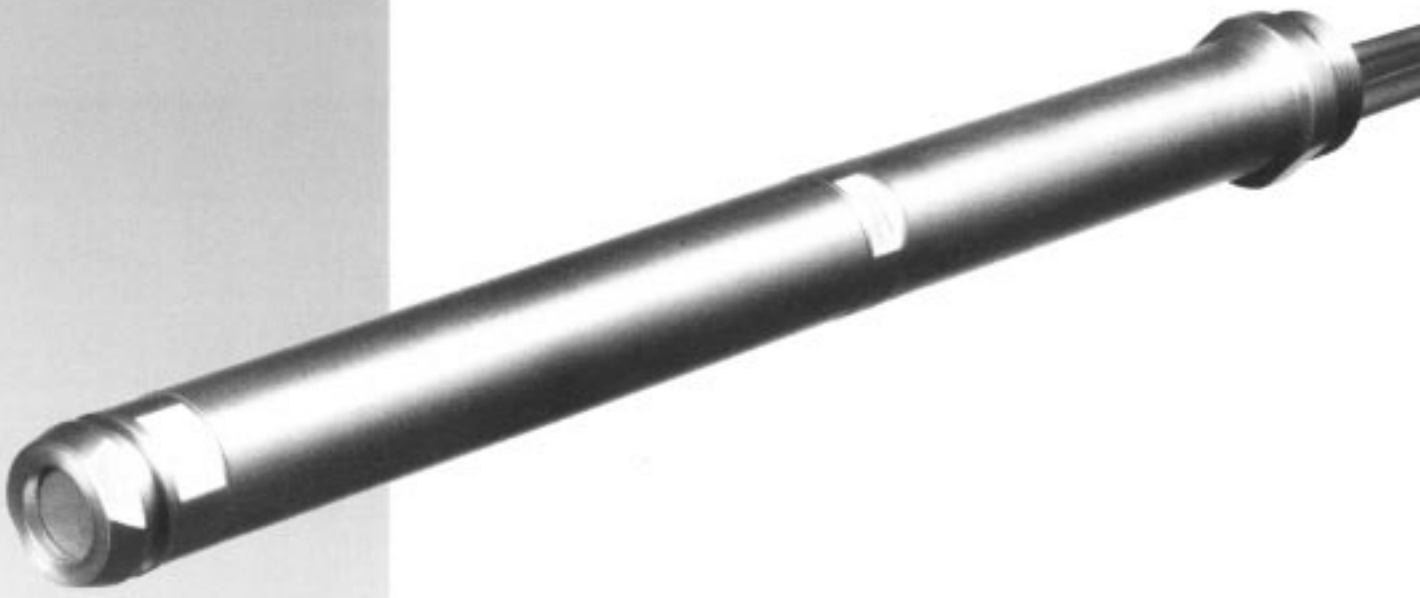
MODEL 797

Diluting stack sampler



Continuous emission monitoring
and gas analysis
Dilution is the solution

EPM ENVIRONMENTAL

MODEL 797

DILUTING STACK SAMPLER FOR MONITORING GASEOUS EMISSIONS WITH AMBIENT AIR ANALYZERS

Continuous In-Situ sample extraction using the EPM Dilution System offers many advantages over In-Situ monitors and other extractive techniques. These advantages include:

Low cost installation, maintenance and operation

Low extractive flow rates, promotes long filter life

No need for heated sample line

Diluted sample is transported at positive pressure

No moving parts anywhere in the system

Can be used in explosion proof areas

Easy dynamic in-situ calibration of total dilution system

Can be used with any existing ambient air analyzer

Made of corrosion resistant materials

Manual or optional automatic blow back, backflushes coarse filter

Optional probe heater

WORKING PRINCIPLE

The Model 797 Dilution System performs four critical functions to prepare the sample from the stack, so that it can be measured accurately and precisely by the analyzer. The system uses an air driven aspirator which extracts the sample from the stack. It is then passed consecutively through a coarse and fine particulate filter, a preselected glass or quartz critical orifice and diluted with the air from the aspirator. This process has now reduced the dew point of the stack sample to below that of the ambient air. It prepared the often warm, wet, sticky and particulate laden sample, so that it can be transported via an unheated line to the analyzer up to 100 m (300 feet) away!

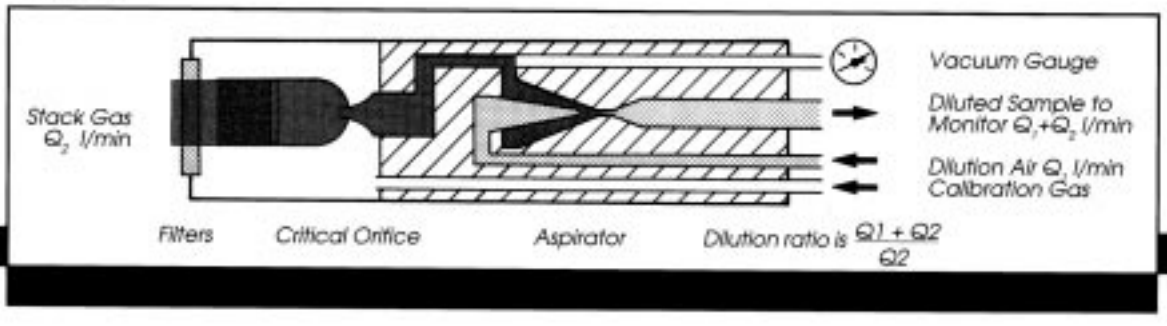
Figure 1 shows a schematic of the operational principle of the dilution probe. The critical orifice can be chosen out of a range of 7 interchangeable pre-calibrated orifices, offering dilution ratios from 1:10 to as high as 1:350. The appropriate size of the critical orifice is selected according to prevailing stack and ambient conditions.

STACK PROBE

Figure 2 shows a cut-away view of the probe. The outer mantle of the probe is made of Inconel®, a corrosion resistant nickel alloy, specially selected to withstand severe acid mist environment and high temperatures.

INCONEL® is a registered trademark of Inco Alloys Int'l. Inc..

Figure 1



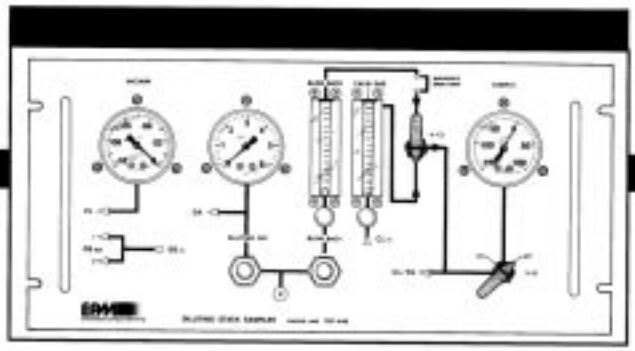


Figure 3

Between the aspirator and this outer steel mantle a heat exchanger serves to preheat the dilution air before entering the aspirator so as to compensate for changes in dilution ratio at varying temperatures of the dilution air.

The front section of the probe is the mantle that screws onto the "pump section" of the probe assembly. The mantle houses the coarse filter and protects the critical orifice from mechanical damage. It also functions to provide the blow back air to the coarse filter and to allow in-situ dynamic calibration.

The critical orifice/fine filter determines the flow rate, with which the sample is extracted from the stack. A selection of 7 different orifices permits easy exchange to accommodate different dilution ratio requirements.

In-situ calibration is easy. The calibration gas is supplied via the umbilical cord to the probe mounted in the stack. The cal gas enters the probe and is diluted at the same dilution ratio as the sample from the stack. Dividing the concentration of the cal gas by the concentration after dilution yields the actual dilution ratio. The calibration line of the probe is also used to provide blow back air to the course filter for cleaning purposes.

UMBILICAL CORD

The umbilical cord consists of four 1/4" OD tubes. The lines carrying cal gas and diluted sample are made of FEP. The tubes for the pressurized air and the vacuum are made of Polypropylene. A flexible mantle assures long life in the most demanding conditions.

CONTROL UNIT 797.440

Operation of the EPM Dilution probe is done with the model 797.440 control panel. All hardware is contained in a 19" panel for easy mounting in any instrument rack. The panel permits full control and observation of all operating parameters of the probe.

DILUTER UNIT 797.430

Additional dilution is easily obtained through the use of the model 797.430 dilution panel. By placing this panel in series with the diluted sample from the sample probe, dilution ratios as high as 100.000:1 can be obtained. The maximum dilution ratio of the panel is 1:350 at an accuracy of 2%.

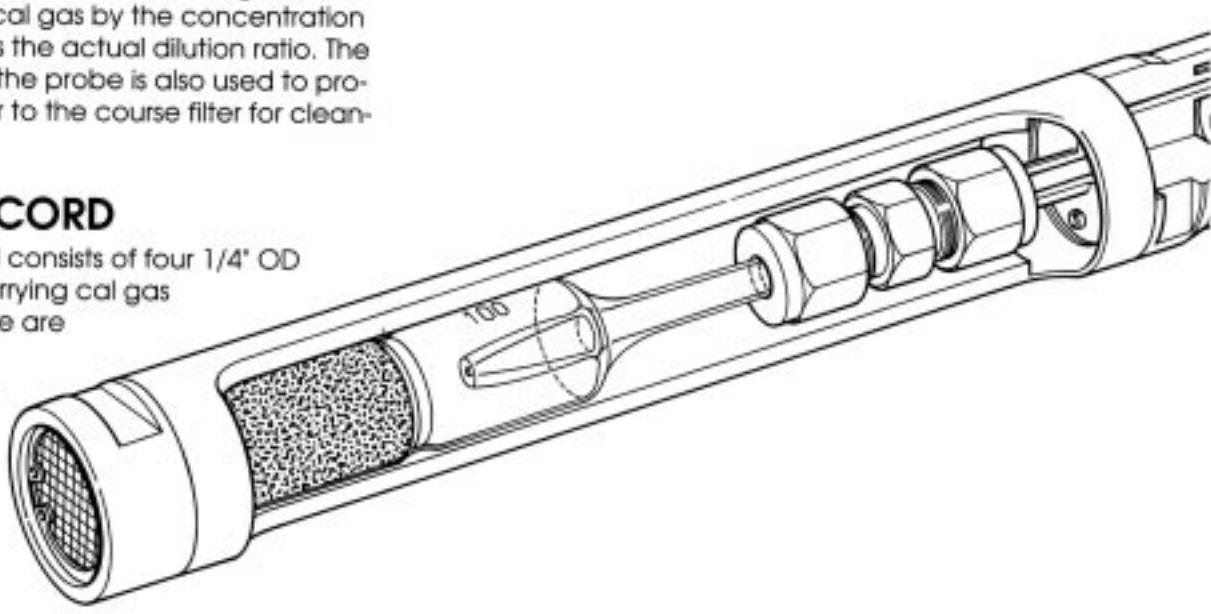


Figure 2

MODEL 797

DILUTING STACK SAMPLER TECHNICAL SPECIFICATIONS AND ORDERING INFORMATION

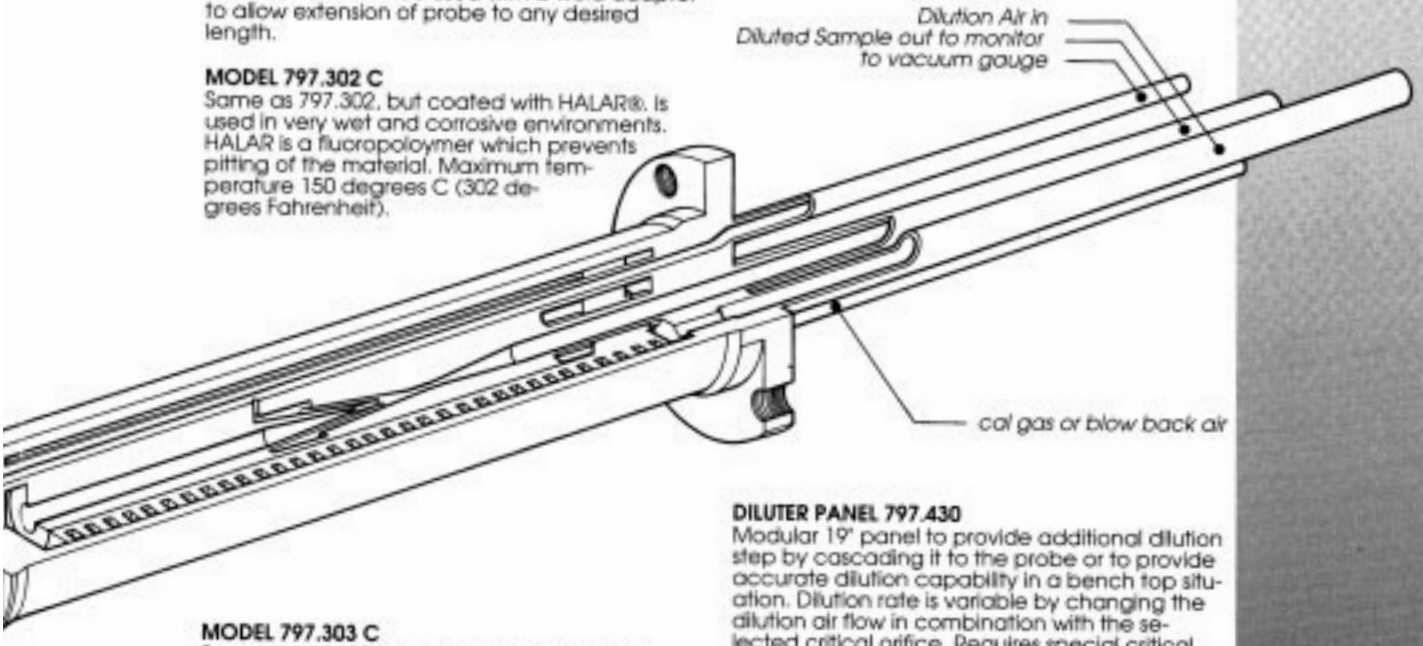
MODEL 797.302 DILUTING STACK PROBE
Special corrosion resistant nickel alloy material. Furnished with bolted support flange 46 mm (1 7/8") diameter and 4 threaded mounting holes. Maximum temperature 400 degrees Celsius (752 degrees Fahrenheit). Probe length 310 mm (12 1/5", diameter 27mm (1 1/12").

MODEL 797.303
Same as above, but furnished with 7/8" G threaded end. To be used with a weld adapter to allow extension of probe to any desired length.

MODEL 797.302 C
Same as 797.302, but coated with HALAR®. Is used in very wet and corrosive environments. HALAR is a fluoropoloymer which prevents pitting of the material. Maximum temperature 150 degrees C (302 degrees Fahrenheit).

CONTROL PANEL 797.440
Modular 19" panel for control of the pressurized air in the probe (all models). Flow meters allow the measurement and control of "blow back air" for coarse filter cleaning and the flow adjustment of span gas. Height 8 3/4" = 5 units.

CONTROL PANEL 797.441
Same as model 797.440, but provides automatic blow back for cleaning of coarse filter.



MODEL 797.303 C
Same as 797.303, coated with HALAR® and threaded end piece.

MODEL 797.305
Same as 797.302, but for high temperature applications. Maximum temperature 600 degrees C (1112 degrees Fahrenheit). Requires Quartz orifice with ball-joint mounting end.

MODEL 797.306
Same as 797.303, but for high temperature applications. See 797.305.

CRITICAL ORIFICES

Nominal flow ml/min	Dilution Ratio min	max	Glass part#	Quartz part#
20	215:1	350:1	2126.064	N/A
50	95:1	150:1	2126.047	N/A
100	44:1	75:1	2126.044	2126.057
150	32:1	50:1	2126.045	2126.058
200	27:1	37:1	2126.046	2126.059
250	20:1	30:1	2126.048	2126.060
500	12:1	16:1	2126.049	2126.061

DILUTER PANEL 797.430
Modular 19" panel to provide additional dilution step by cascading it to the probe or to provide accurate dilution capability in a bench top situation. Dilution rate is variable by changing the dilution air flow in combination with the selected critical orifice. Requires special critical orifices!

UMBILICAL CORD
Connects probe to control panel. Consists of 4 1/4" lines, strain relief cord and flexible mantle. Maximum recommended length 300 feet.

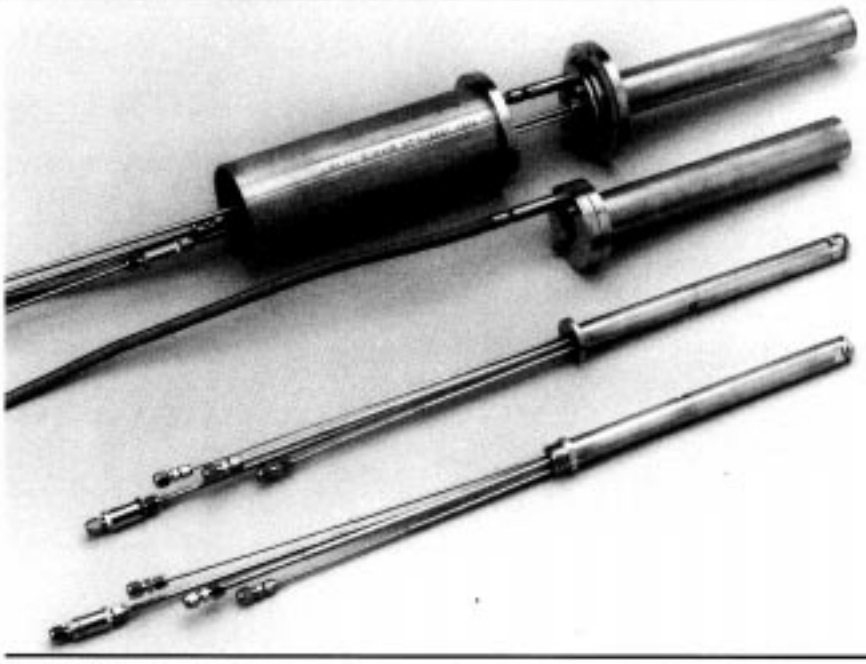
WELDING ADAPTER
For use on probes with 7/8" G threaded ends. Allows extension of probe to any desired length with appropriate extension pipe.

0040.260 Standard welding adapter for use with 1 1/4", schedule 10 seamless SS pipe.
0040.261 As above, but for 1 1/4", schedule 40 seamless SS pipe.
0040.262 As above, but for 1 1/4", schedule 80 seamless SS pipe.
0040.263 As above, but for 1 1/2", schedule 160 seamless SS pipe.

HALAR® is a registered trademark of Allied Corporation.

MODEL 797

Heater assembly



The EPM probe heater may be used in those applications where strong variations of the process or stack temperature and consequently in the probe may be expected.

The heater allows the EPM stack probe to be kept at a constant temperature which may be set to approximately 30...50 °C (50...90 °F) above stack temperature. The maximum set temperature of the heater is 300 °C (572 °F). The temperature is set on an optional temperature controller (P/N 2136.270).
A thermocouple type K, incorporated in the heater coil, is used as a temperature sensor. The heater power is controlled via an optional solid state relay (P/N 2136.272).

The probe heater 797.560/561 series is designed to accept model 797.302 as well as model 797.303 probes. The probes must be fitted with the latest model filter cap assembly to allow the use of a special KALREZ® O-ring. All probes manufactured after December 1993 are fitted with this new model filter cap.

The front caps (P/N 0041.051) with inlet filter (P/N 0040.267) and circlip (P/N 6132.222) of older probes must be replaced by the new model filter cap (P/N 0041.108) when the model 797.560/561 series heater is being used.

HEATERS OPTIONS

With SS 316L mantle
797.560L-230V- 4m
797.560L-115V- 4m
797.560L-230V- 8m
797.560L-115V- 8m

With Hastelloy C22 mantle
797.560H-230V-4m
797.560H-115V-4m
797.560H-230V-8m
797.560H-115V-8m

With SS 316L mantle and extension flange (including SS 316 counter flange)
797.561L-230V- 4m
797.561L-115V- 4m
797.561L-230V- 8m
797.561L-115V- 8m

With Hastelloy C22 mantle and extension flange (including Hastelloy C22 counter flange)
797.561H-230V-4m
797.561H-115V-4m
797.561H-230V-8m
797.561H-115V-8m

Temperature Controller	P/N 2136.270
Solid state relay	P/N 2136.274

Extension cables:
T/C extension cable for type K T/C with special T/C connectors

HEATER MODELS

A variety of heater models is available from EPM. The modular construction features a flexible assembly of the various basic models in our works at Erm, the Netherlands.

Choice can be made of:

1. Material of the outer mantle. Choice of SS 316L or Hastelloy C22. Other materials on request.

2. Models 797.561 fitted with a mounting flange to allow easy extension of the heater whereby all (gas) connections of the probe and the electrical leads of the heater are protected inside the extension/mounting tube (3 1/2" Sch.5S...40S pipe).

3. 230 V or 115 V power supply.

4. Length of power supply and T/C cable of either 4 meter (160") or 8 meter (320").

For ordering codes refer to the heater options list.

All heater models are supplied with one KALREZ® O-ring (P/N 2132.100) which must be mounted on the (new model) filter cap assembly of the probe.
All model 797.561 heaters include the extension ring which must be welded to the 3 1/2" Sch.5S...40S extension pipe (by customer). The extension ring is always supplied in the same material as the outer mantle of the heater (P/N 0041.107 extension ring made of SS 316 and P/N 0041.127 extension ring made of Hastelloy).
The four bolts and nuts, which are supplied to connect the heater flange to the extension ring are made of SS 316 (also for the Hastelloy heaters).

EPM

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