Non-Dispersive Infrared Analyzer

- Factory Mutual FM approved CI, DII, Groups B, C, D with approved purge
- Routine adjustments made from front panel keypad
- Luft detector technology
- Front panel push-button calibration
- Standard linearizer field-adjustable
- Optional auto zero/span
- Field-changeable configurations
- Optional remote range change and ID
- LCD display with backlighting
- Adjustable speed of response

Emerson's Rosemount Analytical Model 880A is an infrared analyzer designed to cover a wide range of process, stack and automotive applications. Time-proven Luft detector technology, microprocessor operation, user-friendly software and many other features make the Model 880A an industry benchmark. Ease of operation and calibration, programmable linearizing coefficients, field-retrofitable configurations, selectable speed of response and proven reliability are just a few of the many standard features you expect from a worldwide leader in non-dispersive infrared technology.

FEATURES

The Model 880A offers the convenience of complete setup and operation from the front panel keypad. The component of interest, range span, linearizing coefficients and zero/span parameters are all set with these keys. A calibration gas control option allows two solenoids to be remotely actuated from the front panel, enabling calibrations without leaving the analyzer. An automatic zero/span option is also available for unattended calibration of all three ranges.

Calibration is made even easier with calibration error messages and single key calibration. The calibration messages alert the user that preset limits or adjustment have been reached during zero or span operations and that maintenance, such as cleaning the cells, is required. The single key calibration for either zero or span automatically calibrates the analyzer to programmed values with the push of a button.

The Model 880A offers a choice of readout units. The analyzer can be set up and calibrated to read percent of fullscale or by actuating the linearizer, can be set to read engineering units. An additional advantage offered by the 880A is analyzer diagnostic functions. By pressing the front panel mode key, the user can quickly check the status of four operational parameters without interrupting the continuous operation of the analyzer. The pre-programmed diagnostic function checks the oscillator tuning, source current, detector signal and power supply voltages.

Four user-programmable function keys are available to enable the frequent checking of a single diagnostic point or set point modification. Once programmed, a simple push of the key will instantly access the specific diagnostic data or allow for changes in the range setting, alarm setpoint, current output scaling, time constant or any other preset function.

The flexibility of the Model 880A is further increased by the ability to reconfigure the analyzer in the field. For instance, ranges may be changed or the analyzer's linearizer can be adjusted for specific user gas values. The individual target gas can also be changed, for appropriate cell lengths, by simply changing the detector and the analyzer setup.

The operation of the Model 880A can be enhanced with the choice of several options. In addition to the zero/span options already mentioned, current output with zero suppression is also available. In normal use, the 0/4 to 20 mA current output is set to represent 100% of scale.

In the suppressed range mode selected from the front panel, the current output represents any suppressed range with at least a 25% span, such as 0% to 25%, 20% to 80% or 75% to 100% of scale. User-set dual alarms are available with configurable HI/LO designations and deadband. Also available is an optional remote range change and ID with keypad-selectable decimal or binary codes.

In vehicle emissions measurements where small deviations may determine the course of development programs or in process applications where yield is related to precision, an accurate analyzer with precise measurement capabilities is essential.

Precision is a key feature of the superior performance of the Model 880A. High sensitivity, coupled with optical path length selection, permits measurements from parts per million to 100% concentrations. With precision to 1% of fullscale, measurement deviation is minimized on even the most sensitive ranges.

The completely enclosed beam chopper provides high stability and freedom from atmospheric interferences in the testing location. Glass sample and reference cells improve stability by eliminating zero drift, typically caused by cell corrosion and provide superior light-energy transmittance creating high detector signals with inherently low noise levels.

The improved IR sources with their constant current source driver and the chopper motor controlled by a quartz crystal enhance detector-signal stability, provide drift-free performance and completely eliminate changes due to power line frequency variations.

In addition, the analyzer utilizes the Luft detector principle which has high sensitivity and high interference rejection capability.

Speed of response is field-selectable from 0.5 seconds for high speed monitoring to 20 seconds for closed loop process or emission control. Speed of response can be set independently for each range.

The Model 880A is a relay rack-mounted design, but is also suitable for panel- or table-mount. Materials in contact with the sample include 316 Stainless Steel fittings, gold-plated glass cells and Teflon[1] tubing. The analyzer is constructed with a slide-out chassis to allow convenient access to all internal components.

PRINCIPLE OF OPERATION

The Model 880A Analyzer produces infrared radiation from two separate energy sources. This radiation is modulated by a chopper into 5 Hz pulses. Depending on the application, the radiation may them pass through optical or gas filters to reduce background interference from other infrared-absorbing components. Each infrared beam passes through a separate cell. One cell contains a continuous flowing sample while the other cell is either sealed or contains a continuous flowing reference gas.

During operation, a portion of the infrared radiation is absorbed by the component of interest in the sample, with the quantity of infrared radiation absorbed being proportional to the component concentration. The detector is a "gas microphone" based on the Luft principle. It converts the difference in energy between sample and reference cells to a change in capacitance. This capacitance change, equivalent to component concentration, is amplified and indicated on the display and, if desired, transmitted to a data acquisition device and/or controller.

APPLICATIONS[2]

The Model 880A Analyzer is designed for a variety of process and automotive applications where a particular component in a gaseous stream must be continuously monitored. Typical measurements include:

Chemical and Petroleum

Carbon Dioxide:	Ethylene oxide manufacture, phthalic anhydride manufacture, ammonia manufacture, producer gas monitor, nitrogen generation
Carbon Monoxide:	Stack monitoring
Methane:	Ammonia manufacture
Acetylene:	Acetylene manufacture, acrylonitrile manufacture, Vinyl chloride manufacture
Sulfur Dioxide:	Sulfuric acid stack gas

Food and Agriculture

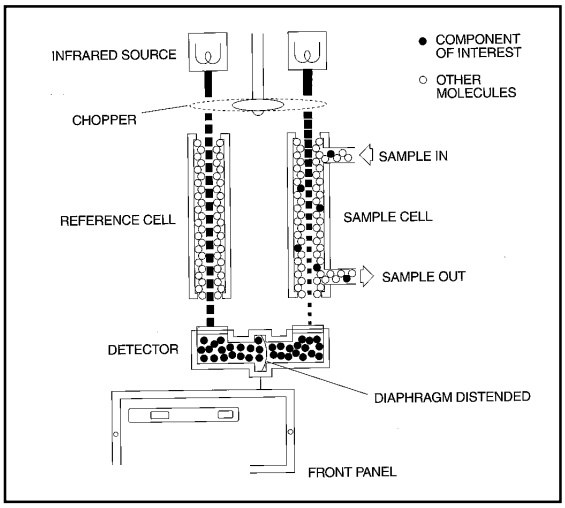
Carbon dioxide and water vapor: blanketing of perishables, fermentation processes, photosynthesis studies, personnel protection

Aerospace and Oceanography

Carbon dioxide, carbon monoxide and water vapor: diving and space chambers

Metals and Ceramics

Carbon Dioxide:	Producer gas monitor, steel converting, cement manufacture, soaking pit, heat treating
Carbon Monoxide:	Inert gas generation, producer gas monitor, rotary kiln roasting, tin plant annealing, steel converting, aluminum powder processing, porcelain kilns, tunnels
Sulfur Dioxide:	Flash smelting
Ammonia:	Ammonia dissociation



SPECIFICATIONS

Precision:	1% of fullscale
Noise:	1% of fullscale
Zero Drift:	± 1% of fullscale per 24 hours/± 2% of FS/week at constant temperature
Span Drift:	± 1% of fullscale per 24 hours/± 2% of FS/week at constant temperature
Ambient Temperature Effect:	< ± 1% of fullscale over any 10°C interval for rate of change no greater than 10°C/hr. (application dependent)
Response Time (Electronic):	Variable, 90% of fullscale in 0.5 sec. to 20 sec., field selectable
Sensitivity:	100 ppm fullscale carbon monoxide at atmospheric pressure 50 ppm fullscale carbon dioxide at atmospheric pressure
Sample Cell Length:	0.04 inches (1mm) to 15.0 inches (381mm)
Materials in Contact with Sample:	Windows: sapphire, quartz, Irtran[3]

TYPICAL CONFIGURATIONS

NO.	APPLICATION
10	0-1 5% CO
11	0-1000 5000 ppm CO
12	0-1 5% CO
14	0-100 1000 ppm CO
16	0-200 1000 ppm CO
18	0-2 10% CO
22	0-1/2 2 1/2% CO_2
23	0-5 20% CO_2

NO.	APPLICATION
27	0-10 100 ppm CO_2
32	0-2 10% CH_4 [2]
36	0-500 5000 ppm CO_2
38	0-2% 6% CO_2
46	0-10 100 ppm CO_2
66	0-200 1000 ppm SO_2
85	0-300 1500 ppm NH_3

[1] Teflon is a registered trademark of E.I. DuPont de Nemours & Co., Inc.

[2] Analyzers sampling flammable gases must be protected by a continuous dilution purge system in accordance with standard ANSI/NFPA 496-1993, Chapter 6. Consult factory for recommendations.

[3] Irtran is a registered trademark of Eastman Kodak Co.

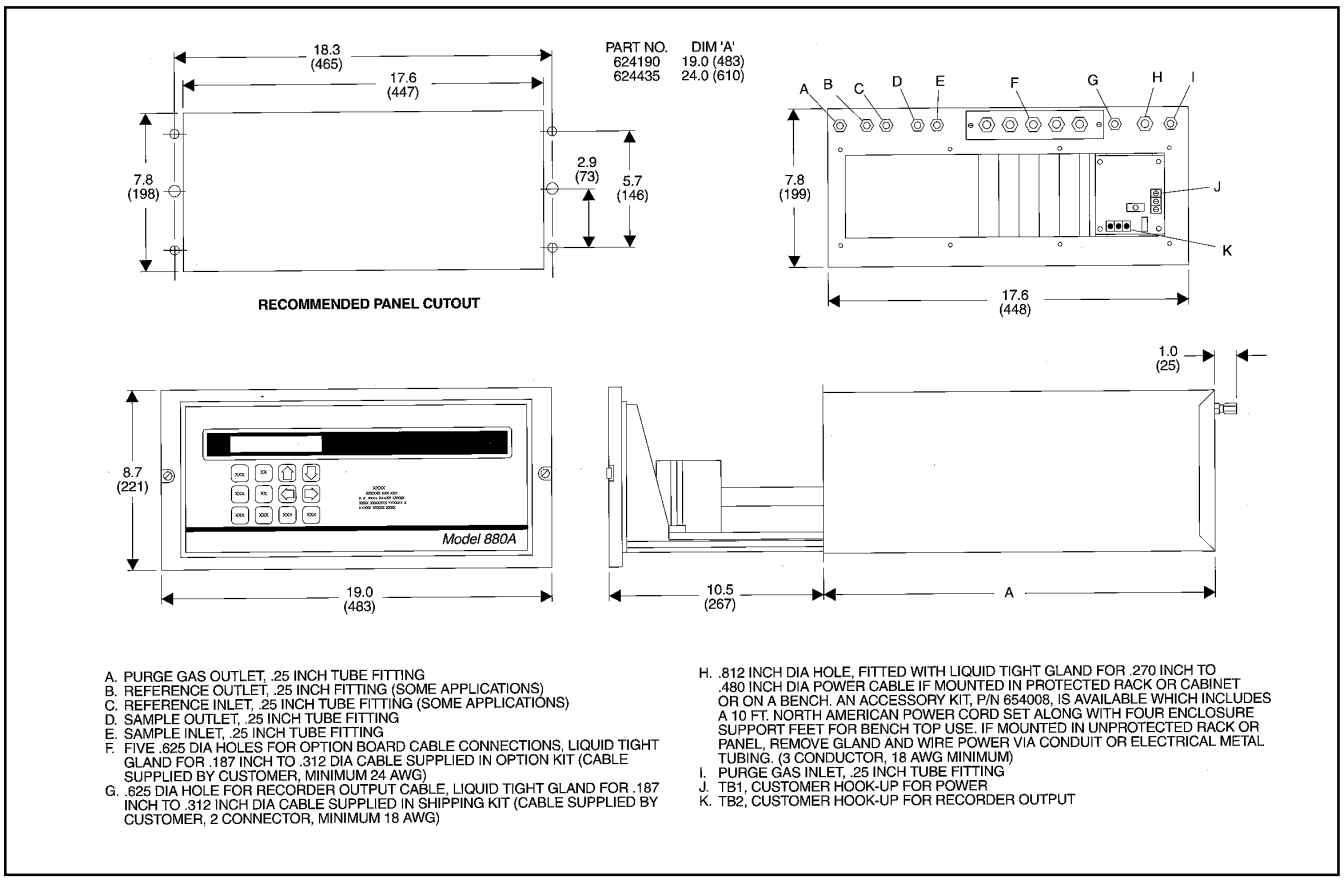
Cells:	Gold-plated Pyrex[1] or Stainless Steel
Tubing:	FEP Teflon
Fittings:	316 Stainless Steel
O-Rings:	Viton-A[2]
Sample Flow Rate:	Nominal 500 to 1,000 cc/minimum
Sample Pressure:	Maximum 10 psig (higher pressures used in pressurized cell applications)
Ambient Temperature Range:	59° to 95°F (15° to 35°C), 32° to 113°F (0° to 45°C) with optional case heater
Analog Output:	Standard (Potentiometric): 0 to 5VDC Optional (Current) 0/4 to 20 mA
Linearization:	Keypad entered coefficients for linearizing 1, 2, or all 3 ranges
Power Requirements:	115 volts AC/230 volts AC ± 10%, 50/60 Hz ± 3Hz, 150 W (300 W with optional case heater)
Alarm Option:	Two single-point, field-programmable high or low, deadband up to 20% of fullscale
Alarm Relay Outputs:	Two form C contacts rated 3 A (125/250 VAC) or 5 A (30 VDC) (resistive)
Calibration Gas Control Option:	Two front panel actuated contact closures
Calibration Gas Control Outputs:	Two form C contacts rated 3 A (125/250 VAC) or 5 A (30 VDC) (resistive)

[1] Pyrex is a registered trademark of Corning Glass Works

[2] Viton is a registered trademark of E.I. duPont de Numours & Co., Inc.

Auto Zero/Span Output:	Four contact closures, field-programmable frequency and duration of closure; two contact closures for indication of insufficient zero and span adjustment
Auto Zero/Span Relay Outputs:	Four form C contacts rated 3 A (125/250 VAC) or 5 A (30 VDC) (resistive) Two form A contacts rated at (resistive load): Maximum switching power: 10W Maximum switching voltage: 30 VDC Maximum switching current: 0.5 A
Remote Range Change and ID Option:	Three remotely changeable ranges with positive identification. Binary or decimal code, field-selectable.
Remote Range Change Relay Output:	Eight form A contacts rated at (resistive load): Maximum switching power: 10W Maximum switching voltage: 30 VDC Maximum switching current: 0.5 A
Enclosure:	General purpose for installation in weather-protected area
Overall Dimensions:	8-11/16 inches (220 mm) H 19 inches (483 mm) W 19 inches (483 mm) L, standard case 24 inches (610 mm) L, extended case
Instrument Weight:	56 pounds (25 kg), standard case 68 pounds (31 kg), extended case

Specifications are subject to change without notification. Our policy is one of continuous product improvement, and we reserve the right to change specifications.



A. PURGE GAS OUTLET, .25 INCH TUBE FITTING
B. REFERENCE OUTLET, .25 INCH FITTING (SOME APPLICATIONS)
C. REFERENCE INLET, .25 INCH TUBE FITTING (SOME APPLICATIONS)
D. SAMPLE OUTLET, .25 INCH TUBE FITTING
E. SAMPLE INLET, .25 INCH TUBE FITTING
F. FIVE .625 DIA HOLES FOR OPTION BOARD CABLE CONNECTIONS, LIQUID TIGHT GLAND FOR .187 INCH TO .312 DIA CABLE SUPPLIED IN OPTION KIT (CABLE SUPPLIED BY CUSTOMER, MINIMUM 24 AWG)
G. .625 DIA HOLE FOR RECORDER OUTPUT CABLE, LIQUID TIGHT GLAND FOR .187 INCH TO .312 INCH DIA CABLE SUPPLIED IN SHIPPING KIT (CABLE SUPPLIED BY CUSTOMER, 2 CONNECTOR, MINIMUM 18 AWG)
H. .812 INCH DIA HOLE, FITTED WITH LIQUID TIGHT GLAND FOR .270 INCH TO .480 INCH DIA POWER CABLE IF MOUNTED IN PROTECTED RACK OR CABINET OR ON A BENCH. AN ACCESSORY KIT, P/N 654008, IS AVAILABLE WHICH INCLUDES A 10 FT. NORTH AMERICAN POWER CORD SET ALONG WITH FOUR ENCLOSURE SUPPORT FEET FOR BENCH TOP USE. IF MOUNTED IN UNPROTECTED RACK OR PANEL, REMOVE GLAND AND WIRE POWER VIA CONDUIT OR ELECTRICAL METAL TUBING. (3 CONDUCTOR, 18 AWG MINIMUM)
I. PURGE GAS INLET, .25 INCH TUBE FITTING
J. TB1, CUSTOMER HOOK-UP FOR POWER
K. TB2, CUSTOMER HOOK-UP FOR RECORDER OUTPUT

ORDERING INFORMATION

Model	Description
880AL	Process NDIR Analyzer (19” rack mount with 24” depth) (880AL)

Level 1	Application	
	06	CO, 0-500 ppm and 0-2500 ppm
	14	CO, 0-100 ppm and 0-1000 ppm, auto exhaust application, high CO_2 and H_2O discrimination
	15	CO, 0-50 ppm, ammonia manufacturing, optical filter, pressurized cell
	16	CO, 0-200 ppm and 0-1000 ppm, OSHA, auto, stack monitoring, optical filter
	19	CO_2, 150 ppm and 500 ppm
	24	CO_2, 0-100 ppm and 0-500 ppm, Environmental Chambers Application
	25	CO_2, 250-350 ppm and 0-600 ppm, differential photosynthesis, flowing reference
	27	CO_2, 0-10 ppm and 0-100 ppm, air separation and ammonia manufacturing, pressurized cell
	37	CH_4, 0-500 ppm and 0-5000 ppm, general application, optical filter
	44	C_6H_{14}, 0-200 ppm and 0-1000 ppm, OSHA Solvent Analysis, optical filter
	45	C_6H_{14}, 250 ppm and 1000 ppm
	46	CO_2, 0-10 ppm and 0-100 ppm, gas purity analysis and natural gas
	56	NO, 0-500 ppm and 0-2000 ppm, auto exhaust and stack monitoring, optical filter (H_2O)
	66	SO_2, 0-200 ppm and 1000 ppm, stack monitoring, optical filter (CO_2)
	75	H_2O, 0-0.2% and 1.0 %, general, gas filter
	77	CO and CO_2, 0-50 ppm
	85	NH_3, 0-300 ppm and 1500 ppm, auto exhaust, leak detection, optical filter
	86	CO and CO_2, 0-50 ppm, ammonia plant, pressurized cell
	87	NH_3, 10% and 100%

Level 2	Range	
	01	Standard range with calibration curves
	02	One non-standard range with calibration curve
	03	Two non-standard ranges with calibration curve
	04	Three non-standard ranges with calibration curve

Level 3	Linearization	
	00	None
	01	One standard range (range 3)
	02	Two standard ranges (ranges 1 and 3)
	03	Two standard ranges and one non-standard
	04	One non-standard range
	05	Two non-standard ranges
	06	Three non-standard ranges

Level 4	Case Temperature Control	
	00	None
	01	Case heater/Controller
	02	EMC Kit without heater – Controller
	03	EMC Kit with heater – Controller

ORDERING INFORMATION (continued)

Level 5	Output	
	00	None (standard 0-5 VDC)
	01	Option Board Mounting Kit, installed (see note)
	10	Isolated current output (mounting kit included)
	11	Dual alarms (mounting kit included)
	12	Isolated remote range control (mounting kit included)
	20	Current output plus dual alarms (mounting kit included)
	21	Current alarms plus remote range control (mounting kit included)
	22	Dual alarms plus remote range control (mounting kit included)
	30	Current output plus dual alarms, plus remote range control (mounting kit included)
	41	Off range alarm contact (with current and remote control)
	42	Fail safe alarm
	43	Off range alarm and fail safe (with current and remote control)

Level 6	Calibration Interface	
	00	None
	01	Manual-zero and span (see note)
	02	Automatic-zero and span

Accessories	
Part #	**Description**
624446	Z Purge
634958	Bench mounting kit
654008	Power cord kit
748250	Manual Model 880A

ORDERING INFORMATION

Model	Description
880AS	Process NDIR Analyzer (19” rack mount with 19” depth) (880AS)

Level 1	Application	
	07	CO, 0-1000 ppm and 1%, general application, optical filter
	08	CO, 0-5000 ppm and 2.5%, general application, optical filter
	10	CO, 0-1% and 5%, general application, optical filter
	11	CO, 0-1000 ppm and 5000 ppm, general application, optical filter
	12	CO, 0-1% and 5%, general application, optical filter
	13	CO, 0-10% and 100%, general application, 200 mm detector
	18	CO, 0-2% and 0-10%, auto exhaust application, optical filter, 50 mm detector
	19	CO_2, 0-150 ppm and 1500 ppm, general application
	21	CO_2, 0-500 ppm and 2500 ppm, general application
	22	CO_2, 0-0.5% and 0-2.5%, general application
	23	CO_2, 0-5% and 0-20%, auto emissions, source purge
	26	CO_2, 0-20% and 0-100%, food processing application
	29	CO_2, 0-0.1% and 1.0%, general application
	30	CO_2, 0-0.5% and 5.0%, general application
	31	CH_4, 0-2000 ppm and 10000 ppm, general application, optical filter
	32	CH_4, 0-2% and 10%, ammonia manufacturing, optical filter
	33	CH_4, 0-10% and 0-50%, general application
	34	CH_4, 0-20% and 0-100%, general application
	35	CH_4, 0-1%, 0-5%, 0-15% and 0-20%, ammonia plant application, stacked cells
	36	CO_2, 0-500 ppm and 0-5000 ppm, environmental diving chamber
	38	CO_2, 0-2% and 0-6%, auto exhaust application
	39	CH_4, 0-1% and 0-10%, general application, optical filter
	41	C_6H_{14}, 0-1000 ppm and 0-5000 ppm, auto emission application
	42	C_6H_{14}, 0-1% and 5%, auto exhaust, optical filter, cell
	43	C_6H_{14}, 0-0.5% and 0-2%, auto exhaust application, optical filter
	54	NO, 0-2000 ppm and 10000 ppm, auto exhaust and stack monitoring, optical filter (H_2O)
	55	NO, 0-2% and 10%, nitric acid plants, optical filter (H_2O)
	63	SO_2, 0-10% and 0-30%, sulfuric acid plant application
	64	SO_2, 0-800 ppm and 4000 ppm, stack monitoring, optical filter CO_2 – Carbon Dioxide
	65	SO_2, 0-0.4 % and 0-2%
	67	SO_2, 0-0.5 % and 0-4%, sullfuric acid plant, optical filter
	71	C_2H_4 Ethylene, 0-2% and 10%, food ripening application
	72	C_2H_4, 0-2% and 10%, ethylene manufacture, optical filter
	73	H_2O, 0-3000 ppm and 0-1.5%, general application, gas filter
	74	H_2O, 0-5%, general application, gas filter
	76	CO_2, 0-5% and 0-20%, CO_2 in natural gas, optical filter
	81	NH_3, 0-2000 ppm and 10000 ppm
	82	NH_3, 0-2% and 10%
	83	NH_3, 0-2000 ppm and 10000 ppm, ammonia manufacturing application, optical filter (H_2O)
	84	NH_3, 0-2% and 10%, ammonia manufacturing application, optical filter (H_2O)
	87	NH_3, 10% and 100%

Level 2	Range	
	01	Standard range with calibration curves
	02	One non-standard range with calibration curve
	03	Two non-standard ranges with calibration curve
	04	Three non-standard ranges with calibration curve

ORDERING INFORMATION (continued)

Level 3	Linearization
00	None
01	One standard range (range 3)
02	Two standard ranges (ranges 1 and 3)
03	Two standard ranges and one non-standard
04	One non-standard range
05	Two non-standard ranges
06	Three non-standard ranges

Level 4	Case Temperature Control
00	None (see note)
01	Case heater/Controller
02	EMC kit without heater – Controller
03	EMC kit with heater – Controller

Level 5	Output
00	None (standard 0-5 VDC)
01	Option board mounting kit, installed (see note)
10	Isolated current output (see note)
11	Dual alarms (see note)
12	Isolated remote range control (see note)
20	Current output plus dual alarms (see note)
21	Current output plus remote range control (see note)
22	Dual alarms plus remote range control (see note)
30	Current output plus dual alarms, plus remote range control (see note)
41	Off range alarm contact (with current and remote control)
42	Fail safe alarm
43	Off range alarm and fail safe (with current and remote control)

Level 6	Calibration Interface
00	None
01	Manual-zero and span (see note)
02	Automatic zero and span (see note)

Accessories	
Part #	**Description**
624446	Z Purge
634958	Bench mounting kit
654008	Power cord kit
748250	Manual Model 880A

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