Mk8 EGA EVO

Set-Up Guide

尾气分析仪
设置指南

AUTOFLAME®

EGA Set-Up Guide
尾气分析仪设置指南

Registered Holder 所有人**:**

Company 公司**:**

Department 部门**:**

Important Notes
重要说明

A knowledge of combustion related procedures and commissioning is essential before embarking work on any of the M.M./E.G.A. systems. This is for safety reasons and effective use of the M.M./ E.G.A. system. Hands on training is required. For details on schedules and fees relating to group training courses and individual instruction, please contact the Autoflame Engineering Ltd. offices at the address listed on the front.

为了安全有效地使用控制模块**/EGA** 系统，控制模块**/EGA** 系统的操作员必须具有与燃烧相关的流程知识和调试知识。我们要求操作员参加实践培训，请按首页所述地址联系 **Autoflame** 办公室以详细了解团体培训课程和个别辅导的时间与费用。

Short Form - General Terms and Conditions
一般条款

A full statement of our business terms and conditions are printed on the reverse of all invoices. A copy of these can be issued upon application, if requested in writing.
所有发票背面均印有我方商业条款全文。客户可通过书面申请的形式获取我公司的商业条款文件。

The System equipment and control concepts referred to in this Manual MUST be installed, commissioned and applied by personnel skilled in the various technical disciplines that are inherent to the Autoflame product range, i.e. combustion, electrical and control.
本手册所提及的系统设备和控制原理须由精通 **Autoflame** 产品燃烧、电气和控制等技术的专业人员进行安装、调试和使用。

The sale of Autoflame's systems and equipment referred to in this Manual assume that the dealer, purchaser and installer has the necessary skills at his disposal. i.e. A high degree of combustion engineering experience, and a thorough understanding of the local electrical codes of practice concerning boilers, burners and their ancillary systems and equipment.
经销商、采购商和安装人员必须具有丰富的相关工作经验、全面了解当地锅炉、燃烧器和辅助系统及设备相关的电气行业规范方能使用本手册提及的 **Autoflame** 系统和设备。

Autoflame's warranty from point of sale is two years on all electronic systems and components.
Autoflame 保修条款**:** 对所有电子系统和部件实行两年售后保修。

One year on all mechanical systems, components and sensors.
对所有机械系统、部件和传感器实行一年售后保修。

The warranty assumes that all equipment supplied will be used for the purpose that it was intended and in strict compliance with our technical recommendations. Auto-flame's warranty and guarantee is limited strictly to product build quality, and design. Excluded absolutely are any claims arising from misapplication, incorrect installation and/or incorrect commissioning.

保修条件**:** 所有设备均按照预期使用目的使用，并严格遵守我方提供的技术建议。**Autoflame** 产品保修条款仅适用于产品制造质量问题和设计问题。根据保修条款，**Autoflame** 不接受因误操作、误安装和**/**或误调试导致的任何索赔请求。

Contents 目录 6

1 INSTALLATION AND WIRING 安装和连接

1.1 EGA 尾气分析仪

1.1.1 Inside View 内视图

Figure 1.1.1.i Inside view 图 1.1.1.i 内视图

1. Dry filter   干滤器
2. Chiller block   冷却器组
3. Pinch valve   夹管阀
4. Drain solenoid   排放电磁阀
5. NO_2 cell (optional) NO_2 感应器（可选）
6. SO_2 cell (optional) SO_2 感应器（可选）
7. NO cell   NO 感应器
8. O_2 cell O_2 感应器
9. CO cell   CO 感应器
10. CO_2 cell CO_2 感应器
11. Battery   电池
12. Pump   组件泵
13. Fan   风机

1.2 Fixing Holes and Dimensions 固定孔和尺寸

335.0mm
[13.07"]

TOP

150.0mm
[5.85"]

FRONT

407.4mm
[15.89"]

72mm
[2.8"]

185.7mm
[7.24"]

BOTTOM

122mm
[4.7"]
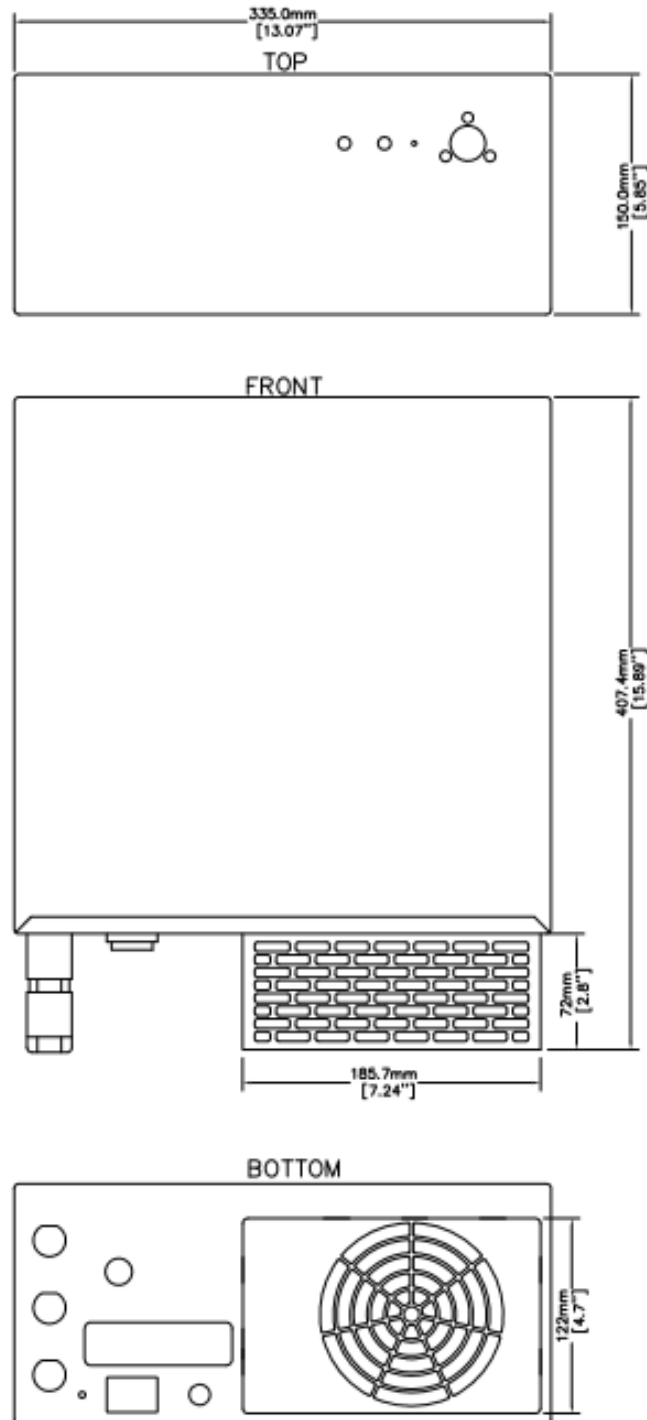
100mm CLEARANCE IN THE TOP TO INSERT SAMPLING TUBE
100mm CLEARANCE IN THE RIGHT SIDE TO INSERT KEY
200mm CLEARANCE IN THE BOTTOM

Drawing No. 7976
图纸编号：7976

1.3   Technical Specifications 技术规范

Electrical Supply 电源	230/110V (minimum 100V, maximum 240V) 50/60 Hz
Power Rating 功率额定值	160W
Max Power Consumption 最大功率消耗	225W
Fuse Rating 保险丝额定值	4A
Environmental Rating 环境额定值	IP20, NEMA 1
Internal Temperature 内部温度	5 – 40°C (40 – 104°F)
K Type Thermocouple K 型热电偶	0 – 400°C (32 – 752°F)
Sampling TubingEnvironment Temperature 采样管环境温度	Maximum 60°C (140°F) 最大 60°C (140°F)
Pump Flow 泵流量	600ml/min
Heating Sampling Line 加热采样线	Requires separate power supply. 需要独立电源。 Power consumption will depend on application and length. 功率消耗取决于应用场所和持续时间。 Fuse rating on EGA for HSL is 20A. 用于加热采样线的尾气分析仪保险丝额定值是 20A。

1.4   Flying Lead Wiring 飞线接线图

1.4.1   EGA Connections 尾气分析仪连接
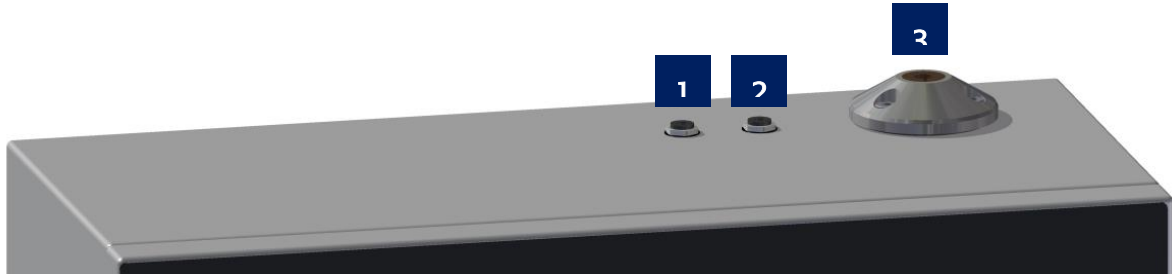
1. Pre-heated air sensor connection 预热空气传感器连接
2. Exhaust temperature thermocouple connection 排气温度热电偶连接
3. Sampling line connection 采样线连接
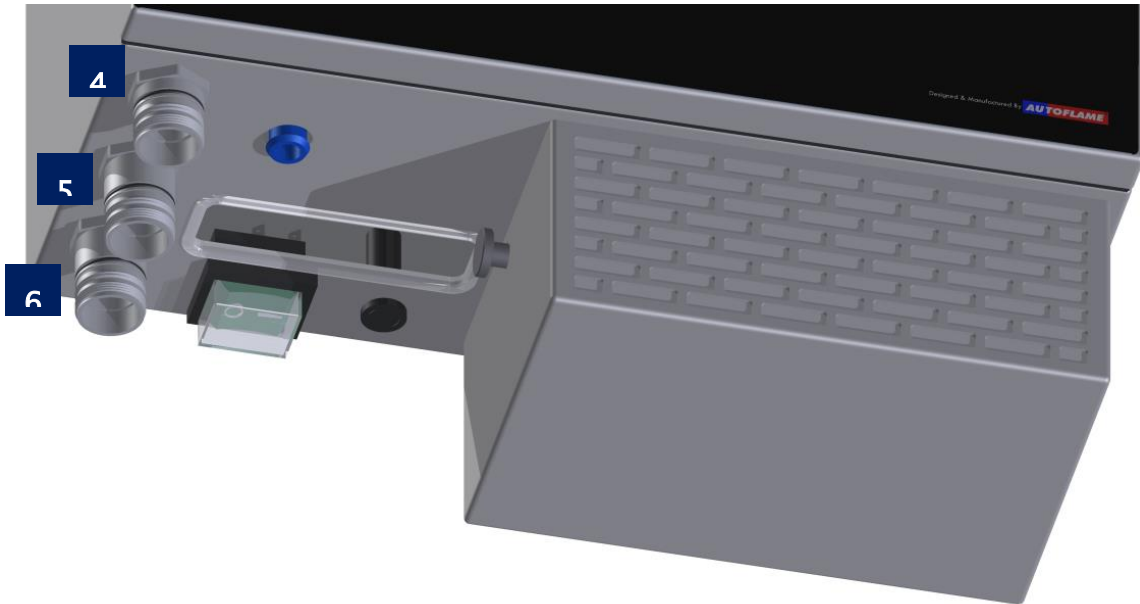
4. Mains flying leading connection 电源飞线连接
5. Data flying leading connection 数据飞线连接
6. Auxiliary flying lead connection 辅助飞线连接

Drawing No. 9058 图纸编号：9058

1.4.2   Flying Leads 飞线

<u>Mains Flying Lead 电源飞线</u>
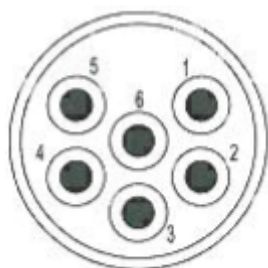
Figure 1.4.2.i Mains
图 1.4.2.i 电源飞线
(Insert Pin Mating View)
（插针匹配图）

Pin 针号	Description 说明
1	Live 火线
2	Live for HSL* 加热采样线火线
3	Earth for HSL 加热采样线地线
4	Neutral for HSL 加热采样线零线
5	Neutral 零线
6	Earth 地线

*Note: If a Heated Sample Line (HSL) is fitted, then a separate power supply is required.
*注：如已安装加热采样线，则需要一个独立电源。

<u>Data Flying Lead 数据飞线</u>
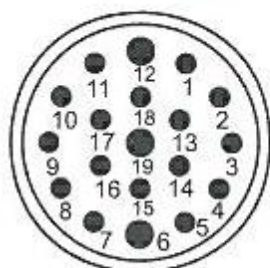
Figure 1.4.2.ii Data
图 1.4.2.ii 数据飞线
(Insert Pin Mating View)
（插针匹配图）

Pin 针号	Description 说明
1	Channel 1 4-20mA Output (+) 4-20mA 通道 1 输出（+）
2	Channel 2 4-20mA Output (+) 4-20mA 通道 2 输出（+）
3	Channel 3 4-20mA Output (+) 4-20mA 通道 3 输出（+）
4	Channel 4 4-20mA Output (+) 4-20mA 通道 4 输出（+）
5	Channel 5 4-20mA Output (+) 4-20mA 通道 5 输出（+）
6	Channel 6 4-20mA Output (+) 4-20mA 通道 6 输出（+）
7	Common for 4-20mA Outputs (-) 4-20mA 输出命令（-）
8	Fuel 1 Select Input 燃料 1 选择输出
9	Fuel 2 Select Input 燃料 2 选择输出
10	Fuel 3 Select Input 燃料 3 选择输出
11	Fuel 4 Select Input 燃料 4 选择输出
12	Common for Fuel Select Input 燃料选择输入命令
13	MM Comms (-) 控制模块通信（-）

14	MM Comms (+) 控制模块通信（+）
15	DTI Comms (-) 数据传输接口通信（-）
16	DTI Comms (+) 数据传输接口通信（+）
17	Common for Fuel Flow 4-20mA Input (-) 4-20mA 燃料流量输入命令（-）
18	Fuel Flow 4-20mA Input (+) 4-20mA 燃料流量输入（+）
19	Unused 未使用

*Note: For standalone mode, a fuel select must be connected to pin 12 Common for Fuel Select Input.

注：在单机模式下，燃料选择必须连接针 12 燃料选择输入命令。

Auxiliary Flying Lead 辅助飞线

Figure 1.4.2.iii Auxiliary
图 1.4.2.iii 辅助飞线
(Insert Pin Mating View)
（插针匹配图）

Pin 针号	Description 说明
1	External Drain (0V)* 外部排放（0V）*
2	Unused 未使用
3	Unused 未使用
4	Unused 未使用
5	External Drain (24V) 外部排放（24V）
6	Unused 未使用

*Note: If an external particulate filter is fitted, then the 24V DC power supply required for the external drain, comes from the EGA.

* 注：如已安装外部颗粒过滤器，则外部排放所需的 24V 直流电源来自尾气分析仪。

1.5   Installing Sampling Probe and EGA 安装采样探头和尾气分析仪

The sampling probe must be purchased separately to the EGA and is supplied with the sampling tube for the exhaust gases and the thermocouple. The sampling tube and thermocouple is available in the below standard lengths, however if a different length is required, please contact Autoflame.

采样探头必须和尾气分析仪分开购买，采样探头配备了用于排气采样的采样管和热电偶。采样管和热电偶的标准长度见下表，如需不同长度，请联系 Autoflame。

Sampling Probe 采样探头	Sampling Tube and Thermocouple Length 采样管和热电偶长度
MM10033	3m (10ft)

MM10033/5	5m (16ft)
MM10033/10	10m (33ft)

The EGA should be checked before installing it on site. It is advisory that EGA remains upright during any tests and checks. Thereafter the E.G.A should be turned off for a period (couple of hours), and turned back on again to drain out any excess moisture remaining in the EGA.

安装尾气分析仪前必须对其进行检查。在测试和检查期间建议使尾气分析仪保持直立状态，随后应将尾气分析仪关闭一段时间（数小时），然后再次开启使其排出内部剩余的水分。

1.5.1 **Sampling Probe Dimensions 采样探头尺寸**
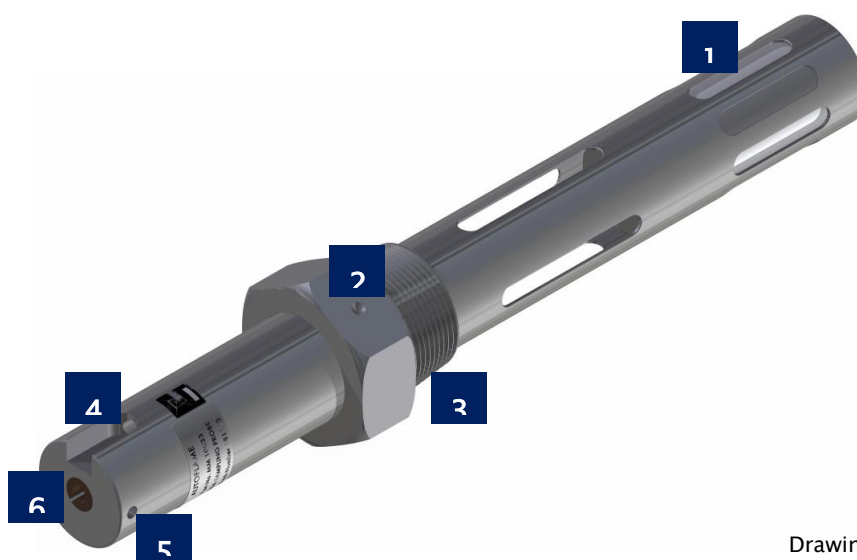
Drawing No. 9058
图纸编号：9058

1. Internal filter 内部过滤器
2. Set screw 2mm (5/64") 固定螺丝 2mm (5/64")
3. Threaded probe socket 1.5" BSP/ NPT 螺纹探头插座 1.5" BSP/ NPT
4. Exhaust temperature thermocouple slot 排气温度热电偶槽
5. Set screw 2mm (5/64") 固定螺丝 2mm (5/64")
6. Sampling line hole 采样线孔

Figure 1.5.1.i Sampling Probe Assembly
图 1.5.1.i 采样探头总成

THERMOCOUPLE LEADS

TO E.G.A. SAMPLING UNIT

FLEXIBLE SAMPLING TUBE CONNECTION MAX LENGTH = 10METRES (PLASTIC TUBING)

334mm [13,2in]

LENGTH ADJUSTABLE TO SUIT APPLICATION

4mm GRUB SCREW FIXING

1.5" B.S.P. (40mm) THREAD (TO SUIT 1.5 B.S.P. SOCKET) (Supplied as a standard)

38mm [1,5in]
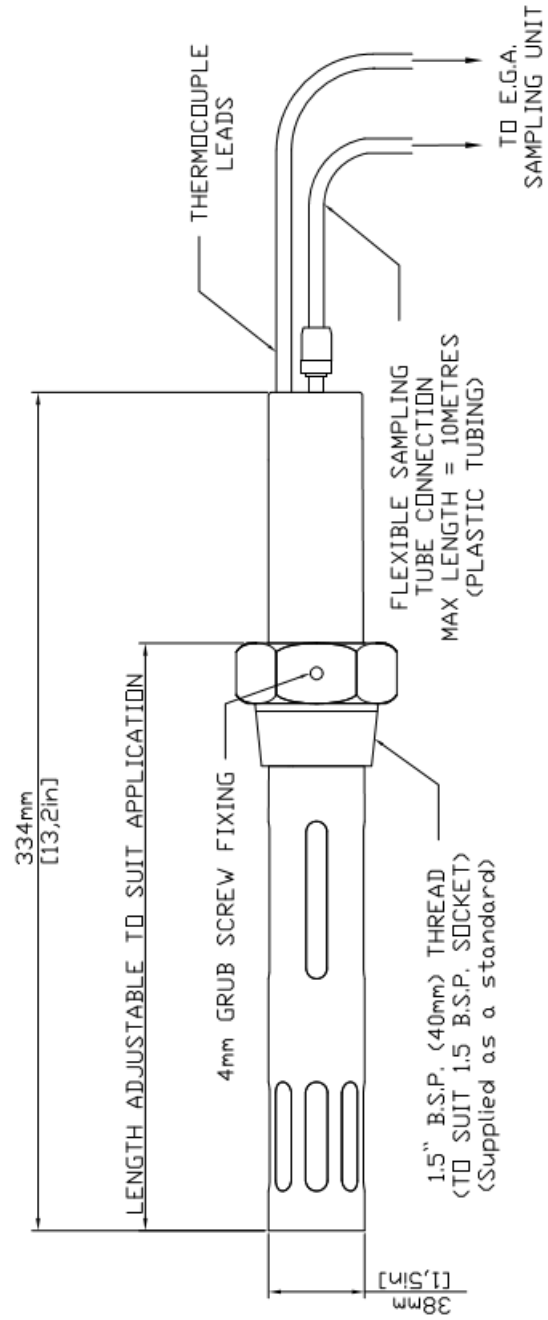
Drawing No. 7978

Figure 1.5.1.ii Sampling Probe Dimensions
图 1.5.1.ii 采样探头尺寸

1.5.2   Sampling Probe – Internal Layout 采样探头内部结构

端视图

外壳

内部高温过滤器

外部高温过滤器

燃气进口

横截面图

所有部件均用不锈钢制成
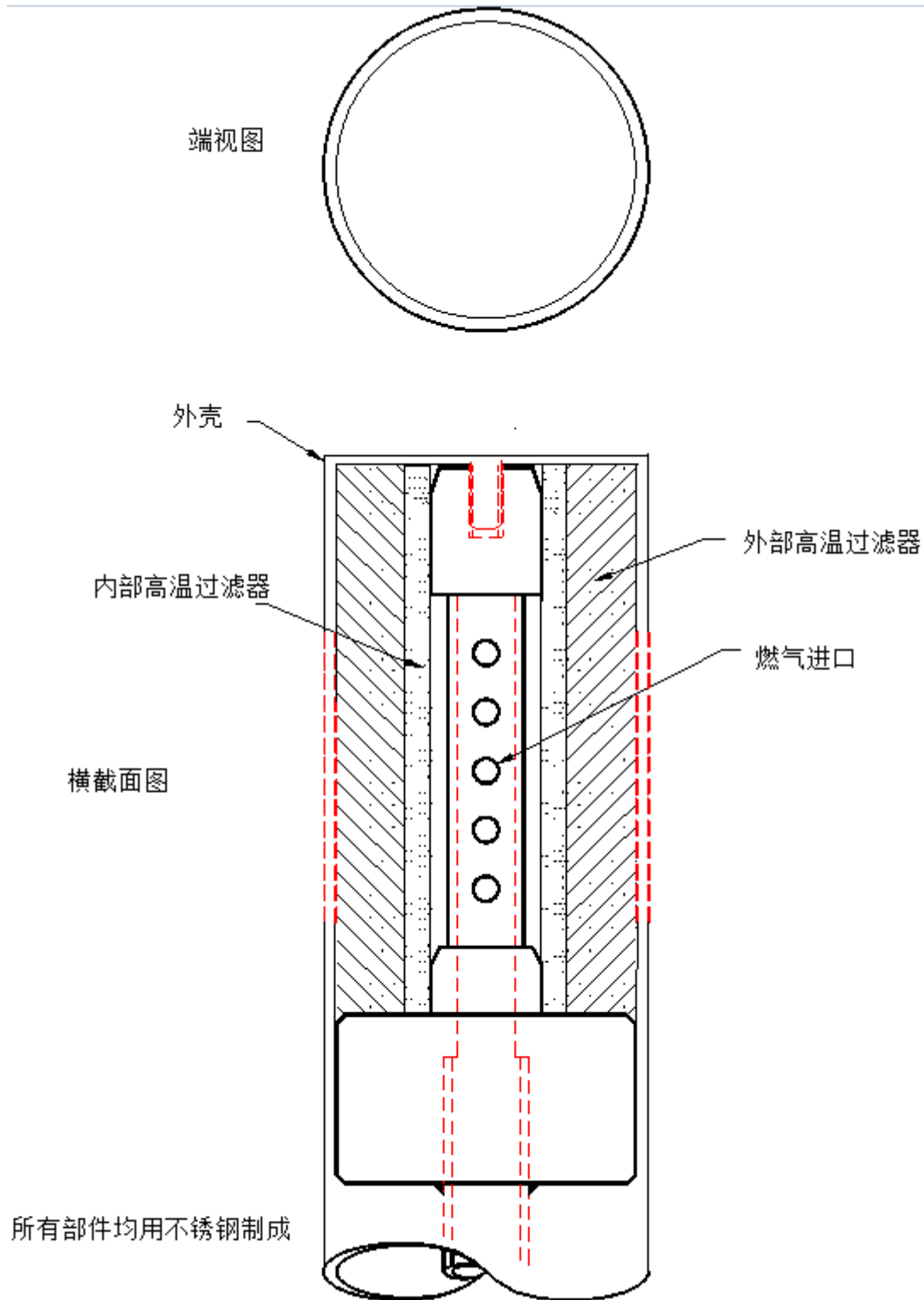
Figure 1.5.2.i Sampling Probe Internal Layout
图 1.5.2.i 采样探头内部结构

1.5.3   Assembly of Dry Filter 干滤器的组装

If pump faults are occurring on the EGA it is advised to check the dry filter in the EGA and check for any blockages and make sure that the filter material has not become saturated.
如尾气分析仪上的泵发生故障，我们建议检查尾气分析仪内的干滤器以及是否堵塞，确保过滤材料未饱和。
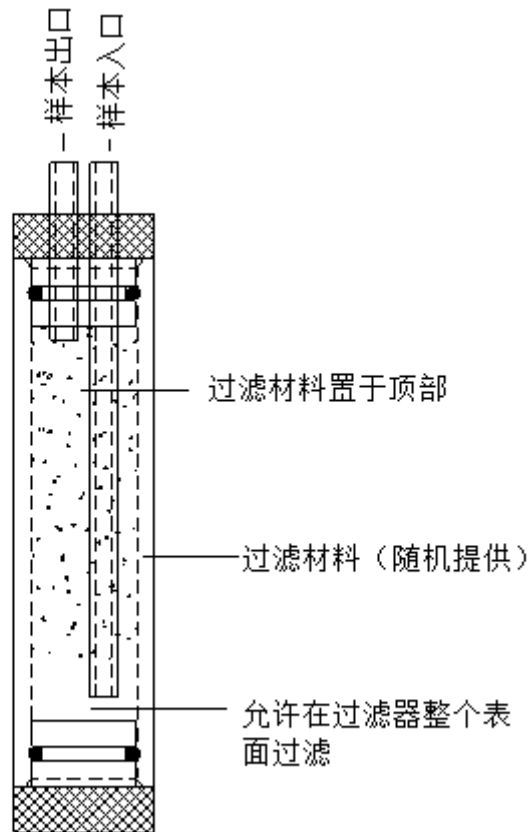
**N.B. FREE SPACE MUST BE LEFT AT BOTTOM TO STOP ANY PREMATURE BLOCKAGE
THE SAMPLE IN & OUT PIPES MUST BE CONNECTED CORRECTLY OR BLOCKAGE WILL OCCUR
WITHIN A FEW HOURS.**
注意底部必须留有自由空间以防止过早堵塞。必须正确连接样本进出口管，否则在几
小时内就会发生堵塞。

This filter is specifically used as a dry filter to remove and dust particulate before the dry gas passed into the cells. The filter is carefully packed as a complete replacement part and should be repacked or the filter material changed in the field, as the filter is critically calibrated for a specific pressure drop. The filter should always be dry, if any carryover of liquid or moisture is sent in the filter, please isolate the EGA and contact Autoflame Technical Support.
该过滤器专门用作干滤器，用于在干燃气进入感应器前清除灰尘微粒。干滤器作为完整的替换
件经过仔细包装，在现场需要重新包装或更换过滤材料，因为该过滤器是按特定的压降进行校
准。干滤器应始终保持干燥，如果过滤器内出现液体或水份，请隔离尾气分析仪并联系
Autoflame 技术支持。

1.5.4   Sampling Probe Installation 采样探头的安装

The sampling probe must be installed as per the below guide to prevent any blockages in the line and incorrect operation.
采样探头必须根据以下规定安装，以防采样线内堵塞和错误运行。

1. Install a 1.5" BSP socket on the flue where the sampling probe is to be positioned.
   在烟道内安装一个 1.5" BSP 插座使采样探头定位。
   a. If using the Autoflame draft control system, the sampling probe should be positioned after the stack damper and air pressure sensor.
      如使用 Autoflame 通风控制系统，则采样探头应在固定排气管挡板和空气压力传感器后定位。
   b. If using a single EGA on a twin furnace, the sampling probe should be positioned after the individual flues are combined into one stack.
      如在一个双炉上使用一个尾气分析仪，则采样探头应在烟道连接排气管后定位。
   c. If an economiser is fitted to the flue, the sampling probe should be positioned before the economiser.
      如在烟道内安装节能器，则采样探头应在固定节能器前定位。

2. Mount the sampling probe at an angle of approximately 45° into the stack. This will allow any condensate in the sample to flow down to the EGA rather causing blockages in the sampling line. A build-up of condensation in the EGA could result in a pump failure. 将采样探头按 45 度角安装在排气管中。这样样本中的冷凝水将不会流入尾气分析仪而导致采样线堵塞，累积在尾气分析仪内的冷凝水可导致泵故障。

3. Mount the main body of the sampling probe as far in as possible; adjustment is made by loosening the grub screws in the flats of the 1.5" BSP bush supplied on the probe.
   在尽可能远的位置安装采样探头主体，松开探头上 1.5" BSP 衬套固定螺丝可以进行调节。

Notes 备注
- Keep the thermocouple and blue sampling tube away from hot surfaces.
- 使热电偶和蓝色采样管远离热表面。
- The thermocouple should be positioned away from high voltage cabling.
- 使热电偶远离高压线。
- Ensure that the thermocouple and sampling tube run from the sampling probe to the EGA with no coils or loops.
- 确保热电偶和采样管从采样探头至尾气分析仪之间没有盘绕或卷线现象。
- The sampling probe must be positioned without air leaks as this will result in incorrect readings on all cells.
- 采样探头必须正确定位而无空气泄露，因为这将导致所有传感器读数不准确。
- If the thermocouple is run in conduit from the sampling probe to the EGA, this must be earthed.
- 如热电偶在采样探头至尾气分析仪的管道内运行，则热电偶必须接地。
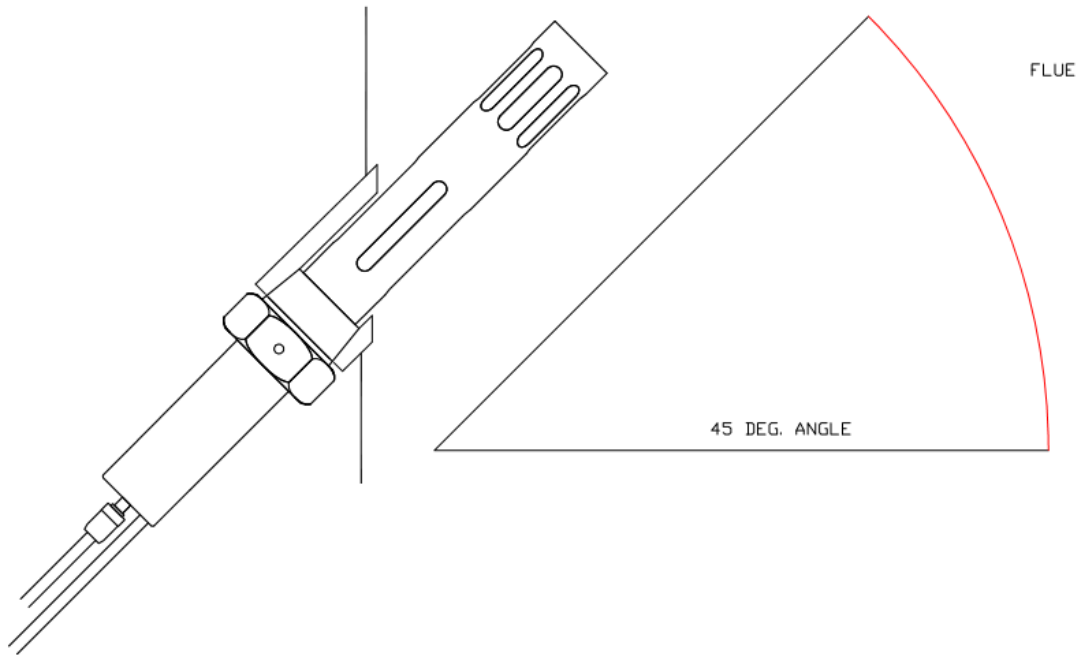
Drawing No. 7978 图纸编号：7978
Figure 1.5.4.i EGA Probe 45° In Flue
图 1.5.4.i 烟道内呈 45 度角的尾气分析仪探头

Figure 1.5.4.ii Sampling Probe Installation – Wrong
图 1.5.4.ii 采样探头错误安装图

Figure 1.5.4.iii Sampling Probe Installation – Right
图 1.5.4.iii 采样探头正确安装图

1.5.5   EGA Installation 尾气分析仪的安装

Once the sampling probe has been positioned and installed into the stack as per the guidelines in section 1.5.4, it can be connected to the EGA following the guidelines below.
采样探头定位并根据第 1.5.4 节所述安装在排气管内后，可以按以下步骤连接尾气分析仪。

1. Push the sampling tine into the inlet tube.
    将采样管固定在进口管上。
2. Plug the thermocouple connector into the socket and tighten the screw.
    将热电偶连接器插入插座并拧紧螺丝。

Notes 注：

-   If the unit is started up for the first time, it may take some time for the chiller to cool down.
    首次启动冷却器组时可能需要一段时间冷却。
-   To obtain optimum performance and reliability do not mount the unit in ambient temperatures above 40°C (104°F) or areas of direct heat radiation. If the ambient temperature is greater than 40°C (104°F), a chilled environmental enclosure is required, see section 1.7.3.
    要获得最佳性能和稳定性，请勿将组件安装在环境温度高于 40°C （104°F） 的位置或有直接热辐射的位置。如环境温度高于 40°C （104°F），则需要安装冷冻环境保护罩，请见第 1.7.3 节。

- For environments with high humidity, a chilled environmental enclosure is recommended to avoid corrosion on the electronics board, see section 1.7.3.
  在高湿环境下我们同样建议使用冷冻环境保护罩，以避免电路板腐蚀，请见第 1.7.3 节。

- If the EGA is placed in an enclosure or cabinet, to avoid the EGA being recalibrated on contaminated gases, ensure that the drain solenoid is taking in fresh air during calibration.
  如尾气分析仪安装在机壳或机柜内，请避免尾气分析仪因污染的燃气进行重新校准，确保排水电磁阀在校准期间吸入新鲜空气。

- Ensure that the air flow to the intake in the bottom of the EGA unit is not impeded and the air temperature is less than 40°C (104°F). If the burner air temperature is greater than 40°C (104°F), then a pre-heated air sensor is required, see section 1.7.4.
  确保空气可以从尾气分析仪底部的进气口顺利流入，且空气温度小于 40°C (104°F)。如燃烧器的空气温度高于 40°C (104°F)，则需要安装预热空气传感器，请见第 1.7.4 节。

- Position the sample tube so that the sample slopes down to the EGA unit at all times. The EGA unit must always be mounted lower than the EGA probe. This helps drain excessive condensate from the flue gases, which may cause blockages in the sample tube.
  将采样管固定，使样本始终向下倾斜对准尾气分析仪。尾气分析仪必须安装在低于尾气分析仪探头的位置，这样有助于排出烟道气体中过多的冷凝水，否则可能会堵塞采样管。

- If extension tubing is attached to the drain solenoid, check that the end of the tubing is clear of any obstructions or contaminants. When the EGA performs an air calibration, the air is sucked into the EGA through the solenoid.
  如在排水电磁阀上连接加长管，请确保管端无任何妨碍物或污染物。尾气分析仪进行空气校准时，空气将通过电磁阀被吸入尾气分析仪。

- Condensate in the EGA could also occur from the load demand not being so high at certain times, resulting in the back end temperature of the boiler being low and not warm enough to evaporate the condensation quick enough. This will cause a large build-up of moisture in the EGA, and so the time period between drains may need to be shorted in Commission Mode settings 43 and 44.
  尾气分析仪中的冷凝水可能为特定时间内负载要求不高所致，从而导致锅炉的后端温度较低，没有足够热量快速蒸发冷凝水。这将导致尾气分析仪中积聚大量湿气，因此在调试模式设置 43 和 44 中需要将排水时间设的较短。

- Do not mount the units where excessive vibration occurs.
  切勿将设备安装在有过度振动的位置。

- The EGA should be positioned away from high voltage cabling.
  尾气分析仪应远离高压线。

- The EGA O_2, CO, NO, SO_2 and NO_2 cells have a 6 month shelf-life. If ordering an EGA for project that will be installed later we would advise to purchase an EGA without these cells, and then purchase the cells when they are due to be installed. This EGA will come with the CO_2 cell only (patent no: MM72004/NC) as this can only be fitted at Autoflame office. We recommend that the cells are replaced 12-18months

for gas firing from manufacturing date and 6-12 months for heavy oil firing applications.

尾气分析仪的 O_2、CO、NO、SO_2 和 NO_2 感应器有 6 个月的保质期。如果订购一个尾气分析仪并在后期进行安装时，我们建议先购买不带感应器的尾气分析仪，然后在安装时再购买感应器。尾气分析仪仅标配二氧化碳感应器（专利号：MM72004/NC），因为感应器只可在 Autoflame 工厂进行安装，我们建议使用燃气燃烧时每隔 12 至 18 个月更换一次感应器，在使用重燃油燃烧时每隔 6 至 12 个月更换一次。

1.5.6 Cable Specification 电缆规范

Low Voltage 低压

The screened cable used for low voltage wiring from the EGA for the fuel flow 4-20mA input, and channels 1 to 6 4-20mA outputs must conform to the following specification:
尾气分析仪低压线路使用的屏蔽电缆用于 4-20mA 燃料流量输入，4-20mA 通道 1 至 6 输出，且必须符合以下规范：

16/0.2mm PVC insulated overall braid, screened, PVC sheathed.
16/0.2mm 聚氯乙烯护套编织屏蔽电缆。
➢ Sixteen wires per core
➢ 每芯 16 线。
➢ Diameter of wires in each core 0.2mm
➢ 每芯线直径：0.2mm。
➢ Rated at 440V AC rms at 1600Hz
➢ 1600Hz 时额定有效值：440V AC。
➢ DEF 61-12 current rating per core 2.5A
➢ 每芯 DEF 61-12 电流额定值：2.5A。
➢ Maximum operating temperature 70°C (158°F)
➢ 最大运行温度：70°C (158°F)
➢ Nominal conductor area 0.5sq mm per core
➢ 每芯标称导体截面积：0.5mm^2
➢ Nominal insulation radial thickness on core 0.45mm
➢ 每芯标称绝缘径向厚度：0.45mm
➢ Nominal conductor diameter per core 0.93mm
➢ 每芯标称导体外径：0.93mm
➢ Nominal core resistance at 20°C. 40.1Ω/1000m
➢ 20°C 时标称线芯电阻：40.1Ω/1000m
➢ Nominal overall diameter per core 1.83mm
➢ 每芯公称外径：1.83mm
➢ Fill factor of braid screen 0.7
➢ 编制屏蔽填充因数：0.7
➢ Equivalent imperial conductor sizes 14/0.0076
➢ 等效导体尺寸：14/0.0076

Use the number of cores suitable for the application. A universal part numbering system appears to have been adopted for this type of cable as follows:
请根据应用场合选择合适的线芯数量。此类电缆可以参考以下通用零件编号系统：

16-2-2C 2 Core
16-2-2C 2 芯

16-2-3C 3 Core
16-2-3C 3 芯
16-2-4C 4 Core
16-2-4C 4 芯
16-2-6C 6 Core
16-2-6C 6 芯
16-2-8C 8 Core
16-2-8C 8 芯

(5 Core not readily available)
（不提供 5 芯电缆）

Note: If using 4 Core cable and interference is detected, use 2 sets of 2 Core.
注：使用 4 芯电缆时如检测到干扰，请使用两套两芯的电缆。

Data Cable
数据电缆
Data cable must be used for communication connections between MMs for sequencing applications as well as between MMs to EGAs, MMs to a DTI and DTI to BMS systems.
数据电缆必须用于排序控制模块以及尾气分析仪控制模块、数据传输接口控制模块和电池管理系统数据传输接口之间的通信。

Communication cable should not exceed 1km.
通信电缆长度不得超过 1km。

Types of data cable that can be used:
使用的数据电缆类型：

1   Beldon 9501 for 2-core shielded cable (1 twisted pair)
      Beldon 9501 两芯屏蔽电缆（1 对双绞线）
2   Beldon 9502 for 4-core shielded cable (2 twisted pairs)
      Beldon 9502 四芯屏蔽电缆（2 对双绞线）
3   STC OS1P24

Samples are available upon request. Low voltage and data cable can be ordered directly from Autoflame Engineering, please contact Autoflame Sales.
可以根据要求提供样品。低压电缆和数据电缆可以直接从 Autoflame 订购，请联系 Autoflame 销售部。

1.6   **Wiring Schematics** 接线示意图

1.6.1   **Connection between EGA and Mk8 MM** 尾气分析仪和 **Mk8** 控制模块的连接

The data cable should be screened at the MM end and connected all the way to the EGA plug; the screen from the flying lead provided should be connected to the data cables that connect to the MM.
数据电缆应在控制模块末端屏蔽并连接到尾气分析仪的插头上。提供的屏蔽飞线应与已连接控制模块的数据电缆相连。
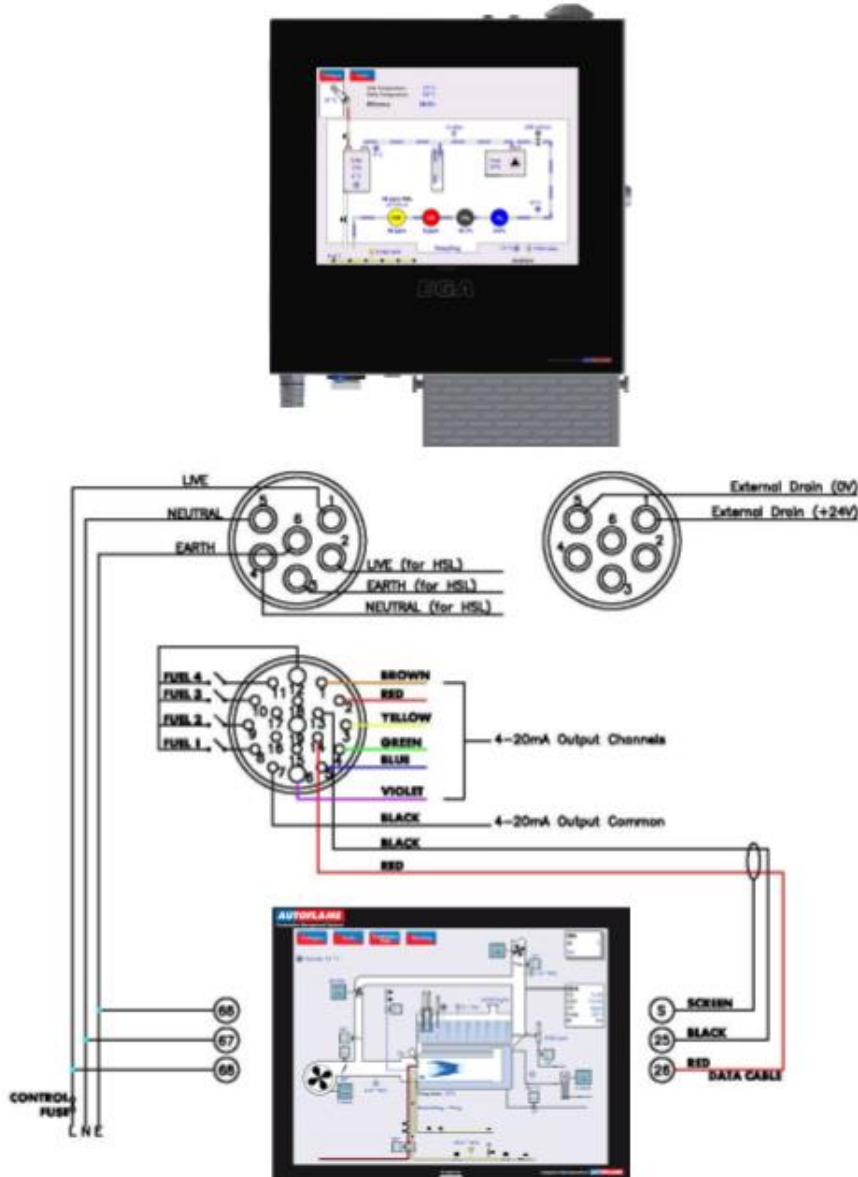
Drawing No 图纸编号. 7980

1.6.2   Connection between EGA, MM and DTI 尾气分析仪、控制模块和数据传输接口的连接

The data cable should be screened at the MM and DTI end and connected all the way to the EGA plug; the screen from the flying lead provided should be connected to the data cables that connect to the MM and DTI.

数据电缆应在控制模块和数据传输接口末端进行屏蔽并连接到尾气分析仪的插头上。提供的屏蔽飞线应与已连接控制模块和数据传输接口的数据电缆相连。
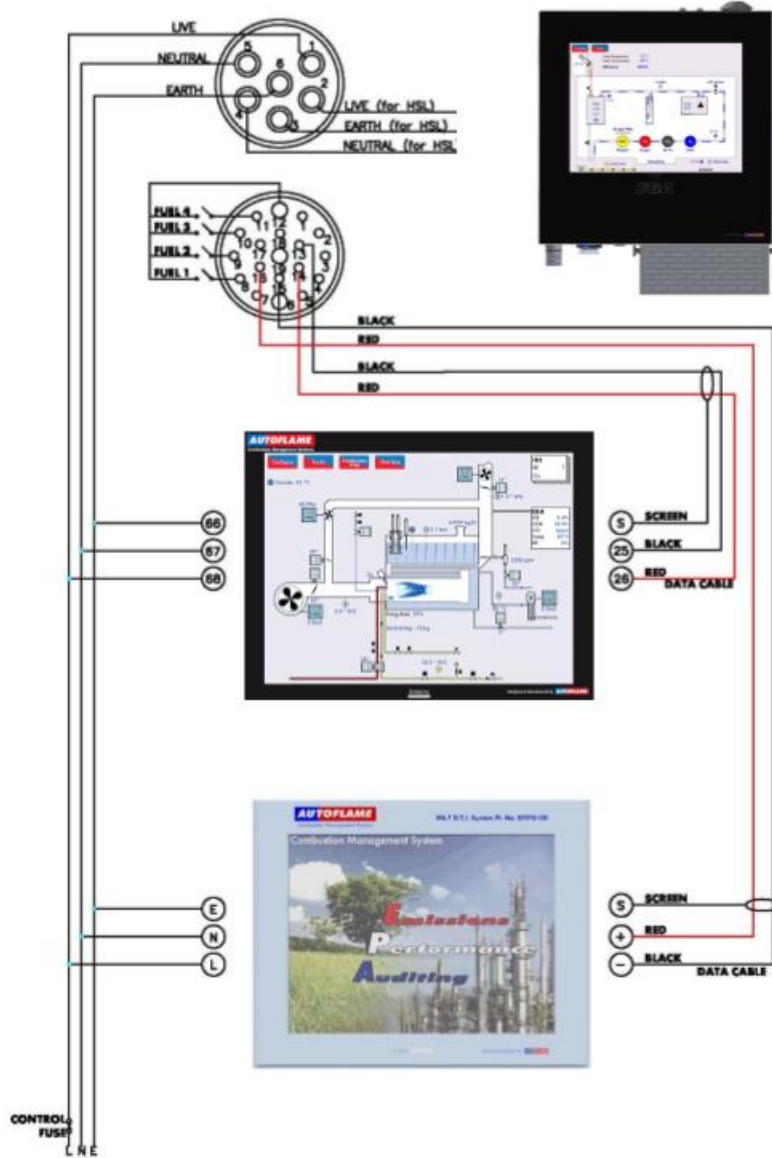
1.6.3 Connection between EGA and DTI 尾气分析仪和数据传输接口的连接

The data cable should be screened at the DTI end and connected all the way to the EGA plug; the screen from the flying lead provided should be connected to the data cables that connect to the DTI.

数据电缆应在数据传输接口末端屏蔽并连接到尾气分析仪的插头上。提供的屏蔽飞线应与已连接数据传输接口的数据电缆相连。
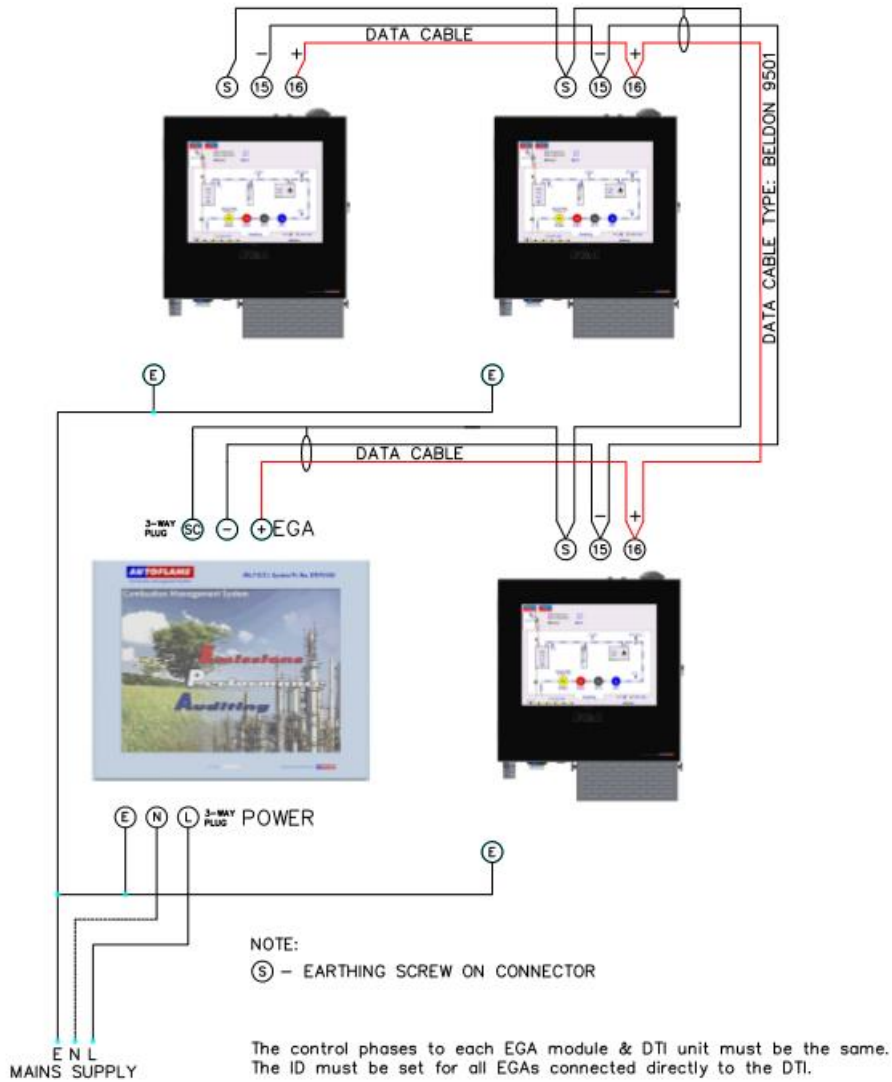
Drawing No. 7979

1.7 Ancillary Parts 辅助部件

1.7.1 Air Inlet Filter 进气过滤器

The air inlet filter is designed to protect the EGA from dust and other particles that may cause damage or reduce the performance of the EGA over time. The air inlet filter will fit over the fan that cools the EGA and stop dust and particles from getting inside the EGA. The air inlet filter is easy to maintain with only the air filter material needing replacing once it has become saturated. The time between each change of air filter will depend on the site conditions.

进气过滤器设计用于保护尾气分析仪远离灰尘和其他微粒，因为随着时间的推移灰尘和微粒可能会损坏尾气分析仪或降低其性能。进气过滤器将配备一个用于冷却尾气分析仪的风机，阻止灰尘和微粒进入尾气分析仪。进气过滤器非常容易维护，过滤器堵塞时只需更换过滤器材料即可。更换过滤器的时间取决于现场环境。

Drawing No. 9058

Figure 1.7.1.i Air Inlet Filter
图 1.7.1.i 进气过滤器

While the EGA can successfully be used to measure combustion exhaust gases when burning HFO, it is very important that the fuel is carefully maintained at a constant and known composition. The fuel temperature and pressure play a major role in the amount of particulate carry-over sampled, before combustion even takes place.

燃烧重燃油时尾气分析仪可以用于成功地测量燃烧废气，重要的是需要保持燃料含有恒定、已知的成分。在燃烧开始前，燃料温度和压力对采样的微粒量起到重要作用。

The burner must be regularly maintained to ensure complete combustion of the hydrocarbons. Failure to do so will result in premature failure of the EGA Ensure the oil filter is regularly maintained and the oil nozzle is regularly inspected for fatigue.

燃烧器必须定期维护，确保碳氢化合物充分燃烧。燃烧不完全将导致尾气分析仪过早出现故障。确保定期维护燃油过滤器，定期检查喷油孔是否老化。

It is recommended that when the EGA is used on a dual fuel application where natural gas is the primary fuel and HFO is the secondary fuel, the EGA should not be monitoring the HFO exhaust. This can be achieved by simply isolating the EGA when the HFO fuel is selected to be fired.

尾气分析仪使用双燃料时，建议主燃料使用天然气，辅燃料使用重燃油。尾气分析仪不应监测重燃油的排气。当选择重燃油燃烧时，可以通过隔离尾气分析仪实现监测排气功能。

1.7.2   External Particulate Filter 外部微粒过滤器

The external particulate filter is designed to be used when there is excessive moisture from the flue gases, or if there is excess particulates in the flue gases which may cause damage to the EGA The external particulate filter stops excessive moisture from getting into the EGA as it has its own drain solenoid to remove any excess moisture. This drain occurs at the same time intervals as the normal drain solenoid on the EGA The external particulate filter has its own filter, capable of filtering excess particulates from the flue gases. We recommend that this external particulate filter be used for any heavy oil applications. Due to the nature of this product it can only be installed by Autoflame and cannot be fitted on site.
外部微粒过滤器设计用于过滤烟道烟气中的水分和过多的微粒，因为过多的微粒可能会损坏尾气分析仪。外部微粒过滤器可以阻止过多的水分进入尾气分析仪，因为过滤器中配备了排水电磁阀，用于清除过多的水分。排水过程与尾气分析仪上正常排水电磁阀同步工作。外部微粒过滤器自身也配有过滤器，可以过滤烟道中的过多微粒。我们建议在使用重燃油时使用外部微粒过滤器。因为产品比较特殊，因此需要由 Autoflame 进行安装，过滤器不得在现场安装。

The external particulate filter can be ordered with a new EGA or retrofitted onto an existing EGA at our Autoflame London office.
外部微粒过滤器可以与新型尾气分析仪一同订购，或在 Autoflame 伦敦办事处将其改装到现有的尾气分析仪中。

Drawing   No.

Figure 1.7.2.i External Particulate Filter
图 1.7.2.i 外部颗粒过滤器

Note: For applications firing on heavy or dirty oil, an external particulate filter is highly recommended to be fitted with the EGA.
注：在使用重燃油或脏油时强烈建议将外部微粒过滤器安装在尾气分析仪中。

The external particulate filter will need to be changed depending on the amount of particulate carried over from the combustion process. This could be a month or as little as once every 6 months, once the filter starts to discolour. Use the Bacharach scale of 5 as an indication as to when the filters need to be changed.

外部微粒过滤器根据燃烧过程中产生的微粒数量需要及时更换，时间一般是一个月或每隔 6 个月更换一次，即过滤器开始变色时就更换。更换过滤器时可以用 5 级格林曼黑度计进行检查。

The filter material is fluorocarbon resin bonded, borosilicate glass micro-fibre designed to coalesce liquid particles through a two layer construction. The inner layer forms the main filtration and the coarser layer provides drainage. It is a type MCE 95% 25micron high efficiency filter. The filter should be fitted as in the Figure 1.7.2.i ensuring that the filter operates correctly. Please note that there may be a discharge of liquid from the filter when in use. This is a design feature to drain any excess moisture from the flue before it reaches the EGA.

过滤材料是氟碳树脂和硼硅酸盐玻璃微纤维，设计可以通过两层结构聚集液体颗粒。内层是主过滤层，粗过滤层用于排水。过滤器是一种 MCE 95% 25 微米高效过滤器。过滤器应按图 1.7.2.i 所示方式固定，以确保过滤器正常工作。请注意，过滤器在使用时可能会排出液体。这是过滤器的设计特点，即在过多水分到达尾气分析仪前就将其从烟道中排出。

The inlet from the flue is connected to the horizontal section on the top of the filter. The vertical section is connected directly to the EGA inlet.
烟道入口连接过滤器顶部的水平部分，垂直部分直接连接尾气分析仪入口。

External particulate filters should be used for applications firing on heavy or dirty oil, environments with dust and particulate, extremely cold or high humidity conditions.
外部颗粒过滤器应用于使用重燃油或脏油的场所、或用于含较多灰尘和颗粒的环境以及过冷或高湿环境。

1.7.3   Chilled Environmental Enclosure 冷冻环境保护罩

The exhaust gas is vented into the air stream leaving the EGA unit. This is located on the outside of the EGA enclosure next to the drain solenoid outlet. It is extremely important that the exhaust gas is vented into atmosphere; **do not install an EGA within a sealed enclosure**. Installing the EGA in a sealed enclosure will cause the EGA to calibrate on contaminated gases. The EGA will self-calibrate every 12 hours of running or when the burner starts and stops.

废气将进入尾气分析仪排出的气流中。保护罩位于紧邻排水电磁阀出口的尾气分析仪外壳外侧。确保废气排入大气非常重要，因此请勿将尾气分析仪安装在密闭的外壳内，否则可能使尾气分析仪对污染的燃气进行校准。尾气分析仪每隔 12 小时或当燃烧器启动和停止时将自行校准一次。

In areas of harsh ambient conditions, or excessive heat, it is necessary to use an environmental enclosure with the EGA module. This protects the EGA from dust and ensures that the EGA is well protected. Using the enclosures allows the EGA to operate under optimal operating conditions.

在极端环境条件或过热环境下有必要在尾气分析仪模块上使用环境保护罩。这样可以防止灰尘进入尾气分析仪，保护尾气分析仪。使用保护罩后，尾气分析仪可以在最佳运行条件下运行。

Autoflame manufacture a chilled environmental enclosure that uses a chiller module and control panel in order to maintain the EGA installed within the enclosure at a set temperature to protect itself from excessive heat. The temperature is user adjustable by means of a thermostat counted on the unit but is nominally set for 35°C (95°F), which ensures ideal operating conditions for the EGA. Autoflame also manufacture a heated enclosure for low temperature and for anti-condensing sites.

Autoflame 生产了一种冷冻环境保护罩，配备了冷却器模块和控制面板，目的是使安装在保护罩内的尾气分析仪始终保持在预设温度下，以防止尾气分析仪过热。用户可以用温控器设置预

设温度，通常设为 35°C (95°F)，这样可以确保尾气分析仪在理想的运行条件下运行。Autoflame 还生产了一种用于低温环境的加热保护罩，可以用于防止冷凝的场所。

If you require further information please contact Autoflame Technical Support.
如要获得更多信息，请联系 Autoflame 技术支持。
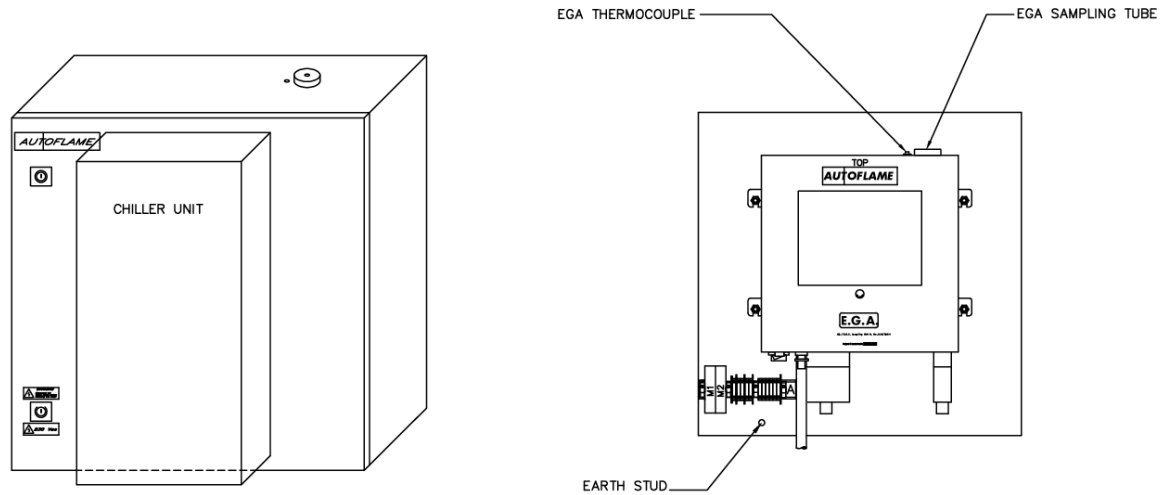
Figure 1.7.3.i Schematic of Chilled Environmental Enclosure
图 1.7.3.i 冷冻环境保护罩示意图

1.7.4　Pre-Heated Air Sensor 预热空气传感器

A pre-heated air sensor can be connected to the EGA to ensure an accurate combustion efficiency calculation when using pre-heated air to the burner. If the temperature of the air going into the burner is more than 40$^\text{O}$C (104$^\text{O}$F), a preheated air sensor is required.
预热空气传感器可以连接尾气分析仪，当燃烧器使用预热空气时可以确保准确计算燃烧效率。如进入燃烧器的空气温度高于 40$^\text{O}$C (104$^\text{O}$F)，则需要安装预热空气传感器。
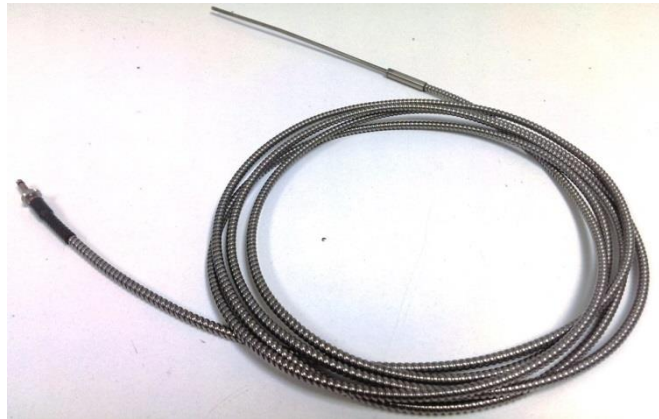
Figure 1.7.4.i Pre-Heat Air Sensor
图 1.7.4.i 预热空气传感器

The pre-heated air sensor uses a K-type thermocouple and the working temperature range is 0 – 400°C (32 – 752°F). The pre-heated air sensor will need to be enabled in Commission Mode setting 41, see section 2.2.1.
预热空气传感器使用 K 型热电偶，工作温度范围是 0 – 400°C (32 – 752°F)。预热空气传感器需要在调试模式设置 41 中启用，请见第 2.2.1 节。
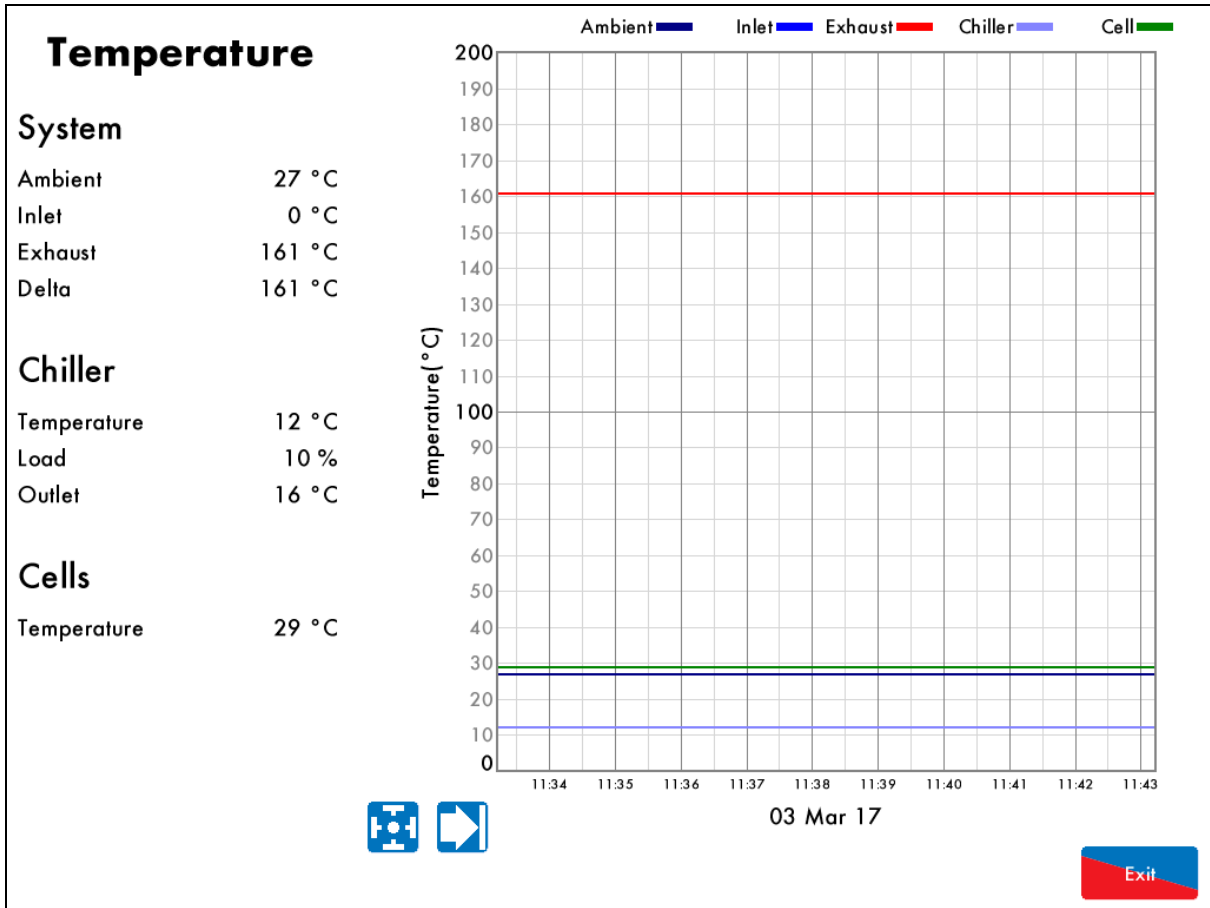
Figure 1.7.4.ii Temperature Screen with Pre-Heated Air Sensor Enabled
图 1.7.4.ii 安装了预热空气传感器的温度显示界面

The EGA will separate the ambient temperature from the pre-heated air (inlet) temperature.

尾气分析仪将区分环境温度和预热空气（进气口）温度。

2 COMMISSIONING EGA 调试尾气分析仪

2.1 Operating Modes 运行模式

2.1.1 EGA through MM 通过控制模块调试尾气分析仪

If using the EGA with an MM then the EGA, the EGA is connected to the MM following the wiring schematic in section 1.6.1. The EGA must also be enabled in the MM settings. If the EGA is to be connected to a DTI as well, then the boilers on the DTI will need to set up with 'EGA fitted,' and modules connected following the wiring schematic in section 1.6.2.
如使用配有控制模块的尾气分析仪，请按第 1.6.1 节所示的接线示意图连接尾气分析仪和控制模块。尾气分析仪必须在控制模块设置中设为启用。如尾气分析仪还连接了数据传输接口，则连接数据传输接口上的锅炉需要设为"EGA fitted/已安装尾气分析仪"，控制模块的连接请参考第 1.6.2 节所示的接线示意图。

When used with the MM, the EGA can be set to monitoring only, 3-parameter trim, or 3-paramter with combustion limits, through option 12. If an EGA fault occurs, the burner can either shutdown or continue running depending on option 13. The table below shows the relevant options and parameters for on the MM for the EGA.
当尾气分析仪和控制模块一起使用时，尾气分析仪可以通过选项 12 设为仅监控、3 参数调节或带燃烧限值的 3 参数。如果尾气分析仪出现故障，燃烧器则根据选项 13 的设置进行停机或继续运行。下表显示了尾气分析仪和控制模块的相关选项和参数。

Options 选项	Description 说明
12	EGA Functionality 尾气分析仪功能
13	EGA Fault Response 尾气分析仪错误响应
18	Carry Forward of Trim 调节值的延续
19	O_2 Upper Limit Offset 氧气上限补偿值
20	CO_2 Upper Limit Offset 二氧化碳上限补偿值
21	CO Upper Limit Offset 一氧化碳上限补偿值
22	O_2 Lower Limit Offset 氧气下限补偿值
23	CO_2 Lower Limit Offset 二氧化碳下限补偿值
25	O_2 Absolute Limit 氧气绝对限值
26	CO_2 Absolute Limit 二氧化碳绝对限值
27	CO Absolute Limit 一氧化碳绝对限值
28	Trim Threshold 调节阈值
32	Trim Delay 调节延迟
76	Trim Channel 调节通道

Parameters 参数	Description 说明
4	Delay before EGA Commission Can Be Stored 存储尾气分析仪调试值前延迟
8	Trim Delay After Drain 排水后调节延迟
10	EGA Version 尾气分析仪版本
12	CO Used for Trim On Oil 用于燃油调节的一氧化碳
13	Commission Fuel-Rich Trim 调试富油调节

14	Trim Reset Angular Rate 调节重置角速率
16	Time Between Air Calibrations 空气校准间隔时间
17	Number of Trims Before Limits Error Generated 产生限值错误前的调节次数
18	Maximum Trim During Run 运行时的最大调节幅度
19	Commission Air-Rich Trim 调试富氧调节
23	Add Air when CO Present 一氧化碳出现时添加空气
26	Trim Samples Per Cycle 单个调节周期内调节样本
94	NO Upper Limit Offset 一氧化氮上限补偿值
96	Exhaust Temperature Upper Limit Offset 排气温度上限补偿值
97	Exhaust Temperature Absolute Limit 排气温度绝对限值

Please refer to the MM Installation and Commissioning Guides for full description of these settings.
关于设置的具体说明请参考控制模块安装和调试指南。

Please refer to section 4.3 for the 3-parameter trim function and section 4.5 for combustion limits.
关于 3 参数调节功能请参考第 4.3 节，燃烧限值请参考第 4.5 节。

2.1.2 Standalone EGA 单机运行尾气分析仪

If using the EGA as a standalone module, with or without a DTI, a fuel select input must be given to the EGA. This is done by connecting a link between the chosen fuel select input and the fuel input common. The EGA must also be set to standalone mode in setting 1, see section 2.3 for EGA Settings.

如将尾气分析仪作为单机模块使用，无论有无数据传输接口，燃料选择输入都必须分配给尾气分析仪，分配时将已选定的燃料选择输入和燃料输入命令连接在一起即可。尾气分析仪还必须在设置 1 中设为单机模式，请见第 2.3 节尾气分析仪的设置。

Fuel Select 燃料选择	Data Flying Lead Wiring 数据飞线的连接
1	Pin 8 to pin 12 第 8 针连接第 12 针
2	Pin 9 to pin 12 第 9 针连接第 12 针
3	Pin 10 to pint 12 第 10 针连接第 12 针
4	Pin 11 to pin 12 第 11 针连接第 12 针

Note: When using an EGA in standalone mode, there is no 3-parmeter trim function or combustion limits, this can only be set on the MM.

注：在单机模式下使用尾气分析仪时没有 3 参数调节功能或燃烧限值，它们只可在控制模块上设置。

The standalone EGA will also require a fuel flow input on pins 17 and 18 in the data flying lead, see section 2.2.2 for setting up the 4-20mA fuel flow inputs.

单机模式下的尾气分析仪还需要在数据飞线第 17 和 18 针上有燃料流量输入，关于如何设置 4-20mA 燃料流量输入，请见第 2.2.2 节。

Up to 10 EGAs can be connected to the DTI to monitor the emissions remotely, without an MM. The EGAs will need to be connected to the DTI following the wiring schematic in section 1.6.3.

最多 10 个尾气分析仪可以连接数据传输接口，用于远程监控排气，而无需使用控制模块。尾气分析仪应按第 1.6.3 节所示的接线示意图连接数据传输接口。

When adding boilers on the DTI, they should be set up to 'MM not fitted' and 'EGA fitted' on the DTI.

在手机传输接口上添加锅炉时，锅炉应设为数据传输接口上"未安装控制模块"和"未安装尾气分析仪"。

Please refer to the DTI Setup Guide for more information on adding EGAs to the DTI.

关于如何在数据传输界面中添加尾气分析仪，请参考数据传输接口设置指南。

2.2 EGA Settings 尾气分析仪的设置
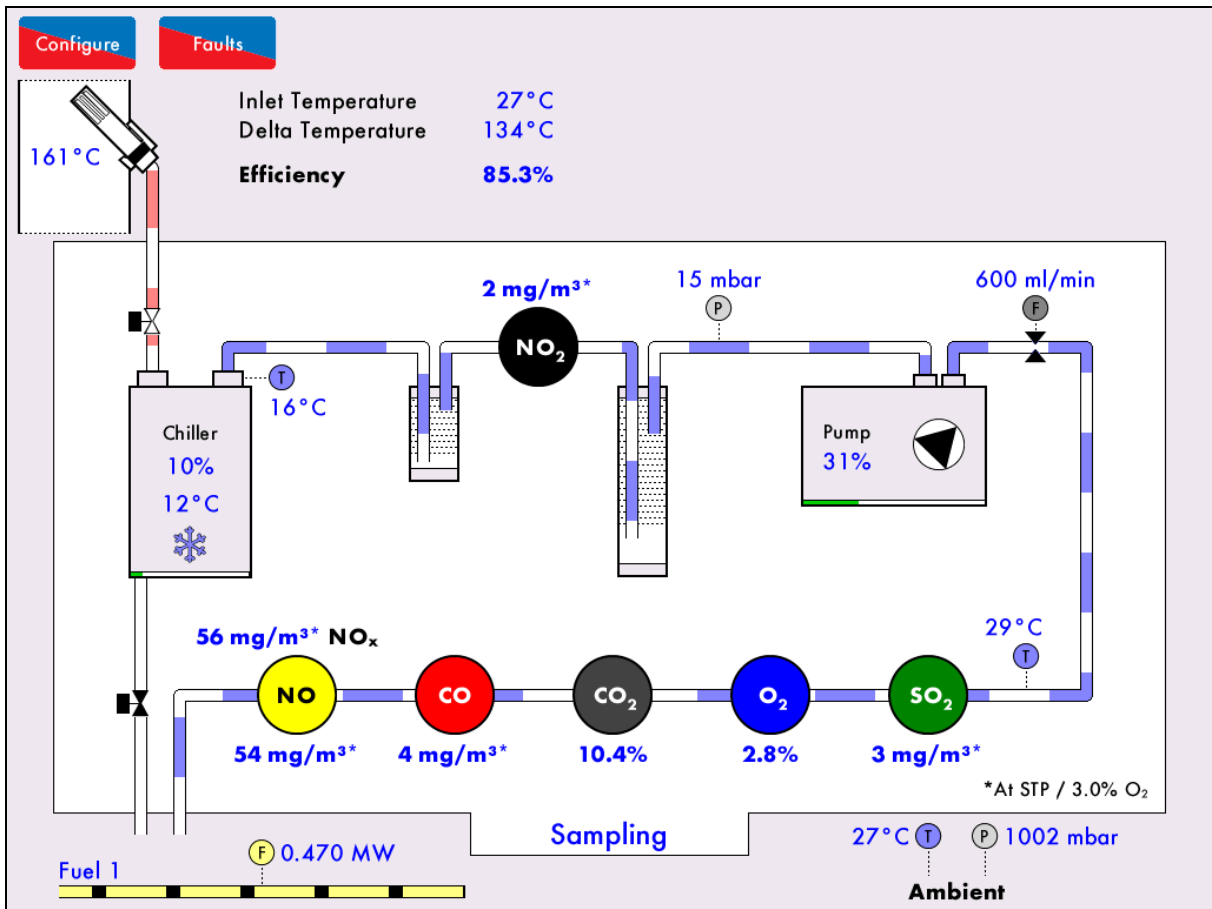
Figure 2.2.i Sampling Screen
图 2.2.i 采样屏幕

When the EGA is first powered up and has loaded the data, the Sampling screen will appear. Press on

Configure to access the System Configuration screen.

首次启动尾气分析仪并加载数据后将显示采样屏幕。按下 **Configure** 按钮可以访问系统设置屏幕。
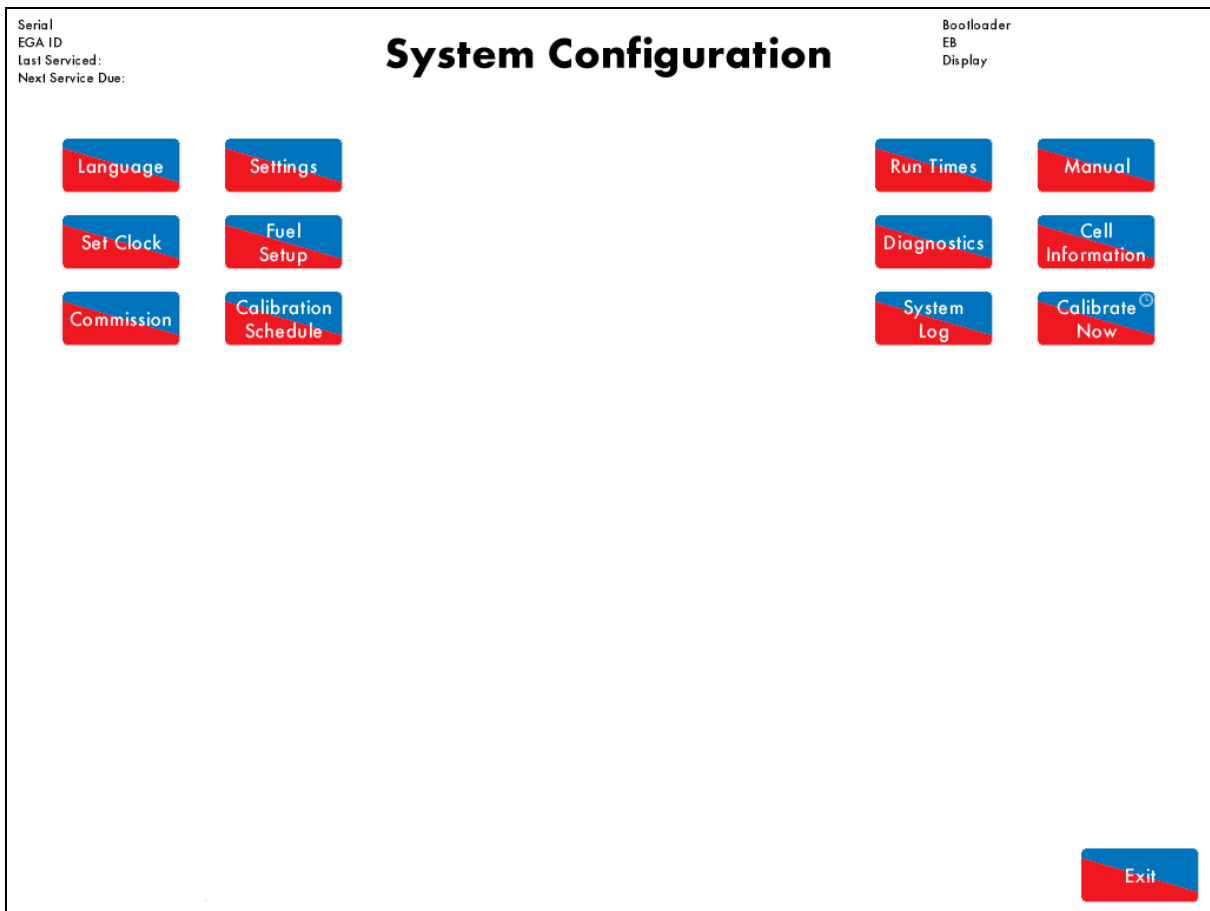
Figure 2.2.ii System Configuration Screen
图2.2.ii 系统设置屏幕

Press to access the Commissioning mode of the EGA. You will be prompted to enter the password.

按下按钮可以访问尾气分析仪的调试模式，但需要输入密码。

The System Configuration provides information on:
系统设置将提供以下信息：

- EGA Serial number 尾气分析仪的序列号。
- EGA ID number (set in Commission Mode setting 2) 尾气分析仪的 ID 号（在调试模式设置 2 中设置）。
- Date of last service 最后一次维护日期。
- Date of next service 下次维护日期。
- Bootloader software version Bootloader 软件版本。
- EB software version EB 软件版本。
- Display software version 显示软件版本。
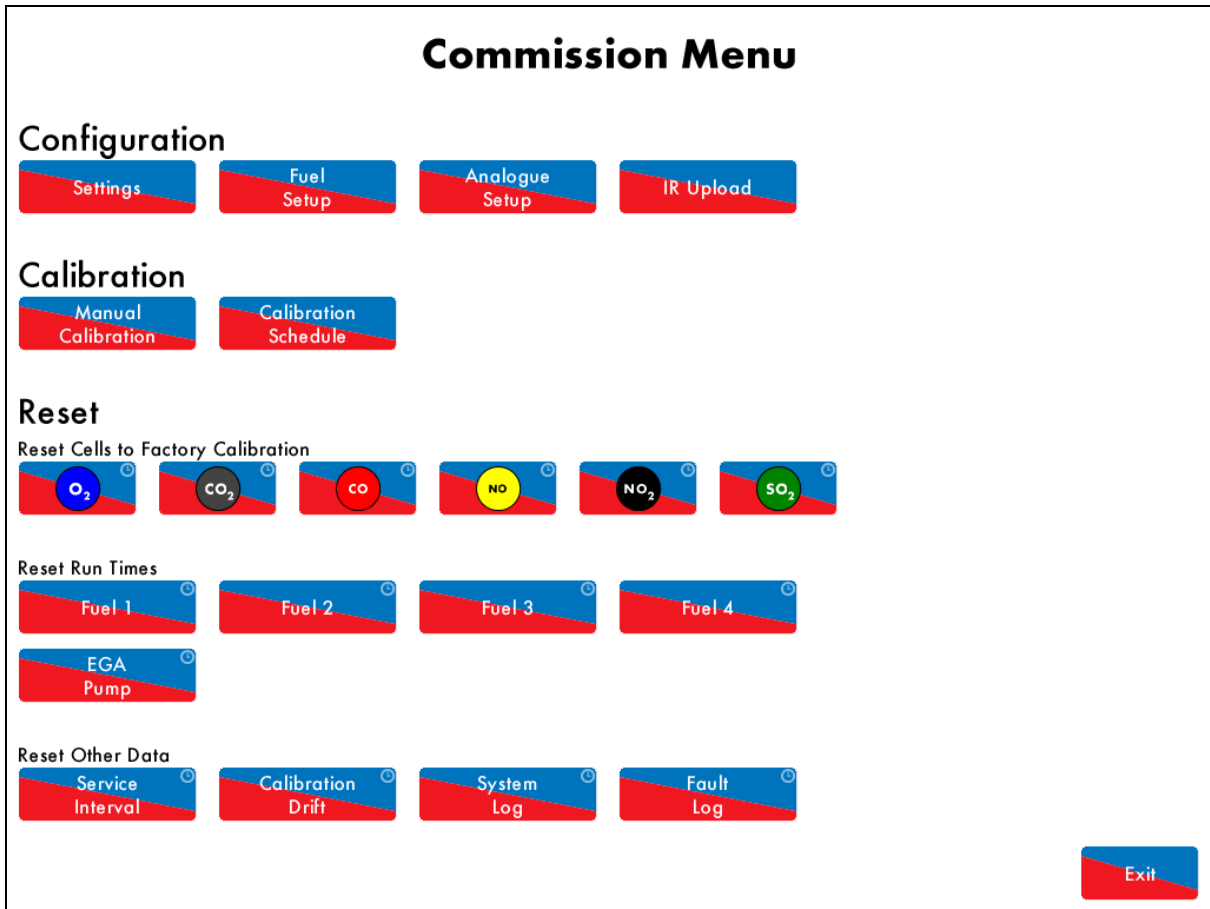
Figure 2.2.iii Commission Menu
图 *2.2.iii 调试菜单*

In the Commission menu, the following can be changed according to the application requirements:
在调试菜单中可以根据应用要求更改以下内容：

- EGA operational settings 尾气分析仪的操作设置。
- Fuel type, units and cost 燃料类型、单位和费用。
- Analogue 4-20mA outputs 4-20mA 模拟输出。
- Upload EGA settings to the unit 向设备上传尾气分析仪的设置。
- Calibration schedule 校准安排。
- Reset cells to factory calibration 重置感应器至出厂校准值。
- Reset fuel run times, pump history, service interval period, calibration drift 重置燃料运行时间、泵使用记录、维护间隔时间和校准偏差值。
- Reset system log and fault log 重置系统日志和故障日志。

2.2.1 Commission Mode Settings 调试模式设置

Commission Mode		
#	Description	Value
1	Base: Control Mode	Controlled by MM
2	Base: Communications Id	1
3	Base: Display Units	Metric
4	Base: Efficiency Calculation Method	English
5	Base: Currency Units	GBP
6	Base: Backlight On Time	600 seconds
7	Base: Logo Display Timer	600 seconds
8	Base: Show Advanced Values	Disabled
9	Base: Pollutant Concentration Units	ppm
10	Cells: CO Poison Detection	Enabled
11	Cells: CO Poison Limit	600 ppm
12	Cells: CO Poison Return	200 ppm
13	Cells: SO2 Correction	100%
14	Cells: Minimum NO2 Fraction of NOx (if NO2 cell fitted)	0%
15	Cells: Reference O2 Concentration	3.0% O2
16	Cells: NO Fraction of NOx (if NO2 cell not fitted)	94.0%
17	Cells: Standard Temperature	298.0 °K
18	Cells: Standard Pressure	1013.2 mbar (406.8 inWG)
19	Unused: Unused	0

| All | Base | Cells | Calibration | Back box | System | Vendor | | | Exit |

Figure 2.2.1.i Commission Mode
图 2.2.1.i 调试模式

Press [Settings] in the Commission Menu to access the Commission Mode settings. The settings are grouped together in tabs: Base, Cells, Calibration, Back Box, System and Vendor.

按下调试菜单中的 [Settings] 按钮可以访问调试模式设置屏幕。设置内容被归类在基本设置、感应器、校准、备选设置、系统和供应商等选项卡中。

Once settings have been changed, press [Exit] to return to the Commission Menu screen.

更改设置后按下 [Exit] 按钮可以返回调试菜单屏幕。

The below table shows the Commission Mode settings, range and their default values; these settings should be adjusted by factory trained technicians.
下表显示了调试模式设置、范围和默认值，这些设置应由经工厂培训的技术人员进行调整。

Setting 设置	Default 默认值	Range 范围	Description 说明
1	0		Control Mode 控制模式
		0	The EGA can be used with an MM or as standalone. For setting 0, the fuel select comes from the MM; 3-parameter trim and combustion limits can also be set on the MM. For setting 1, a link between the fuel select input and fuel select common on the flying lead is required, and a 4-20mA fuel flow input is required for fuel consumption, see section 2.1 on operating modes. 尾气分析仪可以和控制模块一起使用或作为单机使用。设置为 0 时，可以在控制模块上选择燃料，3 参数调节和燃烧限值也可以在控制模块上设置。设置为 1 时，需要用飞线连接燃料选择输入和燃料选择命令，燃料消耗中需要 4-20mA 燃料流量输入，请见第 2.1 节运行模式。 Controlled by MM 通过控制模块控制
		1	Standalone 单机模式
2	1		Communications ID 通信 ID
		1 – 10	The ID number is used when the EGA is connected to a DTI. When multiple EGAs are connected to a DTI, each EGA will require a different ID number. Up to 10 EGAs can be connected to a DTI. 当尾气分析仪连接一个数据传输接口时需要使用 ID 号。当多个尾气分析仪连接一个数据传输接口时，每个尾气分析仪都需要一个不同的 ID 号。一个数据传输接口可以连接多达 10 个尾气分析仪。 ID number ID 编号
3	0		Display Units 显示单位
		0	The EGA can be viewed in metric or imperial units. Once the EGA has been running and data is stored, changing the units will invalidate existing data log files stored within the EGA. 尾气分析仪可以按公制单位或英制单位查看。当尾气分析仪运行时以及数据保存后，更改单位将使保存在尾气分析仪中的现有数据日志文件失效。 Metric 公制
		1	Imperial 英制
4	0		Efficiency Calculation Method 效率计算方法
		0	For setting 0, the hydrogen and moisture loss is taken into account in the combustion efficiency displayed on the EGA, and for setting 1, the hydrogen and moisture is not taken into account. 设置为 0 时，尾气分析仪上显示的燃烧效率要考虑氢和水的影响；设置为 1 时，则不考虑氢和水的影响。 English 英语
		1	

Setting 设置	Default 默认值	Range 范围	Description 说明
			Hydrogen 氢气
5	2		**Currency Units 货币单位**
			The currency units are used with fuel flow to determine the boiler's fuel consumption and how much it costs.
		0	货币单位用于燃料流量的计算，用于确定锅炉的燃料消耗量和成本。 USD (US Dollar)
		1	USD（美元） EUR (European Single Currency)
		2	EUR（欧元） GBP (British Pound Sterling)
		3	GBR（英镑） CNY (Chinese Yuan)
		4	CNY（人民币元） CAD (Canadian Dollar)
		5	CAD（加拿大元） AUD (Australian Dollar)
		6	AUD（澳元） NZD (New Zealand Dollar)
		7	NZD（新西兰元） KRW (South Korean Won)
		8	KRW（韩元） ZAR (South African Rand) ZAR（南非兰特）
6	600		**Backlight On Time 背光时间**
			If the screen is not pressed, and this timer elapses, the backlight will dim.
		0	如未触碰屏幕，背光将随计时器时间推移而变暗。 Disabled
		1 – 3600	禁用 Seconds 秒
7	600		**Logo Display Timer 标志显示定时器**
			If a custom logo is stored on the data SD card in the EGA, then after this timer elapses in idle mode, the custom logo will appear on the screen.
		0	如客户的标志储存在尾气分析仪的 SD 存储卡上，当计时器处于空闲模式后，客户标志将出现在屏幕上。 Disabled
		1 – 3600	禁用 Seconds 秒
Setting 设置	**Default 默认值**	**Range 范围**	**Description 说明**
8	0		**Show Advanced Values 显示高级数值**
			For setting 1, the fault code number is shown in the fault log.
		0	设置为 1 时，故障代码数量将在故障日志中显示。 Disabled
		1	禁用 Enabled

			启用
9	0		Pollutant Concentration Units 污染物浓度单位
		0	The units for the NO_2, NO, CO and SO_2 cells can be displayed as ppm or mg/m^3. For mg/m^3, the exhaust gas concentrations are shown at the standard temperature and pressure set in commission mode settings 17 and 18, and corrected to reference O_2 set in commission mode setting 15. NO_2, NO, CO 和 SO_2 感应器的单位是 ppm 或 mg/m^3。如是 mg/m^3，废气浓度将按标准温度显示，压力在调试模式设置 17 和 18 中设置，参考氧气量校准在调试模式设置 15 中设置。
		1	ppm mg/m^3
10	1		CO Poison Detection 一氧化碳毒性监测
		0	For setting 0, no message will display when the CO ppm rises above the CO poison limit in setting 11. For setting 1, if the CO ppm is above the CO poison limit, the message 'Poisoned' will appear on the sampling screen for the CO cell. The cells will stop reading the exhaust gas readings until the CO ppm has decreased to the CO poison return level in setting 12. 设置为 0 时，当一氧化碳 ppm 值大于设置 11 设定的毒性限值时，屏幕上将不显示任何消息；设置为 1 时，如一氧化碳 ppm 值大于其毒性限值时，用于一氧化碳感应器的采样屏幕上将显示"有毒"。此时，感应器将停止读取废气读数，直至一氧化碳 ppm 值降至设置 12 设定的一氧化碳毒性返回水平。 Disabled 禁用
		1	Enabled 启用
11	600		CO Poison Limit 一氧化碳毒性限值
		100 – 1000	If setting 10 is to set to 1, the message 'poisoned' will appear next to the CO cell on the sampling screen if the CO is above the limit set in this setting. 如在设置 10 中设为 1 时，当一氧化碳浓度值大于设置的限值时，则采样屏幕上一氧化碳感应器符号旁将显示"有毒"。 CO ppm 一氧化碳浓度 ppm
12	200		CO Poison Return 一氧化碳毒性返回
			If setting 10 is set to 1, the message 'poisoned' next to the CO cell on the sampling screen will clear when the CO reaches the limit set in his setting. 如在设置 10 中设为 1 时，当一氧化碳浓度值达到设置的限值时，则采样屏幕上一氧化碳感应器符号旁显示的"有毒"消息将消失。
13	100		SO_2 Correction 二氧化硫校正值
		50 – 100	There may be a difference in the EGA SO_2 reading and a reading taken straight from the flue, as the water in the sample flowing down to the EGA will absorb a part of the SO_2. The reading displayed on the EGA can be adjusted by changing this SO_2 correction. 尾气分析仪中的二氧化硫读数可能会不同，该读数直接来自于烟道中的废气，因为样本中的水分流入尾气分析仪后将稀释部分二氧化硫。

Setting 设置	Default 默认值	Range 范围	Description 说明
			因此，可以通过修改二氧化硫校正值调整尾气分析仪上显示的读数。 50 – 100 %
14	0		Minimum NO$_2$ Fraction of NO$_X$ (if NO$_2$ cell fitted) 氮氧化物中的最少二氧化氮含量（如已安装二氧化氮感应器）
		0 – 10	Please contact Autoflame Engineering Ltd for more information. 更多信息请联系 Autoflame 工程有限公司。 0 – 10 %
15	30		Reference O$_2$ Concentration 氧气参考浓度
		1 – 200	The NO$_X$ can be displayed normalised to a specific O$_2$ value on the EGA sampling screen. This reference O$_2$ concentration is also used to display the pollutants in mg/m^3, see commission mode setting 9. 尾气分析仪采样屏幕上可以显示氮氧化物中的特定氧气值。氧气参考浓度也可以用于显示污染物指数（ mg/m^3），请见调试模式设置 9。 0.1 – 20.0 % O$_2$ 0.1 – 20.0 % 氧气
16	940		NO Fraction of NO$_X$ (if NO$_2$ cell not fitted) 氮氧化物中的一氧化氮含量（如安装二氧化氮感应器）
		100 – 1000	If an optional NO$_2$ cell is not fitted, then the EGA will calculate the NO$_X$ in the exhaust gases, based on how much NO is part of the NO$_X$. 如未安装二氧化氮感应器（可选），则尾气分析仪将根据氮氧化物中的一氧化氮含量计算废气中的氮氧化物含量。 10.0 – 94.0%
Setting 设置	Default 默认值	Range 范围	Description 说明
17	2980		Standard Temperature 标准温度
		2000 – 4000	The standard temperature and pressure values are used to calculate the volume flow of the gases, from their respective mass flows, and to convert the pollutant ppm concentrations to mg/m^3, see commission mode setting 9. 标准温度和标准压力值用于计算燃气的体积流量，包括各种燃气的质量流量，还可以将污染物浓度 ppm 转换成 mg/m^3，请见调试模式设置 9。 200.0 – 400.0^{O}K
18	10132		Standard Pressure 标准压力
		9000 - 11000	The standard temperature and pressure values are used to calculate the volume flow of the gases, from their respective mass flows, and to convert the pollutant ppm concentrations to mg/m^3, see commission mode setting 9. 标准温度和标准压力值用于计算燃气的体积流量，包括各种燃气的质量流量，还可以将污染物浓度 ppm 转换成 mg/m^3，请见调试模式设置 9。 900.0 – 1100.0 mbar (361.3 – 441.6" WG)

19	-	-	Unused 未使用
20	2095		O$_2$ Air Calibration Value O$_2$空气校准值
		1800 – 2200	When the EGA performs an air calibration, it will calibrate the O$_2$ cell to the value set for the O$_2$ calibration value. 尾气分析仪进行空气校准时将会把氧气感应器校准成设置的氧气校准值。 18.00 – 22.00 %
21	360		Air Calibration Time 空气校准时间
		20 – 2400	This is the time taken for the air calibration, when the EGA starts up, by calibration or it is forced into an air calibration. Air goes into the EGA via the drain solenoid valve. 空气校准时间用于空气校准。尾气分析仪启动后将自动进行校准或强制进行空气校准。空气通过排水电磁阀进入尾气分析仪。 Seconds 秒
22	-	-	Unused 未使用
23	1000		CO Span – Calibration Drift Reference 一氧化碳范围-校准偏差参考值
		0 1 – 1000	The calibration drift limit for the CO cell is 5.0% of the calibration drift reference set in this setting. If a single cell calibration reaches 4 times the calibration limit or if it reaches 2 times the limit for 5 consecutive days, an excess drift fault will occur. 一氧化碳感应器的校准偏差限值是设定校准偏差参考值的 5.0%。如单个感应器的校准值是校准限值的 4 倍或连续 5 天达到校准限值的 2 倍，则会出现过度偏差故障。 Disabled 禁用 CO ppm 一氧化碳浓度 ppm
24	500		NO Span – Calibration Drift Reference 一氧化氮范围 - 校准偏差参考值
		0 1 – 1000	The calibration drift limit for the NO cell is 2.5% of the calibration drift reference set in this setting. If a single cell calibration reaches 4 times the calibration limit or if it reaches 2 times the limit for 5 consecutive days, an excess drift fault will occur. 一氧化氮感应器的校准偏差限值是设定校准偏差参考值的 2.5%。如单个感应器的校准值是校准限值的 4 倍或连续 5 天达到校准限值的 2 倍，则会出现过度偏差故障。 Disabled 禁用 NO ppm 一氧化氮浓度 ppm
25	500		NO$_2$ Span – Calibration Drift Reference 二氧化氮范围-校准偏差参考值
			The calibration drift limit for the NO$_2$ cell is 2.5% of the calibration

drift reference set in this setting. If a single cell calibration reaches 4 times the calibration limit or if it reaches 2 times the limit for 5 consecutive days, an excess drift fault will occur.

二氧化氮感应器的校准偏差限值是设定校准偏差参考值的 2.5%。如单个感应器的校准值是校准限值的 4 倍或连续 5 天达到校准限值的 2 倍，则会出现过度偏差故障。

	0		Disabled 禁用
		1 – 1000	NO$_2$ ppm 二氧化氮浓度 ppm

Setting 设置	Default 默认值	Range 范围	Description 说明
26	1000		<u>SO$_2$ Span – Calibration Drift Reference</u> <u>二氧化硫范围-校准偏差参考值</u>
			The calibration drift limit for the SO$_2$ cell is 2.5% of the calibration drift reference set in this setting. If a single cell calibration reaches 4 times the calibration limit or if it reaches 2 times the limit for 5 consecutive days, an excess drift fault will occur. 二氧化硫感应器的校准偏差限值是设定校准偏差参考值的 2.5%。如单个感应器的校准值是校准限值的 4 倍或连续 5 天达到校准限值的 2 倍，则会出现过度偏差故障。
		0	Disabled 禁用
		1 – 1000	SO$_2$ ppm 二氧化硫浓度 ppm
27	-	-	Unused 未使用
28	-	-	Unused 未使用
29	-	-	Unused 未使用
30	1		<u>Heated Sample Line Mode</u> 加热采样线模式
			If a self-calibration EPA EGA is purchased, then a Heated Sampling Line is also required. This setting sets whether the HSL is used for monitoring the temperature of the exhaust gases or maintaining the exhaust gas temperature to the value set in setting 31, before they reach the EGA. 如购买了自校准 EPA 尾气分析仪，则还需要加热采样。在废气进入尾气分析仪前，可以利用本设置设定加热采样线是否用于监控废气温度或将废气温度保持在设置 31 设定的数值。
		0	Off (Monitoring only) 关闭（仅监控）
		1	On (Temperature control) 开启（温度控制）
31	110		<u>Heated Sample Line Target</u> 加热采样线目标值
			If a self-calibration EPA EGA is purchased, then a Heated Sampling Line is also required. If setting 30 is set to 1, then the Heated Sampling Line will try to maintain the target temperature value set

Setting 设置	Default 默认值	Range 范围	Description 说明
		0 – 200	this setting. 如购买了自校准 EPA 尾气分析仪，则还需要加热采样线。如在设置 30 中设为 1，则加热采样线将尝试保留本设置中设定的目标温度值。 0 – 200°C (32 – 392°F)
32	-	-	Unused 未使用
33	-	-	Unused 未使用
34	-	-	Unused 未使用
35	-	-	Unused 未使用
36	-	-	Unused 未使用
37	-	-	Unused 未使用
38	-	-	Unused 未使用
39	-	-	Unused 未使用
40	0		MM Comms Mode 控制模块通信模式
		0	If the EGA is connected to a Mk8 MM or Mini Mk8 MM, then this setting should be set to RS485, and parameter 10 on the MMs should be set to Mk8. If the EGA is connected to a Mk7 MM or Mini Mk7 MM, then this setting should be set to Legacy, and parameter 10 on the MMs should be set to Mk8 rev 3. 如尾气分析仪连接了一个 Mk8 控制模块或 Mk8 微型控制模块，则本设置应设为 RS485，控制模块上的参数 10 应设为 Mk8。如尾气分析仪连接的是一个 Mk7 控制模块或 Mk7 微型控制模块，则本设置应设为 Legacy，控制模块上的参数 10 应设为 Mk8 rev 3。 Mk8 Protocol (RS485) Mk8 协议（RS485）
		1	Mk8 Protocol (Legacy) Mk8 协议（Legacy）
Setting 设置	Default 默认值	Range 范围	Description 说明
41	0		Preheated Air Sensor 预热空气传感器
		0	If the temperature of the air going into the burner is more than 40°C (104°F), a preheated air sensor is required. For setting 1, the EGA will separate the ambient temperature from the preheated air temperature in the displayed graphs on the EGA. 如进入燃烧器中的空气温度高于 40°C (104°F)，则需要安装预热空气传感器。设置为 1 时，尾气分析仪将以图示方式在屏幕上分别显示环境温度或预热空气温度。 Disabled 禁用
		1	Enabled 启用

42	30		Reading Hold Time 读数保留时间
		5 – 240	Following a drain or calibration, the cells will allow the time set in this setting for the readings to settle, before they update on the EGA screen. 排水或校准后，在尾气分析仪屏幕更新读数前，可以在本设置中为感应器设置读数保留时间。 Seconds 秒
43	240		Time Between Drains While Sampling 排水和采样的间隔时间
		60 – 3600	This setting sets the time period between the drain solenoid valve opening to drain out the excess moisture in the sample, while the EGA is sampling. If the sample is has too much moisture, then reduce this time so the EGA drains more often. 本设置可设定排水电磁阀开启排出样本中多余水分和尾气分析仪采样之间的间隔时间。如样本含过多水分，则需要缩短间隔时间，以便尾气分析仪有更多时间排水。 Seconds 秒
44	600		Time Between Drains While Idle 排水和空闲的间隔时间
		60 – 3600	This setting sets the time period between the drain solenoid valve opening to drain out the excess moisture in the sample, when the EGA is idle. 本设置可设定排水电磁阀开启排出样本中多余水分和尾气分析仪空闲之间的间隔时间。 Seconds 秒
45	600		Idle Transition Time 空闲过渡时间
		0 1 – 1800	When a fuel is deselected, or the MM has shut down the burner, this setting allows some time before the EGA goes into idle mode. This transition time allows the EGA to calculate the combustion efficiency when there are still leftover exhaust gases in the stack. 如取消选定的燃料或控制模块关闭了燃烧器，则本设置可设定尾气分析仪进入空闲模式前的过渡时间。在过渡时间中，当烟道中仍有剩余废气时，尾气分析仪可以计算燃烧效率。 Disabled 禁用 Seconds 秒
46	0		Forced Drain Using Self-Calibration Pump 利用自校准泵强制排水
		0 1	If a self-calibration EPA EGA is purchased, then when the EGA performs a drain, this setting allows the self-calibration to also force water out of the EGA drain. 如购买了自校准 EPA 尾气分析仪，当尾气分析仪排水时，本设置可设定强制将水排出尾气分析仪。 Disabled 禁用 Enabled 启用

Setting 设置	Default 默认值	Range 范围	Description 说明
47	25		Inlet Pressure Fault Tolerance 进口压力故障允许限度
		0 – 50	If the inlet pressure to the EGA drops below the value set in this setting, then a 'input blocked' fault will occur. 如尾气分析仪的进口压力小于本设置设定的数值，则会出现"进口堵塞"故障。 0 – 50mbar (0 – 20"WG)
48	1100		Barometer Limit 气压计限值
		900 – 1200	The barometric pressure sensor measures the pressure in the sample line, and indicates if the sample line is blocked. If the barometric pressure goes above the limit set in this value, an 'output blocked' fault will occur. 气压计的压力传感器可以测量采样线的压力，指示采样线是否堵塞。如气压计的压力大于本设置设定的限值，则会出现"出口堵塞"故障。 900 – 1200 mbar (361 – 482"WG)
49	0		Burner Detection Firing Method 燃烧器检测燃烧方法
		0	If an EGA is to be installed prior to the MM, then this setting allows the EGA to run without a fuel flow meter input for CEMS logging. 如在安装控制模块前安装了尾气分析仪，则本设置可设定尾气分析仪在没有燃料流量计输入 CEMS 记录的情况下运行。 Fuel Flow 燃料流量
		1	CO$_2$ Threshold (3%) 二氧化碳阈值（3%）
Setting 设置	Default 默认值	Range 范围	Description 说明
50	***		Password Code 1 密码 1
		0 – 255	
51	***		Password Code 2 密码 2
		0 – 255	
52	***		Online Changes Code 1 在线修改密码 1
		0 – 255	
53	***		Online Changes Code 2 在线修改密码 2
		0 - 255	
54	24		Service Interval 服务间隔时间
		3 – 24	A message will appear on the screen if the EGA has reached its service interval time set in this setting. 如尾气分析仪已达到本设置设定的服务间隔时间，屏幕上将显示对应消息。 Months 月
55	0		Service Interval Error Period 服务间隔错误时间
		0	This setting sets how long the EGA continues to run after the service interval period in setting 54 has elapsed. 本设置可设定尾气分析仪在设置 54 中设定的服务间隔时间用完后继续运行的时间。 Disabled 禁用
		1 – 12	

			Months
			月
56	-	-	Unused 未使用
57	-	-	Unused 未使用
58	-	-	Unused 未使用
59	-	-	Unused 未使用
60			<u>Vendor Details Line 1</u> 供应商详细信息行 1
			Enter Vendor Name 输入供应商名称
61			<u>Vendor Details Line 2</u> 供应商详细信息行 2
			Enter Address Details (Street) 输入详细地址（街道）
62			<u>Vendor Details Line 3</u> 供应商详细信息行 3
			Enter Address Details (Town /City /Zip) 输入详细地址（镇/市/邮编）
63			<u>Vendor Details Line 4</u> 供应商详细信息行 4
			Enter Contact Details (Phone /Email Address) 输入联系人详细信息（电话/电子邮件）
64	-	-	Unused 未使用
65	-	-	Unused 未使用
66	-	-	Unused 未使用
67	-	-	Unused 未使用
68	-	-	Unused 未使用
69	-	-	Unused 未使用
70	0		<u>Factory Restore</u> 恢复出厂设置
		0 – 100	Setting 5 will reset all settings to factory default. 设置 5 将恢复所有设置至出厂设置

2.2.2 Fuel Setup Settings 燃料设置

The fuel flow for the EGA can be taken from the MM (if connected) or by a 4-20mA fuel flow input on pins 17 and 18. The fuel type and cost be set on the EGA for CEMS analysis.
尾气分析仪的燃料流量可以在控制模块（如已连接）上设置或通过第 17 和 18 针上的 4-20mA 燃料流量输入设置。燃料类型和成本可以在尾气分析仪上设置，用于烟气连续排放监测系统（CEMS）分析。

If the fuel flow input is used, then the 4-20mA input must be configured.
如使用燃料流量输入，则必须设置 4-20mA 输入。

Fuel Setup

#	Description	Value
1	Fuel 1: Fuel Type	Natural Gas (Birmingham, AL)
2	Fuel 1: Costing Units	1000 ft³
3	Fuel 1: Cost Per Unit	10.00 GBP/1000 ft³
4	Fuel 1: Fuel Flow Source	MM
5	Fuel 1: Fuel Flow Meter Units	MW
6	Fuel 1: Fuel Flow Meter Min At 4mA	0.00 MW
7	Fuel 1: Fuel Flow Meter Max At 20mA	0.00 MW
8	Unused: Unused	0
9	Unused: Unused	0
10	Unused: Unused	0
11	Fuel 2: Fuel Type	Natural Gas (Birmingham, AL)
12	Fuel 2: Costing Units	1000 ft³
13	Fuel 2: Cost Per Unit	10.00 GBP/1000 ft³
14	Fuel 2: Fuel Flow Source	MM
15	Fuel 2: Fuel Flow Meter Units	MW
16	Fuel 2: Fuel Flow Meter Min At 4mA	0.00 MW
17	Fuel 2: Fuel Flow Meter Max At 20mA	0.00 MW
18	Unused: Unused	0
19	Unused: Unused	0
20	Unused: Unused	0

| All | Fuel 1 | Fuel 2 | Fuel 3 | Fuel 4 |

Figure 2.2.2.i 图 2.2.2.i

Press [Fuel Setup] in the Commission Menu screen to access the Fuel Setup settings. The settings are grouped together in tabs by fuel 1, fuel 2, fuel 3 and fuel 4.

在调试菜单屏幕上按下[Fuel Setup]按钮可以访问燃料设置。设置内容被归类在燃料 1、燃料 2、燃料 3 和燃料 4 等四个选项卡中。

Once settings have been changed, press [Exit] to return to the Commission Menu screen.

更改设置后，按下[Exit]按钮可以返回调试菜单屏幕。

The below table shows the Fuel Setup settings, range and their default values.

下表显示了燃料设定值、范围和默认值。

Setting 设置	Default 默认值	Range 范围	Description 说明
1	0		Fuel 1: Fuel Type 燃料 1：燃料类型
		0	Natural Gas (Birmingham, AL)
		1	天然气(伯明翰)
			Natural Gas (North Sea)
		2	天然气(北海)
			Natural Gas (Pittsburgh, PA)
		3	天然气(宾夕法尼亚州匹兹堡)
			Butane
		4	丁烷
			Digester Gas
		5	沼气
			Heavy Fuel Oil #6
		6	6 号重燃油
			Light Fuel Oil #2
		7	2 号轻燃油
			Propane
			丙烷
			(More information on fuels can be found in at the end of this table.)
			（关于燃料的更多信息请见本表末尾处）
2	0		Fuel 1: Costing Units 燃料 1：成本单位
		0	1000 ft^3
		1	MMBtu
		2	MWh
		3	m^3
		4	US gallons
		5	Litres
3	1000		Fuel 1: Cost Per Unit 燃料 1：单位成本
		0 – 65535	The currency units is set in Commission Mode setting 5, see section 2.2.1. 货币单位在调试模式设置 5 中设置，请见第 2.2.1 节。 0.00 – 655.35 currency per costing unit 0.00 – 655.35 货币/成本单位 The default value is 10.00 GBP /1000 ft3 默认值是 10.00 GBP /1000 ft^3
4	0		Fuel 1: Fuel Flow Source 燃料 1：燃料流量源
		0	For setting 0, the EGA is connected to an MM and the fuel flow rate is received from the MM's fuel flow rate based on fuel flow metering. For setting 1, a fuel flow meter is connected to the EGA via a 4-20mA input on pins 17 and 18 in the data flying lead. 设置为 0 时，尾气分析仪与控制模块相连，控制模块接收的燃料流率是根据燃料流量计计算。设置为 1 时，燃料流量计通过数据飞线第 17 和 18 针上的 4-20mA 输入连接尾气分析仪。 MM
		1	Fuel Flow Meter 燃料流量计

Setting 设置	Default 默认值	Range 范围	Description 说明
5	0		<u>Fuel 1: Fuel Flow Meter Units</u> 燃料 1：燃料流量计量单位
			Setting 5 must be set if setting 4 is set to fuel flow meter. 如设置 4 用于设置燃料流量计，则必须设定设置 5。
		0	MW
		1	MMBtu/h
		2	ft^3/h
		3	m^3/h
		4	lb/h
		5	kg/h
		6	litres/h
		7	US gallons/h
6	0		<u>Fuel 1: Fuel Flow Meter Min at 4mA</u> <u>燃料 1：4mA 时燃料流量计最小值</u>
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 5 0.00 – 655.35 燃料流量计单位在设置 5 中设定
7	0		<u>Fuel 1: Fuel Flow Meter Max at 20mA</u> <u>燃料 1：20mA 时燃料流量计最大值</u>
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 5 0.00 – 655.35 燃料流量计单位在设置 5 中设定
8	-	-	Unused 未使用
9	-	-	Unused 未使用
10	-	-	Unused 未使用
Setting 设置	Default 默认值	Range 范围	Description 说明
11	0		<u>Fuel 2: Fuel Type</u> 燃料 2：燃料类型
		0	Natural Gas (Birmingham, AL) 天然气(伯明翰)
		1	Natural Gas (North Sea) 天然气(北海)
		2	Natural Gas (Pittsburgh, PA) 天然气(宾夕法尼亚州匹兹堡)
		3	Butane 丁烷
		4	Digester Gas 沼气
		5	Heavy Fuel Oil #6 6 号重燃油
		6	Light Fuel Oil #2 2 号轻燃油
		7	Propane 丙烷
			(More information on fuels can be found in at the end of this table.) （关于燃料的更多信息请见本表末尾处）
12	0		<u>Fuel 2: Costing Units</u> 燃料 2：成本单位
		0	$1000 \ ft^3$
		1	MMBtu
		2	MWh
		3	m^3
		4	US gallons

			5	Litres

Setting	Default	Range	Description
13	1000		Fuel 2: Cost Per Unit 燃料 2：单位成本
		0 – 65535	The currency units is set in Commission Mode setting 5, see section 2.2.1. 货币单位在调试模式设置 5 中设置，请见第 2.2.1 节。 0.00 – 655.35 currency per costing unit The default value is 10.00 GBP /1000 ft^3 0.0 – 655.35 货币/成本单位 默认值是 10.00 GBP /1000 ft^3
14	0		Fuel 2: Fuel Flow Source 燃料 2：燃料流量源
		0	For setting 0, the EGA is connected to an MM and the fuel flow rate is received from the MM's fuel flow rate based on fuel flow metering. For setting 1, a fuel flow meter is connected to the EGA via a 4-20mA input on pins 17 and 18 in the data flying lead. 设置为 0 时，尾气分析仪与控制模块相连，控制模块接收的燃料流率是根据燃料流量计计算。设置为 1 时，燃料流量计通过数据飞线第 17 和 18 针上的 4-20mA 输入连接尾气分析仪。 MM
		1	Fuel Flow Meter 燃料流量计
15	0		Fuel 2: Fuel Flow Meter Units 燃料 2：燃料流量计单位
		0 1 2 3 4 5 6 7	Setting 15 must be set if setting 14 is set to fuel flow meter. 如设置 14 用于设置燃料流量计，则必须设定设置 15。 MW MMBtu/h ft^3/h m^3/h lb/h kg/h litres/h US gallons/h
16	0		Fuel 2: Fuel Flow Meter Min at 4mA 燃料 2：4mA 时燃料流量计最小值
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 15 0.00 – 655.35 燃料流量计单位在设置 15 中设定。
17	0		Fuel 2: Fuel Flow Meter Max at 20mA 燃料 2：4mA 时燃料流量计最大值
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 15 0.00 – 655.35 燃料流量计单位在设置 15 中设定。
18	-	-	Unused 未使用
19	-	-	Unused 未使用
20	-	-	Unused 未使用

Setting 设置	Default 默认值	Range 范围	Description 说明
21	0		Fuel 3: Fuel Type 燃料 3：燃料类型
		0 1	Natural Gas (Birmingham, AL) 天然气(伯明翰) Natural Gas (North Sea)

		2	天然气(北海) Natural Gas (Pittsburgh, PA)
		3	天然气(宾夕法尼亚州匹兹堡) Butane
		4	丁烷 Digester Gas
		5	沼气 Heavy Fuel Oil #6
		6	6 号重燃油 Light Fuel Oil #2
		7	2 号轻燃油 Propane
			丙烷 (More information on fuels can be found in at the end of this table.) （关于燃料的更多信息请见本表末尾处）
22	0		Fuel 3: Costing Units 燃料 3：成本单位
		0 1 2 3 4 5	1000 ft^3 MMBtu MWh m^3 US gallons Litres
23	1000		Fuel 3: Cost Per Unit 燃料 3：单位成本
		0 – 65535	The currency units is set in Commission Mode setting 5, see section 2.2.1. 货币单位在调试模式设置 5 中设置，请见第 2.2.1 节。 0.00 – 655.35 currency per costing unit 0.0 – 655.35 货币/成本单位 The default value is 10.00 GBP /1000 ft^3 默认值是 10.00 GBP /1000 ft^3。
24	0		Fuel 3: Fuel Flow Source 燃料 3：燃料流量源
		0 1	For setting 0, the EGA is connected to an MM and the fuel flow rate is received from the MM's fuel flow rate based on fuel flow metering. For setting 1, a fuel flow meter is connected to the EGA via a 4-20mA input on pins 17 and 18 in the data flying lead. 设置为 0 时，尾气分析仪与控制模块相连，控制模块接收的燃料流率是根据燃料流量计计算。设置为 1 时，燃料流量计通过数据飞线第 17 和 18 针上的 4-20mA 输入连接尾气分析仪。 MM Fuel Flow Meter 燃料流量计
25	0		Fuel 3: Fuel Flow Meter Units 燃料 3：燃料流量计单位
		0 1 2 3 4 5 6 7	Setting 25 must be set if setting 24 is set to fuel flow meter. 如设置 4 用于设置燃料流量计，则必须设定设置 25。 MW MMBtu/h ft^3/h m^3/h lb/h kg/h litres/h US gallons/h
26	0		Fuel 3: Fuel Flow Meter Min at 4mA 燃料 3：4mA 时燃料流量计最小值

		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 25 0.00 – 655.35 燃料流量计单位在设置 25 中设定
27	0		Fuel 3: Fuel Flow Meter Max at 20mA 燃料 3：20mA 时燃料流量计最大值
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 25 0.00 – 655.35 燃料流量计单位在设置 25 中设定
28	-	-	Unused 未使用
29	-	-	Unused 未使用
30	-	-	Unused 未使用

Setting 设置	Default 默认值	Range 范围	Description 说明
31	0		Fuel 4: Fuel Type 燃料 4：燃料类型
		0 1 2 3 4 5 6 7	Natural Gas (Birmingham, AL) 天然气(伯明翰) Natural Gas (North Sea) 天然气(北海) Natural Gas (Pittsburgh, PA) 天然气(宾夕法尼亚州匹兹堡) Butane 丁烷 Digester Gas 沼气 Heavy Fuel Oil #6 6 号重燃油 Light Fuel Oil #2 2 号轻燃油 Propane 丙烷 (More information on fuels can be found in at the end of this table.) （关于燃料的更多信息请见本表末尾处）
32	0		Fuel 4: Costing Units 燃料 4：成本单位
		0 1 2 3 4 5	1000 ft^3 MMBtu MWh m^3 US gallons Litres
33	1000		Fuel 4: Cost Per Unit 燃料 4：单位成本
		0 – 65535	The currency units is set in Commission Mode setting 5, see section 2.2.1. 货币单位在调试模式设置 5 中设置，请见第 2.2.1 节。 0.00 – 655.35 currency per costing unit 0.00– 655.35 货币/成本单位 The default value is 10.00 GBP /1000 ft^3 默认值是 10.00 GBP /1000 ft^3
34	0		Fuel 4: Fuel Flow Source 燃料 4：燃料流量源
			For setting 0, the EGA is connected to an MM and the fuel flow rate is received from the MM's fuel flow rate based on fuel flow

			metering. For setting 1, a fuel flow meter is connected to the EGA via a 4-20mA input on pins 17 and 18 in the data flying lead. 设置为 0 时，尾气分析仪与控制模块相连，控制模块接收的燃料流率是根据燃料流量计计算。设置为 1 时，燃料流量计通过数据飞线第 17 和 18 针上的 4-20mA 输入连接尾气分析仪。
	0		
	1		MM Fuel Flow Meter 燃料流量计
35	0		Fuel 4: Fuel Flow Meter Units 燃料 4：燃料流量计单位
			Setting 35 must be set if setting 34 is set to fuel flow meter. 如设置 34 用于设置燃料流量计，则必须设定设置 35。
		0 1 2 3 4 5 6 7	MW MMBtu/h ft^3/h m^3/h lb/h kg/h litres/h US gallons/h
36	0		Fuel 4: Fuel Flow Meter Min at 4mA 燃料 4：4mA 时燃料流量计最小值
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 35 0.00 – 655.35 燃料流量计单位在设置 35 中设定
37	0		Fuel 4: Fuel Flow Meter Max at 20mA 燃料 4：20mA 时燃料流量计最大值
		0 – 65535	0.00 – 655.35 fuel flow meter units set in setting 35 0.00 – 655.35 燃料流量计单位在设置 35 中设定
38	-	-	Unused 未使用
39	-	-	Unused 未使用
40	-	-	Unused 未使用

The below table shows information on the fuel type set in Fuel Setup settings 1, 11, 21 and 31, for fuels 1, 2, 3 and 4, respectively.
下表显示了燃料设置 1、11、21 和 31 中关于燃料 1、燃料 2、燃料 3 和燃料 4 中设置的燃料类信息。

Fuel Type 燃料类型	Calorific Value (MJ/kg) 热值（MJ/kg）	Specific Gravity 比重	Composition by weight 成分重量		
			C %	H$_2$ %	S %
Natural Gas (Birmingham, AL) 天然气(伯明翰)	50.90	0.60	71.70	23.30	0.00
Natural Gas (North Sea) 天然气(北海)	50.86	0.59	69.40	22.50	0.00
Natural Gas (Pittsburgh, PA) 天然气(宾夕法尼亚州匹兹堡)	50.13	0.63	75.70	23.50	0.00
Butane 丁烷	48.49	2.02	83.50	16.50	0.00

Digester Gas 沼气	19.09	0.80	60.41	13.40	0.00
Heavy Fuel Oil #6 6 号重燃油	42.23	0.96	88.30	9.30	0.85
Light Fuel Oil #2 2 号轻燃油	44.25	0.83	87.30	12.50	0.20
Propane 丙烷	50.27	1.52	81.60	18.40	0.00

2.2.3   Analogue Setup Settings 模拟设置

Analogue Setup		
#	Description	Value
1	Output 1: Data Source	Oxygen Concentration
2	Output 1: 4mA Corresponds To	0.0% O2
3	Output 1: 20mA Corresponds To	0.0% O2
4	Unused: Unused	0
5	Unused: Unused	0
6	Output 2: Data Source	Oxygen Concentration
7	Output 2: 4mA Corresponds To	0.0% O2
8	Output 2: 20mA Corresponds To	0.0% O2
9	Unused: Unused	0
10	Unused: Unused	0
11	Output 3: Data Source	Oxygen Concentration
12	Output 3: 4mA Corresponds To	0.0% O2
13	Output 3: 20mA Corresponds To	0.0% O2
14	Unused: Unused	0
15	Unused: Unused	0
16	Output 4: Data Source	Oxygen Concentration
17	Output 4: 4mA Corresponds To	0.0% O2
18	Output 4: 20mA Corresponds To	0.0% O2
19	Unused: Unused	0
20	Unused: Unused	0
All	Output 1	Output 2	Output 3	Output 4	Output 5	Output 6		

Figure 2.2.3.i Analogue Setup Screen
图 2.2.3.i 模拟设置屏幕

Press [Analogue Setup] in the Commission Menu screen to access the Analogue Setup screen. There are 6 analogue outputs available on the EGA, which can be configured to send data as 4-20mA from the EGA. The Analogue Setup settings are grouped together in tabs as Output 1, Output 2, Output 3, Output 4, Output 5 and Output 6.

在调试菜单屏幕上按下 [Analogue Setup] 按钮可以访问模拟设置屏幕。尾气分析仪上有 6 个模拟输出，可以设置从尾气分析仪上发送 4-20mA 数据。模拟设置被归类在输出 1、输出 2、输出 3、输出 4、输出 5 和输出 6 等六个选项卡中。

Once settings have been changed, press [Exit] to return to the Commission Menu screen.

更改设置后，按下 [Exit] 按钮可以返回调试菜单屏幕。

The table below shows the settings, range and default values for the Analogue Setup settings.
下表显示了模拟设置的设定值、范围和默认值。

Setting 设置	Default 默认值	Range 范围	Description 说明
1	0		Output 1: Data Source 输出 1：数据源
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态
2	0		Output 1: 4mA Corresponds To 输出 1：4mA 对应的输出
		0 – 1000	The units will for this setting will depend on the data source in setting 1. 本设置中的单位取决于设置 1 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
3	0		Output 1: 20mA Corresponds To 输出 1:20mA 对应的输出
		0 – 1000	The units will for this setting will depend on the data source in setting 1. 本设置中的单位取决于设置 1 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度

Setting 设置	Default 默认值	Range 范围	Description 说明
		0 – 1	0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率 For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
4	-	-	Unused 未使用
5	-	-	Unused 未使用
6	0		Output 2: Data Source 输出 2：数据源
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态
7	0		Output 2: 4mA Corresponds To 输出 2：4mA 对应的输出
		0 – 1000	The units will for this setting will depend on the data source in setting 6. 本设置中的单位取决于设置 6 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 $0.0 – 1000.0\,^{O}C$ or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。

Setting 设置	Default 默认值	Range 范围	Description 说明
8	0		Output 2: 20mA Corresponds To 输出 2：20mA 对应的输出
			The units will for this setting will depend on the data source in setting 6. 本设置中的单位取决于设置 6 中设定的数据源。

		0 – 1000	0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
9	-	-	Unused 未使用
10	-	-	Unused 未使用
11	0		Output 3: Data Source 输出 3：数据源
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态
12	0		Output 3: 4mA Corresponds To 输出 3：4mA 对应的输出
		0 – 1000	The units will for this setting will depend on the data source in setting 11. 本设置中的单位取决于设置 11 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
13	0		Output 3: 20mA Corresponds To 输出 3：20mA 对应的输出
			The units will for this setting will depend on the data source in

Setting 设置	Default 默认值	Range 范围	Description 说明
		0 – 1000	setting 11. 本设置中的单位取决于设置 11 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
14	-	-	Unused 未使用
15	-	-	Unused 未使用
16	0		<u>Output 4: Data Source 输出 4：数据源</u>
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态

Setting 设置	Default 默认值	Range 范围	Description 说明
17	0		<u>Output 4: 4mA Corresponds To 输出 4：4mA 对应的输出</u>
		0 – 1000	The units will for this setting will depend on the data source in setting 16. 本设置中的单位取决于设置 16 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0% 效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On.

			尾气分析仪状态：0=关闭，1=启动。
18	0		<u>Output 4: 20mA Corresponds To 输出 4：20mA 对应的输出</u>
		0 – 1000	The units will for this setting will depend on the data source in setting 16. 本设置中的单位取决于设置 16 中设定的数据源 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
19	-	-	Unused 未使用
20	-	-	Unused 未使用
21	0		<u>Output 5: Data Source 输出 5：数据源</u>
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态
22	0		<u>Output 5: 4mA Corresponds To 输出 5：4mA 对应的输出</u>
		0 – 1000	The units will for this setting will depend on the data source in setting 21. 本设置中的单位取决于设置 21 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0% 效率

Setting 设置	Default 默认值	Range 范围	Description 说明
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
23	0		Output 5: 20mA Corresponds To 输出 5：20mA 对应的输出
		0 – 1000	The units will for this setting will depend on the data source in setting 21. 本设置中的单位取决于设置 21 中设定的数据源。 0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
24	-	-	Unused 未使用
25	-	-	Unused 未使用

Setting 设置	Default 默认值	Range 范围	Description 说明
26	0		Output 6: Data Source 输出 6：数据源
		0	Oxygen Concentration 氧气浓度
		1	Carbon Dioxide Concentration 二氧化碳浓度
		2	Carbon Monoxide Concentration 一氧化碳浓度
		3	Nitric Oxide Concentration 一氧化氮浓度
		4	Nitrogen Dioxide Concentration 二氧化氮浓度
		5	Sulphur Dioxide Concentration 二氧化硫浓度
		6	Ambient Temperature 环境温度
		7	Exhaust Temperature 排气温度
		8	Efficiency 效率
		9	EGA Status 尾气分析仪状态
27	0		Output 6: 4mA Corresponds To 输出 6：4mA 对应的输出
			The units will for this setting will depend on the data source in

			setting 26. 本设置中的单位取决于设置 26 中设定的数据源。
		0 – 1000	0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0% 效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
28	0		<u>Output 6: 20mA Corresponds To</u> 输出 6：20mA 对应的输出
			The units will for this setting will depend on the data source in setting 26. 本设置中的单位取决于设置 26 中设定的数据源。
		0 – 1000	0.0 – 100.0% for O_2 or CO_2 0.0 - 100.0% 氧气或二氧化碳 0 – 10000 ppm for CO, NO, NO_2, or SO_2 0 - 10000 ppm 一氧化碳、一氧化氮、二氧化氮或二氧化硫 0.0 – 1000.0^{O}C or ^{O}F for temperature 0.0 - 1000.0 摄氏度或华氏度温度 0.0 – 1000.0% for efficiency 0.0 - 1000.0%效率
		0 – 1	For EGA Status, value 0 = Off, and value 1 = On. 尾气分析仪状态：0=关闭，1=启动。
29	-	-	Unused 未使用
30	-	-	Unused 未使用

2.3 Commissioning MM with EGA 用尾气分析仪调试控制模块

Commissioning with the EGA is an extension to commissioning with the MM and is required if the trim function is to be used. The factory trained technician must be completely familiar with the commissioning of the MM unit before commissioning with the EGA For the full commissioning procedure, please refer to the Mk8 MM Installation and Commissioning Guide and Mini Mk8 MM Installation and Commissioning Guide.
利用尾气分析仪进行调试是利用控制模块进行调试的一种补充方式，使用调节功能时则需要进行此类调试。经工厂培训的技术人员在利用尾气分析仪进行调试前必须完全熟悉控制模块的调试。关于完整的调试流程，请参考 Mk8 控制模块安装和调试指南以及 Mk8 微型控制模块安装和调试指南。

The commissioning procedure as described must be strictly adhered to. Anybody commissioning an MM/EGA system must have an adequate understanding of combustion plants and be officially certified by Autoflame Engineering.
操作员必须严格遵守所述的调试流程。调试控制模块和尾气分析仪系统的所有人员都必须完全了解燃烧设备的运行，并获得 Aotoflame 工程有限公司的正式认证。

In the wrong hands, hazardous conditions could be made to exist that could lead to product damage, critical injury or death.
未经培训的人员进行调试时可能会发生危险，导致产品损坏和伤亡。

The fundamental idea of the system is to set a fuel valve position and then set a corresponding air valve position. Care must be taken when adjusting the fuel and air positions so as not to create any unstable or dangerous combustion conditions, e.g. moving the fuel valve to the open position without increasing the air valve correspondingly.
控制系统的理论基础是设置一个燃料阀位置和一个对应的空气阀位置。调节燃料和空气位置时应特别小心，确保不产生任何不稳定或危险的燃烧状况，例如：把燃气阀调节到开启位置时未相应增大空气阀的开度。

Commissioning a system with an EGA does not require a combustion monitor as the EGA performs all normal exhaust gas measurements. When burning oil, a smoke detection device should be used, to check that the smoke generated is within government guidelines.
利用尾气分析仪调试系统不需要燃烧监视器，因为尾气分析仪可以进行所有废气的正常测量。使用燃油时需要用烟气检测设备对产生的烟气进行检测，确定产生的烟气符合政府的规定。

Ideally, to implement commissioning as quickly as possible arrange for a substantial load on the boiler. The commissioning procedure can be interrupted due to excess temperature or pressure, causing the burner to turn off. In these instances the commissioning data accumulated so far is not lost. When the burner is called back on, the system starts up automatically and commissioning can proceed from where it left off.
为了尽快完成调试，锅炉运行时应施加相当的荷载量。过高的温度或压力会中断调试过程并造成燃烧器关闭。当此类情况发生时，已有的调试数据不会丢失。当燃烧器恢复运行后，系统将自动启动并且从上次中止处继续进行调试。

Once the burner has been fired the maximum fuel position is entered first then descending fuel positions are entered consecutively until finally a minimum fuel position is entered. The CH1 and CH2 positions must always be less than the ones previously entered. However with the remaining channels it is possible to move the position above or below the previously

entered points. This is important if these channels are used to control FGR (Flue Gas Recirculation) or atomisation of oil.

燃烧器燃烧时燃料先进入最大燃料位置，然后进入燃料递减位置，直至完全进入最小燃料位置。CH1 和 CH2 的位置必须小于上次进入的数量。在剩余通道中，操作员可以根据先前进入点上下移动位置。这些通道可以用于控制燃气再循环或燃油离子化。

On a newly installed system the following procedures should be carried out as listed:
请按以下流程安装新系统：

1. Check all interconnecting wiring between the MM and external components are correct.
   检查控制模块和外部组件间的所有接线是否正确。
2. Set the MM Settings and EGA Settings, see sections 2.1.1 and 2.2, respectively.
   设置控制模块和尾气分析仪（请分别参考第 2.1.1 和 2.2 节）。
3. Set up positioning motors.
   设置定位电机。
4. Programme fuel/air positions.
   设置燃料/空气位置。

Note: For the safety and operational checks, and the full commissioning procedure of the Mk8 MM Installation and Commissioning Guide and the Mini Mk8 MM Installation and Commissioning Guide.
注：关于安全检查和运行检查，请参考 **Mk8** 控制模块或 **Mk8** 微型控制模块安装和调试指南中的调试流程。

On the Mk8 MM and Mini Mk8 MM, it is possible to commission the burner with option 12 set to no EGA or monitoring only, then add EGA trim later by setting option 12 to 2 or 3 and adding the trim positions in single point change. Once commissioning is complete and all points are entered, the trim is then set in Single Point Change. Ensure that option 12 is now set to trim. Once in single point change you will then be able to activate the trim by pressing the 'trim' button when on a particular point.
在 Mk8 控制模块和 Mk8 微型控制模块上可以调试燃烧器，调试时只需将选项 12 设为"无尾气分析仪"或"仅监控"，然后将选项 12 设为 2 或 3 后再添加尾气分析仪调节，请在单点调节模式上添加调节位置。完成调试并输入所有点后在单点调节上设置调节。此时，请确保选项 12 已设为调节。进入单点调节模式后，您可以在特定点按下"调节"按钮启用调节。

2.4 **Calibration Schedule** 校准安排
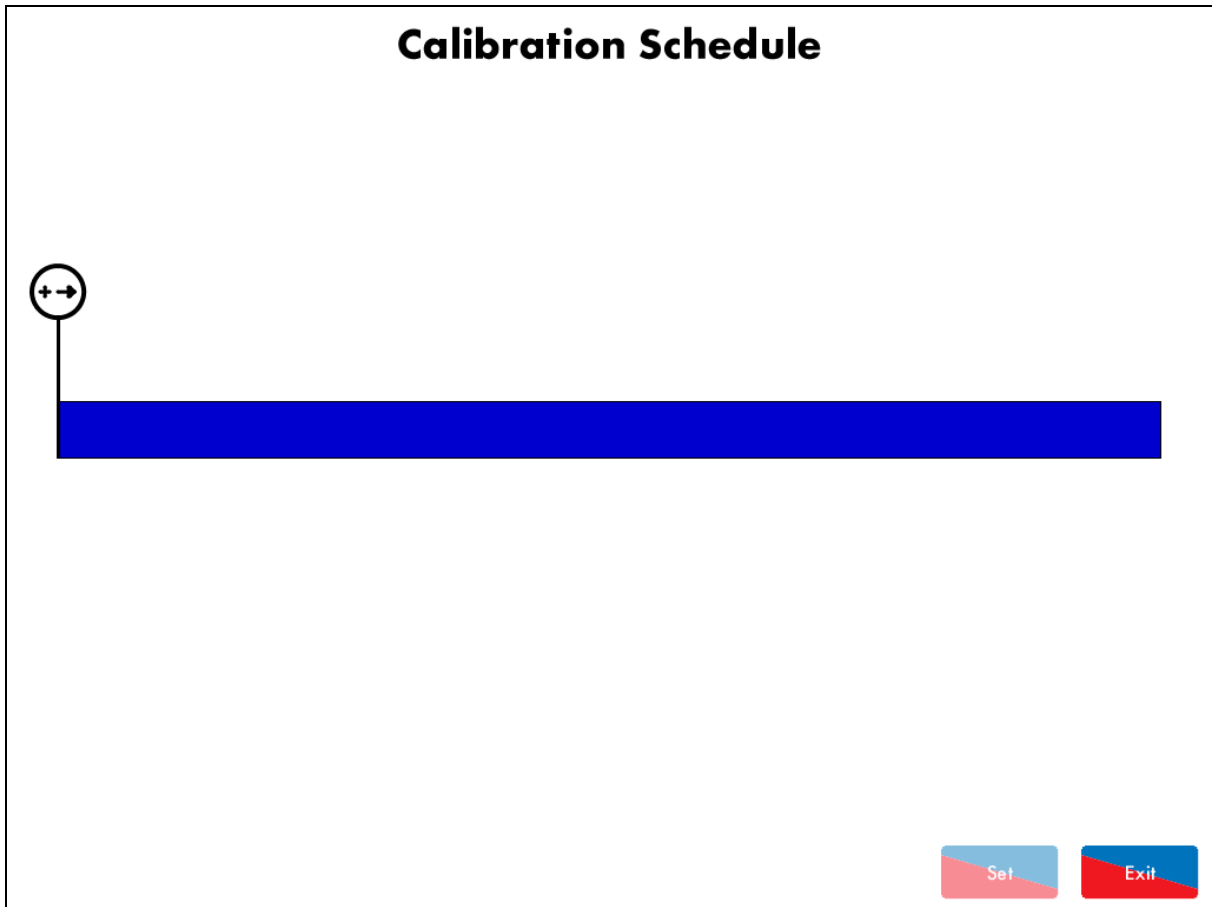
Figure 2.4.i Calibration Schedule (clear)
图 *2.4.i* 校准安排（空白）

Press in the Commission Menu screen shown in Figure 2.2.iii to access the Calibration Schedule screen. Alternatively, press in the System Configuration screen and enter the Online Changes password (14, 14 as default).

在图 2.2.iii 所示的调试菜单屏幕上按下 按钮可以访问校准安排安排屏幕，您也可以在系统设置屏幕上按下 按钮，然后输入在线修改密码（默认 14,14）。
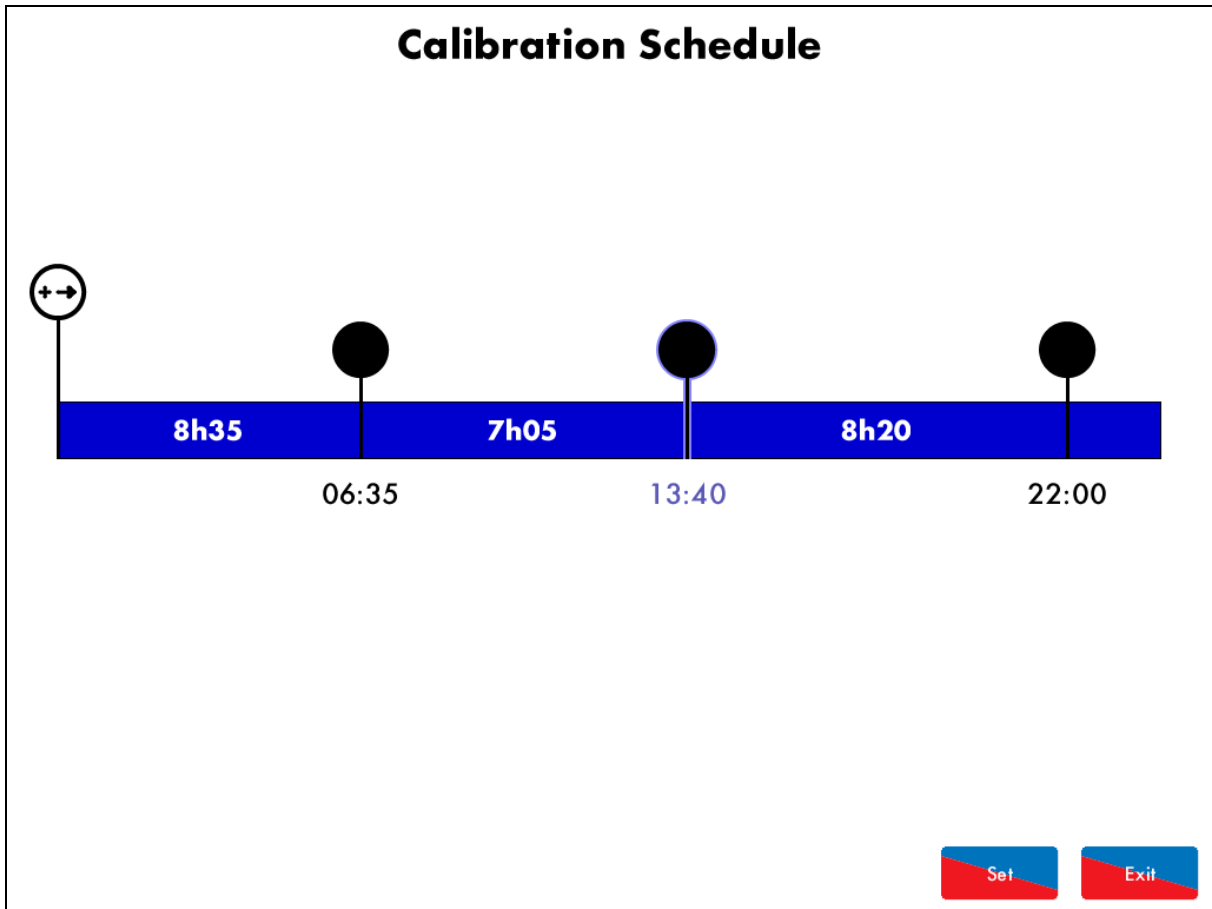
Figure 2.4.ii Calibration Schedule
图 *2.4.ii 校准安排*

Press on ⊕ to add an air calibration time, and drag this circle to the left or right to adjust to the time. The air calibrations can be scheduled at 5 minute intervals, and up to 4 air calibrations can be added over a 24 hour period.

按下 ⊕ 按钮可以添加一个空气校准安排，向左或向右拖动该圆圈可以调节时间。空气校准间隔时间可以设为 5 分钟，24 小时内可以进行 4 次空气校准。

To remove an air calibration press on ● and drag the circle up, and then press ⊗ to remove this air calibration from the calibration schedule.

如要移除空气校准，请按住 ● 按钮向上拖动，然后按下 ⊗ 按钮从校准安排内移除空气校准。

Once the air calibrations have been set, press [Set] to save the air calibration schedule, and then press [Exit] to leave the calibration schedule screen.

完成空气校准设置后，按下 按钮可以保存空气校准表，然后按下 按钮可以退出校准安排屏幕。

To force an air calibration, either trigger this on the MM, or in the System Configuration screen, see section 3.9.

如要强制进行空气校准，可以在控制模块屏幕或系统设置屏幕上拖动对应按钮，请见第 3.9 节。

Note: An air calibration schedule must be set for the health life % to display in the Cell Information screen, see section 3.8.

注：空气校准时间必须设为正常运行的百分比并在感应器信息屏幕上显示，请见第 3.8 节。

2.5   Resetting Data 重置数据

In the Commission Menu screen shown in Figure 2.2.iii, it is possible to reset data on the EGA.
在图 2.2.iii 所示的调试菜单屏幕上可以重置尾气分析仪上的数据。

2.5.1   Reset Cells to Factory Calibration 重置感应器至出厂设置

If the cell calibration is not accurate, the cells can be reset to factory calibration.
如感应器调节不准确，则需要将感应器重置为出厂设置。

Press and hold for 3 seconds to reset the O_2 cell to factory calibration.

按住 按钮 3 秒钟可以将氧气感应器重置为出厂设置。

Press and hold for 3 seconds to reset the CO_2 cell to factory calibration.

按住 按钮 3 秒钟可以将二氧化碳感应器重置为出厂设置。

Press and hold for 3 seconds to reset the CO cell to factory calibration.

按住 按钮 3 秒钟可以将一氧化碳感应器重置为出厂设置。

Press and hold for 3 seconds to reset the NO cell to factory calibration.

按住 按钮 3 秒钟可以将一氧化氮感应器重置为出厂设置。

Press and hold for 3 seconds to reset the NO_2 cell to factory calibration (if fitted).

按住 按钮 3 秒钟可以将二氧化氮感应器重置为出厂设置。

Press and hold for 3 seconds to reset the SO_2 cell to factory calibration (if fitted).

按住 按钮 3 秒钟可以将二氧化硫感应器重置为出厂设置。

2.5.2   Reset Run Times 重置运行时间

When a new cell is fitted on the EGA, the run times and data for the previous data should be reset. Similarly, when a new EGA pump is fitted, the pump run times should also be reset for previous pump.
当尾气分析仪上安装了新感应器后，则需要重置以前的运行时间和数据。同样，当按住了新尾气分析仪泵后，也需要重置以前的泵运行时间。

Press and hold for 3 seconds to reset all the exhaust gas and fuel flow data for fuel 1.

按住 按钮 3 秒钟可以重置燃料 1 的所有废气和燃料流量数据。

Press and hold for 3 seconds to reset all the exhaust gas and fuel flow data for fuel 2.

按住 按钮 3 秒钟可以重置燃料 2 的所有废气和燃料流量数据。

Press and hold for 3 seconds to reset all the exhaust gas and fuel flow data for fuel 3.

按住 按钮 3 秒钟可以重置燃料 3 的所有废气和燃料流量数据。

Press and hold for 3 seconds to reset all the exhaust gas and fuel flow data for fuel 4.

按住 按钮 3 秒钟可以重置燃料 4 的所有废气和燃料流量数据。

Press and hold for 3 seconds to reset the EGA pump data.

按住 按钮 3 秒钟可以重置尾气分析仪泵的数据。

2.5.3 Reset Other Data 重置其他数据

If the service interval period set in Commission Mode setting 54 has elapsed, and a service has been completed on the EGA, the service interval can be reset.
如在调试模式设置 54 中设置的服务间隔时间已用完，且尾气分析仪已完成服务，则需要重置服务间隔时间。

Press and hold for 3 seconds to reset the service interval period.

按住 按钮 3 秒钟可以重置服务间隔时间。

If the new calibration drift has been corrected by fitting a new cell or performing an accurate calibration, the calibration drift data can be reset.
如通过安装新感应器纠正校准偏差或执行某个精确校准时，则需要重置校准偏差数据。

Press and hold for 3 seconds to reset the calibration drift data.

按住 按钮 3 秒钟可以重置校准偏差数据。

Press and hold for 3 seconds to reset the system log.

按住 3 秒钟可以重置系统日志。

Press and hold for 3 seconds to reset the fault log.

按住 按钮 3 秒钟可以重置故障日志。

3   SYSTEM CONFIGURATION 系统设置
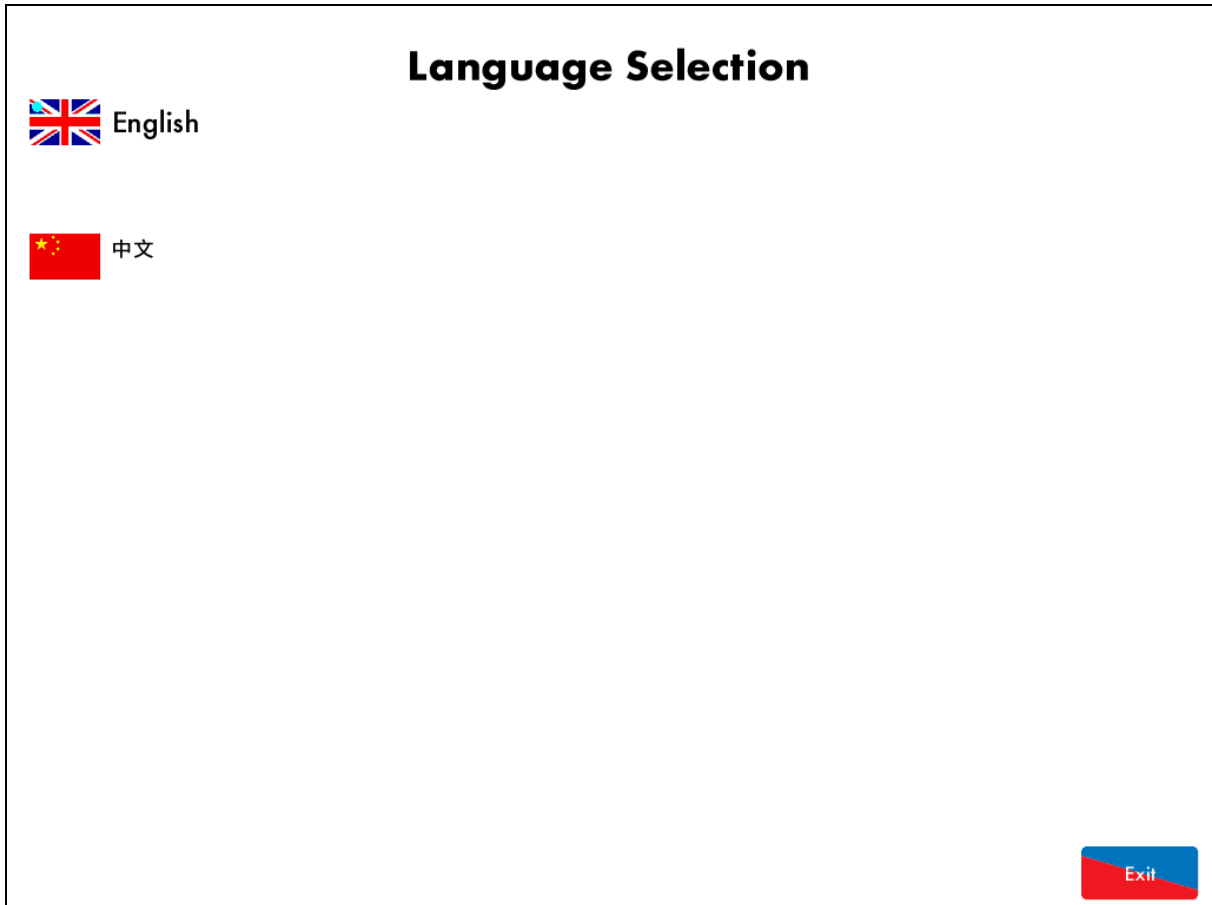
3.1   Language 语言

Figure 3.1.i Language Selection
图 3.1.i 语言选择

Press [Language] in the System Configuration. Enter the Online Changes password (14, 14 as default) to access the Language Selection screen. Select the desired language and then press [Exit] to save the selection and return to the System Configuration screen.

在系统设置屏幕上按下[Language]按钮并输入在线修改密码（默认 14,14）可以访问语言选择屏幕。选定语言后按下[Exit]按钮可以保存选择并返回系统设置屏幕。

If the language required is not displayed, please contact your local Autoflame representative or Autoflame Sales.
如未显示选定的语言，请联系当地 Autoflame 代表或销售人员。

3.2 Set Clock 设置时钟
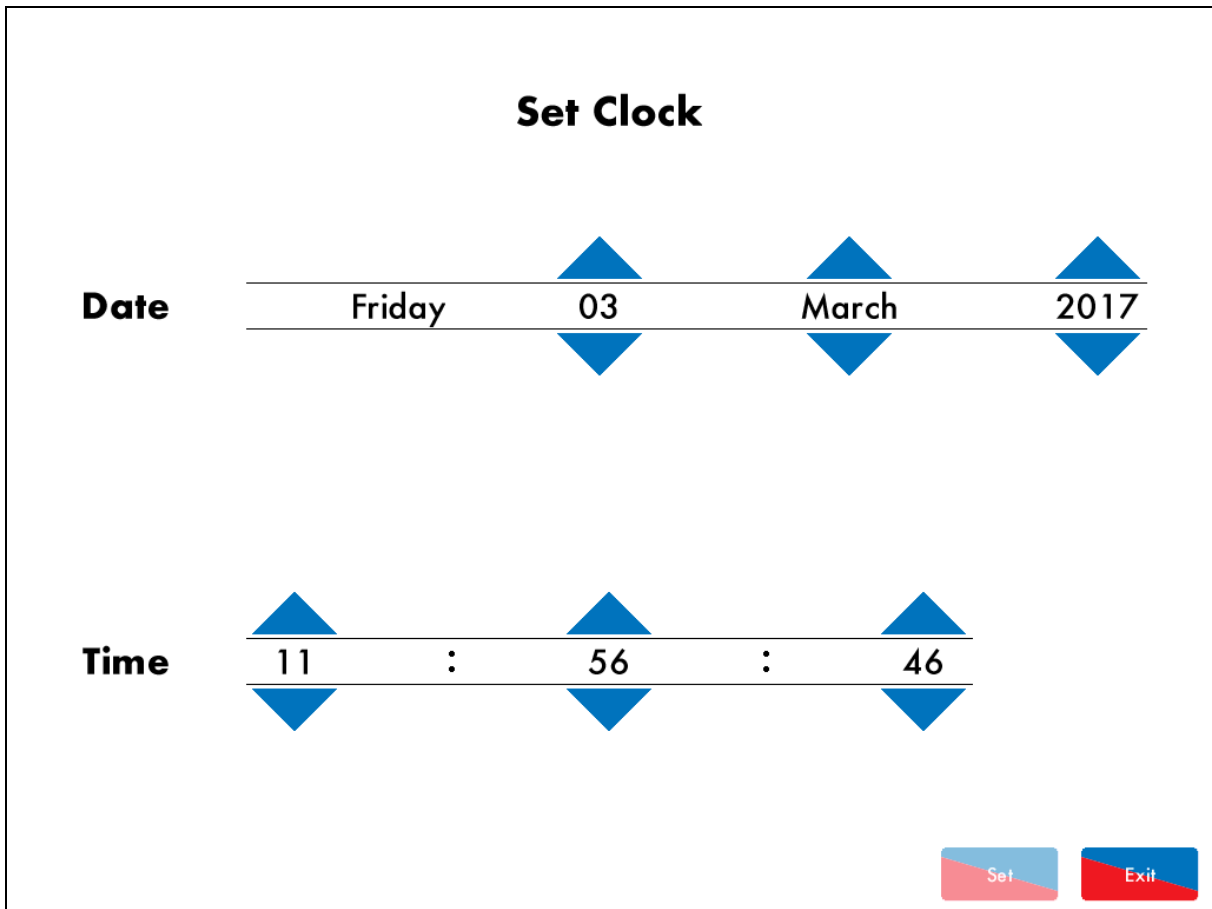
Figure 3.2.i Set Clock
图 3.2.i 设置时钟

Press [Set Clock] in the System Configuration screen. Enter the Set Clock password (10, 10) to access the Set Clock screen.

在系统设置屏幕上按下[Set Clock]按钮并输入设置时钟密码（默认 10,10）可以访问设置时钟屏幕。

Adjust the time and date by using the [▲] and [▼] buttons, and then press [Set] to save the time and then [Exit] to go back to the System Configuration screen.

利用[▲]和[▼]按钮可以调节时间和日期，按下[Set]按钮可以保存时间，按下[Exit]按钮可以返回系统设置屏幕。

Note: Changing the time and date will affect the logged exhaust and fuel flow data, so it is recommended to set the clock when the EGA is installed and then leave it at that time and date setting.

注：由于更改时间和日期将影响记录的废气和燃料流量数据，因此建议在安装尾气分析仪时设置时钟，以后则不用更改已设定的时间和日期。

3.3 Online Changes 在线修改

3.3.1 Settings 设置

Online Changes		
#	**Description**	**Value**
1	Base: Control Mode	Controlled by MM
2	Base: Communications Id	1
3	Base: Display Units	Metric
4	Base: Efficiency Calculation Method	English
5	Base: Currency Units	GBP
6	Base: Backlight On Time	600 seconds
7	Base: Logo Display Timer	600 seconds
8	Base: Show Advanced Values	Disabled
9	Unused: Unused	0
10	Cells: CO Poison Detection	Enabled
11	Cells: CO Poison Limit	600 ppm
12	Cells: CO Poison Return	200 ppm
13	Cells: SO2 Correction	100%
14	Cells: Minimum NO2 Fraction of NOx (if NO2 cell fitted)	0%
15	Cells: NOx Normalised O2 Value	3.0% O2
16	Cells: NO Fraction of NOx (if NO2 cell not fitted)	94.0%
17	Cells: Standard Temperature	298.0 °K
18	Cells: Standard Pressure	1013.2 mbar (406.8 inWG)
19	Unused: Unused	0

All | Base | Cells | Calibration | Back box | System | Vendor | ⬆ ⬇ Exit

Figure 3.3.1.i Online Changes – Settings
图 3.3.1.i 在线修改-设置

Press on [Settings] in the System Configuration screen. Enter the Online Changes password (14, 14 as default) to access the Online Changes screen for the Commission Mode settings, where some of the settings can be adjusted, see section 2.2.1 on Commission Mode settings.

在系统设置屏幕上按下[Settings]按钮并输入在线修改密码（默认 14,14）可以访问在线修改屏幕，进行调试模式设置，其中某些设置可以修改，请见第 2.2.1 节调试模式设置。

3.3.2 Fuel Setup 燃料设置

Press [Fuel Setup] in the System Configuration screen. Enter the Online Changes password (14, 14 as default) to access the Fuel Setup screen where the settings can be adjusted, see section 2.2.2 on Fuel Setup settings.

在系统设置屏幕上按下[Fuel Setup]按钮并输入在线修改密码（默认 14,14）可以访问燃料设置屏幕并对设置进行修改，请见第 2.2.2 节燃料设置。

Once the settings have been adjusted as reqiuired, press [Exit] to save the settings and go back to the System Configuration screen.

按要求修改设置后请按下[Exit]按钮保存设置并返回系统设置屏幕。

3.3.3 Calibration Schedule 校准安排

Press [Calibration Schedule] in the System Configuration screen. Enter the Online Changes password (14, 14 as default) to access the Calibraiton Schedule screen, see section 2.4.

在系统设置屏幕上按下[Calibration Schedule]按钮并输入在线修改密码（默认 14,14）可以访问校准安排屏幕，请见第 2.4 节。

3.4 Run Times 运行时间
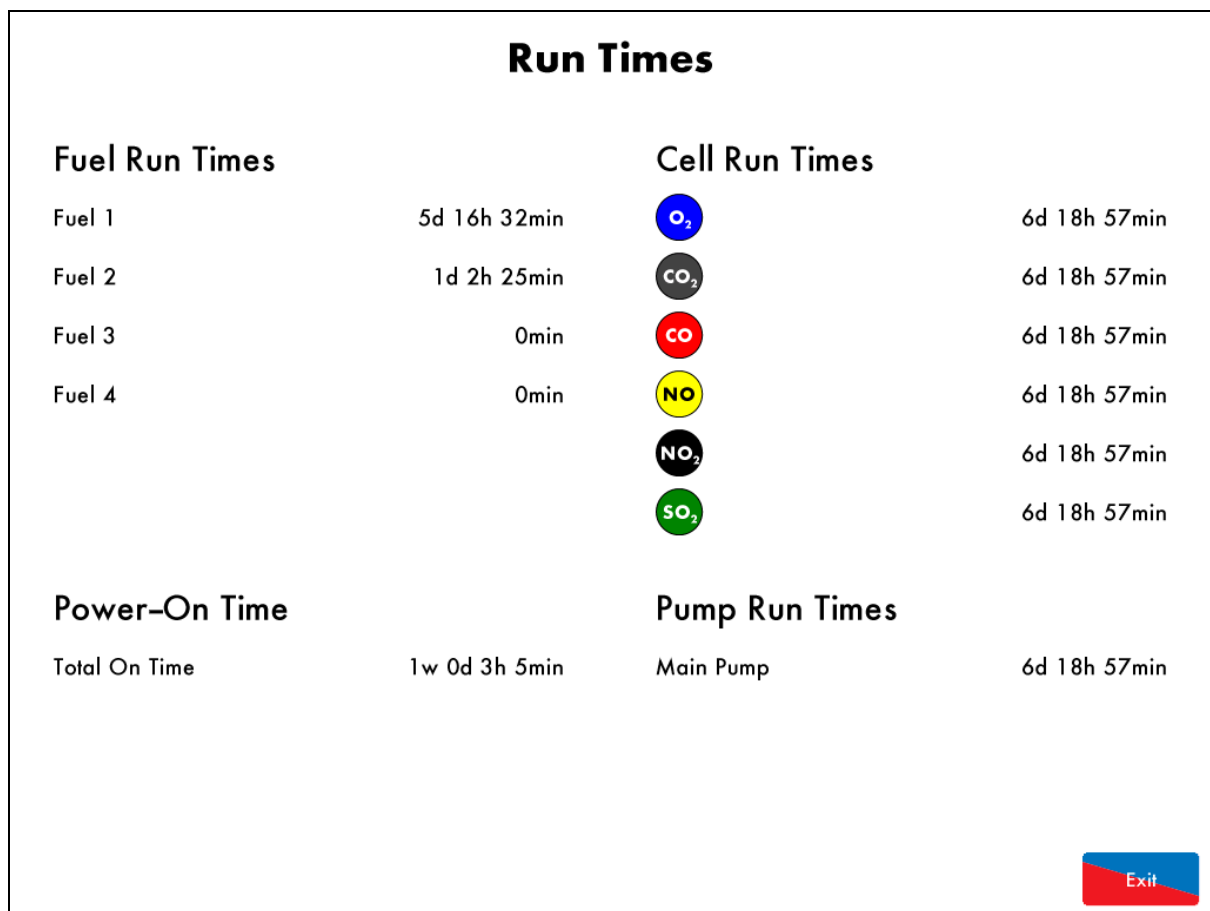
Figure 3.4.i Run Times
图 3.4.i 运行时间

Press [Run Times] in the System Configuration screen to access the Run Times screen. The Run Times screen provides the following information:

在系统设置屏幕上按下[Run Times]按钮可以访问运行时间屏幕，屏幕上将提供以下信息：

- Fuel run times
  燃料运行时间

- Power on time
  上电时间
- Fitted cell run times
  已安装感应器运行时间
- EGA pump run time
  尾气分析仪泵运行时间

Press to go back to the System Configuration screen.

按下 按钮可以返回系统设置屏幕。

3.5   **Diagnostics** 故障诊断

#	Description		Value
1	EGA: Processor temperature (Now)		42.9°C
2	EGA: Processor temperature (Min)	(Limit 3.0°C)	27.3°C
3	EGA: Processor temperature (Max)	(Limit 140.0°C)	45.3°C
4	EGA: PCB temperature (Now)		26.3°C
5	EGA: PCB temperature (Min)	(Limit 3.0°C)	–4.9°C
6	EGA: PCB temperature (Max)	(Limit 40.0°C)	27.0°C
7	Cells: CO2 cell bulb current (Now)		0.562A
8	Cells: CO2 cell bulb current (Min)		0.000A
9	Cells: CO2 cell bulb current (Max)		0.763A
10	EGA: Chiller Current		0.194A
11	Comms: Messages sent to MM per minute		58
12	Comms: Messages sent to DTI per minute		20
13	Cells: O2 Cell raw reading		–629
14	Cells: CO2 Cell raw reading		8977
15	Cells: CO Cell raw reading		17
16	Cells: NO Cell raw reading		151
17	Cells: NO2 Cell raw reading		–5
18	Cells: SO2 Cell raw reading		103
19	Cells: CO2 Cell temperature		29.9°C
20	EGA: Fan frequency		86.0Hz

All   EGA   Cells   Comms   Exit

Figure 3.5.i Diagnostics
图 3.5.i 故障诊断

Press [Diagnostics] in the System Configuration screen to access the Diagnostics screen. The Diagnostics screen shows the real-time values of the EGA's environmental conditions, as well as the minimum and maximum values which have been detected in its entire operating period. Press on the tabs to view the following information:

在系统设置屏幕上按下 [Diagnostics] 按钮可以访问故障诊断屏幕，屏幕上将显示尾气分析仪环境条件的实时数据，以及在整个运行期间检测到的最小值和最大值。按下对应选项卡可以查看以下信息：

- Processor temperature
  处理器温度
- PCB temperature
  PCB 温度
- Chiller current
  冷却器电流
- Fan frequency
  风机频率
- CO_2 bulb current
  二氧化碳灯泡电流

- O_2 cell raw reading
  氧气感应器原始读数
- CO_2 cell raw reading
  二氧化碳感应器原始读数
- CO cell raw reading
  一氧化碳感应器原始读数
- NO cell raw reading
  一氧化氮感应器原始读数
- NO_2 cell raw reading
  二氧化氮感应器原始读数
- SO_2 cell raw reading
  二氧化硫感应器原始读数
- CO_2 cell temperature
  二氧化碳感应器温度
- Messages sent to MM per minute
  每分钟发送给控制模块的消息数
- Messages sent to DTI per minute
  每分钟发送给数据传输接口的消息数

3.6   **System Log** 系统日志

System Log	Detail	Occurred
1. Fuel Selection	Fuel 1 Selected	15 Feb 17 12:43
2. EGA Started		15 Feb 17 12:43
3. Fuel Selection	Fuel 1 Selected	15 Feb 17 12:30
4. EGA Started		15 Feb 17 12:30
5. Fuel Setup 32 Changed	Costing Units (From 0 To 2)	10 Feb 17 16:54
6. Fuel Setup 31 Changed	Fuel Type (From 0 To 1)	10 Feb 17 16:54
7. Fuel Setup 22 Changed	Costing Units (From 0 To 2)	10 Feb 17 16:54
8. Fuel Setup 21 Changed	Fuel Type (From 0 To 1)	10 Feb 17 16:54
9. Fuel Setup 12 Changed	Costing Units (From 3 To 2)	10 Feb 17 16:54
10. Fuel Setup 11 Changed	Fuel Type (From 6 To 1)	10 Feb 17 16:54
11. Fuel Setup 3 Changed	Cost Per Unit (From 1000 To 1750)	10 Feb 17 16:50
12. Fuel Selection	Fuel 1 Selected	10 Feb 17 14:56
13. EGA Started		10 Feb 17 14:56
14. Fuel Selection	Fuel 1 Selected	7 Feb 17 12:27
15. Fuel Selection	No Fuel Selected	7 Feb 17 12:27
16. Fuel Selection	Fuel 1 Selected	6 Feb 17 10:36
17. EGA Started		6 Feb 17 10:36
18. Fuel Selection	Fuel 1 Selected	2 Feb 17 12:29
19. EGA Started		2 Feb 17 12:29
20. Calibration Schedule Change		2 Feb 17 12:01
21. Setting 21 Changed	Air Calibration Time (From 20 To 360)	31 Jan 17 09:57
22. Setting 40 Changed	MM Comms Mode (From 1 To 0)	31 Jan 17 09:51

All   Faults   Config   Service   Operation

Figure 3.6.i System Log
图 3.6.i 系统日志

Press [System Log] in the System Configuration screen to access the System Log. The System stores 1000 entries of changes or any faults that have occurred, including:

在系统设置屏幕上按下 [System Log] 按钮可以访问系统日志屏幕，系统将保存 1000 条已经发生的更改数据或故障数据，其中包括：

- Errors and warnings
  错误和警告
- Settings which have been changed
  已更改的设置
- Serivce intervals
  服务间隔时间
- Fuel selection
  燃料选择
- EGA turned on/off
  尾气分析仪的启停

3.7   Manual 用户手册
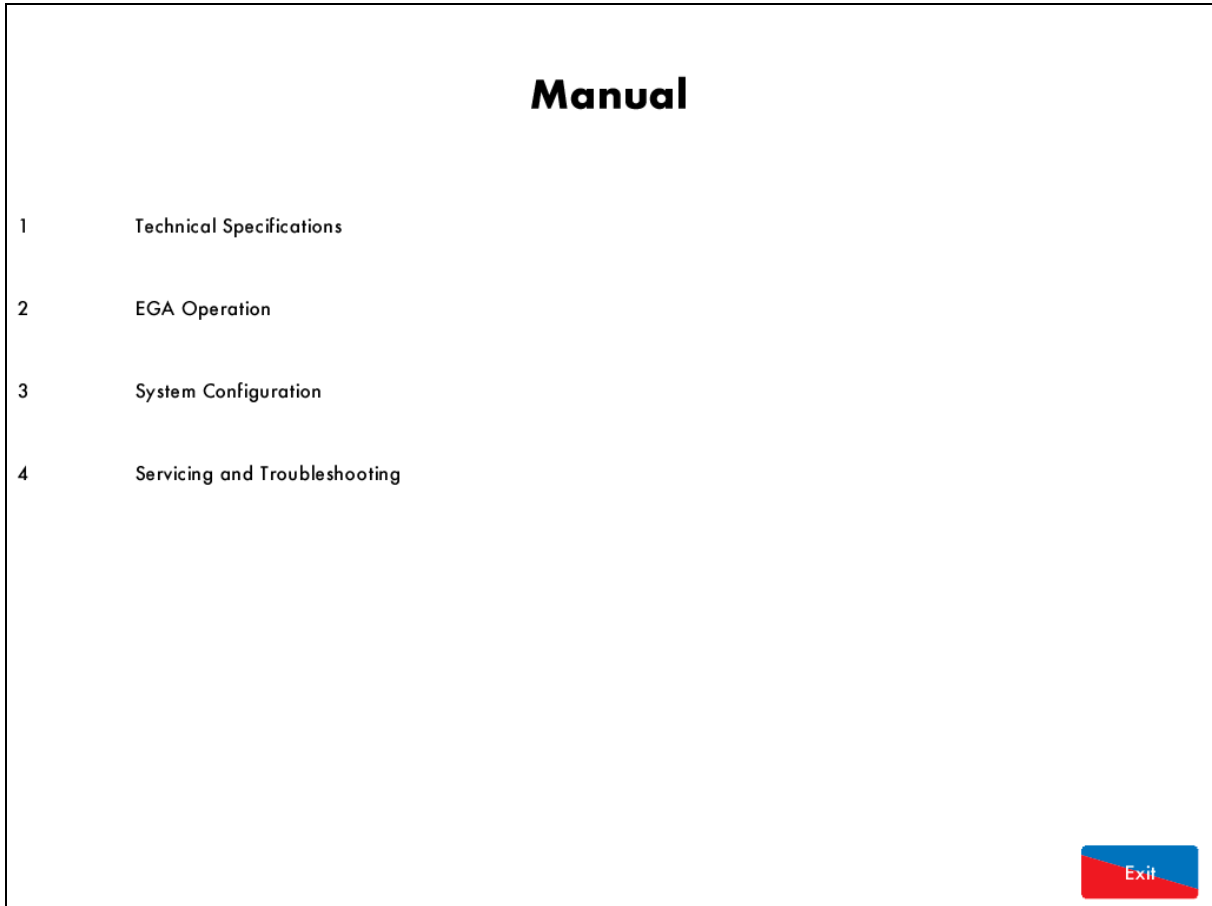
Figure 3.7.i Manual
图 3.7.i 用户手册

Press in the System Configuration screen to access the Manual screen.

在系统设置屏幕上按下按钮可以访问用户手册屏幕。

3.8 Cell Information 感应器信息
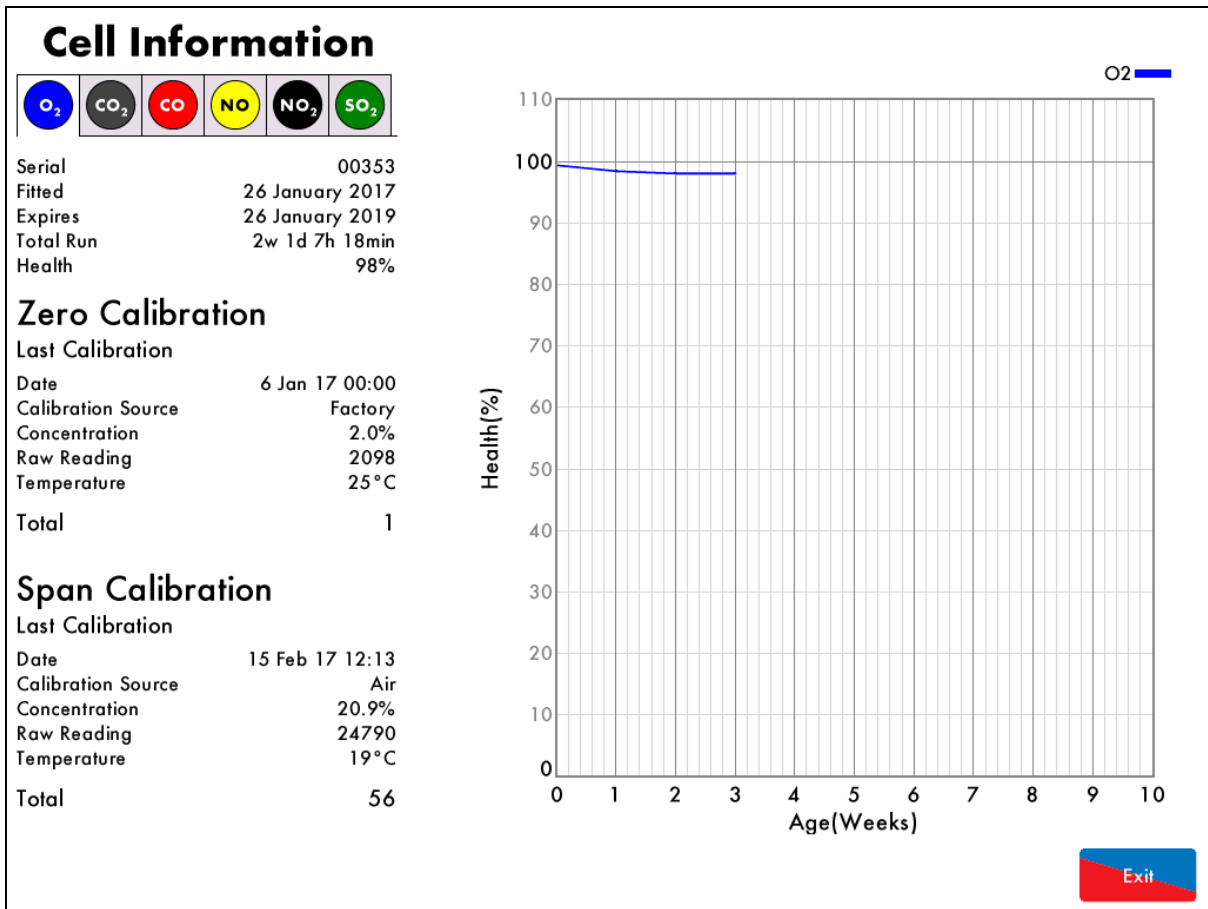
Figure 3.8.i Cell Information Screen
图 3.8.i 感应器信息屏幕

Press ![Cell Information] in the System Configuration screen to access the Cell Information screens. Press on the tabs for information on each cell fitted, including:

在系统设置屏幕上按下 ![Cell Information] 按钮可以访问感应器信息屏幕，按下各感应器对应的选项卡可以查看以下信息：

- Cell serial number
  感应器序列号
- Date cell was fitted
  感应器安装日期
- Cell expiry date
  感应器有效期
- Total run times
  总运行时间
- Health
  正常运行时间
- Last zero calibration date, source, concentration, raw reading, temperature, and total number of zero calibrations
  最后一次零点校准日期、数据源、浓度、原始读数、温度和零点校准总次数。

- Last span calibration date, source, concentration, raw reading, temperature and total number of span calibrations (and pressure of span calibration for CO_2 cell)
  最后一次范围校准日期、数据源、浓度、原始读数、温度和范围校准总次数（压力范围校准用于二氧化碳感应器）。

Note: The health % of the cell will only show in the air calibration has been set, see section 2.4.
注：感应器的正常运行百分比只在空气校准中显示，请见第 2.4 节。

3.8.1 O₂ Cell Characteristics 氧气感应器的特点

This electrochemical cell is used for the detection of oxygen covering a concentration range of 0 to 20.95%. Due to the construction of the cell they offer a long life and a high resistance, even when used with high sulphur content fuels, therefore making it capable of analysis when firing heavy or light fuel oil.

电化学感应器用于检测浓度范围为 0 至 20.95%的氧气。感应器结构可以提供更长的使用寿命和较高的电阻，即使在使用高硫燃料的情况下。因此该感应器可以在燃烧重燃油或轻燃油时用于分析。

The oxygen cell incorporates a lead oxygen cell with a Lead anode and a Gold cathode, using a specific acid electrolyte. Oxygen molecules which diffuse through a non-porous Teflon membrane into the electromechanical cell are reduced at the Gold electrode. The current flow between the electrodes is proportional to the oxygen concentration in the flue gases measured. The O₂ readings are not influenced from CO, H₂, S, NOX and SOX so there is no cross-sensitivity.

氧气感应器包括一个带有铅阳极和金阴极的主氧气感应器，阳极和阴极使用特殊的酸性电解质。通过非多孔聚四氟乙烯膜扩散至电化学感应器中的氧气分子在金电极处减少。电极间的电流流量与测量的烟气中氧浓度成正比。由于氧气读数不受 CO、H₂、S、NOX 和 SOX 的影响，因此没有横向灵敏度。

Figure 3.8.1.i O₂ Cell
图 *3.8.1.i* 氧气感应器

Operation Ranges:
运行范围：

Detection Range 检测范围	0 – 23% O2
Accuracy 精确度	± 0.3 % Vol O2
Operating Temperature 运行温度	5°C to 40°C (41°F to 104°F) 5°C 至 40°C (41°F 至 104°F)
Shelf Life 保质期	6 months from date of dispatch 发货日期算起 6 个月
Long Term Output Drift 长期输出偏差	< 1% signal/month typically < 1%信号/月 < 10% over operating life < 10%运行寿命

As the O_2, CO, NO, SO_2 and NO_2 cells all have a 6 month shelf-life, it may be better to request for the cells to be shipped when the EGA is being installed on site. Depending on the conditions and environment the EGA is in, the cell's life expectancy can go up to 2 years. It is important to replace the cells when the EGA flags this up on the screen. Cells will need to be changed every 9 to 12 months firing on gas, and 6 to 9 months firing on oil.

O_2、CO、NO、SO_2 和 NO_2 感应器的保质期为 6 个月。当尾气分析仪在现场安装后最好要求发送感应器。根据尾气分析仪的使用条件和环境，感应器的寿命可长达两年。当屏幕上出现尾气分析仪标记后则需要更换感应器。使用燃气时感应器每隔 9 至 12 个月需要更换一次，使用燃油时每隔 6 至 9 个月需要更换一次。

Please see section 2.5.2 on resetting previous cell run times after changing the cell.

更换感应器后需要重置以前的感应器运行时间，具体请见第 2.5.2 节。

3.8.2   CO, NO, NO$_2$ and SO$_2$ Cell Charaacteristics CO、NO、NO$_2$ 和 SO$_2$ 感应器的特点

The CO, NO, NO$_2$ and SO$_2$ electromechanical cells which are specifically managed by the calibration philosophy within the Mk8 EGA unit. The accuracy of these cells is within limits of ± 5% at 100ppm. From experience we would expect to see a drift of ± 10ppm per annum without calibration. In our view, this drift would not be detrimental to the operation or application of the EGA The life of the cells depends on the concentration of the gases measured over time. In order to optimise the life of the CO cell, the electronics will detect when the signal level from the cell reaches or exceeds 500ppm and will stop sampling and purge the system. The sample gas flow to these cells is restored once the O$_2$ and CO$_2$ readings are restored to a level within the pre-programmed limits.

CO、NO、NO$_2$ 和 SO$_2$ 电化学感应器在 Mk8 尾气分析仪中根据校准原理进行管理。在浓度为 100ppm 情况下感应器的精度控制在限值的±5%。根据经验表明，感应器每年的偏差为 ±10ppm，因此无需校准，偏差不会对尾气分析仪的运行或应用造成影响。感应器的寿命取决 于测量的燃气浓度。为了优化 CO 感应器的寿命，电子元件将检测感应器的信号电平是否达 到或超过 500ppm，如果达到或超过，感应器将停止采样并开始清洁系统。当氧气和二氧化碳 读数恢复到设定范围内时，流经这些感应器的样气将被储存。

Figure 3.8.2.i CO, NO, SO$_2$ and NO$_2$ Cells
图 3.8.2.i CO, NO, SO$_2$ 和 NO$_2$ 感应器

	Gas (range) 燃气（范围）	Fuel Oil (range) 燃油（范围）	Resoltuion at 20°C 分离度（20°C）	Repeatability 重复性	Shelf Life 保质期
CO	0-1000ppm	Optional 可选	1ppm	1% of signal 信号的 1%	6months from dispatch 发货日算起 6 个月
NO	0-500ppm	Optional	1ppm	2% of signal	6months from

				信号的 2%	dispatch 发货日算起 6 个月
	可选				
SO_2	Optional 可选	0-1000ppm	1ppm	1% of signal 信号的 1%	6months from dispatch 发货日算起 6 个月
NO_2	Optional 可选	0-200ppm	0.5ppm	2% of signal 信号的 2%	6months from dispatch 发货日算起 6 个月

Please see section 2.5.2 on resetting previous cell run times after changing the cell.
更换感应器后需要重置以前的感应器运行时间，具体请见第 2.5.2 节。

Note: The NO_2 and SO_2 values will display on the EGA sampling screen as calculated values if there NO_2 and SO_2 cells are not fitted.
注：如未安装 NO_2 和 SO_2 感应器，二氧化氮和二氧化硫数值将作为计算值在尾气分析仪采样屏幕上显示。

3.8.3 CO2 Sensor CO$_2$ 传感器

The CO$_2$ sensor is manufactured in-house at Autoflame; the technology used is non-dispersive Infra-red. This sensor has no moving parts and is not an electrochemical cell. The accuracy of the reading is   ±0.3% of the reading. The cross-sensitivity is virtually zero to other gases due to the method of calibration within the EGA unit. The lifetime is usually no less than two years of gas firing. The lifetime on oil firing is dependent on the Sulphur content of the fuel.

二氧化碳传感器是由 Autoflame 生产，使用了非色散红外线技术。该传感器没有移动部件，不是电化学感应器。读数精度为读数的±0.3%。根据尾气分析仪组件的校准方法，其横向灵敏度相对其他气体几乎为零。在使用燃气时，其寿命通常不低于两年，在使用燃油时，其寿命取决于燃料中的硫含量。

Figure 3.8.3.i CO$_2$ Cell
图 3.8.3.i CO2 传感器

Measurement Range: 0-20%
测量范围：0-20%
Shelf-Life: 12months from dispatch
保质期：发货日算起 12 个月
Accuracy of reading: 0.3%
读数精度：0.3%

3.9 Calibrate Now 开始校准

To force the EGA into an air calibration, this can be done by either trigger this action through the EGA screen on the MM, or by pressing and holding [Calibrate Now] for 3 seconds in the System Configuration screen.

如要强制尾气分析仪进行空气校准，则可以在控制模块上的尾气分析仪屏幕上激活该选项，或在系统设置屏幕上按住 [Calibrate Now] 按钮 3 秒钟。

4 EGA OPERATION 尾气分析仪的操作

4.1 Sampling Screen Icons 采样屏幕图标

Pressing on the components on the EGA sampling screen will give access to the relevant information screens.
在尾气分析仪采样屏幕上按下对应图标可以访问对应的信息屏幕。

NO	NO Cell 一氧化氮感应器	CO	CO Cell 一氧化碳感应器
CO₂	CO_2 Cell 二氧化碳感应器	O₂	O_2 Cell 氧气感应器
NO₂	NO_2 Cell 二氧化氮感应器	SO₂	SO_2 Cell 二氧化硫感应器
161°C	Sampling probe 采样探头	Pump 31%	Pump 泵
	Pinch valve 夹管阀	Chiller 10% 12°C	Chiller (tries to maintain humidity in cells) 冷却器（请保持感应器中的水分）
	Drain solenoid valve 排水电磁阀		
	Restrictor 限流器		
T	Temperature sensor 温度传感器	F	Sample Gas Flow 样气流量
P	Pressure sensor 压力传感器	F	Fuel Flow 燃料流量

Note: The standard cells that are included in the EGA are NO, CO, CO_2, and O_2. Optional cells are SO_2 and NO_2, and they must be fitted at the factory. If the SO_2 and NO_2 cells are not fitted, then the EGA will calculate these values based on the exhaust gases and fuel composition.
注：尾气分析仪中涉及的标准感应器包括 NO，CO，CO_2 和 O_2 感应器，SO_2 和 NO_2 感应器是可选件。所有感应器都必须在工厂内安装。如未安装 SO_2 和 NO_2 感应器，则尾气分析仪将根据废气和燃料成分计算这些数值。

4.1.1 Temperature 温度
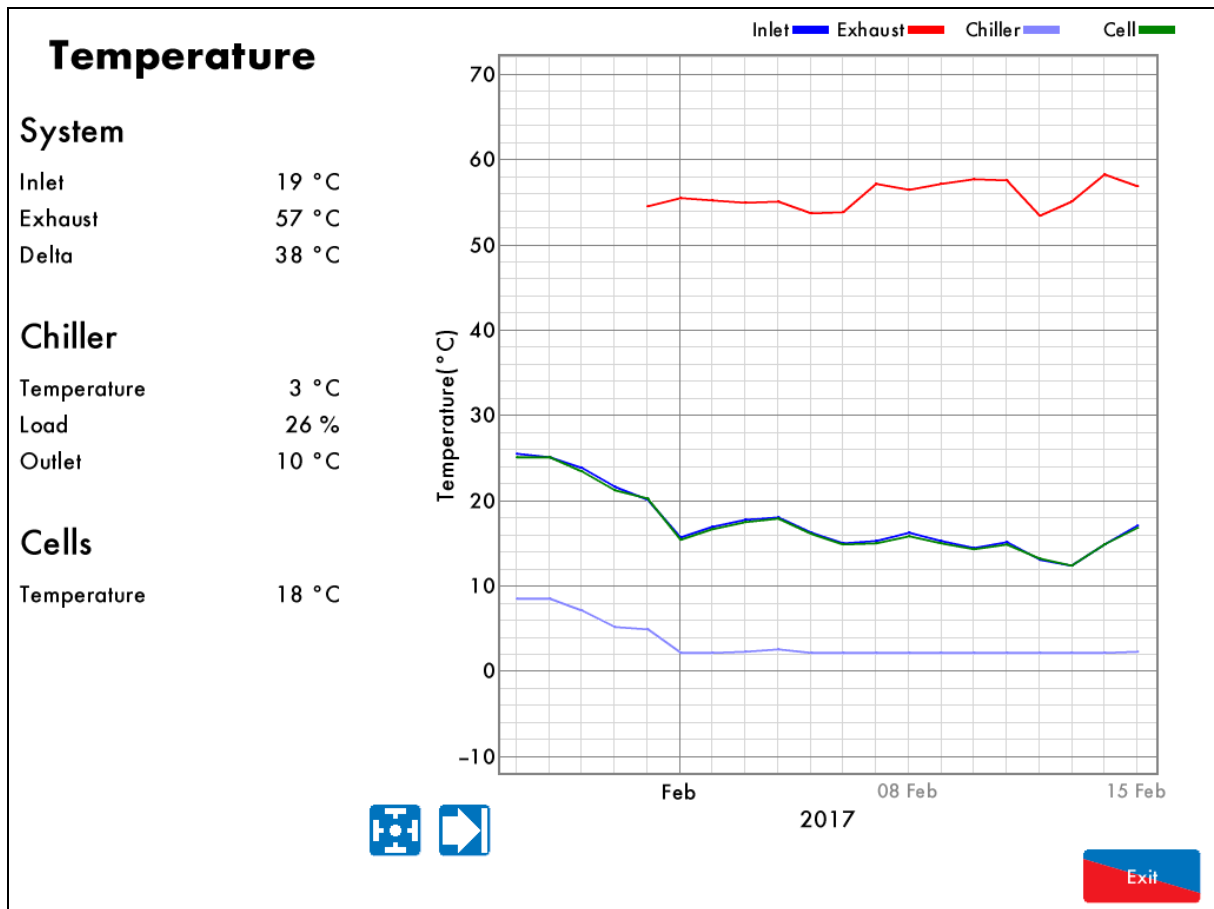
Figure 4.1.1.i Temperature
图 4.1.1.i 温度

Press on either the sampling probe, chiller or temperature sensors on the sampling screen to access the Temperature screen which provides inforamtion on:
在采样屏幕上按下采样探头、冷却器传感器或温度传感器图标可以访问温度屏幕，屏幕上提供以下信息：

- Current inlet air temperature
  当前进气温度
- Current exhaust gas temperature
  当前废气温度
- Delta temperature
  Delta 温度
- Chiller temperature
  冷却器温度
- Chiller load %
  冷却器负载百分比
- Chiller outlet temperature
  冷却器出口温度
- Cells temperature
  感应器温度

- Ambient temperature (it is shown separately from the inlet temperature if a pre-heated sensor is enabled, see section 1.7.4)
环境温度（如启用了预热传感器，则环境温度和进气口温度将分开显示，见第 1.7.4 节）。

This data is logged for 2 years on the EGA. Use the buttons to change the timescale of the data displayed, and press and drag on the axis to zoom in/out of the graph.

这些数据将在尾气分析仪上保存两年。按下按钮可以更改数据显示的时间范围，按下并拖动中心轴可以放大或缩小图表。

This data can be downloaded from the EGA and exporting into an Excel spreadsheet, please refer to the PC Software Guide for more information.
数据可以从尾气分析仪上下载并导入 Excel 电子表格中，更多信息请参考计算机软件指南。

4.1.2   Emissions 排放
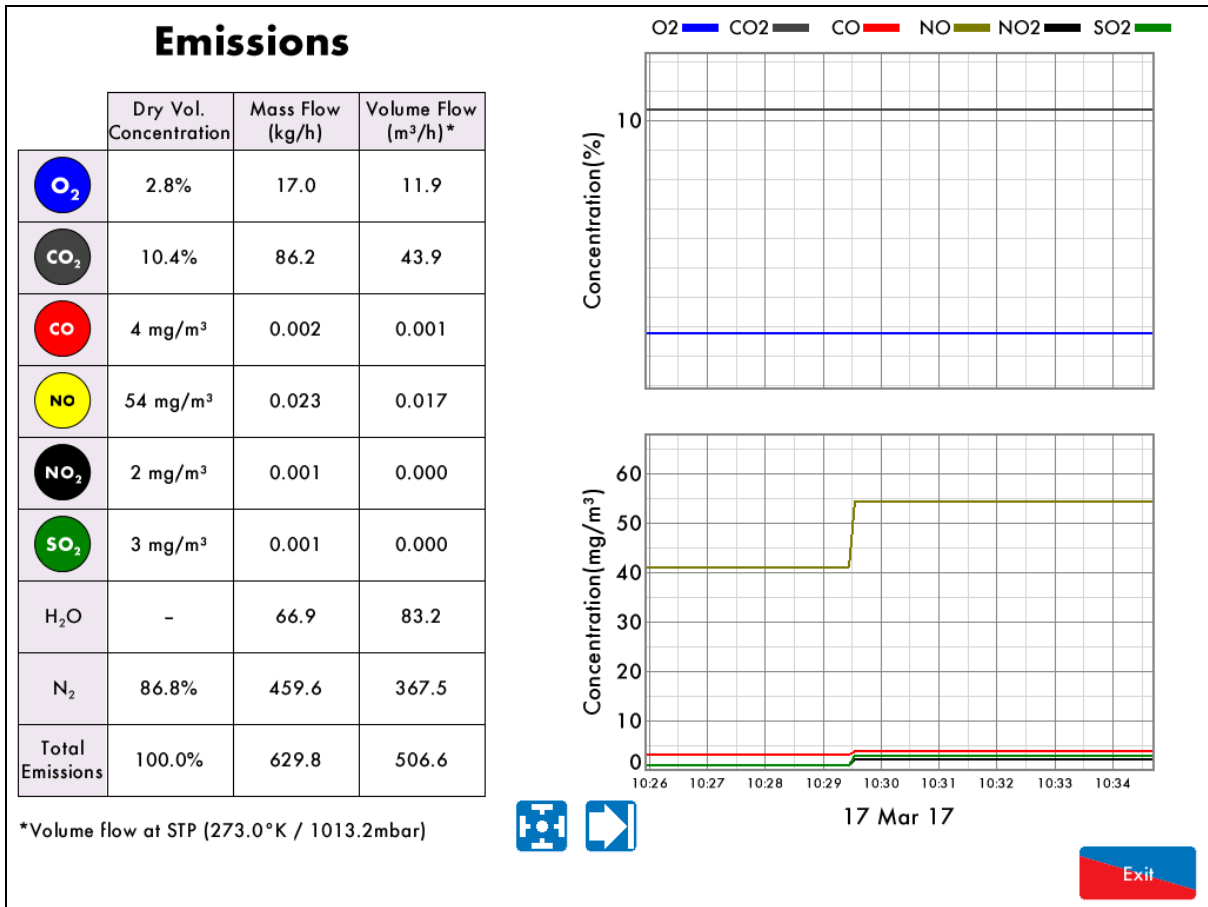
Figure 4.1.2.i Emissions
图 4.1.2.i 排放屏幕

Press on any of the cells in the sampling screen to access the Emissions screen, which provides the dry volume concentration, mass flow and volume flow for the O_2, CO_2, CO, NO, NO_2, SO_2, H_2O, and N_2 emissions in the stack. If NO_2 and SO_2 cells are not fitted, these values are calculated by the EGA. The H_2O is also calculated within the EGA.
在采样屏幕上按下任何一个感应器图标可以访问对应的排放屏幕，屏幕上将提供排气管中排放的 O_2、CO_2、CO、NO、NO_2、SO_2、H_2O 和 N_2 干体积浓度、质量流量和体积流量。如未安装 NO_2 和 SO_2 感应器，则这些数据将由尾气分析仪计算，H_2O 的数据也由尾气分析仪计算。

The volume flow is derived from the mass flow, based on the standard temperature and pressure set in Commission Mode settings 17 and 18.
体积流量来自于质量流量，是根据调试模式设置 17 和 18 中设置的标准温度和压力计算而得。

This data is logged for 2 years on the EGA. Use the ⬡ ▶ buttons to change the timescale of the data displayed, and press and drag on the axis to zoom in/out of the graph.

这些数据将在尾气分析仪上保存两年。按下 ⬡ ▶ 按钮可以更改数据显示的时间范围，按下并拖动中心轴可以放大或缩小图表。

This data can be downloaded from the EGA and exporting into an Excel spreadsheet, please refer to the PC Software Guide for more information.

数据可以从尾气分析仪上下载并导入 Excel 电子表格中，更多信息请参考计算机软件指南。

4.1.3   **Pressure** 压力
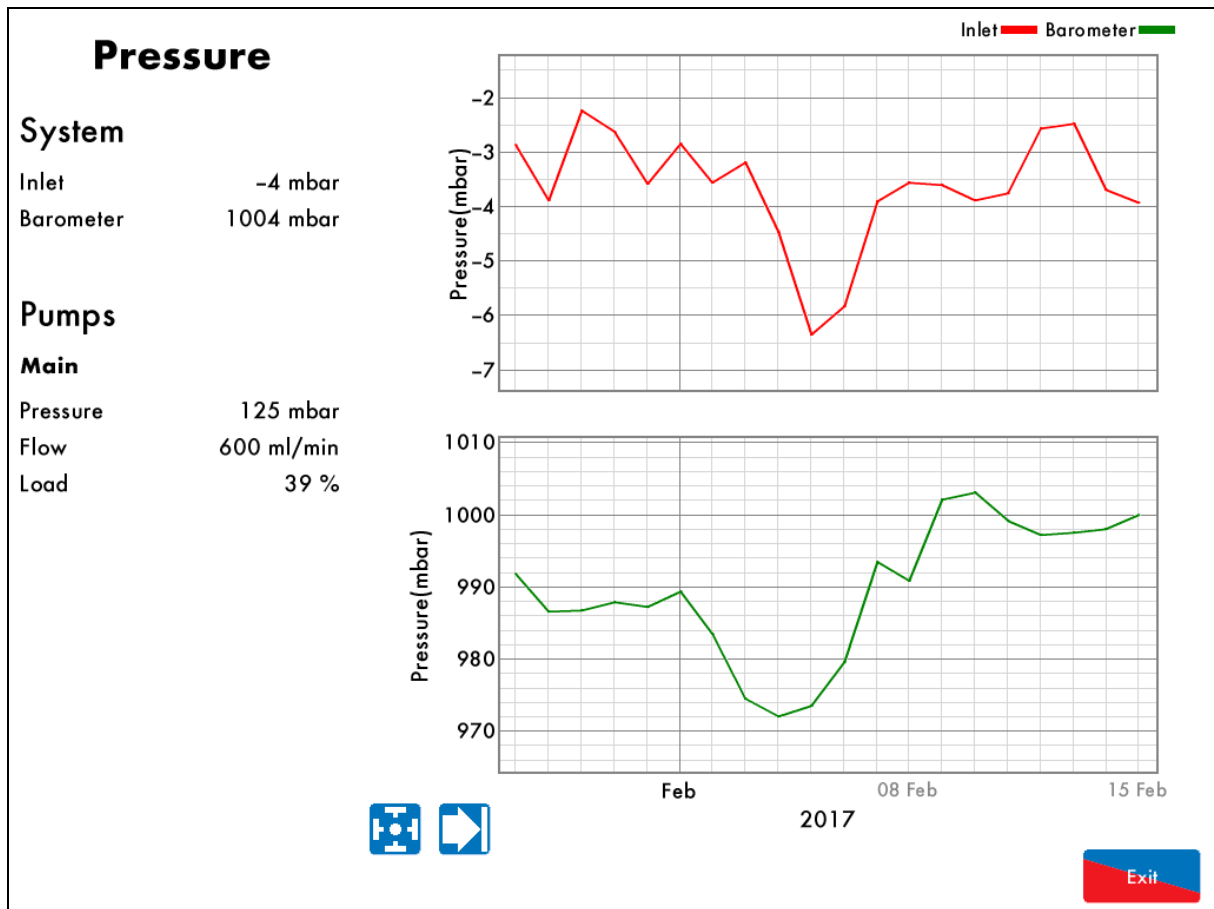
Figure 4.1.3.i Pressure
图 4.1.3.i 压力屏幕

Press on the pump or the pressures sensors in the sampling screen to access the Pressure screen which gives information on:
在采样屏幕上按下泵或压力传感器图标可以访问压力屏幕，屏幕上将提供以下信息：

- Inlet pressure
  进气口压力
- Barometric pressure (in sampling line)
  气压（采样线）
- Pump pressure
  泵压力
- Sample flow
  样本流量
- Pump load %
  泵负载百分比

This data is logged for 2 years on the EGA. Use the [icons] buttons to change the timescale of the data displayed, and press and drag on the axis to zoom in/out of the graph.

这些数据将在尾气分析仪上保存两年。按下[icons]按钮可以更改数据显示的时间范围，按下并拖动中心轴可以放大或缩小图表。

This data can be downloaded from the EGA and exporting into an Excel spreadsheet, please refer to the PC Software Guide for more information.

数据可以从尾气分析仪上下载并导入 Excel 电子表格中，更多信息请参考计算机软件指南。

4.1.4   **Fuel Flow** 燃料流量
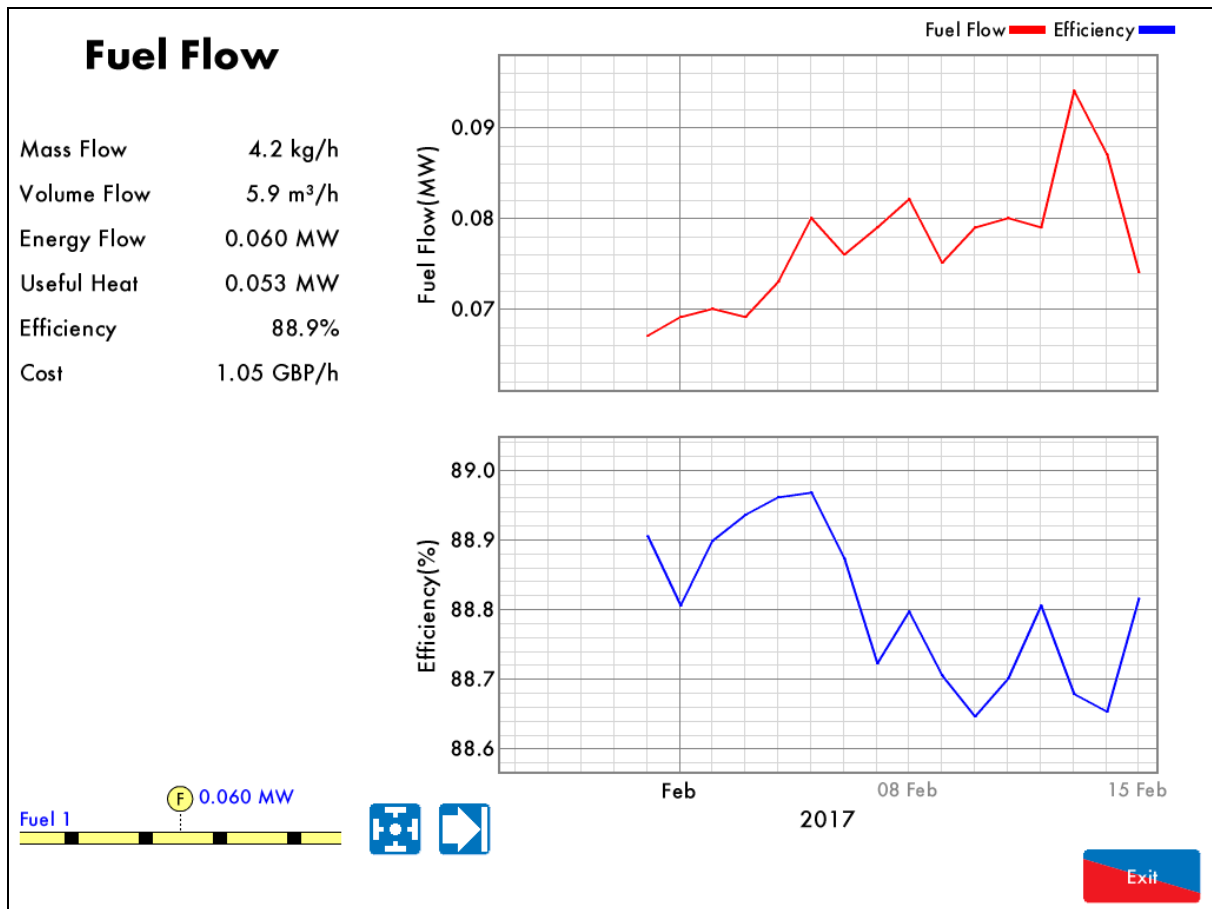
Figure 4.1.4.i Fuel Flow
图 4.1.4.i 燃料流量屏幕

Press on the fuel flow pipe in the sampling screen to access the fuel flow screen, which provides information on the current fuel being fired:
在采样屏幕上按下燃料流量管图标可以访问燃料流量屏幕，屏幕上将提供当前燃烧的燃料信息：

- Mass flow rate
  质量流率
- Volume flow rate
  体积流率
- Energy flow
  能量流量
- Useful heat
  可用热量
- Combustion efficiency
  燃烧效率
- Fuel cost per hour
  每小时燃料成本

The fuel costs and units are set in the Fuel Setup settings, see section 2.2.2. The currency is set in Commission Mode setting 5.

燃料成本和单位在燃料设置中设置，请见第 2.2.2 节，货币在调试模式设置 5 中设置。

The combustion efficiency is calculated in the EGA, and can be set as English or European, see Commission Mode setting 4.
燃烧效率在尾气分析仪中计算，可以设置成英国或欧洲计算方法，请见调试模式设置 4。

This data is logged for 2 years on the EGA. Use the [icon] [icon] buttons to change the timescale of the data displayed, and press and drag on the axis to zoom in/out of the graph.

这些数据将在尾气分析仪上保存两年。按下[icon][icon]按钮可以更改数据显示的时间范围，按下并拖动中心轴可以放大或缩小图表。

This data can be downloaded from the EGA and exporting into an Excel spreadsheet, please refer to the PC Software Guide for more information.
数据可以从尾气分析仪上下载并导入 Excel 电子表格中，更多信息请参考计算机软件指南。

4.1.5   Faults 故障

Errors	Can Reset	Occurred	Reset
1. Unable To Write Data To SD Card		2 Mar 17 14:34	2 Mar 17 14:49
2. Unable To Write Data To SD Card		2 Mar 17 14:18	2 Mar 17 14:23
3. Blocked Input		27 Jan 17 12:07	27 Jan 17 12:31
4. Blocked Input		27 Jan 17 06:07	27 Jan 17 09:25
5. Exhaust Temperature Sensor Is Faulty		26 Jan 17 12:11	26 Jan 17 12:11
6. Exhaust Temperature Sensor Is Faulty		26 Jan 17 12:09	26 Jan 17 12:10
7. Exhaust Temperature Sensor Is Faulty		26 Jan 17 12:09	26 Jan 17 12:09
8. Exhaust Temperature Sensor Is Faulty		26 Jan 17 12:06	26 Jan 17 12:06

Errors   Warnings   [Up] [Down] [Reset] [Exit]

Figure 4.1.5.i Errors
图 4.1.5.i 故障屏幕

Press [Faults] in the Sampling screen to access the fault log. Errors will display on the EGA and stop the EGA from sampling, whereas Warnings display on the EGA but do not stop the EGA from sampling. Please see section 5 for more inforamtion on faults and troubleshooting.

在采样屏幕上按下 按钮可以访问故障日志。当故障内容在尾气分析仪上显示时尾气分析仪将无法采样。当警告信息在尾气分析仪上显示时尾气分析仪将可以采用。关于故障和故障排除的更多信息请见第 5 章。

4.2 EGA Overview 尾气分析仪概述

4.2.1 Features and Benefits 特点和优点

The Exhaust Gas Analyser (EGA) monitors the emissions in the flue produced from the burner/boiler system. The EGA can improve combustion, increase efficiency, reduce fuel consumption and improve safety through its 3 parameter trim function and combustion safety limits.
尾气分析仪可用于监控燃烧器或锅炉系统中产生的烟道废气，同时还可以改善燃烧、提高效率、减少燃料消耗并通过 3 参数调节功能和燃烧安全限制提高安全性。

1. Stand-Alone: When in stand-alone mode, the EGA can be used without a Micro-Modulation (MM) module to monitor the combustion gases. The MM trim function and the combustion safety limits are not activated in this stand-alone mode of operation.
   单机运行：在单机模式下，尾气分析仪在未配微型控制模块的情况下可以监控燃烧的烟气。在单机运行模式下不会启用控制模块调节功能和燃烧安全限制。

2. With MM: When interfaced with an MM, the EGA can monitor emissions or the 3-parameter combustion trim and safety limits can be activated. The emissions levels are monitored by the EGA and the MM makes small adjustments to the air damper to trim the online exhaust gas data back to the commissioned values.
   配控制模块：尾气分析仪在连接控制模块后可以监控排放，3 参数燃烧调节功能和安全限制可以启用。排放等级可以通过尾气分析仪进行监控，控制模块对空气挡板进行微调，使在线排气数据返回至调试的数据。

The main benefits of the EGA include the ability to monitor the exhaust gases and bring them to the safe commissioned levels. Setting the combustion limits on the MM in conjunction with the EGA prevents unsafe combustion scenarios, reducing the fuel consumed in bad combustion. The exhaust and fuel data is logged for 2 years on the EGA and DTI, and can also be downloaded from the EGA.
尾气分析仪的主要优点包括监控排气并使其保持在安全调试水平。在控制模块和尾气分析仪上设置燃烧限值可以防止出现不安全的燃烧情况、减少在不良燃烧中的燃料消耗。废气和燃料数据将在尾气分析仪和数据传输接口上保存两年，并可以从尾气分析仪上下载这些数据。

4.2.2 System Operation 系统运行

The EGA samples the combustion gases via the stack mounted sampling probe (purchased separately from the analyser). The exhaust gases are drawn from the stack by a pump mounted internally within the analyser. Only the supplied sample tubing should be used between the sampling probe and analyser. The internal diameter of the sampling tube is 3mm; if a large diameter tubing is used the sample gas remains resident in the tubing for a longer period. The EGA will then not be able to respond in time to combustion changes, resulting in incorrect operation of the trim function.
尾气分析仪通过排气管上安装的采样探头（需和尾气分析仪单独购买）对燃烧烟气进行采样。废气通过尾气分析仪泵从排气管中抽出。在采样探头和尾气分析仪之间仅可使用提供的采样管。采样管的内径为 3mm，如使用大尺寸采样管，采样气体将在采样管中停留较长的时间。这样尾气分析仪就无法及时对燃烧的变化做出响应，导致无法正确使用调节功能。

Once the exhaust gases have entered the EGA the chiller block reduces their temperature and dries the sample to remove the condensation from the gases prior to entering the cells.

The condensate accumulated in the chiller unit is drained every 4 minutes when running, and every 10 minutes when the EGA is in idle mode, automatically through the drain solenoid.

废气进入尾气分析仪后，冷却器将降低其温度，在进入感应器前将样本干燥以去除烟气中的冷凝水。运行时在冷却器中积累的冷凝水每隔 4 分钟排出一次，当尾气分析仪处于空闲模式时每隔 10 分钟排出一次，冷凝水将通过排水电磁阀自动排出。

The exhaust gas is then filtered through the dry filter, which is a fine filter used to remove any dust particles carried over from the cooling process. If the burner is firing on heavy or dirty oil, an external particulate filter must be used to remove the excess dirt particles. On leaving the filter, the exhaust gas pressure is checked again to ensure that a vacuum is maintained prior to entering the pump and on exiting the pump, the pressure produced by the pump is checked. Both these pressure sensors modulate the flow rate of the sample into the EGA for consistent operation. Once the exhaust gases have been conditioned, they are ready for an accurate sampling by the cells. After the gases have been sampled by all the cells, the remaining sample is pumped out of the EGA from the clear tubing at the bottom of the EGA casing.

废气通过干滤器进行过滤，干滤器是一种细滤器，用于排出冷却过程中携带的各种粉尘颗粒。燃烧器在使用重燃油或脏油时必须使用外部微粒过滤器，用于排除过多的粉尘颗粒。废气在离开过滤器后将对其压力进行再次检查，确保在进入泵前保持真空，废气在离开泵时将对泵产生的压力进行检查。压力传感器将用于调节进入尾气分析仪的样本流量，以确保运行一致。废气经过调节后可以进行准确的采样，采样后剩余的样气将从尾气分析仪外壳底部的干净管道中排出。

Note: The EGA needs to vent to atmosphere via the drain solenoid on the bottom; this is also where the EGA performs its air calibrations. Care should be taken to ensure the outlet is not restricted or that contamination from exhaust gas occurs.

注：尾气分析仪需要通过底部的排水电磁阀将废气排放到大气中，此时尾气分析仪需要执行空气校准操作。此时应注意出口没有任何堵塞且废气不会造成污染。

4.2.3 Overview of 3-Parameter Trim 3 参数调节概述

The 3-parameter trim function can be enabled when the Mk8 EGA is used in conjunction with an MM module to manage the combustion. When the EGA detects any differences in the online exhaust gas readings to the original commissioned values, the trim function will make small corrections to the air damper (and channel 5 if optioned for trim), to bring those online values back to the commissioned readings. The trim function controls the combustion of the burner by adding air (air rich) or taking away air (fuel rich) from the commissioned air positions to keep the volume of O_2, CO_2 and CO close to their commissioned values without compromising safety. The air rich and fuel rich limits are set by adding trim data when commissioning the burner or through single point change for 'quick commission.' This trim data is translated into a combustion map, which shows how the burner reacts when air is added or removed from the combustion process during commissioning. The Autoflame system continually monitors 3 parameters O_2, CO_2 and CO to create the safest and most efficient way of trimming the combustion process.

当 Mk8 尾气分析仪和控制模块一同用于管理燃烧时可以启用 3 参数调节功能。当尾气分析仪检测到在线废气读数和原调节数之间存在差异时，调节功能将对空气挡板（可以选择通道 5 进行调节）进行微调，使在线数值与调节的读数保持一致。调节功能可以通过增加空气（富氧）或从调试空气中排出空气（富油）控制燃烧，使氧气、二氧化碳和一氧化碳的含量接近其调试值，且不影响安全性。调试燃烧器时或通过单点改变进行快速调试时，富氧和富油限值可以通过增加调节数据进行设置。调节数据将被转换成燃烧图，显示添加空气或在燃烧过程中排出空气时的燃烧器反应。Autoflame 系统可以持续监控氧气、二氧化碳和一氧化碳等 3 个参数，使调节燃烧过程更加安全有效。

Ingress of tramp air through an ill-fitting boiler or flue section will distort the O_2 reading and show an increase in this value. This results in the EGA reading the tramp air influence in the sample rather than just the actual combustion gases.

通过不匹配的锅炉或烟道段进入的空气将改变氧气读数并显示数值增加，这会影响尾气分析仪对样气的读数，而不会显示实际的燃烧气体。

Single parameter O_2 trim systems would see both of these conditions as rich (excess air) combustion and start to trim back on the air by closing the air damper. In reality this trim process is not trimming the combustion gases at this point, but is in fact trimming the exhaust gases with the excess O_2. This can potentially lead to the formation of excessive amounts of CO but more importantly this can lead to incomplete combustion with dangerous consequences.

单参数氧气调节系统可以检测到富氧（过多空气）燃烧的条件，通过关闭空气挡板调节空气。在现实中，调节过程并不是在该点对燃烧气体进行调节，而是调节过多氧气中的废气。这样可能导致过多一氧化碳的形成，更重要的是可能导致燃烧不完全的危险后果。

Similarly, single parameter CO_2 trim systems would interpret of air as lower CO_2 levels in the flue, inflicting similar dangerous conditions in the boiler.

同样，单参数二氧化碳调节系统将检测到烟道空气中存在低含量二氧化碳，使锅炉出现类似的危险。

Another benefit of the 3 parameter trim is that the EGA is continually measuring the formation of CO compared to its commissioned value. A higher CO reading can be contributed to both lean and rich combustion. A lack of air will produce incomplete combustion and the formation of CO. Also, excess air around the flame envelope can chill the flame edge causing incomplete combustion and higher CO levels.

3 参数调节的另一个优点是尾气分析仪可以根据调试值持续测量一氧化碳的形成。较高的一氧化碳读数可能是因不完全燃烧和过度燃烧造成。缺少空气将导致燃烧不完全并形成一氧化碳。同理，火焰周围的过多空气可能会冷却火焰边缘，导致不完全燃烧并产生较高的一氧化碳含量。

By referencing all 3 parameters against mapped combustion performance the burner can be trimmed back to the original commissioned values whilst maintaining the highest degree of safety.

根据燃烧性能确定这 3 个参数可以将燃烧器调节至原始调试值，同时保持最高程度的安全性。

When the trim function adds air to bring back the combustion to the commissioned values, as the burner modulates to a new position, the deviation in air damper movement is added to each air position. In this way, optimum combustion is maintained during modulation, through carry forward trim.

当调节功能增加空气使燃烧返回调试值时，由于燃烧器调节到一个新位置，空气挡板的移动偏差被加入各空气位置，这样在调节过程中通过调节可以保持最佳燃烧。

As a safety feature, as the air is being taken away, the fuel to air ratio will return back to the commissioned positions when the burner modulates, for every 10 degrees of fuel valve movement. Once this new position is held the system will determine whether the air damper should be closing. This ensures safe combustion at all times without any compromise.

至于安全功能，由于空气一直被排出，燃料阀每移动 10 度，燃烧器进行调节时油气比将返回至调试位置。一旦新位置固定，系统将确定是否关闭空气挡板，以确保始终安全燃烧。

4.3　EGA Trim Function 尾气分析仪的调节功能

4.3.1　Trim Operation 调节操作

With the EGA trim facility it is possible to expand the MM so it will measure and display O_2, CO, CO_2 and exhaust gas temperature, together with boiler temperature or pressure. It is also possible to use these O_2, CO and CO_2 values for 3 parameter trim in order to optimise the burner combustion throughout the firing range of the burner in a safe manner. This means that the safety is never compromised by efficiency, but the best burner/boiler efficiency is maintained. Correct set-up of the 3 parameter trim will maintain optimum combustion efficiency, whilst never compromising safety.

在尾气分析仪调节设备中可以增加控制模块，测量并显示氧气、一氧化碳、二氧化碳和废气温度以及锅炉温度或压力。也可以将氧气、一氧化碳和二氧化碳数值用于 3 参数调节，以安全的方式在燃烧器燃烧范围内优化燃烧器燃烧。这意味着既高效又安全，同时还可以使燃烧器/锅炉保持最佳燃烧效率。正确设置 3 参数有助于在保持最佳燃烧效率的同时保证安全。

During commissioning, for every paired value of fuel and air, the corresponding values of O_2, CO and CO_2 are stored. During the normal run mode, the on-line sample at any position within the burner's firing rate is compared to the commissioned values. There are 3 individually sampled parameters (O_2, CO, CO_2) in order to verify the combustion performance either side of the commissioned value. The software within the MM unit will inflict minute corrections to the channel 2 air damper positions or the channel 5 variable speed drive in order to maintain the commissioned values. These small changes ensure that the originally entered commissioning data is adhered to, irrespective of variations in stack pressure, ambient temperature/pressure fluctuations, barometric conditions or fuel pressure changes.

在调试期间，燃料和空气数值以及对应的氧气、一氧化碳和二氧化碳值都将被保存。在正常运行模式下，系统将对在线样本在任何位置的燃烧器燃烧率和调试数值进行比较。有 3 个单独的采样参数（氧气、一氧化碳和二氧化碳）可以证明调试值在任一位置的燃烧性能。控制模块中的软件将对通道 2 空气挡板位置或通道 5 变速驱动器进行校正，从而保证符合调试值。这些小更改可以确保符合最初输入的调试数据，无论排气管压力、环境温度/压力波动、气压条件或燃料压力如何变化。

The commission time is based on the residence time of the combustion gas. The residence time is measured by looking for a change in the O_2 reading from when the air damper is moved, to a change in combustion of >0.2% O_2. This is the time from the time the gas leaves the burner, to the time it exits the boiler into the flue. This time will vary depending on how the burner is firing and the burner turn down ratios. This residence time is displayed in the combustion map screen. The residence time is typically longer at low fire that at high fire due to the volume of the gases passing through the boiler.

调试时间取决于燃烧气体的剩余时间，剩余时间可以通过查看氧气读数进行测量，此时空气挡板将移动，燃烧变化大于 0.2%氧气。该时间也是燃气离开燃烧器、从锅炉进入烟道的时间，该时间根据燃烧器的燃烧情况和燃烧器调节比会有所不同。剩余时间在燃烧图屏幕上显示，通常该时间在低火焰时会较长，在高火焰时则取决于通过锅炉的燃气量。

4.3.2   Important of Measuring 3-Parameters 测量 3 参数的重要性

The Autoflame system trims on O_2, CO_2 and CO, and so is not simply an O_2 trim system. If only O_2 is measured and trimmed on then there is no cross reference to CO, CO_2 or NOx Therefore, even if the O_2 readings are correct, changes in ambient conditions can cause the CO to rise significantly (>>100ppm). Another, more dangerous problem that can occur is oxygen being induced into the boiler through gaskets and small gaps in the boiler flue ways. As the flue gas is measured at the exit of the boiler, this could lead to higher O_2 readings even if the combustion is good, i.e. high CO levels (>>100ppm), low O_2 levels. With a simple O_2 trim system, this potentially dangerous problem would not be accounted for. With the Autoflame EGA, O_2, CO_2 and CO are constantly measured and any changes to these 3 parameters, will result in a trim taking place on the air damper to return the combustion level back to the original commissioned values. Therefore, even if both the O_2 and CO_2 are reading correctly the system will still trim due to changes in the amount of CO produced.

对氧气、二氧化碳和一氧化碳进行调节的 Autoflame 系统并非一个简单的氧气调节系统。如果仅测量和调节氧气，则对一氧化碳、二氧化碳或氮氧化物没有对照参考意义。因此，即使氧气读数正确，环境条件的改变也可能导致一氧化碳浓度大幅升高（>>100ppm）。还可能出现的更危险问题是氧气可能会通过锅炉烟道的垫片和小缝隙进入锅炉。由于烟道中的烟气是在锅炉出口处测量，这可能导致氧气读数升高，即使在燃烧正常的情况下，例如：一氧化碳浓度值（>>100ppm）较高，氧气浓度值则较低。配备简单的氧气调节系统后将不会遇到这些潜在的危险问题。 Autoflame 尾气分析仪可以对氧气、二氧化碳和一氧化碳进行持续测量，这 3 个参数如有任何变化都将对空气挡板进行调节，使燃烧值返回原先的调试值。因此，即使氧气和二氧化碳的读数正确，系统也将根据一氧化碳浓度的变化进行调节。

The following table shows a potential problem with using the O_2 analyser.
下表显示了使用氧气分析仪存在的潜在问题。

O₂ Analyser 氧气分析仪			3 Parameter Trim (Autoflame) 3 参数调节（Autoflame）			
State 状态	**O₂**	**CO**	**O₂**	**CO₂**	**CO**	
1	3	0	3	10	0	Commissioned 已调试
2	4	0	4	10	0	Trim 调节
3	4.5	100	4.5	10.5	100	Increased Trim 增加调节
4	5	200	5	10.5	100	No trim 未调节
5	4	500	5.5	10	0	Commission position 调试位置
6	3	1000+	5.5	10.5	50	Trim 调节

Values in red are ones that are not viewable using an O_2 trim system.
使用氧气调节系统无法查看红色数值。

State 1 – The burner is operating under normal conditions.
状态 1-燃烧器在正常条件下运行。

State 2 – Over a period of time, boilers are susceptible to leaks occurring. One of the most likely places that this will occur is on the stack, near to the point where the analyser is measuring the exhaust gases. As a leak occurs at this point, the analyser is not measuring solely the exhaust gases, but is in fact contaminated with 20.9% O_2 from atmosphere. Therefore, the oxygen reading starts to increase.
状态 2- 锅炉在过一段时间后容易发生泄漏，最常出现的位置是在排气管上分析仪测量废气的位置。在该点出现泄漏时，分析仪将不测量废气，而是大气中含 20.9%的氧气。因此，氧气读数将开始增加。

State 3 – As the amount of oxygen increases so too does the reading. At this point the controller closes the air damper in order to react to the increase in oxygen. The CO begins to rise since the combustion is now not correct.
状态 3- 氧气增加时读数也相应增加。此时随着氧气的增加，控制器将关闭空气挡板。由于此时燃烧不正确，因此一氧化碳将开始增加。

State 4 – Both analysers still see an increase in the oxygen reading. The O_2 analyser continues to close the air damper in order to reduce the excess air through the system, and so producing CO. The Autoflame analyser measures the increasing CO value and ensures that the air damper does not continue to close.
状态 4- 两个分析仪仍检测到氧气读数增加。氧气分析仪继续关闭空气挡板，以减少通过系统的过多空气，从而产生一氧化碳。Autoflame 分析仪将测量增加的一氧化碳值，确保空气挡板不会继续关闭。

State 5 – The O_2 analyser continues to trim based on the oxygen readings and so excess CO is produced. The Autoflame analyser has seen this ambiguous case and returns the air damper back to the commissioned value in order to ensure that the O_2, CO_2 and CO levels are returned to the commissioned values (or close to) before further trimming occurs. This, potentially dangerous anomaly has been corrected for.
状态 5- 氧气分析仪继续根据氧气读数进行调节，从而产生过多的一氧化碳。Autoflame 分析仪检测到此种情况后将空气挡板返回至调试值，从而确保在进一步调试前氧气、二氧化碳和一氧化碳数值返回至调试值（或接近），这样可以大大减少潜在危险。

State 6 – Dangerous combustion occurs on the O_2 analyser, whereas the Autoflame EGA system has taken this ambiguous case into account.
状态 6- 氧气分析仪将发生危险燃烧，而 Autoflame 尾气分析仪系统将对此种不明确的情况进行检测。
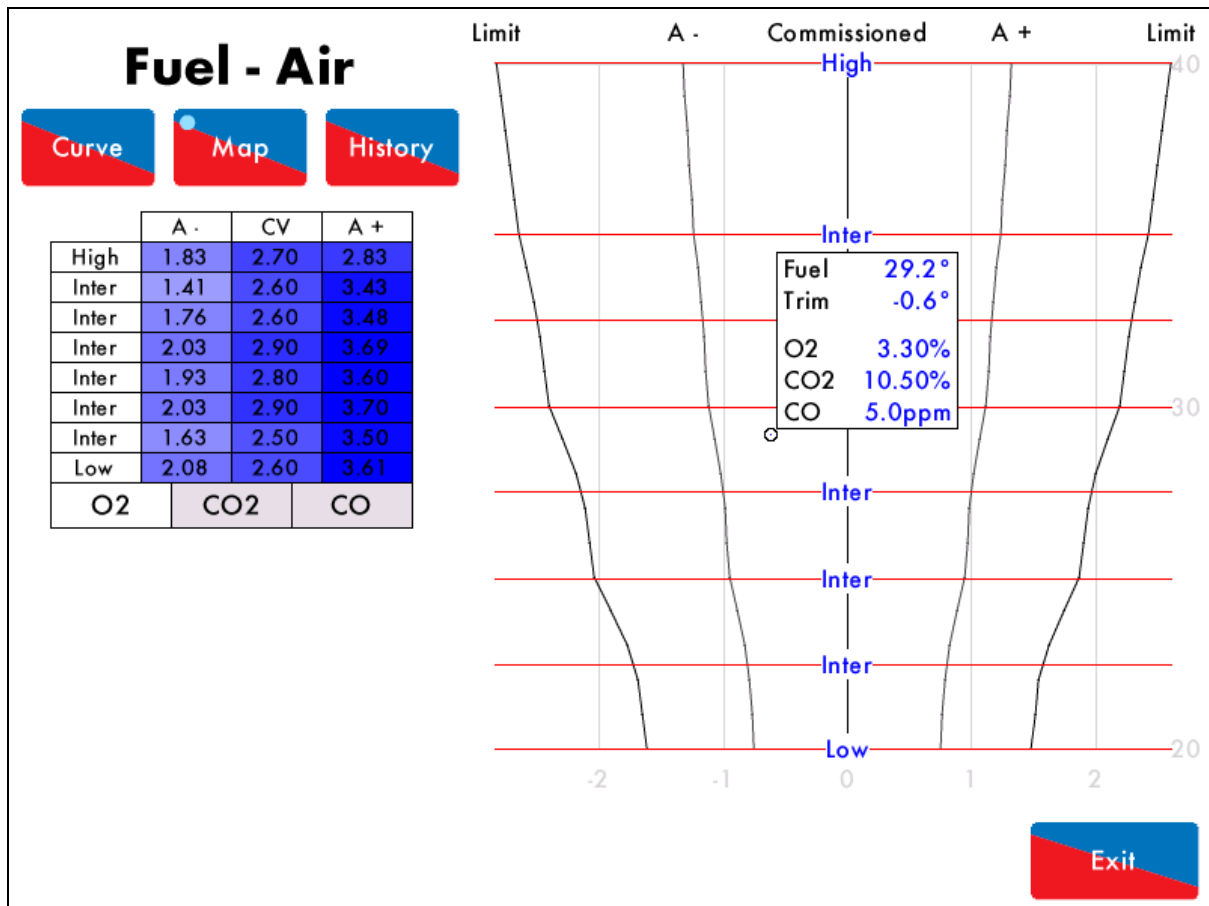
Figure 4.3.2.i Combustion Map Screen
图 4.3.2.i 燃烧图屏幕

The combustion map (see Figure 4.3.2.i) shows how the trim function works on the system. The combustion map screen can be accessed by pressing the 'combustion map' button on the M.M home screen. The combustion map clearly shows the commissioned EGA values for O_2, CO_2 and CO. The graph on the left of the screen shows the amount of trim being added by the MM to control these emissions values so that they are as close to their commissioned values as possible. The red circle indicates the current position of the trim being applied and the current combustion values are displayed at this point as well.

燃烧图（见图 4.3.2.i）显示了调节功能如何在系统中工作。按下控制模块主屏幕上的'燃烧图'按钮可以访问燃烧图屏幕。燃烧图清楚地显示了尾气分析仪对氧气、二氧化碳和一氧化碳的调试值。屏幕左侧图表显示了控制模块增加的调节数，以控制这些排放值，使数值更接近其调试值。红色圆圈表明当前使用的调节位置和当前的燃烧值。

4.3.3   **Trim Correction Calculation 调试校正值的计算**

The additional correction calculated at each trim cycle is the combination of the correction determined for each of the combustion products O_2, CO_2 and CO. The correction for each component is independently calculated. The calculation steps for each combustion product are as follows, "A-" denotes Fuel-rich, "CV" denotes Commissioned Value, "A+" denotes Air-rich:

每个调试周期内计算的额外校正值是根据燃烧产物氧气、二氧化碳和一氧化碳的校正值计算而得，每种产物的校正值都是单独计算，计算步骤如下所述："A-"是指富油，"CV"是指调试值，"A+"是指富氧：

The commissioned values are calculated by interpolation for the current fuel valve position.
调试值是根据当前燃料阀位置计算而得。

The current measured O_2 value is determined as air-rich or fuel-rich side of the commissioned value.
当前测量的氧气值是根据调试值的富氧值或富油值计算而得。

The adjustment which would give rise to the current reading is calculated by linear interpolation of the commissioned values.
导致当前读数上升的调节值是通过线性插值法计算的调试值而得。

Negate this adjustment to produce a correction.
调节值利用求反运算得出校正值。

The corrections for each product are then combined with additional weighting given to O_2 (x1.5) over CO_2 and CO (x1). This combined correction is then added to the running total correction and applied to the air channel. The total correction is limited by an option value set by default to ±10% for safety.
每种产物的校正值结合额外加权值即得出 O_2 (x1.5) 大于 CO_2 和 CO (x1)。该组合校正值再加到运行总校正值上并应用于空气通道。总校正值受选项值的限制，选项值默认是安全值 ±10%。

Example 示例

The following shows an example calculation. At the current firing rate the interpolated commissioned values are:
以下显示了计算示例，即当前燃烧率下对应的调试值：

	Fuel Rich (A-) 富油（A-）	Commissioned Value (CV) 调试值	Air Rich (A+) 富氧（A+）
O_2	2.8%	3.0%	3.4%
CO_2	10.2%	10.0%	9.7%
CO	8ppm	5ppm	0ppm

The current measured values are:
当前测量值：

	Measured 测量值
O_2	3.5%
CO_2	9.7%
CO	2ppm

Using linear interpolation the adjustments that would give rise to these concentrations are calculated:
利用线性插值法计算导致浓度上升的调节值：
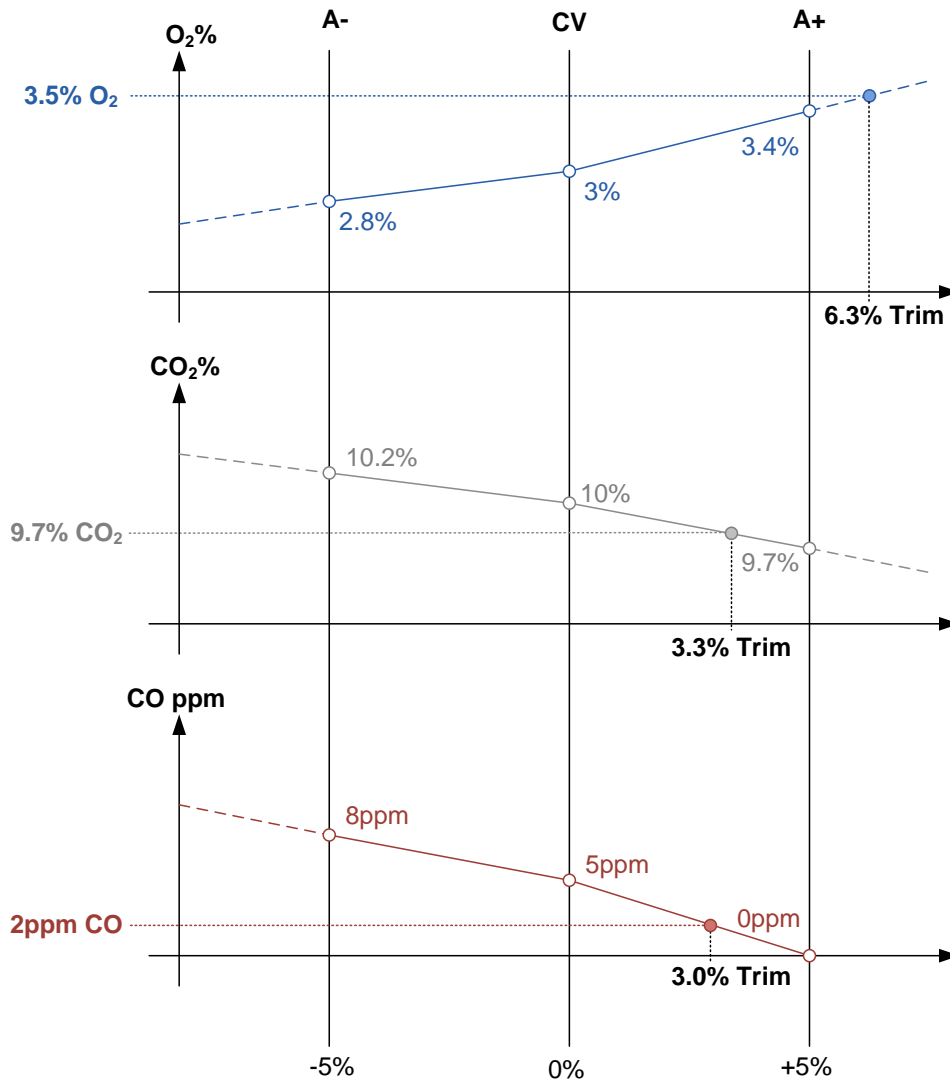
These are negated and combined using their respective weightings:
这些数值经过求反运算并加上各自的加权值：

	Correction 校正值	Weighting 加权值	Weighted Correction 加权校正值
O_2	-6.3%	1.5	-9.4%
CO_2	-3.3%	1.0	-3.3%
CO	-3.0%	1.0	-3.0%
Total 总计		3.5	-15.7%
Average 平均值			-4.5%

Giving an additional trim of -4.5%, which is then added to any existing trim; if for example, there was already +0.5% trim the resultant trim would be -4.0%. This trim fraction is then applied to the air channel, so if for example the air servo was at 52.0° a correction of -2.1° would be applied resulting in an air servo angle of 49.9°.

如额外调节值是-4.5%，则将该值加上任一个可用调节值。例如：调节值是+0.5%，则计算后的调节值则是-4.0%。该调节数再应用到空气通道中，即如果空气伺服装置的角度是 52.0 度，则根据其校正值-2.1 度可以得出空气伺服装置的角度是 49.9 度。

4.3.4 Trim Timing Operation 调节定时操作
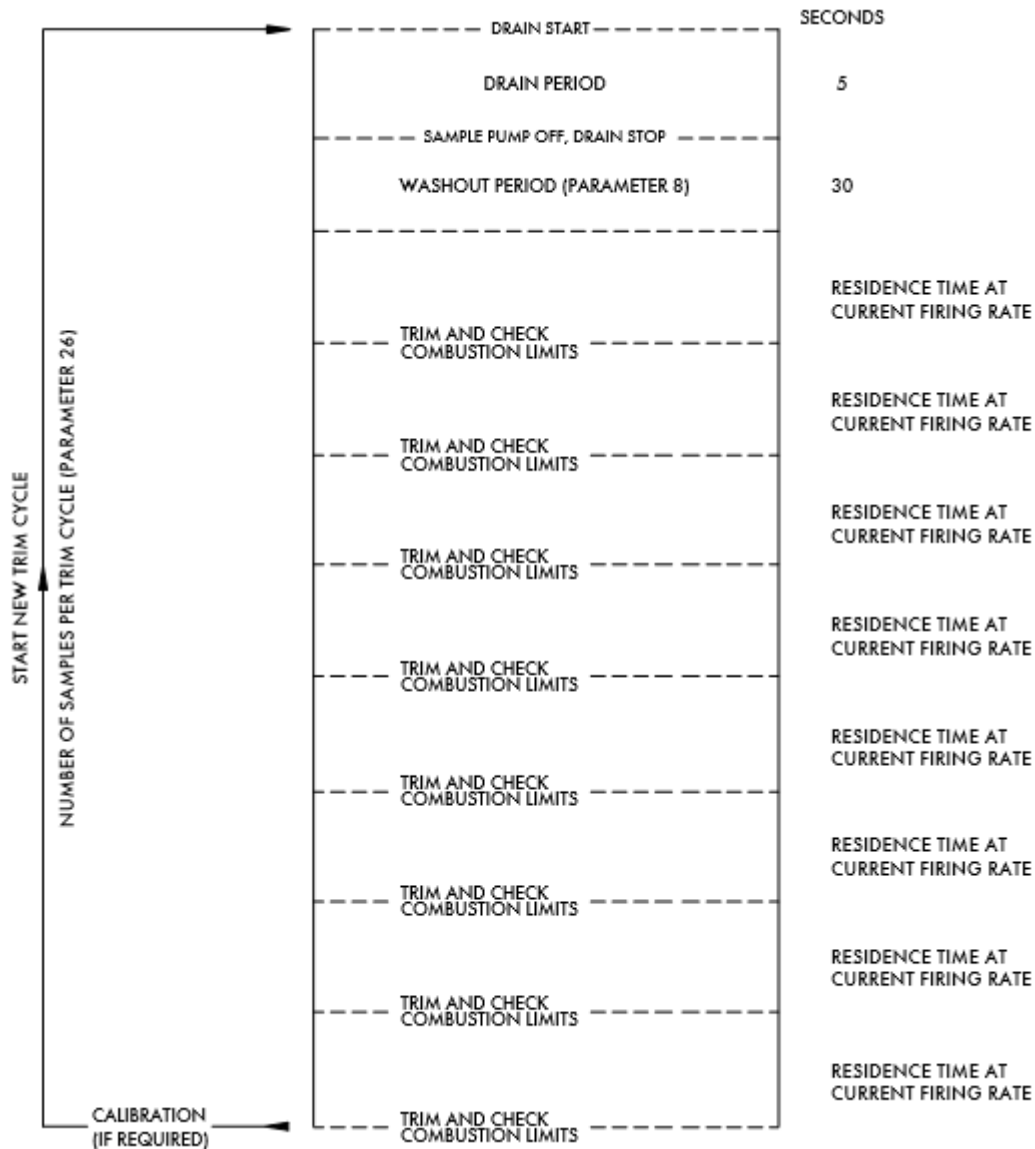
Figure 4.3.4.i Trim Timing Operation
图 4.3.4.i 调节定时操作

If a calibration is due during the trim cycle, the MM will delay the calibration until the cycle has ended.
在调节周期需要空气校准时，控制模块将延迟校准时间直至完成调节。

4.3.5 Channel 5 Trim (Mk8 MM Only) 通道 5 的调节（仅用于 Mk8 控制模块）

When trim is set on channel 5, changing the MM options will make a difference between errors occurring or not. For the purposes of trim, the Mk8 MM needs to know how the VSD will behave, in terms of a change in the VSD input and its effect on the feedback (output) signal, which is why the VSD Options (90 – 97) must be set exactly – i.e. input/output voltage/current ranges and input/output min/max Hertz. If the system is already

commissioned and if any of the VSD drive input/output voltage/current ranges or input/output min/max Hertz are altered then re-commissioning will be necessary as the stored feedback values for each MM entered point will now be incorrect. These stored feedback values are used by the MM as the starting point for working out the expected feedback signal – whether trim on channel 5 is optioned or not.

当设置通道 5 调节时，更改控制模块选项将有助于控制错误的发生。调节时 Mk8 控制模块需要知道 VSD 怎样工作，包括 VSD 输入的改变和反馈（输出）信号的作用，这就是为什么 VSD 选项（90-97）必须准确设置的原因，例如：输入输出电压/电流范围和输入输出最小/最大功率。如果系统已经过调试，VSD 驱动的输入输出电压/电流范围或输入输出最小/最大功率已经改变，则需要进行重新调试，因为各控制模块输入点保存的反馈数值将不正确。控制模块将这些保存的反馈值用作反馈信号的起始点，而无论是否已选择了通道 5 调节。

4.3.6   Trim Delay 调节延迟

On burner start-up without calibration the EGA performs a drain and starts sampling at 20.9% O_2 (fresh air), which then reduces to the commissioned value. Enough time must be given before the EGA commences trim, to ensure that it is not correcting the air damper at high O_2 values. The total time delay before the EGA starts to trim is based on the boiler's residence time. If the total time delay before trim starts it too short, then a scenario could arise where the EGA reads 5%O_2 and over-trims on air damper, reducing the O_2 too far.

燃烧器启动后如未校准，尾气分析仪将开始排水，并在 20.9%氧气（新鲜空气）的条件下开始采样，这样将降低调试值。因此在尾气分析仪开始调节前必须留出足够的时间，确保在高氧值时不会校正空气挡板的位置。尾气分析仪开始调节前的总延迟时间取决于锅炉的停留时间。如果调节开始前总延迟时间较短，尾气分析仪将读取 5%氧气并大幅度调节空气挡板，以便大幅减少氧气。

If calibration on start-up is active, option 32 (trim delay) must be greater than the calibration time (parameter 24). A minimum of 40 seconds should be added. Parameter 24 is set as default to 120 seconds, so option 32 should be set to a minimum time of 160 seconds. The total time before trim is applied is 200 seconds (option 32 + parameter 8); this will also depend on the boilers residence time.

如果启动时开始校准，选项 32（调节延迟）必须大于校准时间（参数 24），即至少要增加 40 秒。参数 24 设为默认的 120 秒时，选项 32 应设为至少 160 秒。调节前的总时间则为 200 秒（选项 32+参数 8）。这也取决于锅炉的停留时间。

4.4   Combustion Efficiency Calculations 燃烧效率的计算

Based on dry gas.
根据干燃气计算。

<u>English Calculation:</u>
英国计算方式：

$$\% \, Combustion \, Efficiency = 100 - (sensible \, heat \, loss + hydrogen \, and \, moisture \, loss)$$
燃烧效率（%）=100-（显热损失+氢和水损失）

$$\%Combustion \, Efficiency = 100 - \left(\frac{K1(TG - TA)}{\%CO_2} + \left(K2\left(1121.4 + (TG - TA)\right) \right) \right)$$

燃烧效率（%）=100- $\left(\frac{K1(TG - TA)}{\%CO_2} + \left(K2\left(1121.4 + (TG - TA)\right) \right) \right)$

$K1 = 0.38$	Natural Gas (F1/F4) 天然气（F1/F4）
$K1 = 0.56$	Fuel Oil (F2/F3) 燃油（F2/F3）
$K2 = 0.0083$	Natural Gas (F1/F4) 天然气（F1/F4）
$K2 = 0.0051$	Fuel Oil (F2/F3) 燃油（F2/F3）
TG	Flue Gas Temperature 燃气温度
TA	Ambient Air Temperature in Boiler House 过滤房内环境空气温度

Note: To use these equations temperatures must be converted to °C.
注：使用上述公式时温度必须转换为摄氏度。

<u>European Calculation:</u>
欧洲计算方法：

$$\%Combustion \, Efficiency = 100 - sensible \, heat \, loss$$
燃烧效率（%）= 100-显热损失

$$\%Combustion \, Efficiency = 100 - \left((TG - TA) \times \left(\frac{A}{20.9\% - O_2\%} + B \right) \right)$$

燃烧效率（%）=100-

$A = 0.66$	Natural Gas (F1/4) 天然气（F1/F4）
$A = 0.68$	Fuel Oil (F2/F3) 燃油（F2/F3）
$B = 0.009$	Natural Gas (F1/F4) 天然气（F1/F4）
$B = 0.007$	Fuel Oil (F2/F3) 燃油（F2/F3）

4.5   Combustion Limits 燃烧限值

The combustion limits are only available when the EGA system is used in conjunction with a MM control module. The system will have improved safety from using the combustion limits, as these ensure that the combustion exhaust gases do not reach dangerous levels for health and safety, and also environmental regulations. The engineer can set limits as an offset value of the commissioned exhaust gases value, or as an absolute value. These can be upper or lower limits, depending on the exhaust gas variable and the application; the combustion limits can be set on 5 combustion variables: O_2, CO_2, CO, NO and exhaust gas temperature.
燃烧限值仅在尾气分析仪和控制模块一起使用时有效。使用燃烧限值时，系统将大大提高安全性，因为这样可以确保燃烧的废气不会达到危害健康和安全的程度，同时还符合环境法规。工程师可以将限值设为调试废气值的一种补偿值或设为一种绝对值。根据废气变量和应用条件计算出上限值和下限值，燃烧限值可以在氧气、二氧化碳、一氧化碳、一氧化氮和废气温度等 5 个燃烧参数上设置。

The limits of combustion can be adjusted through options 19 – 27 and parameters 94 – 97 on the MM module. Before the burner is commissioned, option 12 must be set correctly so that the limits of combustion are checked.
燃烧限值可以通过在控制模块上的选项 19-27 和参数 94-97 进行调节。在调试燃烧器前，选项 12 必须正确设置并检查燃烧限值。

Offset Limits 补偿限值
Standard (offset) limits are a set percentage volume above and below for O_2 and CO_2, ppm above for CO and NO, and temperature above for exhaust gas temperature, for all the commissioned values. If the online exhaust gas values go above this offset of the commissioned value for that point in the firing curve, the burner will lockout or an error will be displayed, depending on how option 12 has been set on the MM. These are values are entered after the commissioning of the EGA system has been completed throughout the firing range of the burner, according to health and safety requirements or environmental regulations.
标准（补偿）限值是一种涉及所有调试值的体积百分比，大于或小于氧气和二氧化碳值，浓度大于一氧化碳和一氧化氮浓度，温度大于废气温度。如果在线废气值大于燃烧曲线中调试值的补偿值，燃烧器将锁定或显示错误，这取决于控制模块上选项 12 的设置。根据健康和安全要求或环境法，在整个燃烧范围内，这些数值都应在完成尾气分析仪系统调试后输入。

Absolute Limits 绝对限值
Absolute limits are a specific percentage volume, ppm or temperature. In this form only an ultimate low value may be put on O_2 and exhaust gas temperature in percentage volume and temperature respectively. In the case of CO_2 only an ultimate high value may be entered in percentage volume. For CO and NO an ultimate high in ppm may be entered. These values are entered when commissioning of the EGA system has been completed throughout the load index of the burner to avoid the burner locking out when commissioning.
绝对限值是一种特定的体积百分比、浓度或温度。在这种形式下，氧气可能被设为一个偏低值，废气温度和温度设为体积百分比。在仅有二氧化碳的情况下，偏高值可以按体积百分比输入。至于一氧化碳和一氧化氮，可以输入浓度偏高值。这些数值在尾气分析仪系统根据燃烧器负荷指数完成调试后输入，以防止在调试中燃烧器锁定。

Combustion Limits Control Functions 燃烧限值控制功能

Using Option 12 on the MM module it is possible to have two distinct control functions on how the system will react when the limits of combustion are exceeded.
当超过燃烧限值时，利用控制模块上的选项 12 可以对系统反应实现以下两种完全不同的控制功能。

Control Function 1 控制功能 1
Once the combustion limits are exceeded the trim function is disabled automatically and the system runs on the fuel-air ratio positions that the MM module was commissioned on. An error will also appear on the MM module, and until the error is reset on the MM, the trim function will remain disabled, even if the combustion limits are no longer exceeded.
当超过控制限值时，调节功能将自动禁用，系统将在燃油空气比位置运行，该位置也是控制模块的调试位置。控制模块出现错误时，在重置控制模块上的错误前，控制功能将保持禁用状态，即使不再超过燃烧限值。

Control Function 2 控制功能 2
Once the combustion limits are exceeded the MM module will lockout the burner. The MM module will also display an error message, and until the lockout is reset on the MM module, the system will remain in a lockout condition.
当超过燃烧限值时，控制模块将锁定燃烧器。同时控制模块将显示错误消息，直至该错误被重置，此时系统将保持锁定状态。

The following figures give a graphical presentation of how the standard limits of combustion works.
下图用图形方式显示了燃烧标准限值的作用。

4.5.1   O$_2$ Combustion Limits 氧气燃烧限值

Figure 4.5.1.i O$_2$ Limits Example
图 4.5.1.i 氧气限值示例

Figure 4.5.1.i shows an example of the O$_2$ limits. If the offset limit was set to 2%, than the burner would alarm (depending on the terminal 79 operation) when the actual O$_2$ value dropped below 2% offset from the commissioned value. If the absolute lower limit was set to 3%, the burner would alarm when the actual O$_2$ value dropped below 3%.

图 4.5.1.i 显示了氧气限值示例。如果补偿限值设为 2%，当实际氧气值从调试值降至低于 2% 补偿值时，燃烧器将发出警报（取决于终端 79 的操作）。如果绝对下限值设为 3%，当实际氧气值降至低于 3%时，燃烧器将发出警报。
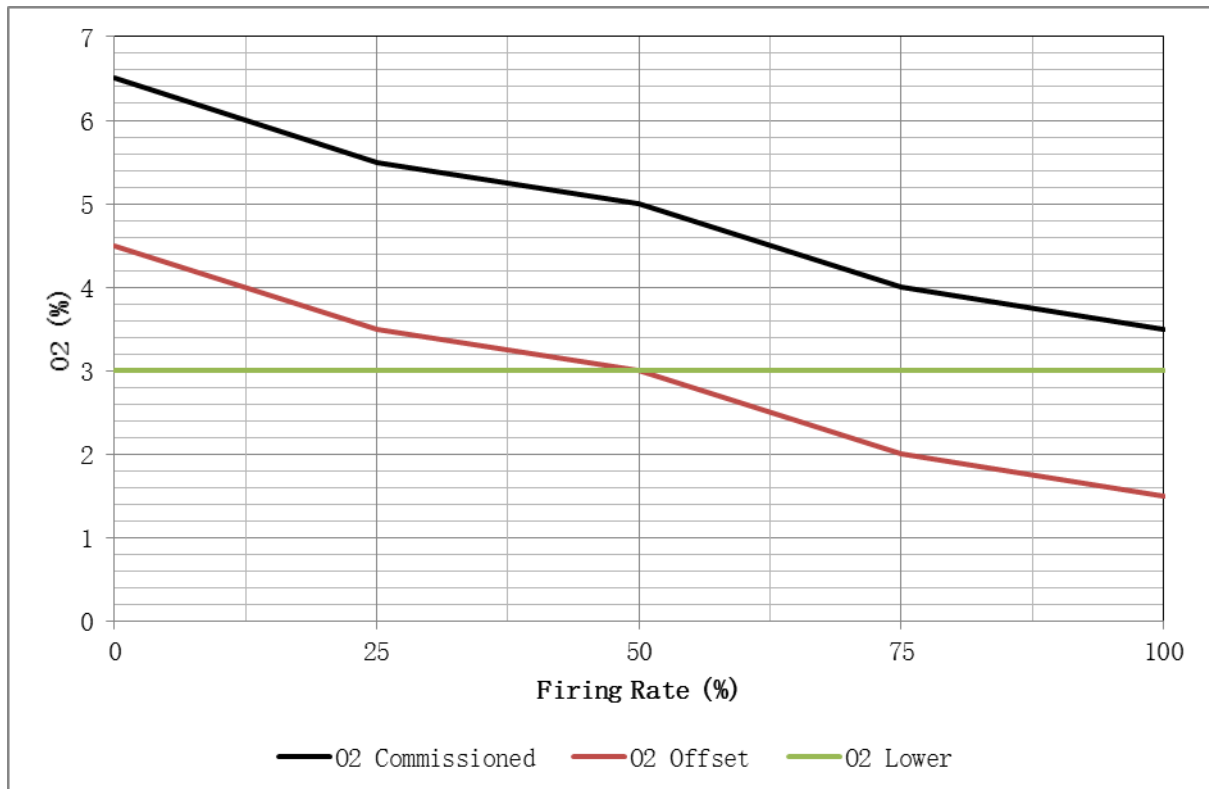
4.5.2   NO Combustion Limits 一氧化氮燃烧限值

Figure 4.5.2.i NO Limits Example
图 4.5.2.i 一氧化氮限值示例

Figure 4.5.2.i shows an example of the NO limits. If the offset limit was set to 20ppm, than the burner would alarm (depending on the terminal 79 operation) when the actual NO value rose above 20ppm offset from the commissioned value. If the absolute higher limit was set to 40ppm, the burner would alarm when the actual NO value rose above 40ppm.

图 4.5.2.i 显示了一氧化氮限值示例。如果补偿限值设为 20ppm，当实际一氧化氮值从调试值升高大于 20ppm 补偿值时，燃烧器将发出警报（取决于终端 79 的操作）。如果绝对下限值设为 40ppm，当实际一氧化氮值升高大于 40ppm 时，燃烧器将发出警报。

4.5.3   CO Combustion Limits 一氧化碳燃烧限值

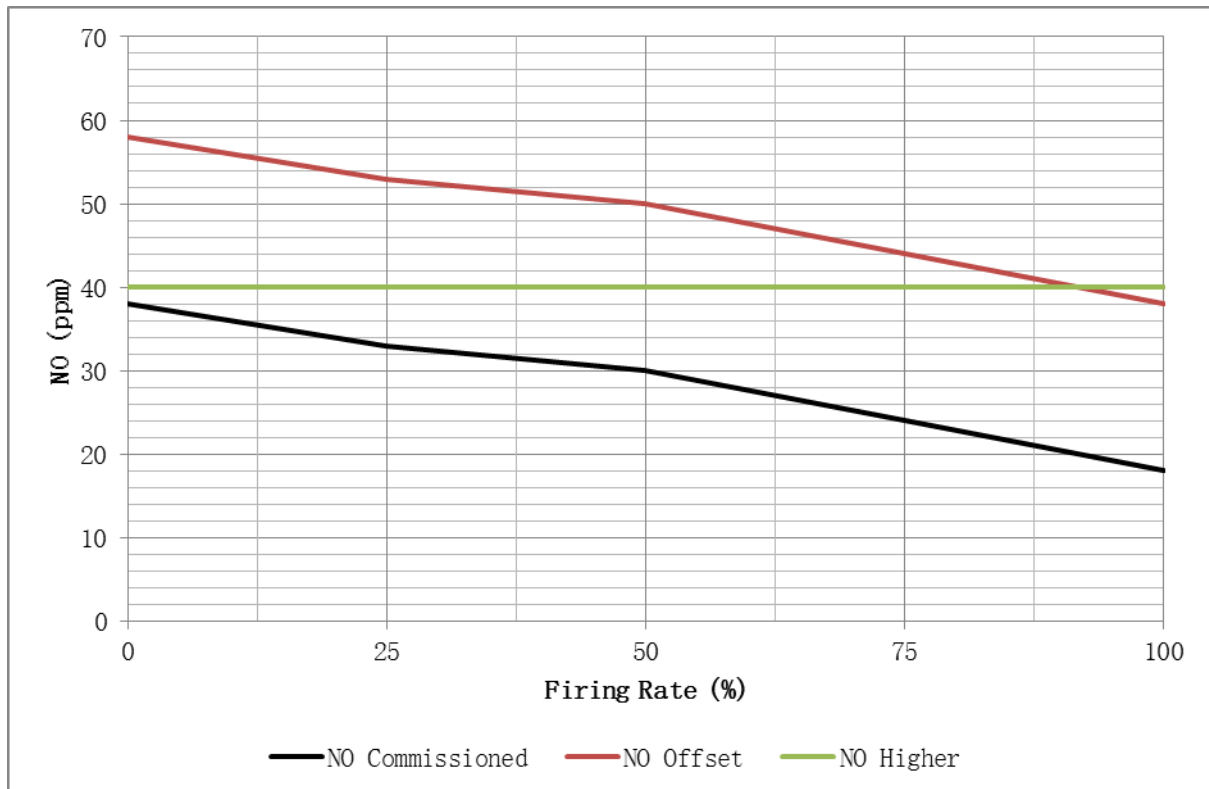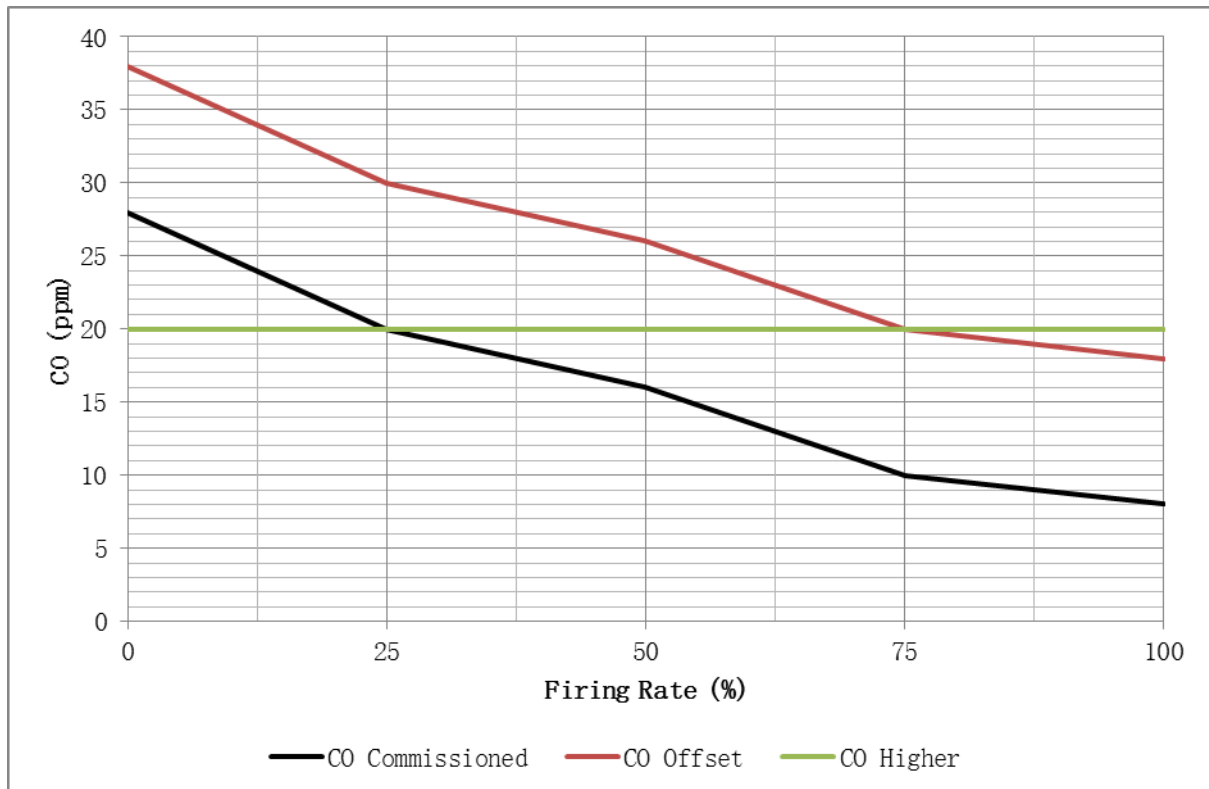*Figure 4.5.3.i CO Limit*
图 4.5.3.i 一氧化碳限值示例

Figure 4.5.3.i shows an example of the CO limits. If the offset limit was set to 20ppm, than the burner would alarm (depending on the terminal 79 operation) when the actual CO value rose above 20ppm offset from the commissioned value. If the absolute higher limit was set to 20ppm, the burner would alarm when the actual CO value rose above 20ppm.

图 4.5.3.i 显示了一氧化碳限值示例。如果补偿限值设为 20ppm，当实际一氧化碳值从调试值升高大于 20ppm 补偿值时，燃烧器将发出警报（取决于终端 79 的操作）。如果绝对上限值设为 20ppm，当实际一氧化碳值升至大于 20ppm 时，燃烧器将发出警报。

4.5.4   Temperature Limits 温度限值
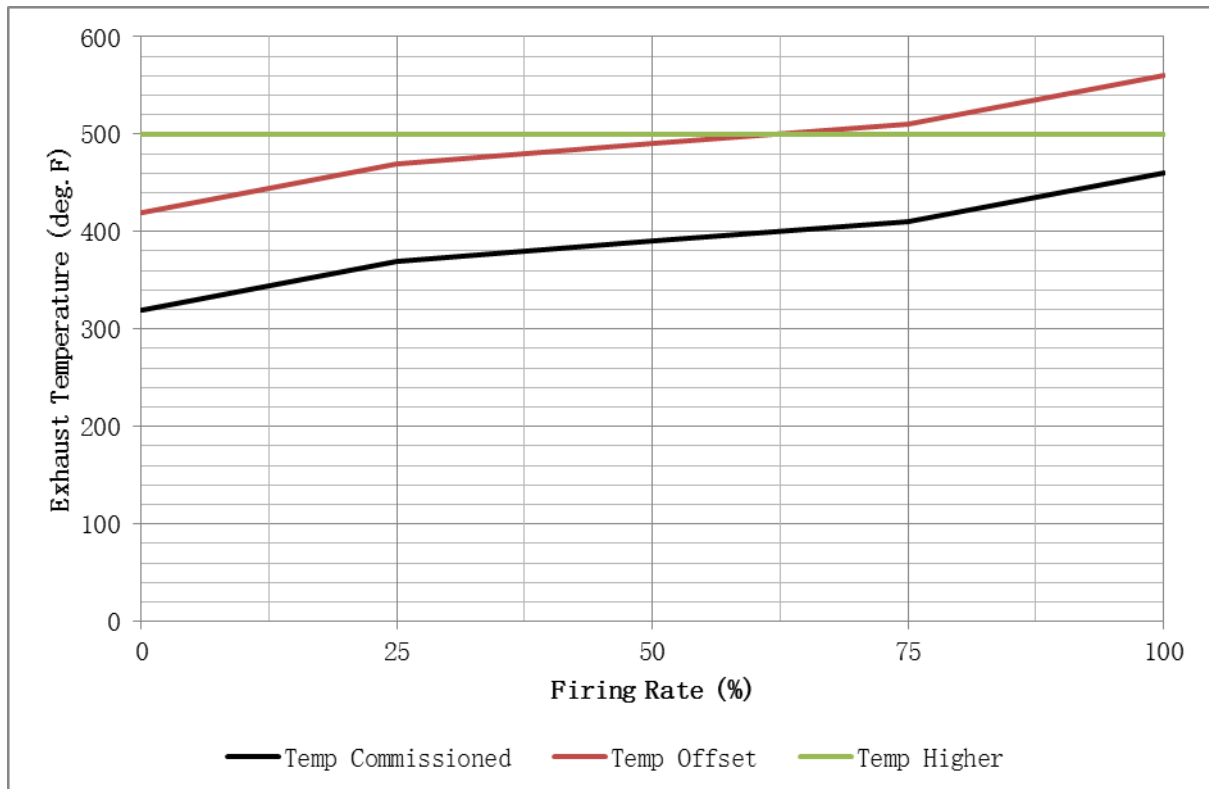
Figure 4.5.4.i Temperature Limits Example
图 4.5.4.i 温度限值示例

Figure 4.5.4.i shows an example of the exhaust temperature limits. If the offset limit was set to 100°F, than the burner would alarm (depending on the terminal 79 operation) when the actual exhaust temperature value rose above 100 ^{O}F offset from the commissioned value.
图 4.5.4.i 显示了温度限值示例。如果补偿值设为 100 华氏度，当实际排气温度值从调试值升高大于 100 华氏度时，燃烧器将发出警报（取决于终端 79 的操作）。

If the absolute higher limit was set to 500 ^{O}F, the burner would alarm when the actual exhaust temperature value rose above 500 ^{O}F.
如果绝对上限值设为 500 华氏度，当实际排气温度值升高大于 500 华氏度时，燃烧器将发出警报。

5 SERVICING AND TROUBLESHOOTING 维护和故障排除

5.1 Servicing 维护

The EGA is a sensitive instrument used to analyse the exhaust gases in the flue, so it needs to be serviced regularly to ensure accurate readings are taken for the trim function to maintain safe operation.
尾气分析仪是一种非常灵敏的仪器，用于分析烟道中的废气，因此需要定期维护，确保通过调节功能获得准确的读数并保证安全运行。

Due to the technology used within the Autoflame E.G.A, to ensure accurate and reliable operation the EGA requires annual servicing. Servicing the EGA and sampling probe is a crucial to maintaining the correct operation of the EGA must be done regularly. For firing on natural gas, the EGA must be sent back every 12 to 18 months depending on the boiler room conditions. For firing on oil, this would be shortened to 6 to 12 months.
由于 Autoflame 尾气分析仪使用了高科技，因此为确保准确、可靠的运行，需要每年对尾气分析仪进行维护。维护尾气分析仪和采样探头对尾气分析仪的正确运行至关重要，因此必须定期进行。使用天然气燃烧时，根据锅炉房的环境，尾气分析仪必须每隔 12 至 18 个月返还公司进行维护，用燃油燃烧时，每隔 6 至 12 个月应返还维护。

Failure to send back the EGA when it is due for a service will cause the operation and life of the EGA to deteriorate. The cells will need to be replaced as they are calibrated instruments which lose accuracy over time and use. The probe is constantly sampling the gases and can become easily clogged with debris and dirt picked up from the burner, without a service this can result in incorrect readings which affect the reliability of the EGA. Further issues such as pump problems, chiller faults and inaccurate trim operation will occur.
尾气分析仪在需要维护时如未返还维护将会影响尾气分析仪的运行和寿命。感应器在长期使用后精度会降低，因此也需要定期更换。探头因为长期进行采样工作，很容易被积累在燃烧器中的堆积物和灰尘堵塞，如果不及时维护将会导致读数不准确，影响尾气分析仪的可靠性。另外也可能导致泵故障、冷却器故障和不准确的调节操作。

5.1.1 Sampling Probe Maintenance 采样探头的维护

On gas only applications it is unlikely that there should be continual maintenance required on the stack mounted probe. It is advised that the probe is checked annually on the gas firing applications in order to ensure that the probe is free of any blockages. On heavy or solid fuel applications, deposits may build up in the outlet part of the tube, causing EGA faults..
在仅使用燃气时，排气管上安装的探头不可能连续不断的进行维护，我们建议每年对探头检查一次，确保没有堵塞。使用重燃料或固体燃料时，管道出口处可能会积累沉淀物，导致尾气分析仪上出现故障。

The deposits can be cleared by running a long drill (7mm/0.275") up into the outlet tube by hand. Twist and withdraw the drill often so as to pull out the deposits, otherwise the deposits will be pushed further into the probe assembly.
用双杀将长钻头（7mm/0.275 英寸）插入出口管可以清洁沉淀物，旋转钻头或拉动钻头可以将沉淀物拉出，否则沉淀物将会被更深地推入探头总成。
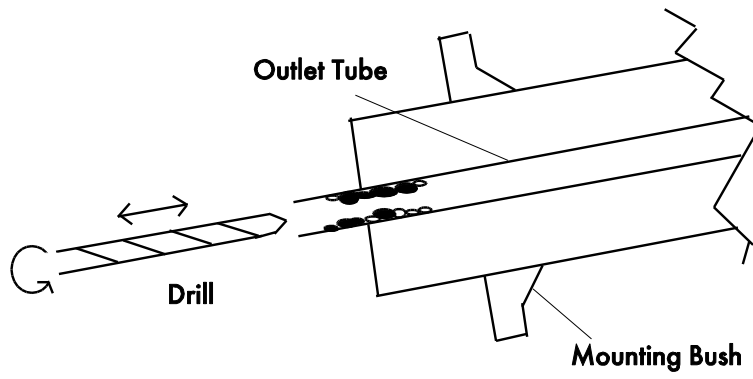
Figure 5.1.1.i Diagram to Show Method of Cleaning a Blocked Outlet Tube
图 5.1.1.i 清洁堵塞出口管示意图

5.1.2   Servicing EGA Sampling Probe 尾气分析仪采样探头的维护

If the filter assembly in the EGA sampling probe is blocked then it is necessary to disassemble the probe and fit a new pre-formed fine filter and coarse filter. To check if the probe is blocked connect the probe to the EGA and allow the EGA to sample. If the pump pressure or flow rate drops below 550 ml/min respectively then the filtering material should be replaced.

如果尾气分析仪采样探头的过滤器总成出现堵塞，则必须拆卸探头并安装一个精细过滤器和粗过滤器。检查探头是否堵塞，将探头连接至尾气分析仪，使尾气分析仪开始采样。如果泵压力或流量降低至 550 ml/分钟，则应该更换过滤材料。

1. To disassemble the probe, unscrew the casing from the base of the probe. See diagram in section 1.5.1. The whole of the internal assembly can now be withdrawn from the sample connection end.
   拆卸探头时先拧下探头底壳上的螺丝。见 1.5.1 节的示意图。然后可以从样本连接端将整个内部总成取下。

2. Remove the sampling tube and thermocouple from the EGA and unscrew the end cap.
   从尾气分析仪上取下采样管和热电偶，并拧下端盖上的螺丝。

3. Retract the filter and thermocouple from inside the probe at the same angle.
   按相同角度从探头内部将过滤器和热电偶拉出。

4. Replace the filter on the end of the thermocouple; the thermocouple can also be replaced.
   更换热电偶端部的过滤器和热电偶。

5. Loose the 2mm set screw located above the cap extract the thermocouple.
   拧下端盖上的 2mm 固定螺丝，将热电偶拉出。

6. Replace the thermocouple and retighten the set screw.
   更换热电偶并拧紧固定螺丝。

7. Remove all traces of the filtering materials from the stainless steel filter.
   从不锈钢过滤器中取出所有过滤材料。

8. Check that the stainless steel filter and inner sample tube are clear inside.
   检查不锈钢过滤器和内部采样管内部是否干净。

9. Very carefully push the delicate pre-formed filter onto the stainless steel filter.
   仔细将预装过滤器推入不锈钢过滤器内。

10. Slide the inner assembly back into the stainless steel outer casing.
    将内部总成推入不锈钢外壳内。

11. Pack the void between the fine filter and the outer casing with coarse filtering material.
    用粗过滤材料封住精细过滤器和外壳之间的缝隙。

12. Use a small rod to pack the material down a little at a time.

用小棍慢慢向下捣入过滤材料。

13. Reassemble by sliding the assembly into the casing and screw together.
将总成滑动至外壳内部并拧紧螺丝。

After reassembly connect the probe to the EGA and check the pump pressure and flow.

重新组装后，将探头连接至尾气分析仪，并检查泵压力和流量

5.2   Shipping 运输

The EGA is a scientific instrument with delicate components. Whenever the EGA is shipped it is essential that the EGA is returned using its original packaging. .
尾气分析仪是一种配备精密组件的科学仪器，因此在运输或返还时必须使用原包装。

Ensure that couriers treat the package appropriately and labelled as containing a delicate scientific instrument. If the EGA is damaged in transit, repair costs will be incurred.
确保快递员正确地处理包装，在包装上应贴上标签，注明是精密的科学仪器。如果尾气分析仪在运输时损坏，则必须支付维修费。

Please contact Autoflame or your local Tech Centre to obtain new Autoflame EGA packaging.
请联系 Autoflame 或当地技术中心获取尾气分析仪的新包装。

5.3   Fault Codes 故障代码

There are two types of faults on the EGA, errors and warnings. Errors stop the EGA from sampling, and Warnings do not stop the EGA from sampling. If the EGA is connected to an MM, option 13 will set where the MM turns the burner off or continues running when an EGA fault occurs.
尾气分析仪上有两种类型故障，即错误和警告。出现错误时尾气分析仪将停止采样，但出现警告时尾气分析仪不会停止采样。如果尾气分析仪连接了控制模块，则可以利用选项 13 设置控制模块关闭燃烧器的位置、或当尾气分析仪出现故障时控制模块是否继续运行。

Please refer to the MM Installation and Commission Guides for EGA fault codes displayed on the MM.
关于控制模块上显示的尾气分析仪故障代码，请参考控制模块安装和调试指南。

Note: The EGA will display the fault message relevant to the component, e.g. if the fault code 0 will display as 'CO Cell Invalid' on the EGA fault screen, for a CO cell fault.
注：尾气分析仪将显示与组件相关的故障消息，例如：如果故障代码 0 在尾气分析仪故障屏幕上显示'CO Cell Invalid 一氧化碳感应器无效'，则表示一氧化碳感应器出现故障。

Fault 故障	Message 消息	Type 类型
0	Cell Invalid 感应器无效	Error 错误
• The displayed cell is either not detected or the incorrect type has been fitted on start-up (O_2, NO, CO, CO_2, NO_2, SO_2). 显示的感应器未检测到、或在启动时安装了错误类型的感应器（O_2, NO, CO, CO_2, NO_2, SO_2）。 • Check the cell has been installed correctly. 检测感应器是否正确安装。		
1	Cell Data Loaded 加载感应器数据	Warning 警告
• A new displayed cell has been detected and calibration data has been reloaded. 检测到显示的新感应器并已重新加载校准数据。 • This is the correct response to a new cell being fitted. 安装新感应器后这属于正确的反应。		
2	Blocked Input 输入阻塞	Error 错误
• Input pressure below optioned fault threshold. 输入压力小于选定的故障阈值。 • Check Commission Mode setting 47. 检查调试模式设置 47。 • Check the air inlet filter, and the external particulate filter, if fitted. 检查进气过滤器和外部颗粒过滤器（如安装）。		
3	Blocked Output 输出阻塞	Error 错误
• Barometric pressure is above optioned fault threshold. 大气压大于选定的故障阈值。 • Check Commission setting 48. 检查调试模式设置 48。		
5	Ambient Temperature Low 环境温度低	Warning 警告
• Ambient temperature is below 3°C (37.4^{O}F) 环境温度低于 3 度(37.4 华氏度)。		

6	Ambient Temperature High 环境温度高	Warning 警告

- Ambient temperature is above 42°C (107.6 华氏度)
  环境温度高于 42 度 (107.6 华氏度)。

7	Chiller Frozen 冷却器被冻住	Error 错误

- Chiller temperature is below 0°C
  冷却器温度低于零度。
- Chiller will then shut down to warm up, if the temperature goes above this low limit of 0°C, the fault will automatically clear and the EGA will resume normal operation.
  冷却器将停机加热，如温度高于最低限值零度，则故障将自动排除，尾气分析仪将重新正常工作。

8	Chiller Temperature High 冷却器温度高	Warning 警告

- Chiller is not cooling
  冷却器不制冷。

10	Flow Out of Range 流量超出范围	Error or Warning 错误或警告

- Sample flow rate is less than 500ml/min or more than 700ml/min
  样本流率低于 500ml/分钟或高于 700ml/分钟。
- For the main pump in a standard EGA, this fault is an error. For the self-calibration pump in a self-calibration EGA, this is a Warning.
  如标准尾气分析仪上安装了主泵，则该故障是一种错误。如在自校准尾气分析仪上安装了自校准泵，则该故障属于一种警告。

11	Self-Cal Low Pressure 自校准压力低	Warning 警告

- Self-calibration has failed due to low source gas pressure.
  自校准功能因供气压力低出现故障。
- Check the indicated gas supply, this fault could mean there is no gas in the bottle.
  检查指定的气源，本故障代码可以表示气瓶中无气体。

12	Self-Cal High Pressure 自校准压力高	Warning 警告

- Self-calibration failed due to high source gas pressure.
  自校准功能因供气压力高出现故障。
- Check the pressure regulator for the gas supply.
  检查气源的压力调节器。

13	HSL Out of Range 加热采样线超出范围	Warning 警告

- Heated Sample (HSL) temperature is out range.
  加热采样线温度超出范围。
- Check the HSL supply fuse and check the connections
  检查加热采样线电源保险丝和连接。

Fault 故障	Message 消息	Type 类型
14	Excess Calibration Drift 校准偏差较大	Error 错误

- Calibration drift is out of range.
  校准偏差超出范围。
- Check Commission Mode Settings 23 to 26.
  检查调试模式设置 23 值 26.

15	Temperature Sensor 温度传感器	Error or Warning 错误或警告

- The displayed temperature sensor is faulty.
  显示的温度传感器出现故障。
- Check the connections on the thermocouple and the pre-heated air sensor
  检查热电偶和预热空气传感器之间的连接。

16	Pressure Sensor 压力传感器	Error 错误
•	The displayed pressure sensor is faulty. 显示的压力传感器出现故障。	
•	Please contact Autoflame or local approved Autoflame tech centre. 请联系 Autoflame 或当地经授权的 Autoflame 技术中心。	
17	Chemical Sensor 化学传感器	Error 错误
•	The displayed chemical cell is faulty, check the connections. 显示的化学感应器出现故障。检查连接。	
18	Optical Sensor 光学传感器	Error 错误
•	CO_2 cell is faulty, check the connections. 二氧化碳感应器出现故障。检查连接。	
19	Optical Bulb 光学灯泡	Warning 警告
•	CO_2 cell bulb current is below 50mA. 二氧化碳感应器灯泡电流低于 50mA。	
•	Check the connections. 检查连接。	
20	Fan Blocked 风机堵塞	Warning 警告
•	Ventilation fan frequency is below 40Hz. 通风风机频率低于 40Hz。	
•	Check the air inlet filter. 检查进气过滤器。	
21	EEPROM Write Failed EEPROM 写入失败	Error 错误
•	EEPROM data could not be written after multiple attempts. EEPROM 数据在多次尝试后无法写入。	
22	EEPROM Read Failed EEPROM 读取失败	Error 错误
•	EEPROME data could not be read after multiple attempts. EEPROM 数据在多次尝试后无法读取。	
23	Clock Not Set 时钟未设置	Warning 警告
•	Clock not set. 时钟未设置。	
•	Check the battery on the main PCB. 检查主 PCB 板上的电池。	
24	Service Interval 服务间隔时间	Error or Warning 错误或警告
•	Service interval has expired. 服务间隔时间已到期。	
•	Check Commission Mode setting 54 for service interval and 55 for service interval error period. 服务间隔时间请检查调试模式设置 54，服务间隔时间错误请检查调试模式设置 55。	
25	Calibration Result Invalid 校准结果无效	Warning 警告
•	A cell calibration is rejected. 感应器校准被拒绝。	
•	Check gas bottles are in correct port. 检查气瓶是否安装在正确的进出口上。	
26	Software Error 软件错误	Warning 警告
•	Please contact Autoflame or local approved Autoflame tech centre. 请联系 Autoflame 或当地经授权的 Autoflame 技术中心。	
27	Software Error 软件错误	Error 错误
•	Check the software versions installed in the EGA are compatible.	

检查安装在尾气分析仪上的软件版本是否兼容。
- Please contact Autoflame or local approved Autoflame tech centre.
  请联系 Autoflame 或当地经授权的 Autoflame 技术中心。

28	Software Error 软件错误	Error 错误

- Software is corrupt, re-install EB software.
  软件损坏，请重新安装 EB 软件。
- Please contact Autoflame or local approved Autoflame tech centre.
  请联系 Autoflame 或当地经授权的 Autoflame 技术中心。

29	Software Error 软件错误	Warning 警告

- Please contact Autoflame or local approved Autoflame tech centre.
  请联系 Autoflame 或当地经授权的 Autoflame 技术中心。

30	Display Communications 显示通信	Error 错误

- Check connections between display PCB and main PCB.
  检查显示 PCB 板和主 PCB 板之间的连接。
- Please contact Autoflame or local approved Autoflame tech centre.
  请联系 Autoflame 或当地经授权的 Autoflame 技术中心。

31	Display Log Write Fail 显示日志写入失败	Error 错误

- Unable to write CEMS data to the SD card, check the SD card.
  无法向 SD 存储卡写入 CEMS 数据。检查 SD 存储卡。

5.3.1   General Troubleshooting 一般故障排除

- Ambient Temperature – This must be between 5 – 40°C (40 – 140°F). The temperature is measured by a sensor on the electronics PCB and is cross referenced with the sensor on the side of the CO_2 cell.
  环境温度-环境温度必须在 5-40 摄氏度(40-140 华氏度)之间。通过 PCB 板上传感器测量的温度也可以用二氧化碳感应器上的传感器进行测量。

- Chiller – This will be Ready or Not Ready. There is a temperature sensor on the chiller unit and this chiller must get down to a set temperature before the pump will start to draw a sample from the stack. If the chiller is not decreasing its temperature then check the operation of the fan. If the ambient air in the boiler house is high, it may be necessary to draw cooler air into the EGA In warm environments, an air conditioned enclosure should be used; in cold environments a heated enclosure should be used.
  冷却器-读数包括就绪或未就绪。冷却器上配备了一个温度传感器，冷却器在泵开始从排气管中提取样本前必须处于设定温度范围内。如果冷却器未降低自身温度，则需要检查风机是否正常运行。如果锅炉房内的环境温度较高，则必须将冷空气送入尾气分析仪。在较热环境下可以使用空调，在寒冷环境下可以使用加热保护罩。

- If the EGA is mounted in an excessively dusty environment a build-up of particles on the terminals can cause arcing. If the particles are corrosive then any attack to the conformal coating on the printed circuit boards can cause tracks to arc and component failure. Any sign of this activity and the unit should be returned to the supplier.
  如果尾气分析仪安装在灰尘较多的环境下，终端上积累的微粒可能导致电弧击穿。如果微粒有腐蚀性，则会腐蚀印刷电路板，导致出现电弧和组件故障。出现上述情况时应将设备返回供应商。

- If you get a continuous O$_2$ reading of 20%, this tells you that the Mk8 EGA is sampling fresh air. To troubleshoot this:
- 如持续获得 20%的氧气读数，这表明 Mk8 尾气分析仪正采集新鲜空气，请通过以下方法排除故障：

  a. Check all piping is airtight
     检查所有管道是否密闭。
  b. Check sample tube is not blocked
     检查采样管是否堵塞。
  c. Check that there are no leaks on the flue
     检查烟道是否有漏气点。
  d. Check the pinch valve tubing for leaks
     检查夹管阀管道是否有泄露。

5.3.2 Faults on MM 控制模块故障

In the event of an EGA failure, an error will appear on the EGA screen of the MM The MM will show 'See EGA for fault description.' All other screens on the MM are still viewable whilst there is an EGA error. The switched neutral alarm output Terminal 79 can be set to become active or remain inactive in the event of an EGA error (see Option 12). The setting of Option 12 will determine how the burner will operate, i.e. continue to run based on the original commissioned values (trim and limits testing disabled) or lockout the burner until the EGA error is reset and becomes fully operational once again.
尾气分析仪出现故障时，控制模块上的尾气分析仪屏幕上将显示错误消息，控制模块将显示"查看尾气分析仪故障说明"。尾气分析仪出现故障后仍可以查看控制模块上的其他屏幕，同时还可以将中性报警输出终端 79 设启动或保持非活动（见选项 12）。选项 12 的设置将决定燃烧器如何运行，即是否根据初始调试值（调节和限值测试禁用）继续运行或锁定燃烧器，直至尾气分析仪错误被重置并再次开始工作。

It is possible to remove and re-install the EGA at a later date without the burner needing to be re-commissioning if using the trim function with an MM module. After removing the EGA set Option 12 on the MM module to 0. Once the EGA module is ready to be re-installed reset Option 12 back to the required setting, provided the combustion has not been changed either through commissioning mode or single point change the MM module will load up as normal and will not be required to be re-commissioned.
使用控制模块的调节功能时，可以取下尾气分析仪并在后期重装，而不必对燃烧器进行重新调试。取下尾气分析仪后请将控制模块上的选项 12 设为 0。尾气分析仪模块准备好重装时，请将选项 12 重新设回以前的数值，但条件是燃烧未随调试模式或单点变化而改变，此时控制模块将正常加载而无需重新调试。

When an error code appears on an MM module it is required that the error is reset on the MM module as well as the EGA If the error is not reset on the MM the EGA and MM will not communicate with each other. This will mean the EGA will display "No Fuel Selected" when in run with MM mode until the error is reset.
控制模块上出现错误代码时，需要在控制模块和尾气分析仪上重置错误，如果无法在控制模块上重置错误，尾气分析仪和控制模块将无法互相通信。此时在控制模块模式运行时，尾气分析仪将显示'未选择燃料'，直至错误被重置。

When first going into commissioning mode, the MM invokes an EGA calibration. If an error occurs at this stage it will be necessary to investigate and resolve the error before restarting the commissioning procedure.

首次进入调试模式时，控制模块将请求尾气分析仪校准。如果此时发生错误，则需要在重启调试流程前检查并解决错误。

The table below shows the EGA errors on the MM. Option 13 sets the way the MM responds to an EGA error.

下表显示了在控制模块上出现的尾气分析仪错误。设置选项 13 后，控制模块将响应尾气分析仪错误。

EGA Error 尾气分析仪错误	Description 说明
1	EGA Internal Error 尾气分析仪内部错误
	• Check EGA for fault. • 检查尾气分析仪的故障。
2	No Communications 无通讯
	• Check parameter 10 is set to correct EGA version. • 检查参数 10 是否设为正确的尾气分析仪版本。 • Check EGA operating mode is selected as 'EGA with MM.' • 检查尾气分析仪运行模式是否已选择"配控制模块的尾气分析仪" • Check wiring between EGA and MM (terminals 25 and 26 on MM). • 检查尾气分析仪和控制模块之间的连接（控制模块上终端 25 和 26）。
3	O_2 Upper Limit 氧气上限值
	• Current O_2 value is above upper offset limit of commissioned value.* • 当前氧气值大于调试值的上限补偿值。* • Check exhaust gas readings and option 19. • 检查废气读数和选项 19。
4	O_2 Absolute Limit 氧气绝对限值
	• Current O_2 value is below absolute limit.* • 当前氧气值小于绝对限值。* • Check exhaust gas readings and option 25. • 检查废气读数和选项 25。
5	O_2 Lower Limit 氧气下限值
	• Current O_2 value is below lower offset limit of commissioned value.* • 当前氧气值小于调试值的下限补偿值。* • Check exhaust gas readings and option 22. • 检查废气读数和选项 22。
6	CO_2 Upper Limit 二氧化碳上限值
	• Current CO_2 value is above upper offset limit of commissioned value.* • 当前二氧化碳值大于调试值的上限补偿值。* • Check exhaust gas readings and option 20. • 检查废气读数和选项 20。
7	CO_2 Absolute Limit 二氧化碳绝对限值
	• Current CO_2 value is above absolute limit.* • 当前二氧化碳值大于绝对限值。 • Check exhaust gas readings and option 26. • 检查废气读数和选项 26。
8	CO_2 Lower Limit 二氧化碳下限值
	• Current CO_2 value is below lower offset limit of commissioned value.*

- 当前二氧化碳值小于调试值的下限补偿值。*
- Check exhaust gas readings and option 23.
- 检查废气读数和选项 23。

9	CO Upper Limit 一氧化碳上限值

- Current CO value is above upper offset limit of commissioned value.*
- 当前一氧化碳值大于调试值的上限补偿值。*
- Check exhaust gas readings and option 21.
- 检查废气读数和选项 21。

10	CO Absolute Limit 一氧化碳绝对限值

- Current CO value is above absolute limit.*
- 当前一氧化碳值大于绝对限值。*
- Check exhaust gas readings and option 27.
- 检查废气读数和选项 27。

11	NO Upper Limit 一氧化氮上限值

- Current NO value is above upper offset limit of commissioned value.*
- 当前一氧化氮值大于调试值的上限补偿值。*
- Check exhaust gas readings and parameter 94.
- 检查废气读数和选项 94。

12	Exhaust Temperature Upper Limit 排气温度上限值

- Current exhaust temperature is above upper offset limit of commissioned value.*
- 当前排气温度大于调试值的上限补偿值。*
- Check exhaust gas readings and parameter 96.
- 检查废气读数和选项 96。

13	Exhaust Temperature Absolute Limit 排气温度绝对限值

- Current exhaust temperature is above absolute limit.*
- 当前排气温度大于绝对限值。*
- Check exhaust gas readings and parameter 97.
- 检查废气读数和选项 97。

*When option 12 is set to 3 for trim and combustion limits, the combustion limits are evaluated once per trim cycle. A combustion limit error will occur if the current exhaust value has crossed the combustion limit for the number of trim cycles set in parameter 17 (the default value is 3 cycles).

* 当调节和燃烧限值的选项 12 设为 3 时，则在每个调节周期将对燃烧限值检查一次。当调节周期在参数 17（默认值是 3 个周期）中已设定，如当前排气值超过该周期的燃烧限值，则燃烧限值将出现错误。