



# Anatomy of a Fixed System

Rev. 6-24-14



## What is a Fixed System?

- A fixed system also known as stationary system or continuous monitor, is a gas detection system designed to monitor gas on a continuous basis. This system may be required to activate horns, lights, shut down a process, evacuate a building or other work that may be required. RKI's core competencies include:



**Combustible Gas**



**Oxygen Content**



**Toxic Gas**



## Fixed System Applications

- Refineries
- Chemical & Petrochemical Plants
- Water & Wastewater
- Fuel Storage
- Breweries
- Wineries
- Oil and Gas



3



## Fixed System Uses

- Room air monitoring for employee protection
- Fence line or perimeter monitoring
- Process control
- Gas cabinet exhaust monitoring
- Industrial point gas monitoring



4



## The Building Blocks

Selecting the right components



## Gas Detector or Transmitter

- Select the appropriate gas detector or transmitter for the gas you need to detect
- Gas detectors/transmitters can be provided in a variety of configurations to meet your needs:
  - Explosion proof
  - Non explosion proof
  - Diffusion (blind), either direct connect or 4-20 mA communication



## Gas Detector or Transmitter

- Diffusion (non-intrusive), 4-20 mA communication, Modbus
- Sample draw, either direct connect or 4-20mA communication or PoE

7



## Controller

- Select the appropriate controller for your application
  - RKI Controllers are not always used in fixed system applications, however they perform a vital function
  - If an RKI Controller is not used, transmitters can be wired to a PLC or DCS

8





## Controller

- RKI Controllers provide the following:
  - Regulated power to each gas transmitters or direct connect sensor (model dependent)
  - A readout of gas concentration for each channel
  - Receives signal from transmitters or direct connect sensors
  - Audible and visual alarms

Rev. 3/15/06

9



## Controller

- Relay contacts for performing specific work functions
- Recorder output for trending (optional on the Beacon 800)
- Can charge back-up battery systems if needed
- May be installed in a NEMA 4X housing suitable for industrial use

10



## Controller Selections

- Beacon 110, single sensor
- Beacon 200, one or two sensors
- Beacon 410, one to four sensors
- Beacon 800, one to eight sensors
- RM-5000, from 2 points to 12 points



11



## Accessories

- Choosing the proper accessory will help complete the system
- Horns
  - For warning or evacuation
- Strobes
  - To alert workers to danger
- Solenoid valves
  - Shut off leaking gas supply

12



## Accessories

- Auto dialers
  - Notify authorities
- Recorder/Data logger
  - Document readings and trends
- Back up battery
  - Supplies back-up power to system and enunciators

13



## Accessories

- Air Aspirated Sample Draw Adapter
  - Sample from duct or remote location
  - Runs from compressed air only
- J-Tube
  - Self draining moisture trap
- Water Trap
  - Trap liquids

14



## Accessories

- Remote calibration adapters
  - Simplifies calibration for sensors installed on ceilings
- Humidifier tube
  - Adding humidity to dry gas for calibrating MOS type sensors
- Splash guards
  - To protect sensors from wet environments

Rev. 3/15/06

15



## Calibration Kits

- Required for performance verification and to calibrate sensor/transmitter assemblies
- Select proper kit for each gas
- Do not use other manufacturers regulators, test cups or tubing

Verify age of gas before use by looking at the "Best When Used By" date.

Many gases have short shelf life such as:  
NO<sub>2</sub> - 6 months and Chlorine - 9 months



16



## Internal Power Supply

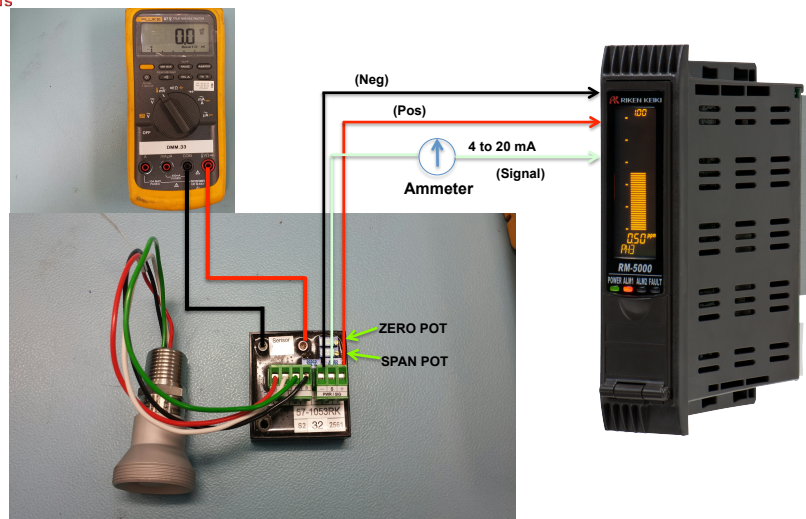
- Do not use the internal power supply to power external devices such as horns, strobes or valves
- Many external devices produce electrical noise that can adversely affect the operation of your monitor



17



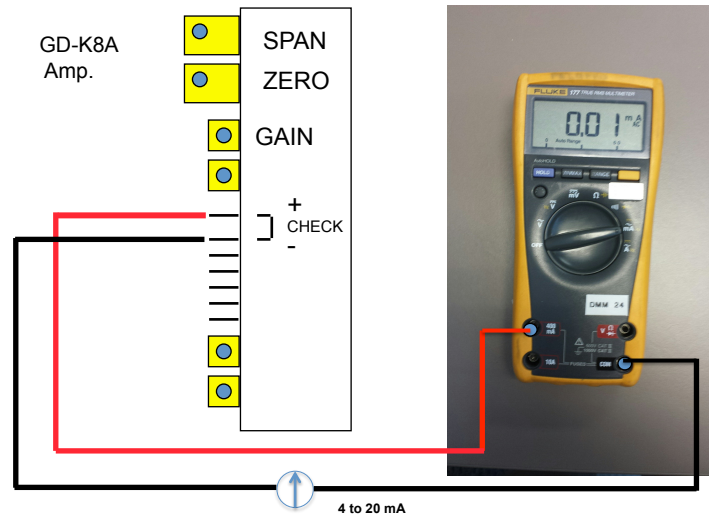
## 4-20 mA Communication



18



## 4-20 mA Communication



19 19



## Useful Formulas

- Standard S-Type Transmitter
  - Oxygen:  $20.9/\text{full scale} \times 400 + 100$ 
    - Oxygen calibration setting in mV
  - Combustible & Toxic:  $(\text{Cal gas}/\text{full scale}) \times 400 + 100$ 
    - Combustible/toxic span setting in mV
- Current Source Amplifier
  - Toxics:  $(\text{Cal gas}/\text{full scale}) \times 16 + 4$ 
    - Toxic span setting in mA

20

## 10.0 Applications Worksheet

### 10.1 Description And Explanation of Importance:

The Applications Worksheet is a guide which compiles all of the information normally necessary to consider to select and design a gas monitoring system. The Worksheet questions will help define the application parameters so that the pertinent considerations can be included. Please take care to fill out the Applications Worksheet completely and accurately. Feel free to contact RKI if you need assistance or have any questions regarding the worksheet or how to consider the information on it. When contacting RKI for assistance, please first fill out the worksheet as much as you can and Fax it to RKI at (510) 441-5650 prior to calling so that the RKI Systems Applications Engineers can best serve you.

### 10.2 How to Fill Out an Applications Worksheet:

Please make a copy of the Applications Worksheets in this manual, and return the originals to the binder for later use. The worksheet consists of 4 parts:

- 10.2.1 Customer information, description of the general application, and what gases and ranges you need to detect. Please fill this information in carefully since it is critical in helping to select the proper system.
- 10.2.2 Conditions at the sensor location. Please describe the environmental conditions at the sensing location. The worksheet asks questions and has blanks to fill in the appropriate information. The information on this sheet will assist both you and RKI to select the most appropriate sensor solution for your application.
- 10.2.3 Conditions at the controller. Please decide where you would like the controller to be installed. In many cases the controller is not located in the same area as the sensor, so it is important to evaluate the conditions where the controller will be located to select an appropriate controller.
- 10.2.4 Sketch a drawing of the area to be monitored on the graph paper section of the Worksheet. Include dimensions of the area to be monitored (estimate if necessary), and include the location of the equipment, tank, piping, etc. , that is the possible source of the gas leak. This sketch will help to select the best location for the gas sensors, and the number of gas sensors.

When the worksheet is completed to the best of your ability, Fax it to RKI Instruments Fixed Systems Applications Engineering at (510) 441-5650 (or your local distributor) for assistance selecting and pricing the best system for your use.

## 10.0 Applications Worksheet

Company: \_\_\_\_\_

Date: \_\_\_\_\_

CONDITIONS AT CONTROLLER (Please use a separate sheet for each type of controller, application or location)										
Location:				Location#:						
Number of detectors in system:										
Describe controller site:										
Location Requirements					Hazard Rating					
Indoor <input type="checkbox"/>		Outdoor <input type="checkbox"/>			Hazardous <input type="checkbox"/>		Non Hazardous <input type="checkbox"/>		Restricted Access <input type="checkbox"/>	
Inaccessible <input type="checkbox"/>		Duct or Vessel <input type="checkbox"/>			XP Rating:		Class:		Division: Group:	
Environment					3rd Party approval Req'd Yes <input type="checkbox"/> No <input type="checkbox"/>					
					Approval Needed: FM <input type="checkbox"/> UL <input type="checkbox"/> CSA <input type="checkbox"/> Other:					
Temperature:		Minimum:		Maximum:		Cycle:		Available Utilities		
		Humidity:		% RH:		Electrical:		Volts AC: Volts DC: Hertz:		
		Condensing <input type="checkbox"/>		Non Condensing <input type="checkbox"/>						
Dust/Mists:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, which?		Compressed Air:		PSIG: Volume: Filtered: Yes <input type="checkbox"/> No <input type="checkbox"/>		
Corrosives:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, state types.		Signal Required:		4-20 mA RS-232: RS-485: Other:		
Vibration:		Yes <input type="checkbox"/> No <input type="checkbox"/>				Interferences:		Radio: EMI: Poisons:		
Splash/Washdown:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, which?						
Replacing existing equipment?					Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, explain why					
Back-up power supply <input type="checkbox"/>					Repeater display <input type="checkbox"/> Relays <input type="checkbox"/> Alarm delay needed <input type="checkbox"/> Alarms <input type="checkbox"/> Audible <input type="checkbox"/> Visual <input type="checkbox"/>					

CONDITIONS AT DETECTOR (Please use a separate sheet for each type of controller, application or location)										
Location:				Location#:						
Target gas:										
Describe detector / transmitter site:										
Operate other equipment? If yes, state type.										
Any special relays?										
Location Requirements					Hazard Rating					
Indoor <input type="checkbox"/>		Outdoor <input type="checkbox"/>			Hazardous <input type="checkbox"/>		Non Hazardous <input type="checkbox"/>		Restricted Access <input type="checkbox"/>	
Inaccessible <input type="checkbox"/>		Duct or Vessel <input type="checkbox"/>			XP Rating:		Class:		Division: Group:	
Environment					3rd Party approval Req'd Yes <input type="checkbox"/> No <input type="checkbox"/>					
					Approval Needed: FM <input type="checkbox"/> UL <input type="checkbox"/> CSA <input type="checkbox"/> Other:					
Temperature:		Minimum:		Maximum:		Cycle:		Available Utilities		
		Humidity:		% RH:		Electrical:		Volts AC: Volts DC: Hertz:		
		Condensing <input type="checkbox"/>		Non Condensing <input type="checkbox"/>						
Dust/Mists:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, which?		Compressed Air:		PSIG: Volume: Filtered: Yes <input type="checkbox"/> No <input type="checkbox"/>		
Corrosives:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, state types.		Signal Required:		4-20 mA RS-232: RS-485: Other:		
Vibration:		Yes <input type="checkbox"/> No <input type="checkbox"/>				Interferences:		Radio: EMI: Poisons:		
Splash/Washdown:		Yes <input type="checkbox"/> No <input type="checkbox"/>		If yes, which?						
Replacing existing equipment?					Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, explain why					



## 10.0 Applications Worksheet

Optional / Accessories:		
	Yes	
Back-up power supply:		
Repeater display:		
Alarms delay needed:		
Splash guard:		
Filter:		
Hydrophobic:		
Particulate:		
Sample-draw adapter:		
Comp. air/electric pump		
Sample conditioning:		
Heated/cooled? If yes, which?		
Alarms:		
Audible		
Visual		
Display:		
Spare parts:		
Start-up service:		
Service contract:		

## 10.0 Applications Worksheet

### Sketch:

(Please include rough dimensions, note significant features and equipment, suggested sampling sites, etc.)

This image shows a full page of blank graph paper. The grid consists of small, equal-sized squares formed by thin black lines. There are 20 columns and 20 rows of squares, creating a total of 400 square units. The grid covers the entire area of the page, leaving no margins or other markings.



## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.