ITS 184X0254M123

ITS Flame Scanner with SiC Photodiode

User & Maintenance

Manual

V1.6

Effective from 03.08.2016

ITS

Industrial Turbine Services

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ITS
Industrial Turbine Services

Chapter 1

Introduction

1.   Introduction

1.1.   General Description

Flame Scanner is one of the most critical elements among the protection systems of industrial heavy-duty gas turbines.

Its main area of application is continuous flame detection in the combustion process, particularly to isolate fuel in the potentially dangerous "flame-off" situation. A failure to react quickly enough to a "flame off"- event may lead to great damage or even an explosion caused by the continuous supply of fuel to the gas turbine. The risk is especially increased during the start-up or shutdown process of the gas turbine, when the flames are normally more volatile due to airflow variations.

A reliable monitoring of the flame is therefore vital for a safe working environment.

1.2.   Area of Application

ITS designed the Flame Scanner to operate reliable on General Electric Frame 1, 3, 5, 6, 7 and 9 industrial gas turbines.

The Flame Scanner ITS 184X0254M123 is compatible with part numbers manufactured by the following manufacturers:

GE Part No.:   362A1052P106
                             362A1052P107
                             362A1052P306
                             362A1052P307
                             121T9685P00010

Reuter Stokes Part No.:   RS-FS-9004

Chapter 2

Sensor Device

2. Sensor Device

2.1. Description

ITS 184X0254M123 is a two-wire Flame Scanner based on a SiC photodetector.

Silicon carbide (SiC) photodetectors/photodiodes have a spectral response of approximately 210 – 380nm and are not sensitive to radiation outside this range. This characteristic makes a SiC based Flame Scanner ideal for certain applications, which include monitoring the longer wave length components of the UV light, as no solar rejection filters are needed.

SiC photodetectors are extremely durable and have been proven to withstand prolonged UV exposure. They have been used as optical flame detectors in gas turbines for more than two decades.

2.2.   Specifications
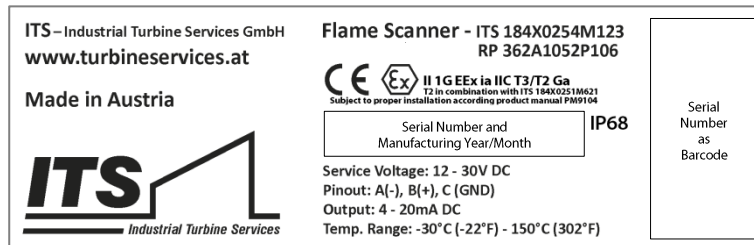
ITS 184X0254M123 Flame Scanner Characteristics

Manufacturer	ITS Industrial Turbine Services
Country of Origin	Austria, Europe
Country of Manufacture	Austria, Europe

Certification	EN ISO 9001:2008, SCC*:2011, OHSAS 18001:2007
	CE, RoHS, ATEX
	CE ⟨Ex⟩ II 1G EEx ia IIC T3/T2 Ga
	Subject to proper installation according product manual PM9104
	T2 only with Water Cooling System part no. ITS 184X0251M621

Housing	1.4571 Stainless Steel
Mounting	3/4" internal NPT
Wrench Width	44mm (1.73in)

Connector Electrical	MIL-DTL 38999 Series III, 038999/27Y-15-05PN 1041 B Thread
Sensor	Silicon Carbide Photodiode
Window	Fused Silica
Avg. Spectral Sensitivity	210-380nm
Sensitivity	$> 4mA$ @ $1x10^{10}$ photons/in^2/sec. @ 308nm
Output	4 – 20 mA DC current loop @ 24VDC
Response Time	< 20ms
Power Requirements	12 – 30 VDC Reverse polarity protection

Temperature Range	-30°C (-22°F) to 150°C (302°F),
	up to 235°C (455°F) with water cooling
Temperature at Mount	Max. 427 °C (800°F)
Relative Humidity	100%
Int. Protection Marking	IP68
Process Pressure	Up to 28bar (400 psi)

Max. Dimension / Wight	Diameter 64mm (2.520in), length 128mm (5.039in) / 1.6kg (3.5lb)
Packing	Foam, cardboard box, 235x110x107mm (9.252x4.331.4.213in),
	0.1kg (0.22lb), sealed

2.3. Certification

ITS 184X0254M123 Flame Scanner Certificates

ITS – Industrial Turbine Services GmbH
www.turbineservices.at

Made in Austria

Flame Scanner - ITS 184X0254M123
RP 362A1052P106

CE (Ex) II 1G EEx ia IIC T3/T2 Ga
T2 in combination with ITS 184X0251M621
Subject to proper installation according product manual PM9104

Serial Number and Manufacturing Year/Month

IP68

Service Voltage: 12 - 30V DC
Pinout: A(-), B(+), C (GND)
Output: 4 - 20mA DC
Temp. Range: -30°C (-22°F) - 150°C (302°F)

Serial Number as Barcode

Laser engraved product label on the Flame Scanner

The product complies with the related requirements for protection concerning equipment and protective systems. It's intended for use in potentially explosive atmospheres and the restriction of the use of certain hazardous substances in electrical and electronic equipment of the European Parliament and of the Council Directive 2014/34/EU Explosive Atmospheres (ATEX) in parallel to the Directives 2014/32/EU, 2014/30/EU, 2014/35/EU and 2011/65/EU.

The product complies also with the essential protection requirements of the European Parliament and of the Council Directive 2011/65/EU, dated June, 8th, 2011 concerning the restriction of the use of certain hazardous substances in electrical and electronic equipment in approximation of the laws of the Member States.

Related regulations and standards concerning CE conformity:

EN 1127-1:2011, EN 60079-0:2014, EN 60529:2014, EN 60770-2:2011, EN 61000-6-2:2005, EN 61000-6-4:2011, EN 61140:2007, EN 61293:1995, EN 61326-1:2013

Related regulations and standards concerning ATEX conformity:

EN 1127-1:2011, EN 60079-0:2014, EN 60079-11:2012,
EN 61000-6-2:2005, EN 61000-6-4:2011

TÜV AUSTRIA CERT certifies that ITS – Industrial Turbine Services GmbH applies a management system in line with standard EN ISO 9001:2008, SCC*:2011 and OHSAS 18001:2007 for the scope of development, manufacturing, sales, trade and installation of industrial gas turbine spare parts, HMI systems as well as diagnostic- and remote control systems.

2.4. Accessories

ITS 184X0251M621 Water Cooling Coil

Manufacturer	ITS Industrial Turbine Services
Country of Origin	Austria, Europe
Country of Manufacture	Austria, Europe
Material	1.4571 Stainless Steel
Thread	1/2 " internal NPT
Water Temp. Range	10°C (50°F) to 57°C (135°F),
Water Flow Rate	3.8l/m (1.0US g/m) to 5.7l/m (1.5US g/m)
	For each Flame Scanner
Max. Dimension / Wight	Diameter 103mm (4.055in) without connectors / 1.4kg (3.1lb)
Packing	Loose

ITS 184X0251M421 Cable for Flame Scanner

Manufacturer	ITS Industrial Turbine Services
Country of Origin	Germany, Europe
Country of Manufacture	Germany, Europe
Wire	18 gauge (1.13mm), 19 x 0.226 nickel plated cooper conductor
Insulation	Teflon PTFE
Shield	Braid of nickel plated cooper, opt cov >85%
Color Code	Black (-) negative, White (+) positive, Green/Yellow – ground
Cable Length	9.1m (30ft)
Voltage	For service 12 – 35 VDC, max. 600 Vrms
Connector Electrical	MIL-DTL 38999 Series III, 038999/27Y-15-05PN 1041 B (3 pins used)
Cover	1.4571 Stainless Steel, M16x 1.5/2, laser engraved
Back shell	90°
Temperature Range	-30°C (-22°F) to 260°C (500°F),
Wight	0.9kg (1.98lb)
Packing	Loose, rolled and tied with cable ties

ITS 184X0251M461 Flame Scanner Protective Conduit

The Flame Scanner connecting cable spirally-wound metal protective conduit is made of stainless steel with an outer diameter of 16,5mm (0.65in) and an inner diameter of 13mm (0.51in)

ITS 184X0251M481 Flame Scanner Fitting Set

The Flame Scanner metal protective conduit system fitting set consists of two assemblages and is used to connect the cable connector ITS 184X0251M421 with the protective conduit ITS 184X0251M461 as well as the ITS 184X0251M461 with the junction box.

Depending on the manufacturer of the junction box, an adapter converting 3/8″ to 1/2″, 3/4″ or 1″ may be necessary.

ITS 184X0251M911 Protected Cable for Flame Scanner

1x Stainless Steel 90° connector with cable ITS 184X0251M421
1x Spirally-wound metal protective conduit (3 Meter) ITS 184X0251M461
1x Fitting set (consisting of 2 parts) ITS 184X0251M481

Find further Accessory Parts and Flame Scanner Sets on http://www.flamescanner.net/

Chapter 3

Installation

3.   Installation

3.1.   Electrical Installation Ex Protection "ia"

The Flame Scanner is designed as a 2-wire current (4-20 mA) transmitter for measurement of UV-radiation in combustion chambers of industrial gas turbines.

To fulfill the requirements for an installation in a potentially explosive atmosphere, all the used components, like the power supply, connectors, cables etc., as well as the installation itself, have to comply with the related directives and standards.

Polarity and Connectivity:

Wire Black   Pin A   negative
Wire White   Pin B   positive
Wire Green/Yellow   Pin C   ground

The green / yellow wire must be connected to the safety earth / ground at the next junction box. Reversed polarity will not damage the Flame Scanner.
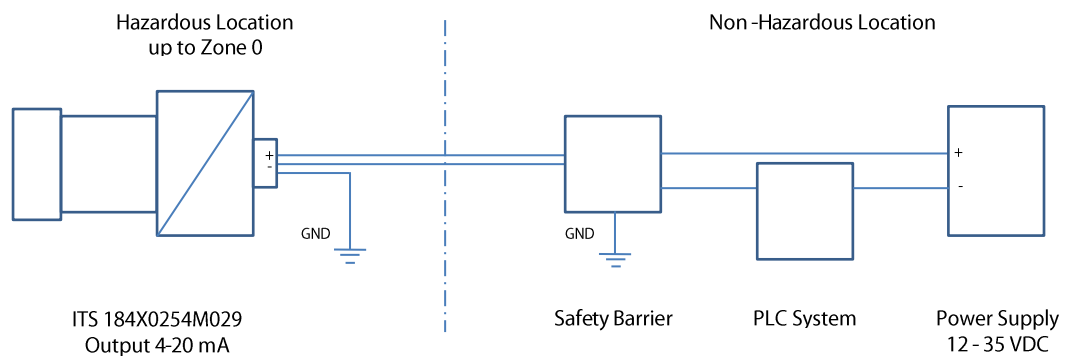

Do not proceed with the mechanical installation until the function test, as described in chapter 3.4, is completed.

3.2.   Mechanical Installation

The Flame Scanner can be operated safely in a temperature range up to 150°C (302°F) without water-cooling, and up to 235°C (455°C) with "Water Cooling Coil ITS 184X0251X621".

Step 1)   **This step is only necessary if water-cooling is required!**
Slide the Water Cooling Coil over the Flame Scanner and secure it
on the cold side (electrical connector side) of the Flame Scanner with the
retaining ring.

Step 2)   Check the Flame Scanner mount for optical damage and contamination

Step 3)   Use a Teflon tape or an anti-seize & lubricating compound on the threads, prior to
reinstalling the Flame Scanner.

Step 4)   Inspect the Flame Scanner window and clean it if necessary.

Step 5)   Insert the Flame Scanner to the thread and turn it until it is fastened finger tight.

Step 6)   Turn it with a wrench (44mm/1.73in) until it is tight and the keys on the connector
fit to the interconnection cable.
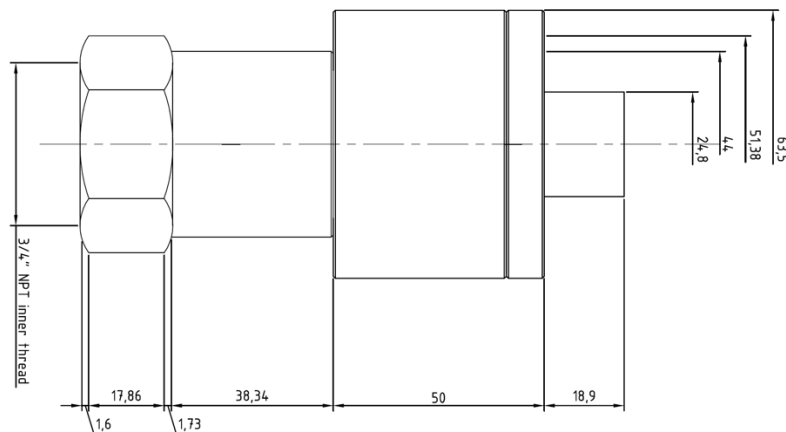
3.3. Function Test

CAUTON

Be aware of the high operating temperature of the Flame Scanner and its accessory parts. Let them cool down to a safe handling temperature before you attempt to work on them.

WARNING

Do not disconnect the connector while the Flame Scanner is powered on, unless the area is known to be non-hazardous.

Turn off the power supply for the Flame Scanner and disconnect it from the interconnection cable. After removing it from the turbine it has to be reconnected to the interconnection cable and securely stored to prevent harm and damage.

Depending on the ambient light level around the turbine, it may detect some UV-radiation. By covering the Flame Scanner window, the measured dark-offset-current should be between 3.79 mA and 3.89 mA. As a crosscheck, daylight or a good flashlight should generate a current of more than 8 mA, depending on the brightness.

When the Flame Scanner is tested, its reinstallation should be done in the same way but backward.

3.4. Maintenance

CAUTON

Be aware of the high operating temperature of the Flame Scanner and its accessory parts. Let them cool down to a safe handling temperature before you attempt to work on them.

WARNING

Do not disconnect the connector while the Flame Scanner is powered on, unless the area is known to be non-hazardous.

After initial installation of the Flame Scanner, it is recommended to record the signal level during normal operation to serve as a reference. During operation, the Flame Scanner window can become dirty and the signal level decreases with increasing dirt residue. Therefore, the detected signal value should be compared to the initial one from time to time.

If under comparable operating conditions a significant reduction of the detected signal level is noticed, the lens should be checked and cleaned at the earliest opportunity.

It is recommended to use liquid, abrasive-free glass cleaner to avoid scratching the lens.

ITS
Industrial Turbine Services

3.5.   Contact

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