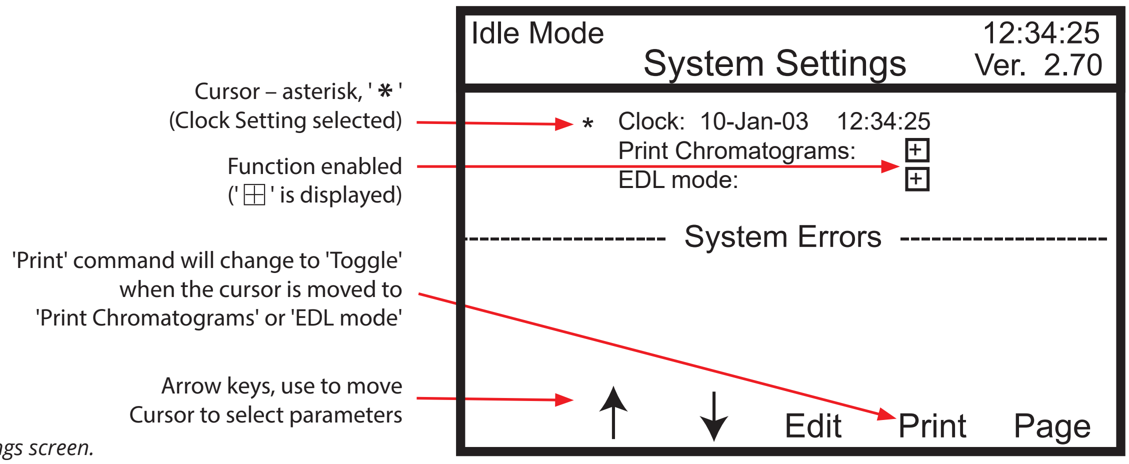

Figure 3-4.
System Settings screen.

Working From the System Settings Screen

The first **Page** screen (**System Settings** screen, Figure 3-4) is for general configuration settings.

Setting the Clock

This screen allows you to set the ta7000R Time and Date. Use the **Up**/**Down** arrow keys to select **Clock**, then press the **Edit** key. Move the cursor (' * ') to the first number and use the **Up**/**Down** arrow keys to make changes. The time format is **DD-MMM-YY HH:MM:SS**, where:
- **DD** is the numeric day
- **MMM** is the first three letters of the month
- **YY** is the last two digits of the year
- **HH** is the hour in 24 hour time format
- **MM** is the minute
- **SS** is the seconds

When finished press the **Esc** key and the time will be set.

Printing Chromatograms

Select this feature to print chromatograms after each run. Use the **Up**/**Down** arrow keys to select **Print Chromatograms** and then press the **Toggle** key to toggle this feature On/Off (enabled/disabled).

Enabling Enhanced Detection Limit (EDL) Analysis Mode

Using the **Enhanced Detection Limit** mode will help eliminate noise that occurs from run-to-run. This parameter will toggle **Enhanced Detection Limit** mode On/Off. Use the arrow keys select **EDL mode** and then press the **Toggle** key to toggle the mode On/Off. **EDL mode** averages the last eight (8) samples point-by-point to get an average sample and chromatogram.

Printing Diagnostic Information

The *Diagnostic* **Print** key appears when setting the clock. Press the **Print** key from this page to print a complete report of all system settings, calibration settings, temperatures and status, and the chromatogram from the last run of the ta7000R. This is a system diagnostic tool which can be used to troubleshoot problems with the ta7000R.

Viewing System Information on the Temperatures & Status Screen

From the **System Settings** screen press the **Page** key to view the **Temperatures & Status** screen, which displays *status information* about the critical heated zones and status of the Detector, and the Carrier and Calibration gas pressures. No user input is allowed on this page.

The ' **#** ' symbol means that the heater for the corresponding component (i.e., **RGD Bed**) is active, and will continue heating until it reaches the **Set** temperature. After reaching **Set** temperature, the ' **#** ' symbol will not be shown, and will only appear when the heater is active again.

```
Idle Mode                                   12:34:25
              Temperatures & Status
                          Meas         Set
       RGD Bed   =  265 #        265
    RGD Column  =  128 #        130
    RGD Window  =    79 #         80
       RGD Lamp  =  On
        RGD Vout  =  36187
        RGD Vsig  =  1978.4
------------------------ Pressure --------------------------
             Carrier  =    60.3
             Calib.    =    75.2
                                                  Page
```

Figure 3-5.
Temperatures & Status screen.

Working From the Calibration Screen

From the **Temperatures & Status** screen press the **Page** key to view the **Calibration** screen, which displays information about the most recent calibration run. From this screen you can also configure Auto-Calibration parameters.

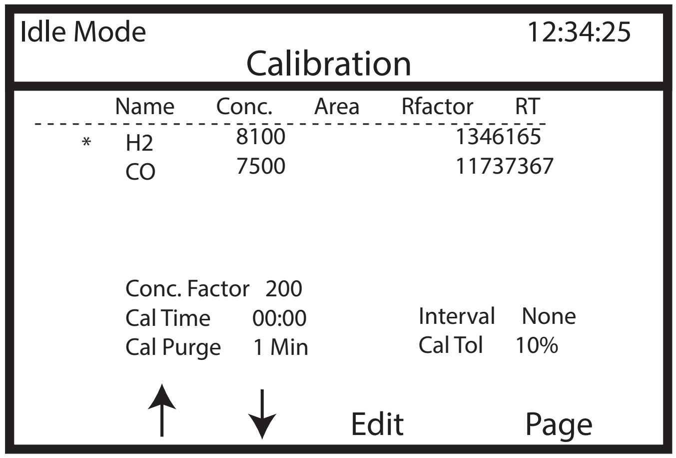

Figure 3-6.
Calibration screen.

Name

This is the gas species to be measured.

Conc.

This is the cylinder concentration (or blend) of the Calibration gas connected to the instrument.

Area

This is the area of the last analysis run for each gas type.

Rfactor

This is the *Response Factor* created by the most recent (or previous) calibration cycle. **Rfactor** is used to generate the area.

RT

This is the Retention Time, which is the time point of the peak from the start of the most recent analysis run.

Conc. Factor

This is a value that is preset at the factory. This number represents the internal gas blender ratio.

Setting Auto-Calibration Parameters

The **Calibration** screen (Figure 3-6) is also used to set up automatic calibrations. The ta7000R Monitor does not need Zero calibration. An external Calibration gas source must be connected to the **AUX** port on the ta7000R Rear Panel of the ta7000R marked. Refer to the Gas Calibration specifications in Chapter 5.

Cal Time

This is the time of day of the automatic calibrations. This time is in 24-hour format **HH:MM**, where **HH** is hour and **MM** is minute.

Interval

This is the time interval (in days) between automatic calibrations. This parameter has preset intervals to choose from. Calibrations can be run at intervals of *1 day*, *7 days*, *14 days*, and *30 days*. To change these settings, select **Interval** and the **Toggle** key will appear. Press the **Toggle** key to select a preset value. Setting the interval to *None* will disable Auto-Calibrations.

Cal Purge

This is the amount of time (in minutes) the ta7000R opens the purge valve and allows Calibration gas to flow through and purge the line. The **Cal Purge** parameter has preset values of *1 minute* (factory default), *6 minutes*, *13 minutes*, and *21 minutes*. The **Purge** time must allow enough time to fully purge the supply line of the Calibration gas. For example, if the Calibration Bottle is located far from the analyzer, a longer purge time must be used. Failure to completely purge the supply line will result in significant discrepancies between the *real* concentration and the *reported* concentration.

Cal Tol

This is the tolerance of the calibration run. If the calibration difference from the previous calibration run is within the set tolerance range the instrument will automatically update the calibration response factor.

If the calibration settings are not within the set tolerance range, the **Status LED** will turn RED and the settings will not be updated. To manually update these settings, move the cursor in front of the gas name and press the **Accept** key. For information about how to permanently save the changes, refer to "Saving Changes to Non-Volatile RAM" in this chapter.

Initiating a Manual Calibration

From the Main Menu, press the **Calib** key to start a Manual calibration run of the ta7000R. The ta7000R does not need Zero calibration. An external Calibration gas source must be connected to the **AUX** port on the ta7000R Rear Panel. Refer to the Specifications chapter for Calibration gas specifications.

In **Calibration** mode the instrument first checks for Calibration gas pressure. Next the instrument purges the Calibration gas line for the duration that has been entered. Finally the ta7000R performs three calibration runs. The first of these three calibrations is discarded. The second and third runs are used to generate the calibration response factor.

When the calibration cycle is finished the **Status LED** will turn RED, indicating that there has been a change to system settings. To view these changes press the **Page** key twice to view the **Calibration** screen. Move the cursor to the first gas. The percent change since the last calibration will appear in the right corner below the time. If the percent change is acceptable, press the **Accept** button. This will save the change in temporary memory. Repeat this process for each gas species.

To finalize the calibration and make the changes permanent, the changes will need to be saved into non-volatile RAM. See "Saving Changes into Non-Volatile RAM" in this chapter for information about how to do this.

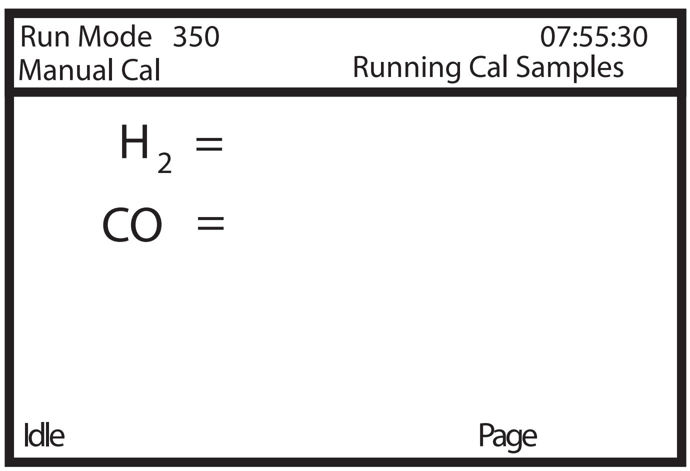

Figure 3-7.
Calibration Run screen and Calibration screen.

NOTE

Any changes made and not saved into non-volatile RAM will be lost if the instrument is turned Off or power is interrupted. Any changes accepted in non-volatile RAM are permanent and cannot be undone (see "Saving Changes into Non-Volatile RAM" in this chapter for more information).

Saving Changes to Non-Volatile RAM

After changes have been made by Manual calibration or on any of the **Page** screens, the system LED will turn RED. This indicates that there is a system error or system state change.

The ta7000R must be in **Idle** or **Warm-up** mode before it will accept or save changes into non-volatile RAM.

Use the **Page** key to move to the **System Settings** screen. Any changes made will be displayed under **System Errors** on the **System Settings** screen (Figure 3-4). Use the **Up**/**Down** arrow keys to move the cursor to the desired selection and press the **Accept** key (appears when applicable). Next, press the **Save** key to save the changes into non-volatile RAM.

NOTE

*Any changes made will be lost if the instrument is turned Off before the changes have been accepted and saved on the **System Settings** screen.*

Powering Down the ta7000R Gas Purity Monitor

Powering down the ta7000R Monitor for maintenance or for any other reason is very simple.

CAUTION

Carrier and Sample gas to the ta7000R must not be shut off until Column and/or Detector temperatures are below 50 °C.

CAUTION

If the ta7000R Monitor must be powered down due to an emergency or for any safety reason, simply switch the ta7000R AC Power Switch – located on the ta7000R Rear Panel – to the Off position.

To power down the ta7000R under normal operating conditions:

1. From the ta7000R User Interface **Main Menu** press the **Idle** key to stop analysis.

2. Shut off all support gases except the Carrier gas.

3. Press the **Cool** key and allow the ta7000R to cool down until all temperatures are below 50 °C.

4. Switch Off the AC power to the ta7000R and all other components.

5. Shut off the Carrier gas.

Troubleshooting

Error Messages are viewed and acknowledged on the **System Settings** screen. When the **Status LED** on the front panel is RED it indicates that there are system errors or the status of the ta7000R Gas Purity Monitor has changed. The **System Status** screen displays error messages that the system has encountered. From the **System Settings** screen, check the **System Errors** area for error messages (alarms) that have been detected by the ta7000R Monitor.

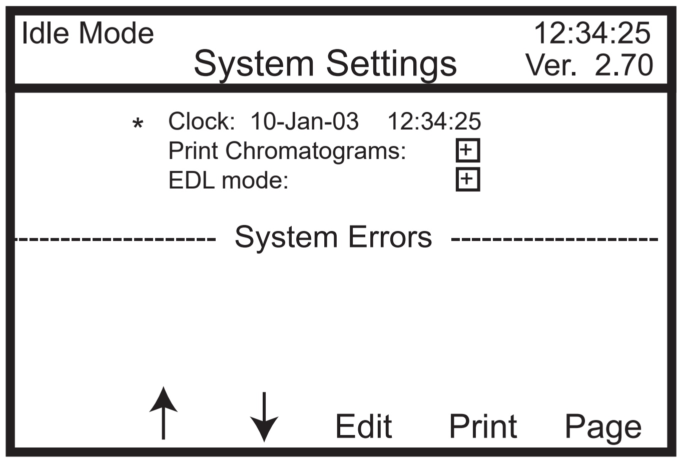

Figure 4-1.
System Settings screen.

Error Messages

This section lists the Error messages that can be triggered by the system, to alert you to potential or impending problems with the ta7000R. Descriptions of the Errors, along with possible trigger conditions, and corrective action to take to correct the Errors, are also included.

Error Condition / Description / Corrective Action
Chassis Controller Error Internal electronics failure. ***Corrective Action:*** Contact AMETEK Service or qualified service representative for troubleshooting assistance.
Detector Controller Error Internal electronics failure. ***Corrective Action:*** Contact AMETEK Service or qualified service representative for troubleshooting assistance.

Error Condition / Description / Corrective Action
Temperature Out of Range Either the temperature zone is 2 degrees over the set point, or the temperature zone has been disabled. ***Corrective Action:*** From the User Interface, check the Temperature Measure (**Meas**) and Setpoint (**Set**) values to see if the **Meas** value is ≥ the **Set** value. Refer to "Starting the ta7000R in the Warm-Up Cycle" in Chapter 2.
Vsig Out of Range (Lamp OFF ?) During the Warm-up cycle the analyzer performs a system test of the RGD lamp. If the RGD lamp is not within operating range this error will be displayed. ***Corrective Action:*** Check the support gases, and then perform the Warm-up procedure. Refer to "Starting the ta7000R in the Warm-Up Cycle" in Chapter 2.
Carrier Pressure Out of Range External carrier pressure is not within specified limits. ***Corrective Action:*** • Verify the external carrier pressure supply; adjust the pressure if necessary. • Check the Carrier Gas tank to ensure there is an adequate supply.
Analog Signal Zeroing Error The instrument has failed to Zero the detectors analog signal. ***Corrective Action:*** Contact AMETEK Service or qualified service representative for troubleshooting assistance.
Vsig Minimum Voltage Limit This fault will occur if the RGD detector does not have the minimum Vsig (1000 mv) for proper analysis. Typical Values are 1750–2250. Vsig cannot be above 2500. ***Corrective Action:*** Incorrect values could indicate that the RGD lamp is defective or has degraded due to normal usage.
Calib Pressure Out of Range Calibration gas pressure is not within normal operating range. ***Corrective Action:*** • Check the Calibration Gas requirements in the Specifications chapter, and check the Calibration Gas tank to ensure there is an adequate supply. • Adjust the pressure if necessary.

Error Condition / Description / Corrective Action
Event Program Error Internal event program has not been correctly entered, is missing, or has been corrupted. ***Corrective Action:*** Contact AMETEK Service or qualified service representative for troubleshooting assistance.
Printer Error Printer is not connected, is turned Off, or is not functioning properly. ***Corrective Action:*** • Check to ensure a printer is connected properly at the printer and the COM port on the ta7000R Rear Panel. • Check the printer to ensure it has been powered On. • Check the printer cable for damage. • Test the printer to ensure it is working properly. • Check to ensure the printer has paper.
Database Change, Update NV RAM This fault will occur if any of the system parameters have been changed. The most common system parameters that are changed are the response factor due to performing a calibration run. This fault can only be updated during the **Warm-up** or **Idle** modes. ***Corrective Action:*** • Place the ta7000R into **Warm-up** mode to check if this updates and clears this error. • Place the ta7000R into **Idle** mode to check if this updates and clears this error. • If changes to the System Settings have been made, make sure they have been saved. Refer to "Saving Changes to Non-Volatile RAM" in Chapter 3 for information about how to permanently save the changes.

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Specifications

Model Designation and Detection Limit Specifications

ta7000R Standard Model

Sample Gas	Model	Lower Detection Limit	
		H_2 PPB	CO PPB
Nitrogen (N_2)	ta7000R-N2	<0.5	<0.5
Argon (Ar)	ta7000R-Ar	<0.5	<0.5
Helium (He)	ta7000R-He	<0.5	<0.5
Oxygen (O_2)	ta7000R-O_2	<0.5	<0.5

Performance Specifications

Specification	Description
Accuracy, EDL Mode (Enhanced Detection Limit Mode)	Greater of +0.25 PPB H_2; +0.25 PPB CO; +10 of reading
Range	0–199.9 PPB
Response Time	5 minutes to 99 % response 30 minutes to 75 % response in EDL Mode. Response time is independent of sample concentration.
Ambient Operating Temperature	16 °C to 32 °C (60 °F to 90 °F)
Sample Compatibility	Specific models available for N_2, Ar, He, or O_2, or H_2 analysis.
Resolution, Display	0.1 PPB
Resolution, Communication Ports	0.01 PPB

Sample/Carrier Gas Supplies

Specification	Description
Inlet Fitting	1/4-inch male face seal fitting*
Inlet Pressure Range	4.8–6.1 BAR (70–90 PSIG)
Inlet Pressure Stability	±2 %, UHP regulator required
Vent (Return) Pressure	Atmospheric pressure vent is optimal, ±0.5 PSIG maximum
Flow Rate	300 cc/minute minimum, sample bypass at 50 cc/minute
Temperature	16 °C to 38 °C (60 °F to 100 °F), optimum when maintained ±2 °C
Maximum Impurity Levels	200 PPB Moisture, CO_2, Hydrocarbons
** 1/4-inch face seal x 1/16-inch adapter fittings are available from AMETEK.*	

Gas Ports

Specification	Description
Carrier/Sample Inlet	1/4-inch VCR compatible
Aux (Calibration)	1/16-inch VICI compression
Sample Outlet	1/16-inch VICI compression
Actuator Gas	1/8-inch VICI compression

Actuator Gas

Specification	Description
Inlet Fitting	1/8-inch VICI compression fitting
Inlet Pressure Range	4.8–10.2 BAR (70–150 PSIG)
Gas Type	Inerts (Nitrogen, Argon, Helium), 7 nines or better or CDA, dewpoint < -65 °C
Gas Type (for ta7000R-O_2 only)	Inerts (Nitrogen, Argon, Helium), 7 nines or better

Calibration Gas

Specification	Description
Inlet Fitting	1/16-inch VICI compression fitting
Cylinder Concentration	5–10 PPM H_2, CO, balance Nitrogen
Cylinder Volume	100 cubic feet minimum (2800 L)
Supply Pressure	5.4–6.1 BAR (80–90 PSIG)
Consumption	Approximately 1.0 L per calibration (4–8 L/month), automatic shut-off between calibration.

Chassis

Specification	Description
Dimensions	18 cm (7") H x 43 cm (16.8") W x 67 cm (26.5") D
Weight	15.9 kg (35 lb)
Power	100–120 VAC, 50/60 Hz 200–240 VAC, 50/60 Hz

Outputs

Specification	Description
Display	LCD graphics, backlit, 100 mm x 150 mm
Printer Port	Concentration, chromatogram, and diagnostic reports
Serial PLC Port	Concentration data and general alarm via RS-232
4–20 mA (optional)	Concentration signals

ta7000R PLC Output Format

The concentration data, status, and other detail information is sent from Port 2 of the ta7000R automatically at the end of every run. The format used is called Comma Separated Variable (CSV), a common MS Excel format.

The fields within each record are defined below. Fields 1–6 are the record identification fields and Fields 7–8 are the impurity fields.

The next impurities will be at Fields 9–10, 11–12, 13–14, 15–16, and 17–18. This string is terminated by a carriage return (CR), and line feed (LF) characters.

The parameters are 9,600 Baud, 8 Data Bits, 1 Stop Bit, and No Parity.

Field 1	Date & Time of RUN
Field 2	Analyzer Serial #
Field 3	Run/Maintenance
Field 4	EDL/Single Analysis
Field 5	N/A
Field 6	ta7000 Error Status
Field 7	Impurity Name
Field 8	Concentration in PPB x 100

Each field is defined as:
DDDD-DD-DD TT:TT:TT,#,R,S,A,EEEEEEEE,NNNNN,C, …

DDDD-DD-DD	=	Date (2000-03-23)
TT:TT:TT	=	Time (12:23:44)
#	=	Analyzer Serial Number
R	=	Run or Maintenance (Calibration) Mode
A	=	EDL or Single Analysis Mode
S	=	N/A
EEEEEEEE	=	Eight digits of error status (0 = Not Error, 1 = Error)

1. General Alarm (MSD)
2. Spare
3. Spare
4. Spare
5. Spare
6. Spare
7. Spare
8. Spare (LSD)

NNNNN	=	Name of impurity
C	=	Concentration in PPB x 100

An example of this output string is:
2001-08-16 14:54:13,54,M,E,2,00000000,CH4 ,441,CO2 ,5332,NMHC,172

Communication Ports

The ta7000R has three (3) communication ports (COM 1, COM 2, COM 3), which are 9-pin male D-type connectors. Refer to Chapter 2 for more information.

Parallel Printer Port (LPT1)

The Parallel Printer Port uses a standard 25-pin female D-type connector. The printer port follows standard parallel printer protocols. Refer to Chapter 2 for more information about printer requirements.

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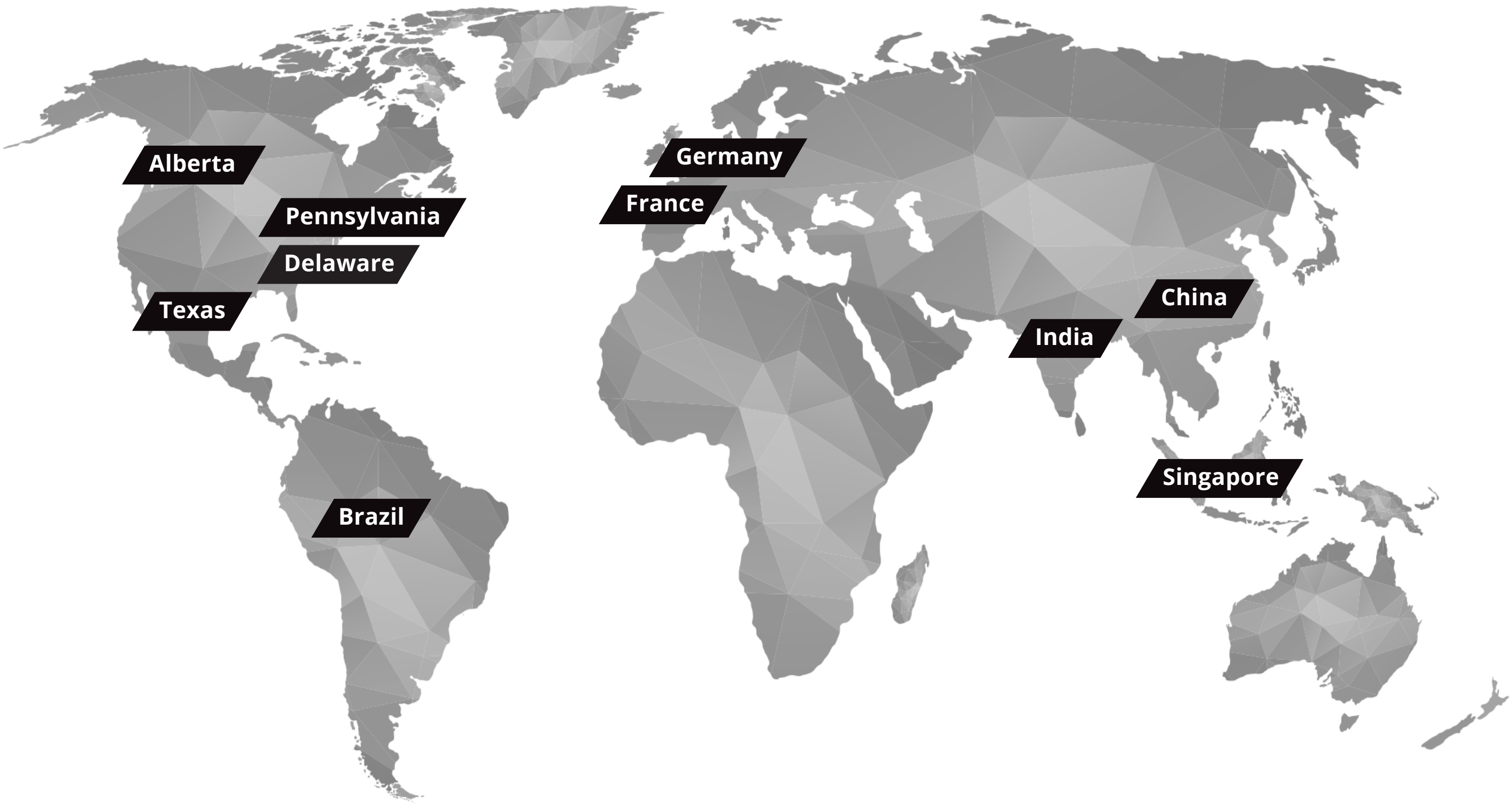

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