

DRAFT

December xx, 1995

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. David B. Lowe
Solid Waste Authority of
Palm Beach County
7501 North Jog Road
West Palm Beach, Florida 33412

Dear Mr. Lowe:

Re: North County Resource Recovery Facility (NCRRF)
PSD-FL-108(B), Solid Waste Authority of Palm Beach County

The Department received your request of August 11, 1995, and supporting information to install a landfill collection system to control emissions from the Class I and Class III landfills at the North County Resource Recovery Facility (NCRRF). This request will require adding new specific conditions to the above referenced PSD permit. This permit is amended as follows:

NEW SPECIFIC CONDITIONS:

1. This source shall be allowed to operate continuously (i.e., 8760 hours/year).
2. The utility flare system shall be designed, manufactured, and operated according to U.S. Environmental Protection Agency criteria as specified in 40 CFR 60.18, guaranteeing high efficiency combustion of landfill gas at the 98% level of destruction of total hydrocarbons, with a flame temperature of at or above 1400°F.
3. There shall be no visible emissions from any individual flare, except for periods not to exceed a total of five minutes during any two consecutive hours.
4. For inventory purposes, the pollutant emission rates from the flare system are:

DRAFT

Mr. David B. Lowe
Page Two
December XX, 1995

EMISSION RATE

<u>Pollutant</u>	<u>Emission Factors</u>	<u>Pounds/Hour</u>	<u>Tons/Year</u>
NO _x	0.07 LB/MMBTU	1.67	7.33
VOC	36 LBS/MMF ³	1.94	8.51
SO ₂	0.002 LB/HR/DSCFM	1.67	1.33
PM ₁₀	1.69 E-05 LBS/SCF	0.91	3.99
CO	0.37 LB/MMBTU	9.10	39.87

5. This source shall meet the applicable requirements of 40 CFR Subpart WWW, NSPS for Municipal Solid Waste Landfills; 40 CFR 60.18, General Control Device Requirements; Chapters 62-209 through 297 and 62-4, F.A.C.

6. Compliance with the visible emissions standard shall be determined using EPA Method 22 and shall be for the duration of 2 hours. Such tests shall be conducted within 60 days of completion of construction and initial startup operation, and annually thereafter. The required visible emissions test report shall also contain the extraction wells gas flow rate and the flare temperature data.

7. Sulfur content of the input gas to any flare shall not exceed 0.045 pounds per hour.

8. An analysis shall be performed to determine the sulfur content of input gas to the flare, by the American Society for Testing and Materials (ASTM) test method, D 1072-90, prior to any flare startup. Additional tests shall be performed on a yearly basis, and results included as part of the facility's annual operating report.

9. Pursuant to Rule 62-296.320(2), F.A.C., Objectionable Odors caused by these sources are prohibited.

10. Total volumetric flow to any flare in the system shall be limited to 900 scfm. Total volumetric flow to the aggregate of the two flares shall be limited to 1800 scfm.

11. Proper devices shall be installed at all wellheads, and at the flare station for 1) gas flow volume and gas pressure measurements, 2) gas composition analysis, 3) gas temperature and flame temperature recording, and 4) flow control, prior to the collection and disposal of the active landfill gases. Such devices shall be properly calibrated and maintained at all times, according to manufacturers' written instructions.



Camp Dresser & McKee Inc.

environmental
services

1601 Belvedere Road, Suite 211 South
West Palm Beach, Florida 33406
Tel: 407 689-3336 Fax: 407 689-9713

November 30, 1995

FEDERAL EXPRESS

Ms. Teresa Heron
Power Plant Siting Section
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

RECEIVED
NOV 4 1995
BUREAU OF
AIR REGULATION

Subject: Power Plant Site Certification PA 84-20
Application to Construct/Operate Landfill Gas
Management System for Class I and Class III Landfills
North County Resource Recovery Facility
Solid Waste Authority of Palm Beach County

Dear Ms. Heron:

Reference is made to your facsimile dated October 16, 1995 regarding the above referenced project. Below is our written response to each of the Department's technical staff comments listed in your letter and repeated below in bold.

Comment No. 1: What will be the total number of wells at both landfills?

This project which is considered Phase I of the entire landfill (both Class I and Class III landfills) gas management system includes:

- 16 wells for Class I landfill
- 98 gas extraction trenches and 60 gas extraction risers for the Class III landfill

The exact number of wells for the future phases of the project will be determined as part of designing the LFG system for the future cells of the landfill.

Comment No. 2: How will the gas flow to the flare and flare flame operating temperature be monitored? Please provide the proposed make and model of the measurement device. Appendix H Will measurements be automatically recorded? What is the maximum/ average gas flow per well? What is the total volumetric gas flow to the flare (SCFM)?

Flare flame operations will be monitored through the use of installed thermocouplers. A strip chart recorder will be installed to continuously record critical operating data (see information attached).

Ms. Teresa Heron
November 30, 1995
Page 2

Also, gas flow calculations for the Class I wells and for the Class III trenches/risers are transmitted herewith. Additionally, as indicated in the original permit application, the maximum throughput rate for each of the proposed two flares is 900 scfm.

Comment No. 3: Appendix B drawings were not included with the application.

A copy of Appendix B drawings is transmitted herewith. Please note that six complete signed and sealed sets of same were submitted with the original application.

Comment No. 4: Provide legible copies of drawings included in Appendix C. Show wells, gas collection system, and flare.

An additional copy of Appendix C drawings is transmitted herewith.

Comment No. 5: What is the net heating value of the gas being combusted (Btu/ scf)?

The net heating value of the landfill gas can vary from a minimum of 300 Btu/cu ft. to a maximum of 600 Btu/cu ft. A heating value of 450 - 550 Btu/cu ft. is anticipated.

Comment No. 6: What is the exit velocity (ft/ sec) of the flare?

An exit Velocity of < 60 ft/sec. is anticipated.

Comment No. 7: What fuel is used for the pilot light and how is its flame monitored?

Propane is used as the fuel for the pilot light. The pilot flame will be monitored through the use of an installed thermocoupler. The thermocoupler will verify that the pilot light has lighted before the main flame ignition is initiated. Once the main flame thermocoupler verifies that the main flame has ignited, the pilot will shut down.

Comment No. 8: What is the maximum/ average sulfur content of the input gas to the flare?

The sulfur content of the input gas to the flare should not exceed .045 pounds per hour.

As requested, we have also enclosed a copy of permit number PSD-FL-108A for the North County Resource Recovery Facility issued by FDEP on January 14, 1992.

Ms. Teresa Heron
November 30, 1995
Page 3

We trust that this submittal satisfies your request for clarification of the information provided in the permit application. If you have any questions or require further clarification, please do not hesitate to contact this office.

Very truly yours,

CAMP-DRESSER & McKEE INC.

A handwritten signature in black ink, appearing to read 'Alex H. Makled', with a long horizontal flourish extending to the right.

Alex H. Makled, P.E.

File: 2678-08-RT[1]

cc: Halmilton S. Oven, P.E., FDEP/Tallahassee, w/o enclosures
David Lowe, P.E., Solid Waste Authority, w/o enclosures
Marc Bruner, Ph.D., Solid Waste Authority, w/o enclosures
John Booth, P.E., Solid Waste Authority, w/o enclosures

mm0829

GAS FLOW CALCULATIONS
 LANDFILL GAS RECOVERY SYSTEM
 NCRRF CLASS I LANDFILL
 SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

DENSITY OF REFUSE: 1200.00 lb/cy
 GAS GENERATION RATE: 0.0350 cf/lb-yr
 PIPE DESIGN 1.2*GGR: 0.042 cf/lb-yr
 RECOVERY DESIGN 0.8*GGR: 0.028 cf/lb-yr
 ROI Factor: 4.30
 ROI Correction Factor: 1.13 0.00

WELL NO.	COORDINATES		EXISTING GRADE (MSL)	LF BASE GRADE (MSL)	WELL ROI (FT)	REFUSE BORING DEPTH (FT)	PIPE DESIGN FLOWS (CFM)
W01	883571	780832	66.55	24.00	125	39.55	7.8
W02	883437	780997	64.35	23.35	125	38.00	7.5
W03	883432	781249	68.92	23.37	125	42.55	8.3
W04	883425	781498	69.00	23.14	125	42.86	8.4
W05	883418	781750	68.31	23.20	125	42.11	8.3
W06	883434	781999	69.32	23.37	125	42.95	8.4
W07	883671	782010	69.82	24.80	125	42.02	8.2
W08	883906	782017	67.95	22.99	125	41.96	8.2
W09	883674	781843	81.88	24.60	125	54.28	10.7
W10	883639	781630	74.36	24.18	125	47.18	9.3
W11	883644	781380	72.25	24.56	125	44.69	8.8
W12	883649	781127	70.02	24.50	125	42.52	8.3
W13	883868	781022	64.48	24.15	125	37.33	7.3
W14	883871	781273	71.94	25.43	125	43.51	8.5
W15	883869	781524	70.57	25.82	125	41.75	8.2
W16	883936	781767	68.61	24.17	125	41.44	8.1
RW1							9.3
DL1							14.2
RW2							4.9
RW3							7.6
DL2							4.8
DL3							4.2
RW4							4.8
DL4							10.6
RW5							4.7

Total 684.69

SUM OF GAS WELL VOLUMES 199.3

793-12

GAS VOLUME CALCULATIONS
 LANDFILL GAS RECOVERY SYSTEM
 NCRRF CLASS II LANDFILL
 SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

REFUSE DENSITY (L 1200 (LBS/CU YD)
 GAS GEN RATE 0.1 (CU FT/LB/YR)

TRENCH	TRENCH LENGTH	PHASE A		PHASE A & B			PHASE A, B & C		
		% VOLUME	GAS VOLUME	TRENCH LENGTH	% VOLUME	GAS VOLUME	TRENCH LENGTH	% VOLUME	GAS VOLUME
CELL #1-3				52.8					
T1	713	0.222	13.9	356.5	0.111	7.0	237.7	0.074	4.6
T2	813	0.253	15.9	406.5	0.127	7.9	271.0	0.084	5.3
T3	843	0.263	16.5	421.5	0.131	8.2	281.0	0.088	5.5
T4	842	0.262	16.5	421	0.131	8.2	280.7	0.087	5.5
L40				356.5	0.111	7.0	237.7	0.074	4.6
L41				406.5	0.127	7.9	271.0	0.084	5.3
L42				421.5	0.131	8.2	281.0	0.088	5.5
L43				421	0.131	8.2	280.7	0.087	5.5
T80							237.7	0.074	4.6
T81							271.0	0.084	5.3
T82							281.0	0.088	5.5
T83							280.7	0.087	5.5
CELL #1-2				84.9					
T5	842	0.201	17.1	421	0.100	8.5	280.7	0.067	5.7
T6	840	0.200	17.0	420	0.100	8.5	280.0	0.067	5.7
T7	838	0.200	17.0	419	0.100	8.5	279.3	0.067	5.7
T8	836	0.200	16.9	418	0.100	8.5	278.7	0.067	5.6
T9	834	0.199	16.9	417	0.100	8.5	278.0	0.066	5.6
L44				421	0.100	8.5	280.7	0.067	5.7
L45				420	0.100	8.5	280.0	0.067	5.7
L46				419	0.100	8.5	279.3	0.067	5.7
L47				418	0.100	8.5	278.7	0.067	5.6
L48				417	0.100	8.5	278.0	0.066	5.6
T84							280.7	0.067	5.7
T85							280.0	0.067	5.7
T86							279.3	0.067	5.7
T87							278.7	0.067	5.6
T88							278.0	0.066	5.6
				414.5	0.100	11.4	276.3	0.067	7.6
				413.5	0.100	11.4	275.7	0.067	7.6
				412.5	0.100	11.3	275.0	0.067	7.6
				411.5	0.100	11.3	274.3	0.067	7.5
				410.5	0.100	11.3	273.7	0.066	7.5
L49				414.5	0.100	11.4	276.3	0.067	7.6
L50				413.5	0.100	11.4	275.7	0.067	7.6
L51				412.5	0.100	11.3	275.0	0.067	7.6
L52				411.5	0.100	11.3	274.3	0.067	7.5
L53				410.5	0.100	11.3	273.7	0.066	7.5
T89							276.3	0.067	7.6
T90							275.7	0.067	7.6
T91							275.0	0.067	7.6
T92							274.3	0.067	7.5
T93							273.7	0.066	7.5

GAS VOLUME CALCULATIONS
 LANDFILL GAS RECOVERY SYSTEM
 NCRRF CLASS III LANDFILL
 SOLID WASTE AUTHORITY OF PALM BEACH COUNTY

REFUSE DENSITY (L 1200 (LBS/CU YD)
 GAS GEN RATE 0.1 (CU FT/LB/YR)

TRENCH	TRENCH LENGTH	PHASE A % VOLUME	GAS VOLUME	TRENCH LENGTH	PHASE A & B % VOLUME	GAS VOLUME	TRENCH LENGTH	PHASE A, B & C % VOLUME	GAS VOLUME
				409	0.125	11.7	272.7	0.084	7.8
				408	0.125	11.7	272.0	0.083	7.8
				407.5	0.125	11.7	271.7	0.083	7.8
				406.5	0.125	11.6	271.0	0.083	7.8
L54				409	0.125	11.7	272.7	0.084	7.8
L55				408	0.125	11.7	272.0	0.083	7.8
L56				407.5	0.125	11.7	271.7	0.083	7.8
L57				406.5	0.125	11.6	271.0	0.083	7.8
T94							272.7	0.084	7.8
T95							272.0	0.083	7.8
T96							271.7	0.083	7.8
T97							271.0	0.083	7.8
				318	0.143	8.7	212.0	0.095	5.8
				383.5	0.173	10.5	255.7	0.115	7.0
				408.5	0.184	11.2	272.3	0.123	7.5
L58				318	0.143	8.7	212.0	0.095	5.8
L59				383.5	0.173	10.5	255.7	0.115	7.0
L60				408.5	0.184	11.2	272.3	0.123	7.5
T98							212.0	0.095	5.8
T99							255.7	0.115	7.0
T100							272.3	0.123	7.5
Total Gas Volume, CFM			415.41			415.41			415.41

TO: Buck Oven
FROM: Teresa Heron
THROUGH: Clair Fancy
Al Linero
SUBJECT: Solid Waste Authority of Palm Beach County
Landfill Flares
DATE: October 5, 1995

These are some questions regarding this project:

1. What will be the total number of wells at both landfills? 16 per class 1 and 97 trenches Please specify. How many gas wells will be installed over the life of the landfill, 200 total, and the maximum number of well for this site? Please be advised that future gas well additions will require modification to any air construction permit that has been issued.
2. How will the gas flow to the flare and flare flame operating temperature be monitored? Please provide the proposed make and model of the measurement device. Appendix H Will the measurements be automatically recorded? What is the maximum/average gas flow per well? Clas 1 :56 cfm What is the total volumetric gas flow to the flare (SCFM)? 900 per each flare.
3. Appendix B drawings were not included with the application.
4. Provide legible copies of drawings included in Appendix C Show wells, gas collection system, and flare.
5. What is the net heating value of the gas being combusted (Btu/scf)
6. What is the exit velocity (ft/sec) of the flare?
7. What fuel is used for the pilot light and how is its flame monitored?
8. What is the maximum/average sulfur content of the input gas to the flare?

PERMITTEE:

Brevard County Board of County
Commissioners

Permit Number:

AC05-238122

Expiration Date:

January 2, 1997

GENERAL CONDITIONS:

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. This source shall be allowed to operate continuously (i.e., 8760 hours/year).

2. The utility flare system shall be designed, manufactured, and operated according to U.S. Environmental Protection Agency criteria as specified in 40 CFR 60.18, guaranteeing high efficiency combustion of landfill gas at the 98% level of destruction of total hydrocarbons, with a flame temperature of at or above 1400°F.

3. There shall be no visible emissions from any individual flare, except for periods not to exceed a total of five minutes during any two consecutive hours.

4. For inventory purposes, the pollutant emission rates from the flare system are:

<u>Pollutant</u>	<u>Emission Rate</u>	
	<u>pounds/hour</u>	<u>tons/year</u>
NO _x	3.4	15.0
NMOC	.01	.05
SO ₂	.09	0.4
PM ₁₀	trace	trace

PERMITTEE:

Brevard County Board of County
Commissioners

Permit Number:

AC05-238122

Expiration Date:

January 2, 1997

SPECIFIC CONDITIONS:

5. This source shall meet the requirements of 40 CFR 60.18, and Chapters 17-212 and 17-4, F.A.C.

6. Maximum allowable emissions rates of carbon monoxide (CO) are 52.3 pounds per hour and 229.0 tons per year. These limitations are accepted by the permittee to avoid the otherwise applicable requirements of New Source Review - Prevention of Significant Deterioration (PSD), Rule 17-212.400, F.A.C., and application of Best Available Control Technology (BACT), Rule 17-212.410, F.A.C.

7. Compliance with the maximum allowable emission rate of carbon monoxide stated in Specific Condition Number 6 shall be determined by utilization of the following equation:

Calculated annual emissions rate of CO (tons per year) =
volumetric flow rate (scfm) of the input gas to the flare
system x .11

The .11 constant is derived based on the flare operating parameters, i.e., the estimated methane content of the input gas stream (53.7%), and the 98% hydrocarbon design destruction capability (efficiency) of the flare system, as follows, and assumes that only 1% of the methane is converted in the stack to CO.

CO (tons per year) = [] scfm x .537 x .01 x 28 lbs./lb.mol
x 1/359 lb.mol/ft³ x 60 min./hour x 24 hours/day x 365
days/year x 1/2000 tons per pound

This computation shall be made prior to the flare startup and annually thereafter. Results shall be reported as part of the facility's Annual Operating Report. Specific Condition Number 12 limits the flow rate to the flare system to 2080 scfm.

8. Compliance with the visible emissions standard shall be determined using EPA Method 22 and shall be for the duration of 2 hours. Such tests shall be conducted within 60 days of completion of construction and initial startup operation, and annually thereafter. The required visible emissions test report shall also contain the extraction wells gas flow rate and the flare temperature data.

9. Sulfur content of the input gas to any flare shall not exceed .045 pounds per hour.

10. An analysis shall be performed to determine the sulfur content of input gas to the flare, by American Society for Testing and Materials (ASTM) test method, D 1072-90, prior to any flare

Add Subpart www requirements

PERMITTEE:

Brevard County Board of County
Commissioners

Permit Number:

AC05-238122

Expiration Date:

January 2, 1997

SPECIFIC CONDITIONS:

startup. Additional tests shall be performed on a yearly basis, and results included as part of the facility's Annual Operating Report.

11. Pursuant to Rule 17-296.320(2), F.A.C., objectionable odors caused by this source are prohibited.

12. Total volumetric flow to any flare in the system shall be limited to 1040 scfm. Total volumetric flow to the aggregate of the three flares shall be limited to 2080 scfm.

13. Proper devices shall be installed at all wellheads, and at the flare station for 1) gas flow volume and gas pressure measurements, 2) gas composition analysis, 3) gas temperature and flame temperature recording, and 4) flow control, prior to the collection and disposal of the active landfill gases. Such devices shall be properly calibrated and maintained at all times, according to manufacturers' written instructions.

The checking and recording of the gas flow, temperature, pressure, and composition, and flame temperature, shall be performed on a weekly basis for all wells and the flare station.

The instrument to be used to measure gas flow, temperature, pressure and composition will be a portable landfill gas extraction monitor and analyzer (e.g., LANDTEC-GEM-500 with on-board computer) or equivalent. The flare flame temperature shall be monitored by a Fuji Electronic MicroController (or equivalent).

The permittee shall keep a hard copy of the weekly gas extraction monitoring and analysis data, as well as instrumentation history records, on site at all times. The weekly data shall be summarized and included as part of the facility's Annual Operating Report.

14. The net heating value of the input gas shall be 200 BTU/scf or greater. Compliance with this parameter shall be determined by methodology specified in paragraph f of 40 CFR 60.18. Samples shall be taken, and results reported annually.

15. Actual exit velocity of each flare shall be calculated and reported on an annual basis, using methods specified in paragraph f of 40 CFR 60.18.

16. An operation and maintenance plan shall be submitted to the Department's Central District Office prior to the expiration date of this permit.

PERMITTEE: Brevard County Board of County Commissioners
Permit Number: AC05-238122
Expiration Date: January 2, 1997

SPECIFIC CONDITIONS:

17. The Central District Office shall be given at least 15 days written notice prior to compliance testing.

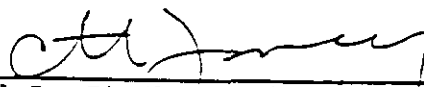
18. Prior to placing the flare in service, the pilot gas for the flare shall be fired by propane at 25 scfh (standard cubic feet per hour), with a maximum heat input rate of .06 MMBTU/hour. The pilot light is not required when the flame is sustained by the landfill gas alone.

19. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the Bureau of Air Regulation prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

20. An application for an operation permit must be submitted to the Central District Office at least 90 days prior to the expiration date of this construction permit. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, and certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports, as required by this permit (F.A.C. Rules 17-4.055 and 17-4.220).

Issued this 22 day
of December, 1993

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION

for 
Howard L. Rhodes, Director
Division of Air Resources
Management

LFG SPECIALTIES, INC.

DATE: 10/31/95

FAX Cover Sheet

To: James Getting
WET

From: Louis Kalani
LFG Specialties

Total number of pages including this cover sheet: 12

If all pages are not received,
please call Jennifer at (216) 891-0305.

Mr. Getting,

Please find attached information you
requested regarding flow meters and
chart recorders for the Solid Waste
Authority of Palm Beach flare package.

Please contact Louis if you have
any questions.

Jennifer

Main Office

7550 Lucerne Drive
Suite #110
Cleveland, Ohio 44130
216/891-0305 FAX: 216/891-8288

OCT-31-1995 12:41

FAX # (904) 243-0077



2168918288

Plant

705 Friendship Drive
P.O. Box 332
New Concord, Ohio 43762
614/826-7686 Fax: 614/826-4943

97%

P.01

TECHNICAL BULLETIN

BULLETIN 686A



FLOWMETERS BY:

Thermal Instrument Co.
217 Sterner Mill Road, Trevose, PA 19053 • (215) 355-8400

THERMAL FLOW PROBE



Figure 1

CONCEPT

The Thermal Flow Probe is a flow meter developed to measure rates of flowing streams by merely inserting the Probe into the stream.

It has flow and temperature detecting sensors mounted on the inside diameter of a piece of sealed pipe. These sensors detect flow rate and temperature of a stream of gas, liquids, or slurries passing over the outside diameter of the pipe.

These sensors are essentially resistance thermometers made of etched metal film in order to provide high speed response. In theory, if one of these temperature sensitive grids were heated slightly by a constant electrical current, it would transfer a certain amount of heat to the flowing stream. The amount of heat conducted off this sensor, by the flowing stream, is directly proportional to the mass flow rate of the stream, with slight errors due to radiant heat losses from the sensor, and conduction losses along the length of the pipe.

These losses are a function of the ambient temperature, which in this case, is the temperature of the stream. It is the function of the temperature sensors in this same piece of pipe to detect these temperature changes and with these corrective readings, correct the flow readout, so it is a true measure of flow rate, in spite of the variation of temperature of the medium and ambient.

CONSTRUCTION

As shown in Figure 1: The design of the Stack Probe presents a very rugged construction. The Probe shown is actually a piece of 1", type 316 stainless steel pipe. The end of the pipe is sealed and welded. It is provided with a raised face flange to seal against a mating flange on the pipe or stack, in which it is to be inserted for flow measurement.

The electrical connections can be made either in a gasketed type conduit, or an explosion-proof conduit.

For flow rate measurement of streams, which do not exceed 400°F, we use our standard etched Nickel sensing elements.

For application up to 1000°F, we utilize Platinum sensors which are imbedded in a ceramic matrix, securely bonded to the inside diameter of the pipe.

Many industrial stacks operate at temperatures reaching 1000°F.

This flow measuring Probe may be constructed of pipe or tubing made of any metal which may be compatible with the corrosive atmospheres or fluids, to be encountered in any given application. Figure 2 is a sketch showing an internal arrangement of sensors in this flow measuring probe.

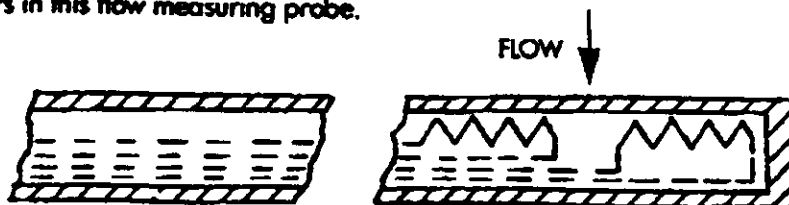


Figure 2

98%

Honeywell

DPR 100 C/D Pen and Multipoint 100 mm Digital Recorders

01-0021
3/94

Specification and Technical Data

Introduction

The DPR 100 C and D are the highest functionality 100 mm (4 inch) recorders on the market today. They offer the best chart in the industry, with complete process documentation, at any speed, for the most demanding applications. Their accuracy is by far superior due to the wide choice of available ranges and actuations.

The two versions are:

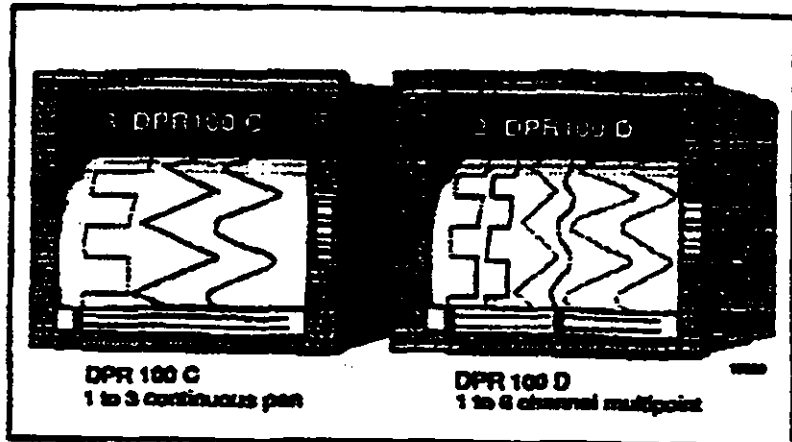
- DPR 100C: 1 to 3 continuous pen
- DPR 100D: 3 or 6 channel multipoint

Their large and bright display, together with their outstanding chart visibility and fluorescent illumination, makes it easy to read and interpret from a distance.

They are particularly suitable for chemicals, pharmaceuticals, power generation, metals, environmental monitoring, and food processing applications.

MAIN FEATURES

- 100 mm (4 inch) chart width (DIN 15230)
- 0.1% accuracy full scale (IEC 873) applicable on a very wide choice of actuations and ranges
- Each input span is adjustable within the selected range, with up to 2 ranges per channel
- Universal input board (T/C, RTD, mV, mA, volts)
- Alphanumeric display: 12 digits or 1 or 2 bargraphs, adjustable brightness
- Roll or fan fold chart



- Fully documented chart with trace color assignment, alarm trend in red, tagging, zooming, zoning, trend or tabular print outs, messages, all at up to 500 mm/h (20 in/h)
- Up to 10 traces (6 analog, 4 digital inputs) on the multipoint DPR 100D
- Up to 6 analog inputs can be configured on a 3 pen DPR 100C
- Full configurability through front keys and interactive program menu in 6 languages as standard. Optional configuration using Honeywell PC configurator connected via the front jack, or by communication, with multilevel password security
- 12 user-configurable messages (14 characters each)
- 4 line batch header automatically incremented and saved in case of power failure
- Event precursor mode
- Software upgrade capability by the front jack (via PC or MODEM)
- Input calibration traceability (audit-trail)

- 12 alarm set points, assignable to any input, math result, communication signal
- 2 configurable chart speeds, selectable via alarm, logic input, front keys or communication
- Universal power supply 85 to 264 V ac/dc, 24 or 48 V ac/dc
- IP 54 front protection (IEC 529)
- Compact dimensions: 144 x 144 mm x (5.7 x 5.7), depth 245 mm (9.7) behind panel

OPTIONS

- Up to 12 relay outputs assignable to alarms or recorder events
- Up to 4 logic inputs
- Mathematic packages, with the results saved in case of power failure. Math functions can be interconnected
- 24 Vdc transmitter power supply 50 mA
- Communication: ASCII, MODBUS RTU
- CSA approved

Honeywell

DPR 100 C/D Pen and Multipoint 100 mm Digital Recorders

01-0021
3/84

Specification and Technical Data

Introduction

The DPR 100 C and D are the highest functionality 100 mm (4 inch) recorders on the market today. They offer the best chart in the industry, with complete process documentation, at any speed, for the most demanding applications. Their accuracy is by far superior due to the wide choice of available ranges and actuators.

The two versions are:

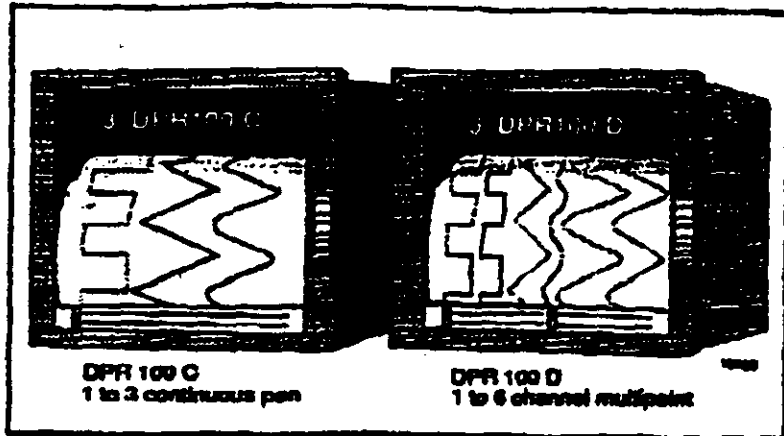
- DPR 100C: 1 to 3 continuous pen
- DPR 100D: 3 or 6 channel multipoint

Their large and bright display, together with their outstanding chart visibility and fluorescent illumination, makes it easy to read and interpret from a distance.

They are particularly suitable for chemicals, pharmaceuticals, power generation, metals, environmental monitoring, and food processing applications.

MAIN FEATURES

- 100 mm (4 inch) chart width (DIN 16230)
- 0.1% accuracy full scale (IEC 873) applicable on a very wide choice of actuators and ranges
- Each input span is adjustable within the selected range, with up to 2 ranges per channel
- Universal input board (T/C, RTD, mV, mA, volts)
- Alphanumeric display: 12 digits or 1 or 2 bargraphs, adjustable brightness
- Roll or fan fold chart

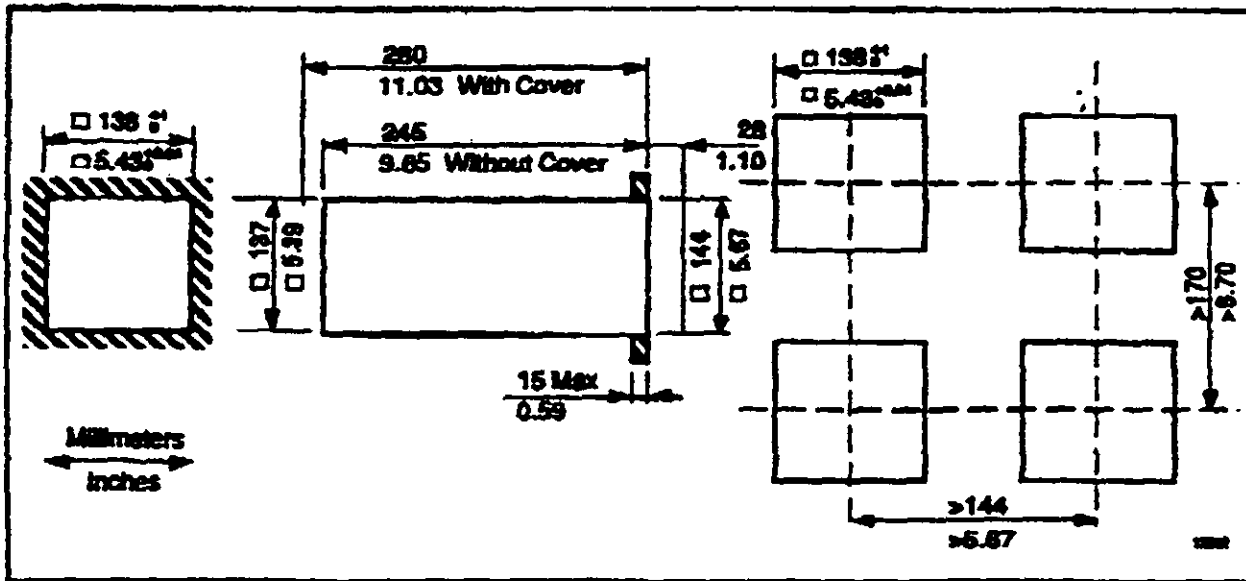


- Fully documented chart with trace color assignment, alarm trend in red, tagging, zooming, zoning, trend or tabular print outs, messages, all at up to 500 mm/h (20 in/h)
- Up to 10 traces (6 analog, 4 digital inputs) on the multipoint DPR 100D
- Up to 8 analog inputs can be configured on a 3 pen DPR 100C
- Full configurability through front keys and interactive program menu in 6 languages as standard. Optional configuration using Honeywell PC configurator connected via the front jack, or by communication, with multilevel password security
- 12 user-configurable messages (14 characters each)
- 4 lines batch header automatically incremented and saved in case of power failure
- Event precursor mode
- Software upgrade capability by the front jack (via PC or MODEM)
- Input calibration traceability (audit-trail)
- 12 alarm set points, assignable to any input, math result, communication signal
- 2 configurable chart speeds, selectable via alarm, logic input, front keys or communication
- Universal power supply 85 to 264 Vac/dc, 24 or 48 Vac/dc
- IP 54 front protection (IEC 529)
- Compact dimensions: 144 x 144 mm x (5.7 x 5.7), depth 245 mm (9.7") behind panel

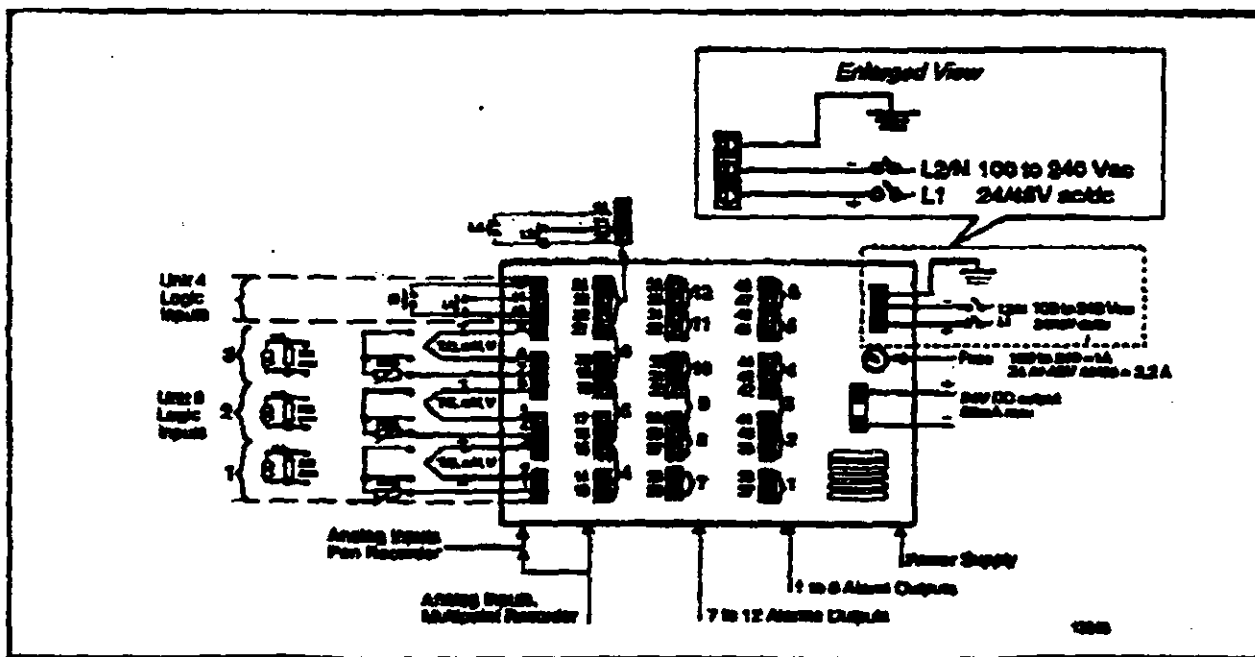
OPTIONS

- Up to 12 relay outputs assignable to alarms or recorder events
- Up to 4 logic inputs
- Mathmatic packages, with the results saved in case of power failure. Math functions can be interconnected
- 24 Vdc transmitter power supply 50 mA
- Communication: ASCII, MODBUS RTU
- CSA approved

Dimensions



Connections



While this information is presented in good faith and believed to be accurate, Honeywell disclaims the implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in its catalog.

In no event is Honeywell liable to anyone for any indirect, special or consequential damages. The information and specifications in this document are subject to change without notice.

Printed in U.S.A. — © Copyright 1984 — Honeywell

Chart Speed, cont	
Speed setting	Pen: 1 to 8000 mm/hr (0.04 in/hr to 240 in/hr). Mpt: 1 to 1500 mm/hr (0.04 in/hr to 60 in/hr). Continuous traces in color, dotted traces in configurable color with regular chart documentation (configurable.)
Stepping chart motor	Resolution 0.12 mm (0.005 inches).
Product configuration	- 2 product configurations can be stored and selected by the front keys
Front configuration	- A very simple and interactive product configuration can be carried out on the product with 6 front keys. A friendly program with prompt messages confirms the operation. The prompt messages can be selected in different languages: English, German, French, Spanish, Italian or Swedish. A 2-level password protects the unit from nonauthorized modification (level 1 = limited access; level 2 = full protection).
PC configuration	- Through the front jack, the unit can be configured from a PC through a Honeywell PC interface. This provides the facility to copy the configuration, modify, store, upload or download the product configuration or make a service diagnostic or upgrade a new software or linearize 2 special customer sensors (50 segments each).
Logic Inputs	Up to 4 dry contact inputs (1.5 mA - 12 Vdc)
Actions	Change chart speed 1 to speed 2, tab interval 1 to tab interval 2, digital print-out, print message, print inhibit, event trace, print a batch message, tabulate maths calculations. Event markings: Pen: Pen 1 used as operation marker on the right side of the chart for event 1 and on the left side of the chart for event 2. Mpt: 4 traces maximum on the chart. The trace position and the color are configurable.
Alarms	
Set-point	12 alarm set-points, freely assignable to any channel and output relay. Full configurability of set-point, hysteresis and alarm type (high, low, rate of change, deviation).
Function	Can trigger a message, print channel red in alarm, print in alarm, change the range, change the speed, print digital PV values, trigger the event precursor.
Output	6 or 12 SPST relay outputs: 2 A, 250 Vac on resistive load Contact N.C. in alarm condition (configurable to N.O.).
Alphanumeric documentation	
Messages	12 freely assignable and configurable messages of 14 characters each, including the specific letter used in German and Swedish. Can be printed with the date/time on top of the traces by alarms, logic inputs or communication.
Batch header	One batch message of 4 lines of 14 characters, fully configurable, with incremented batch numbers and date/time. Printed through digital input and

Page 8

Mathematics package (optional)	Many functions are available such as: - Basic mathematics functions - Square root - F_0 sterilization - Totalization - Mass flows - Energy consumption - Vacuum pressure - Averages - Min, max - Timers
Digital communication Protocols	The maths calculations and results are stored during power interruptions

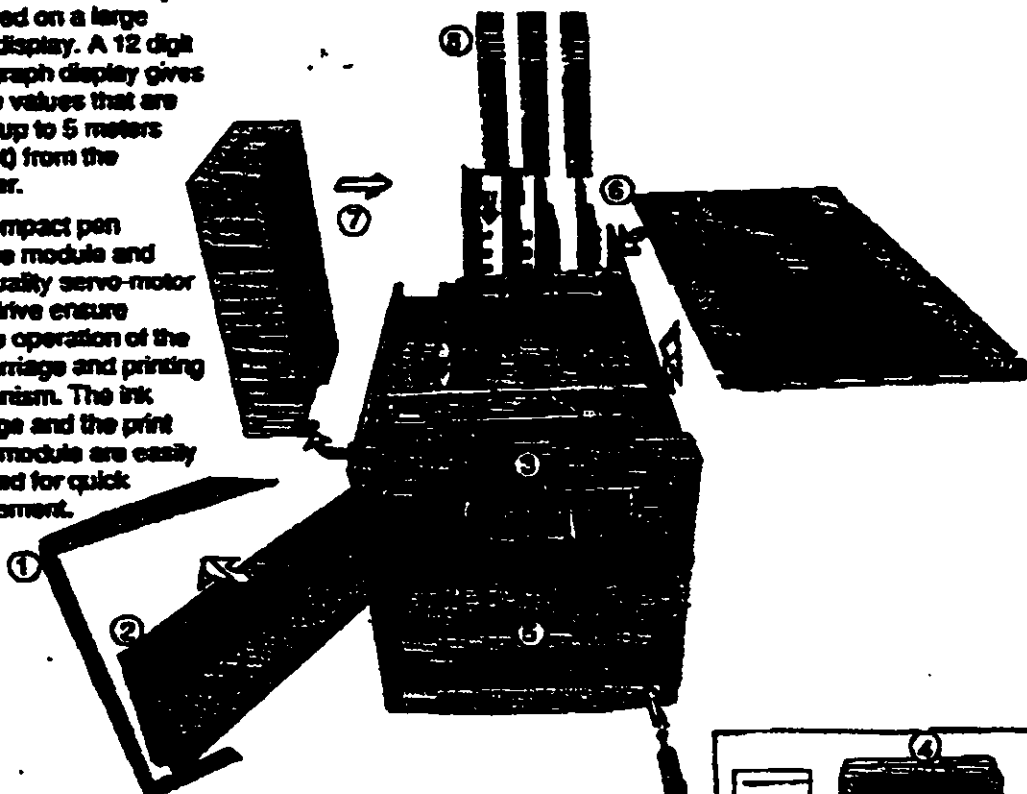
Easy to install... Easy to use... Easy to maintain

The DPR 100's compact, modular design and rugged construction reduces spare parts inventory and simplifies maintenance. Its operator-friendly configuration keys, easy to read analog scales or digital displays, reliable alarm functions and customized charts ensure accurate monitoring and recording of your process.

1) IP54 door

2) Process data is clearly displayed on a large digital display. A 12 digit or bargraph display gives precise values that are visible up to 5 meters (18 feet) from the recorder.

3) The compact pen carriage module and high quality servo-motor chart drive ensure reliable operation of the pen carriage and printing mechanism. The ink cartridge and the print wheel module are easily removed for quick replacement.



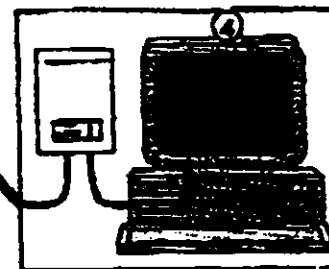
4) Full configuration of the DPR 100 (any model) can be performed from a PC using the Honeywell software, PC interface, and the front jack.

5) Simple keys provide easy configuration and operation. Interactive prompt messages confirm modification of the configuration or function.

6) The universal input card module with 2 logic and 3 analog inputs reduces configuration time.

7) The universal power supply accepts virtually any ac or dc voltage.

8) The plugged rear connections allow easy maintenance.



1228

Rugged, Simple and Modular Construction

Easy Access

Access to the chart and the ink cartridges is straightforward, reducing maintenance costs.

The multipoint print head design provides fine, clear traces in up to 6 colors.

Two Paper Types

Either roll or fan-fold paper cassettes can be used. Roll paper allows easier reading of historical data during operation and is less sensitive to temperature and humidity. On the other hand, fan-fold paper allows easier data access when the record is stored.

Pen Carriage Module

A compact pen carriage module guarantees efficient operation of the pen carriage and the printing mechanism.

Digital Display

The highly visible alphanumeric display provides clear operator information. The illumination level is configurable.

Up to 2 bargraph displays are configurable and include information on the PV trend.

Universal Input Board

The universal input board supports all actuators. Scanning by solid-state relays. This universal input board reduces the configuration cost of the product. It is a "plug-in" board for easy servicing.

Universal Power Supply Module

The universal switching mode power supply simplifies installation of the recorder by accepting 65 to 264 Vac/dc 50/60 Hz. Optionally available is a 24 or 48 V ac/dc power supply module. On request, the power supply can also deliver 24 Vdc 50 mA to supply remote transmitters.

Rear Connections

All inputs/outputs are screw-connected to the rear terminal blocks which may be removed from the chassis without disconnection of the wires.

Easy Configuration

Local Configuration

A user-friendly program with local language prompts (English, French, German, Italian, Spanish, or Swedish) permits a full configuration of the recorder using the 6 front keys. A multilevel password protects against unauthorized changes to the configuration. Two different product configurations can be stored in memory.

PC Configuration

By way of, the front communication jack, the recorder can be configured from a personal computer using an optional PC interface module. In addition to configuration, the PC will provide the ability to upload, download, modify, store the recorder configuration, initiate diagnostic test, and provides the facility to linearize up to two customized input sensors (50 segments each).

The DPR 100 is designed to operate nonstop in harsh industrial environments at 50°C (120°F). It has a front panel protection against dust and water splashes to meet standard IP 54 (IEC 529).

The construction of the DPR 100 is simple and modular, with its few modules being plugged into the main chassis. This modular concept, along with the recorder's extra long life ink cartridge and long paper chart, significantly reduces service and maintenance costs.

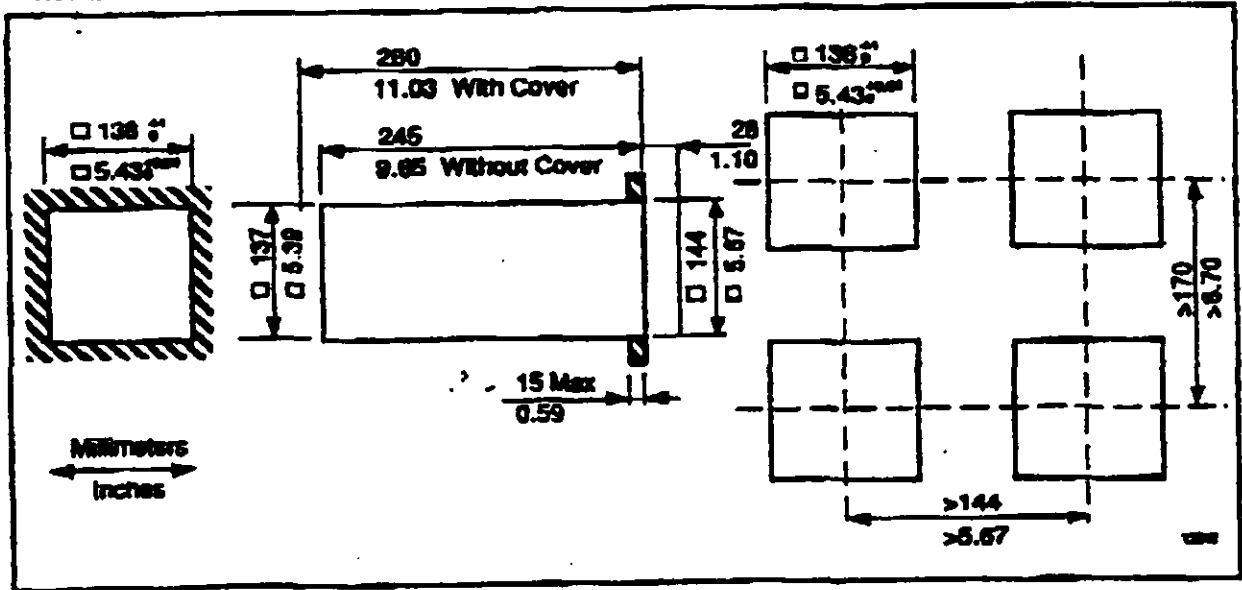
Fluorescent Chart Illumination

In any ambient light condition, chart illumination makes traces and current values immediately visible, even from a distance.

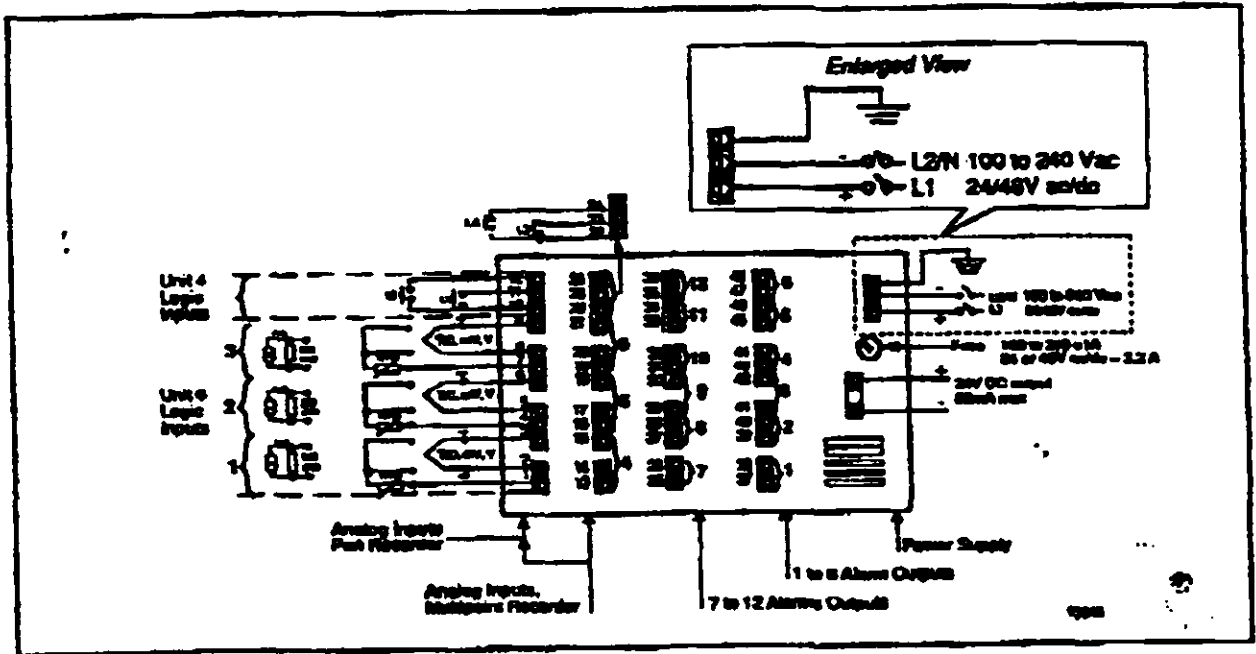
Pen Offset

A memory buffer stores the data in order to place the value on the same time line as the first pen. This feature reduces possible errors when interpreting the chart.

Dimensions



Connections



While this information is presented in good faith and believed to be accurate, Honeywell disclaims the implied warranties of merchantability and fitness for a particular purpose and makes no express warranties except as may be stated in its contracts.

In no event is Honeywell liable to anyone for any indirect, special or consequential damages. The information and specifications in this document are subject to change without notice.

Printed in U.S.A. — © Copyright 1994 — Honeywell

** TOTAL PAGE. 001 **