RFD - 99-002514

Sandy, Alexander

From: Mary.Gerschefski@shell.com
Sent: Tuesday, January 29, 2019 9:19 PM
To: Sandy, Alexander
Cc: Orris, Edward; Gorog, Mark; Doug.Scott@shell.com
Subject: RE: [External] Follow-Up: Leak Detection for Falcon Pipeline
Attachments: Response to PA DEP January 2019.docx

Alex,

This attached file version should be accessible – let me know if you run into issues.

Mary

Mary Gerschefski, P.E.
Project HSSE Manager – Falcon Ethane Pipeline Project

Shell International Exploration and Production
WCK A-274F
150 North Dairy Ashford
Houston, Texas 77079
Tel: +1 832 762 2585
Cell: +1 281 799 5385

From: Sandy, Alexander <asandy@pa.gov>
Sent: Tuesday, January 29, 2019 7:56 AM
To: Gerschefski, Mary G SIEP-PTS/CS <Mary.Gerschefski@shell.com>
Cc: Orris, Edward <eorris@pa.gov>; Gorog, Mark <mgorog@pa.gov>; Scott, Doug D SPLC-DPE <Doug.Scott@shell.com>
Subject: RE: [External] Follow-Up: Leak Detection for Falcon Pipeline

Hi Mary,

Thanks for the response. I haven't had a chance to review the details, but I did notice that I can't open the attachments in the .pdf document. Can you send them as separate attachments, or some other way. Thanks,

Alex

Alexander Sandy | Air Quality Engineering Specialist
Department of Environmental Protection | Air Quality
Southwest Regional Office
400 Waterfront Drive | Pittsburgh, PA 15222
Phone: 412.442.4028 | Fax: 412.442.4194
www.dep.pa.gov

From: Mary.Gerschefski@shell.com <Mary.Gerschefski@shell.com>
Sent: Monday, January 28, 2019 8:49 AM
To: Sandy, Alexander <asandy@pa.gov>
Cc: Orris, Edward <eorris@pa.gov>; Gorog, Mark <mgorog@pa.gov>; Doug.Scott@shell.com
Subject: [External] Follow-Up: Leak Detection for Falcon Pipeline

ATTENTION: *This email message is from an external sender. Do not open links or attachments from unknown sources. To report suspicious email, forward the message as an attachment to CWOPA_SPAM@pa.gov.*

Alex,

This is a follow-up from our conversation on 19 December, please find attached details on the leak detection methods are planned for the Falcon pipeline.

Regards,

Mary Gerschefski, P.E.
Project HSSE Manager – Falcon Ethane Pipeline Project

Shell International Exploration and Production
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150 North Dairy Ashford
Houston, Texas 77079
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28 January 2019
Falcon Project – Response to questions related to Air RFD

Teleconference with PA DEP and Shell Falcon team was held on 19 December 2018 to discuss the Falcon Request for Determination. During the meeting, the following topics were discussed as it relates to monitoring the pipeline operators for leaks: Operator Rounds, leak detection at the facilities, and leak detection over the pipeline.

PA DEP requested for the Falcon project to provide more details related to Operator Rounds, leak detection at the facilities, and leak detection over the pipeline. The following is a summary of the systems and programs for these elements.

Operator Rounds

Station checks will be performed at a minimum of weekly. During a station check the technician/operator will review station connections for possible leaks and document on station checklist. Station checklist will be available for review and auditing. See attachment for reference.

Falcon Weekly Leak Inspection Checklist

Leak Detection at the Facilities

There are two types of leak detection at the facilities: hydrocarbon gas detection and facility pressure monitoring.

We use open path hydrocarbon gas detectors that form a perimeter around each facility. Attached is the data sheet for the gas detection to be located at each meter site. When hydrocarbon gas is detected, the Pipeline Controllers in Houston Control Center will be alerted via an alarm. The Controllers will investigate the alarm and take action accordingly, including a pipeline shutdown if required.

safeye-quasar-900-data-sheet-en-us-58

Pressure monitoring devices will be located at each meter site to sense large drops in pressure that would indicate a leak. For a normal operating pressure of 1100 psig, the meter sites pressure devices will alarm to the Houston Control Center when pressure drops by approximately 15%. An automated shutdown is initiated at the meter sites when the pressure drops another 10% beyond the alarm set point. Attached is the data sheet for the pressure monitoring devices.

product-data-sheet-rosemount-3051s-s

28 January 2019
Falcon Project – Response to questions related to Air RFD

Leak Detection over the Pipeline

The Falcon pipeline will employ monitoring of pressure and flow over the entire span of pipeline with the aim of quickly identifying potential leaks.

Shell Pipeline plans on installing two leak detection systems on the Falcon Pipeline. Atmos Pipe is a third-party software leak detection system that uses statistical analysis and mass balance principles to detect releases. The Atmos Pipe software is hosted on redundant servers that are connected to the Supervisory Control and Data Acquisition (SCADA) system at each SCADA location. Also, a modified volume balance algorithm will be used in addition to the Atmos system. The modified volume balance algorithm is organic to the SCADA system. Based on similar pipelines that are currently in operation for Shell Pipeline, the Atmos Pipe leak detection system for Falcon is estimated to detect leaks that are 3% of the flow over a 1-hour period and the modified volume balance is estimated to detect leaks that are 5% of the flow in one hour. Once a leak is detected the Pipeline Controllers in the Houston Control Center will be alerted via an alarm. The Controllers will investigate the alarm and take appropriate action, including a pipeline shutdown and isolation if required.

The Houston Control Center includes redundancy to assist in achieving reliability. There are redundant communications paths, one using satellites and one using cellular routers to ensure that field data can always be received. The system includes redundant private data networks as well. The SCADA system is housed in quadruple redundant servers located in two separate secure locations each with back-up electrical power. The Houston Control Center itself has two back up locations; one short-term for events like a building fire alarm and a long-term back up for large weather events such as a hurricane.

In conclusion, comprehensive leak detection for the Falcon pipeline is achieved through a combined approach of pressure/flow monitoring, hydrocarbon gas detection, and weekly onsite inspection.

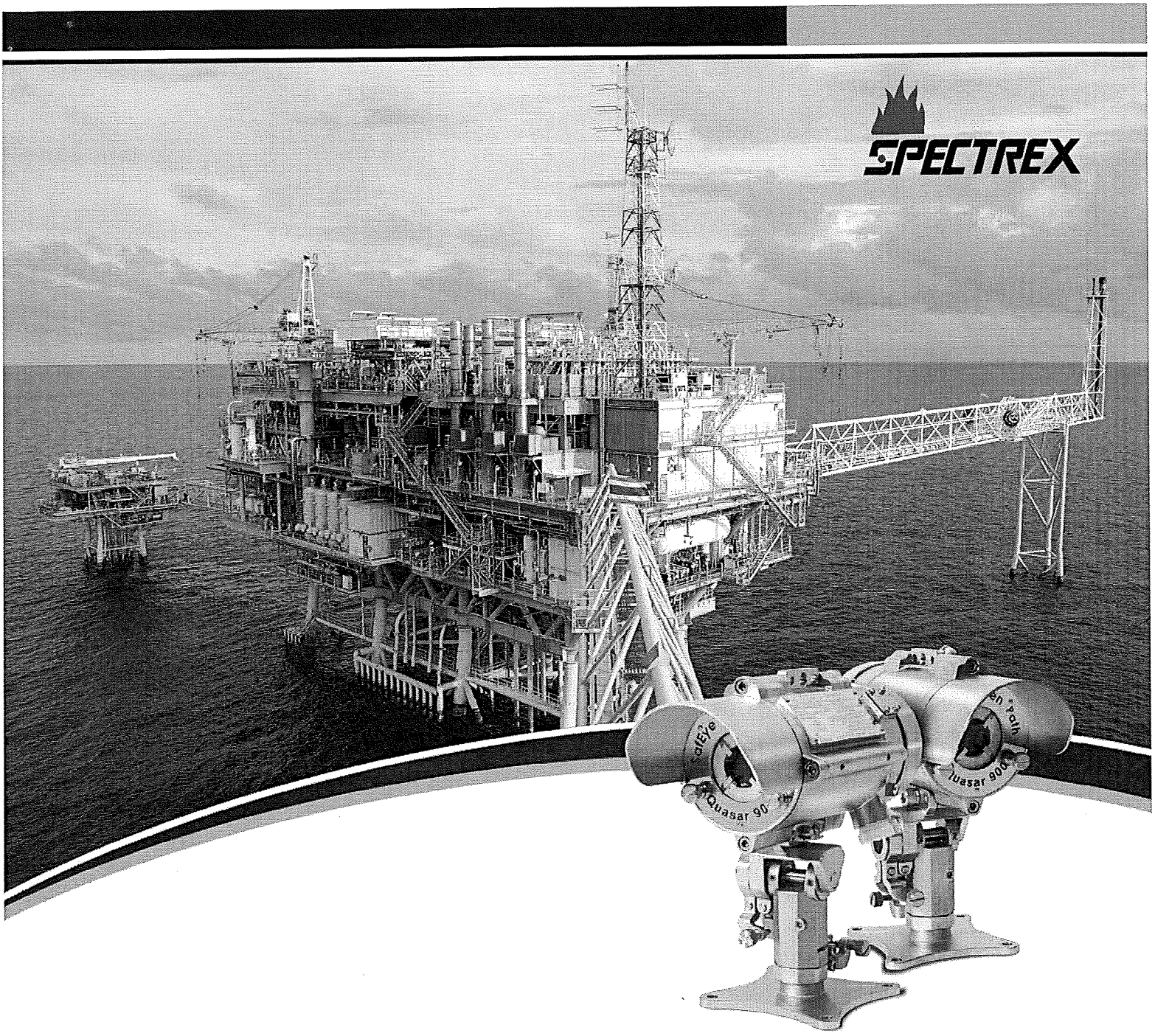
2019 Weekly Leak Inspection Checklist

Falcon Station Leak Checks

January	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Valve Flanges																															
Tubing																															
Meter skid																															
Analyzers																															
Samplers																															
Initials																															
Time																															

Place an X in the date for any non-compliance issues at the facility and write a SAP notification and report to appropiate personnel.

Comments:



Hazardous Locations Demand Superior Gas Detection!

Quasar 900 provides the most reliable gas detection in all weather conditions!

www.spectrex.net

The SafEye Quasar 900 Series is the very latest open path IR technology and detects a wide range of hydrocarbon gases – including alkanes (methane to hexane) and ethylene.
Path lengths can be up to 660ft (200m). Quasar 900 models can be tailored to protect your high-risk installation.
Reliability and performance is key and is assured with SIL2 approval and successful 3rd party FM performance / function testing to FM and EN standards

Why Open Path Gas Detectors?

Spectrex invented the xenon flash lamp design that revolutionized the open-path gas detection market, which, until then, was plagued by false alarms due to the drawbacks of the previous designs. Now, Open path detectors complement the use of individual point detectors, take executive action and offer many significant benefits including:

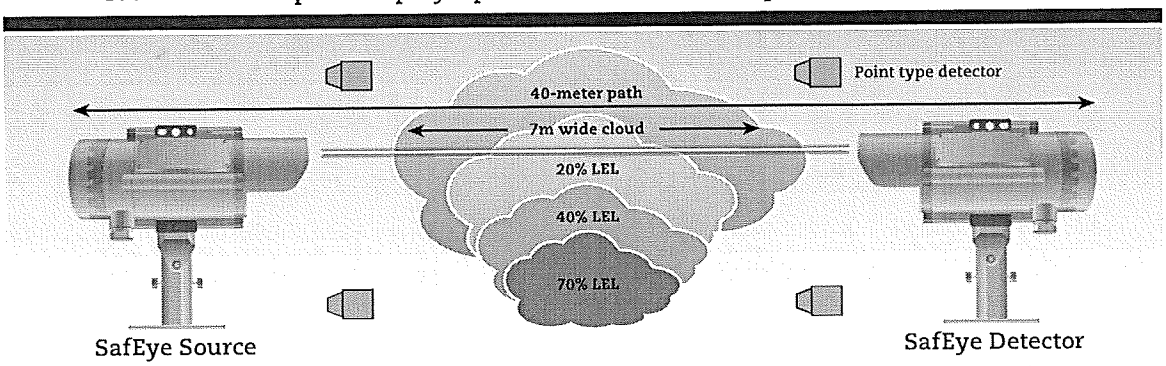
- Wider area coverage
- Most likely method to pick up any leak
- Very high speed of response
- No unrevealed failure modes
- Beam block warning
- Detector location is less critical
- Size of gas hazard indicated

From the Arctic Circle to Middle Eastern Deserts

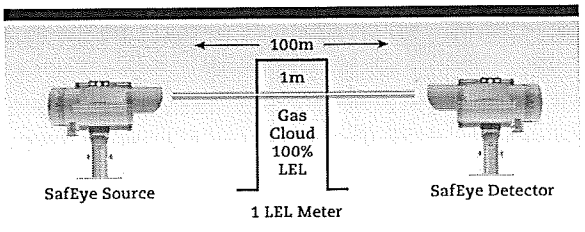
Applications include:

- Offshore platforms & FPSOs
- Petrochemical plants
- Chemical processing plants
- Gas filling and distribution terminals
- Gas transport and pipelines
- Large storage areas & buildings
- Perimeter monitoring

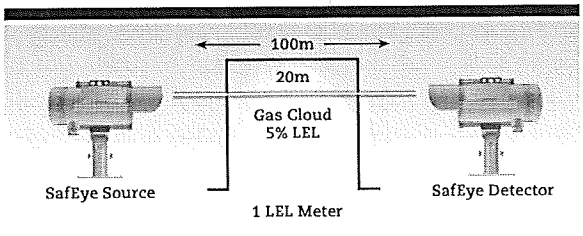
Gas leak can be picked up by Open Path Detectors that point detectors miss!



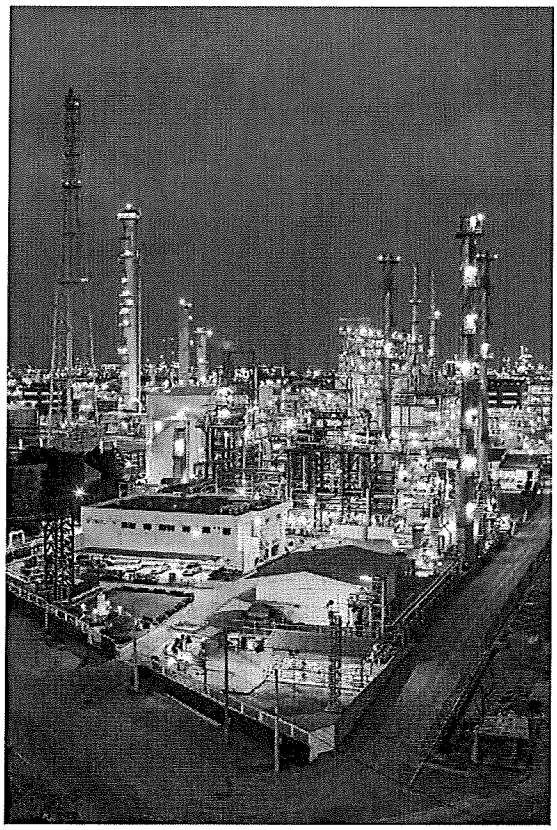
This scenario shows how the matrix of point type detectors can miss a leak or eventually only see diluted gas levels whereas SafEye 900 Open-Path will, in this case, measure 20% LEL x 7m = 1.4 LEL.m - well above 1 LEL.m alarm level



1 LEL meter (1 LEL.m) = a cloud of 100% LEL methane gas that is 1 meter wide



1 LEL meter (1 LEL.m) = a cloud of 5% LEL methane gas that is 20 meter wide



Don't just take our word for it!

We had Factory Mutual (FM) independently test Quasar 900 to recognized worldwide Function and Performance standards for open-path gas detectors (FM6325 and EN60079-29-4). Guess what – we passed with flying colors!

Why do we do this?

(apart from anything else, it costs a lot). Well, its to give you the assurance that what we say about Quasar 900 is true – and in safety, that's important!

IMMUNITY TO FALSE ALARMS

Quasar 900 is totally immune to interference from sunlight or any other sources of radiation such as flare stacks, arc welding or lightning.

PERFORMANCE IN ALL WEATHERS

The Quasars 900's high power xenon lamp will compensate for changing weather conditions, including rain, fog, mist, snow and makes it immune to influences from solar radiation, arc-welding, stack flares or vibration from machinery.

The optical lenses are thermostacically heated to prevent the formation of ice and build up of snow on the optics even under severe weather conditions. It also eliminates build up of condensation on the lenses.

Quasar is rated for operation over a very wide temperature range from -67°F to + 149°F (-55°C to + 65°C) - a truly worldwide product

RELIABILITY

Quasar 900 is approved to SIL2 (IEC61508), equipped with heated optics and tolerates a very wide temperature range to provide reliable detection

FAILSAFE

No unrevealed failures. In normal operation, the output signal is 4 to 20 mA, depending on the measured gas concentration.

Sub-4mA signals includes indications for beam blockage (2mA), a fault (1mA). In addition, a continuous self-test of the Quasar 900 will issue a pre-warning signal (3mA) where the detector is still operational but requires some attention – for example when the transmitter or receiver is misaligned or if there is a deposit build-up on the optics. Maintenance without downtime!

BUILT-IN DATA LOGGER

An internal data-logger keeps a detailed record of the previous 100 events.

GAS LIBRARY

The detectors can be calibrated to methane, propane or ethylene. The calibration selection must be determined when ordering.

MINIMUM DETECTABLE LEVEL

Due to Quasar 900's inherent stability and sensitivity, the minimum detectable level is 0.15 LEL.m

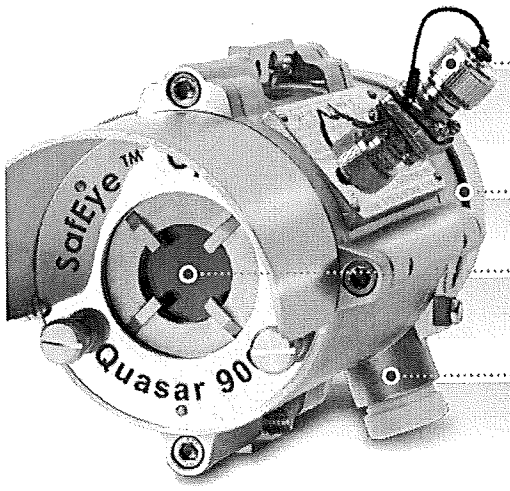
SIMPLE TO ALIGN AND COMMISSION

One person can easily align and commission the system without the need for special training or skills. After an initial coarse adjustment by eye, a telescope is fitted allowing fine adjustment to optimized the adjustment for maximum signal strength.

Installation Options

QUASAR OFFERS OPTIONS FOR YOUR INSTALLATION:

- 0-20mA analog output with HART capability
- RS485 Modbus, where up to 256 detectors can be linked.



I.S. approved conection port for hand held terminal in field or safe area

316L Stainless Steel housing

Heated optics

Electrical entries (x2)
¾" NPT or M25

Worldwide Approvals

- **Hazardous area (Zone 1)**
  FM/FMC, ATEX, IECEx, GOST R Inmetro
- **Performance (3rd party):**
  FM 6325 approved by FM
  EN60079-29-4 tested by FM
- **Reliability:**
  SIL2 (TUV)

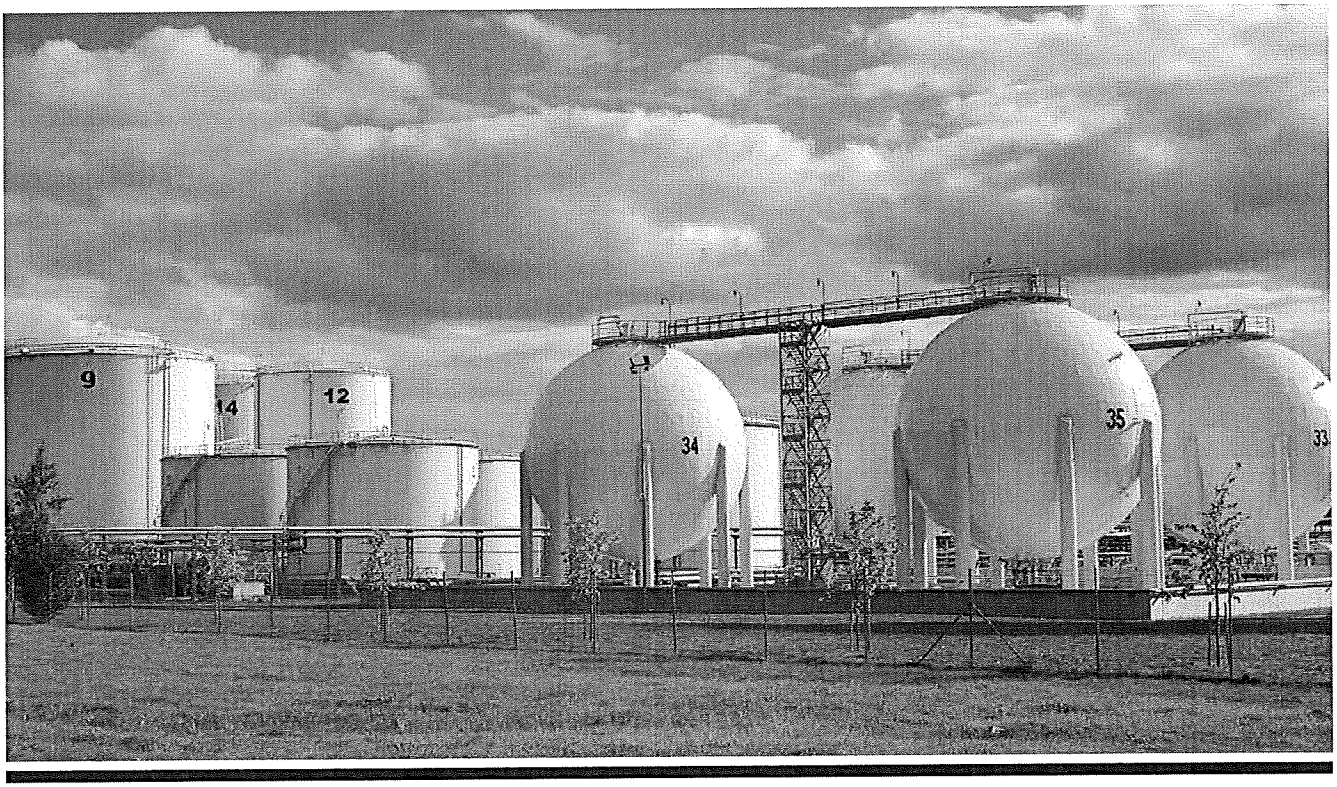
HART

HART capabilities within the Quasar 900 can provide digital communications between the field and the safe area. This can provide real time information on the status of an individual detector as well as configuration and historical data of each device, without the need for extra cable cores.

A key feature of HART is that digital signals are transmitted on the same two wires as the 0-20mA current signal.

Useful and useable information available via HART includes:

- Display set-up
- Reconfigure set-up – such as heater control, address
- Display detector status and definition
- Perform detector diagnostics
- Troubleshooting
- View Event Log



Complete Access in the Field or Safe Area

The unique, intrinsically safe approved connection port on the Quasar 900 receiver allows simple connection of various types of handheld unit that will communicate with Quasar 900 in the hazardous area. These handheld devices allow user to check alignment, zero, perform configuration changes, view event log, perform diagnostic functions, in conjunction with Spectrex software.

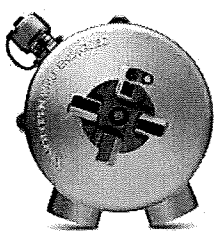
The handheld units are robust weather-proof devices, certified intrinsically safe for use in a hazardous, classified area.

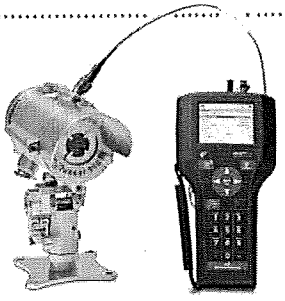
Two options are available, both able to connect to the intrinsically safe approved connection port on the Quasar 900 receiver.

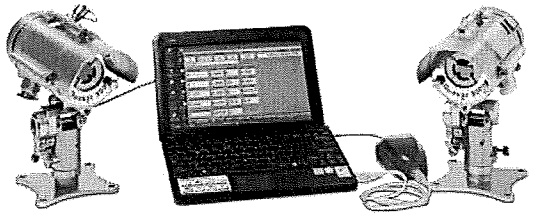
- HART handheld
- RS485 handheld

For work in a safe area / workshop, other options are available, still connected via the I.S. port. for your convenience.

These take the form of cable harnesses to connect with our Mini Laptop kit (p/n 777820-1) or to your own PC/laptop, using free Spectrex software







GENERAL SPECIFICATIONS

Detection Range	**Model**	**901**	**902**	**903**	**904**
	Feet	23-66	50-132	115-330	265-660
	Meters	7-20	15-40	35-100	80-200
Detected Gas	C1-C8				
Response Time	3 sec.				
Immunity to False Alarm	Not influenced by solar radiation, hydrocarbon flames and other external IR radiation sources.				
Sensitivity Range	0-5 LEL.m methane and propane 0-8 LEL.m ethylene				
Spectral Response	2.0 - 3.0µm				
Displacement/Misalignment Tolerance	±0.5°				
Drift	±7.5% of the reading or ±4% of the full scale (whichever is greater)				
Minimum Detectable Level	0.15 LEL.m				
Temperature Range	–67°F (–55°C) to 149°F (65°C)				
Humidity	Up to 95% non-condensing (withstands up to 100% RH for short periods)				
Heated Optics	To eliminate condensation and icing on the window				
Warranty	Safety system – 3 years Flash source bulb – 10 years				

ELECTRICAL SPECIFICATIONS

Power Supply	24VDC nominal (18-32 VDC)
Power Consumption (peak includes heated optics)	Detector: 250mA (300mA Peak) Source: 250mA (300mA Peak)
Warm Up Time	30 sec for transmitter and receiver
Electrical Connection (specify)	2 x 3/4" – 14NPT conduits or 2 x M25 x 1.5mm ISO
Electrical Input Protection	per MIL-STD-1275B
Electromagnetic Compatibility	EMI/RFI protected per EN50270

OUTPUTS – INTERFACES

0-20mA Current Output	Sink (source option) configuration - maximum load of 500 ohm at 18-32 VDC			
	Gas reading	4-20mA	Obscuration/beam block	2mA
	Normal, zero reading	4mA	Zero calibration mode	1mA
	Maintenance call	3mA	Fault	0mA
	Misalignment	2.5mA		
RS-485 Interface – Modbus Compatible	The RS-485 input/output provides complete data information to a PC and receives control commands from the PC or handheld unit			
HART	HART communications on 0-20mA analog current (FSK) – used for maintenance and asset management			
Visual Status Indicator	3 color LED: Green – Power on, Yellow – Fault, Red – Alarm			

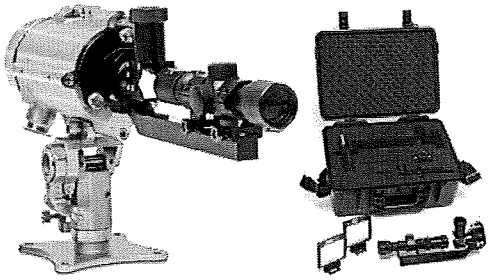
MECHANICAL SPECIFICATIONS

Hazardous Area Approval	ATEX/IECEx	Approved per Ex d e ib [ib Gb] IIB + H2 T4 Gb Ex tb IIIC T135°C Db The detector or source units have a combination of approvals. Each is a single enclosure (Exd) with integral, segregated rear terminal section (Exe) and intrinsically safe (Exia) data-port for external in-situ connection to Hand-Held Diagnostic unit.
	FM/FMC	Approved per Class I Div 1 Groups B, C and D Class II,III Div 1 Groups E, F and G
	Inmetro	Approved per Ex d e ib [ib Gb] IIB+H2 T4 Gb
Performance	Approved per FM6325 and tested by FM per EN60079-29-4	
Reliability	SIL2 per IEC61508 (TUV)	
Enclosure	The source and detector housings are stainless steel 316L with electro polish finish. The circuit boards are conformal coated and protected from mechanical vibrations. The tilt mount is also stainless steel 316L.	
Dimensions	Detector/Source	10.5 x 5.1 x 5.1 inch (267 x 130 x 130mm)
	Tilt Mount	4.7 x 4.7 x 5.5 inch (120 x 120 x 158mm)
Weight	Detector/Source	11lb (5kg)
	Tilt Mount	4.2lb (1.9kg)
Water and Dust Tight	IP66 and IP68 NEMA 250 6P	
Environmental	Meets MIL-STD-810C for Humidity, Salt and Fog, Vibration, Mechanical Shock, High and Low Temperature	

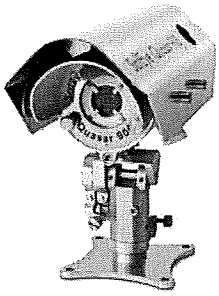
ACCESSORIES

Tilt Mount	P/N 888270	**HART Harness Kit**	P/N 888815
Pole Mount (U-bolt 5 inch)	P/N 799225	**USB/RS485 Harness Converter Kit**	P/N 794079-8
Commissioning Kit	P/N 888247	**Mini Laptop Kit**	P/N 777820-1
HART Hand-Held Diagnostic Unit	P/N 888810	**Sunshade**	P/N 888263

Accessories



COMMISSIONING KIT
P/N 888247
The Commissioning/Alignment Kit is required for commissioning and maintenance checks.
Only one kit is required per site, Includes: Alignment Telescope, Magnetic Mode Selector, Function Check Filters (2) and set of Socket keys for access to units



SUNSHADE, STAINLESS STEEL
P/N 888263

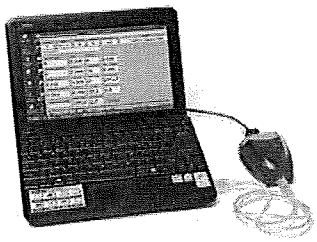
TILT MOUNT
P/N 888270

POLE MOUNT (U-Bolt, 5 inch)
P/N 799225

Communication, Diagnostics, Set-up

Commissioning, maintenance and diagnostics tools for the Quasar 900 Series, which provides verification, status and instructions for changing detector parameters.

HART HAND-HELD DIAGNOSTIC UNIT
P/N 888810
Certified I.S. (EExia) for use in the hazardous area and connects to I.S. port on 900.



MINI LAPTOP KIT
P/N 777820-1
Preloaded with Spectrex software. For use in Safe area only. Connects, for convenience, to port on 900 or RS 485 terminals.

If, instead, user wishes to use their own HART handheld or PC / laptop in safe area, we offer:

HART HARNESS KIT
P/N 888815
For standard HART Hand-Held (I.S.) to connect between the Hand-Held and the I.S. Port on 900, including a harness.

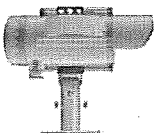
USB RS485 HARNESS CONVERTER KIT
P/N 794079-8
With RS485/USB converter, kit is used with Spectrex Host software, enables the user to connect to any available PC or laptop. For use in safe area only. Connects, for convenience, to connection port on 900 or RS485 terminals

How to choose your new **Quasar 900**

Quasar 900 Part numbers

Model	=	Receiver	+	Transmitter	Installation Distance
901		QR-X-11X	+	QT-X-11X	23-66 ft / 7-20m
902		QR-X-11X	+	QT-X-21X	50-132 ft / 15-40m
903		QR-X-11X	+	QT-X-31X	115-330 ft / 35-100m
904		QR-X-11X	+	QT-X-41X	265-660 ft / 80-200m

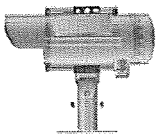
Part no. code for specific requirements



RECEIVER

QR - X - 1 1 X

- X: **C:** ATEX; **F:** FM; **B:** Inmetro
- X: **1:** M25; **2:** ¾" NPT



TRANSMITTER

QT - X - X 1 X

- X: **C:** ATEX; **F:** FM; **B:** Inmetro
- X: **1:** 7-20m: *Short Range*; **2:** 15-40m: *Medium Range 1*; **3:** 35-100m: *Medium Range 2*; **4:** 80-200m: *Long Range*
- X: **1:** M25; **2:** ¾" NPT

For more information view manual or website www.spectrex.net

For all technical assistance or support, contact a Spectrex office or your local distributor listed online.
Specifications subject to change

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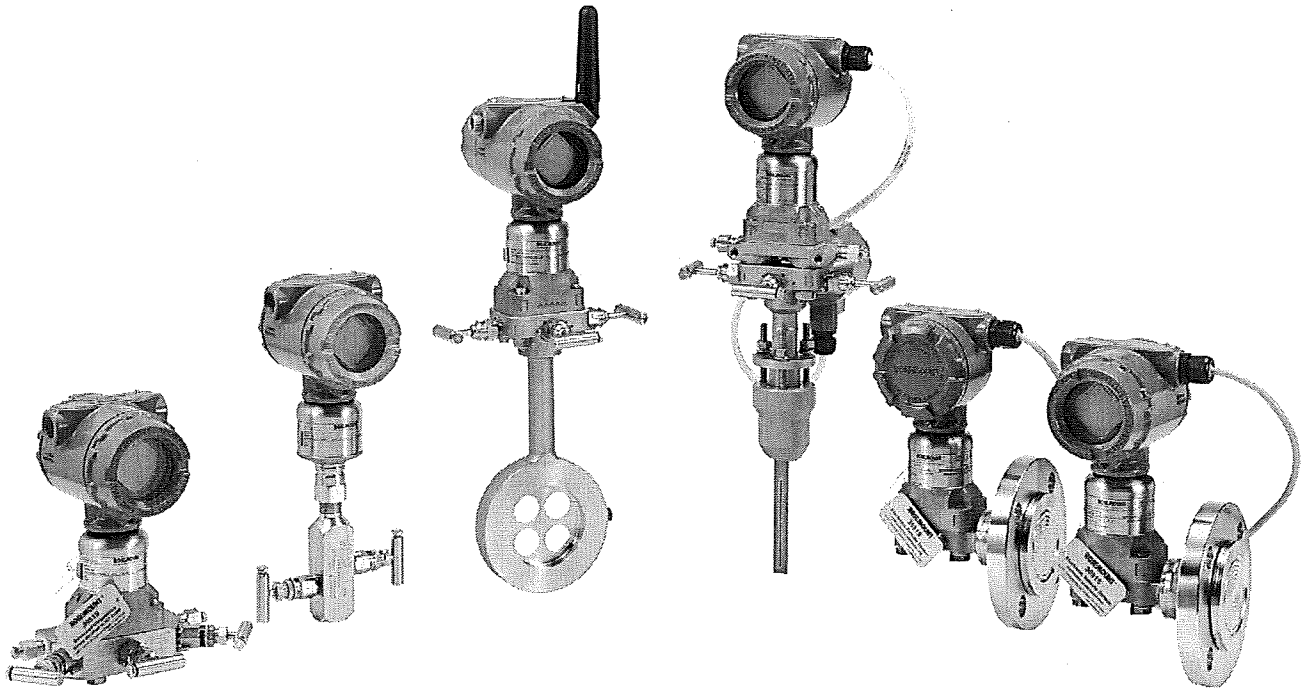
Q-900, February 2017

Product Data Sheet
00813-0100-4801, Rev UK
December 2018

Rosemount™ 3051S Series of Instrumentation



Innovation reaching across your operation

With the Rosemount 3051S Series of Instrumentation, operations can be optimized in these critical areas: production, quality, energy efficiency, and safety and environment. By leveraging the power of the scalable Rosemount 3051S across the entire operation, you'll be able to minimize process variability, gain greater process insight, reduce maintenance and downtime, and meet regulatory demands. What's more, it's easy to use, ensuring the full potential of the measurement investment is realized.

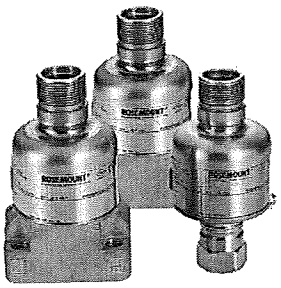
ROSEMOUNT™

EMERSON™

Overview

Rosemount 3051S SuperModule™ Platform

The most advanced pressure, flow, and level measurements



- The all-welded hermetic SST design delivers the industry's highest field reliability.
- Ultra performance provides up to ±0.025% accuracy and 200:1 rangedown.
- Ultra for Flow performance provides up to ±0.04% of reading and 14:1 flow turndown.
- 15-year stability and 15-year limited warranty
- SIL3 Capable: IEC 61508 certified by an accredited 3rd party agency for use in safety instrumented systems up to SIL 3 (minimum requirement of single use [1oo1] for SIL 2 and redundant use [1oo2] for SIL 3).
- IEC 61508 Functional Safety Specifications for 3051S are detailed at Emerson.com/Rosemount/Safety.

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