Series 808, 809, 810, 812
ELECTRIC POWER/DEMAND ANALYZERS

Single instruments that provide all measurements needed for reducing electric power costs.

- Analyze electric energy and demand usage.
- Develop electrical energy management programs.
- Establish continuous monitoring to maintain efficient energy consumption.
- Submeter plant areas, buildings and equipment.
- Troubleshoot plant power systems for intermittent problems.
- Display and print Volts, Amps, PF, KW, KWH, KVA, KVAR, demand, projected demand, time and date.
- Easily connected to single-phase, three-phase and pulse generating systems.
- Communicate load data for use by a remote computer.

DRANETZ SERIES 808 ELECTRIC POWER/DEMAND ANALYZER

HAWKER SIDDELEY
DRANETZ

THE SERIES 808:
An Integral Part of Your Energy Management Program

The Dranetz Series 808 Electric Power/Demand Analyzer will keep working for you through all phases of your energy management program.

During the *initial energy survey,* the Series 808 enables a thorough analysis of your energy consumption. Complete printouts of energy, demand and power factor for interval times used by your electric utility will provide you with reliable usage schedules. These measurements can be made directly at the main power entry or at submetering locations.

For *analysis of power guzzlers,* the Series 808 is the perfect instrument for an in-depth look at the equipment and systems which utilize significant power in your facility. Considerable cost savings are possible by identifying equipment which is inefficient in either design or use.

For *after installation monitoring,* the Series 808 will continue to serve you reliably by providing all necessary data in the simplest format. As a permanent monitor, the Series 808 enables you to not only verify the effectiveness of your energy management program, but also to alert responsible personnel to any subsequent power wastage.

```
Status
12-Apr-82  14:25:58

A     455.6  V
B     455.2  V
C     455.1  V

A     175.2  A
B     175.3  A
C     175.3  A

A     79.82  KVA
B     79.79  KVA
C     79.77  KVA
T     239.3  KVA

A     72.40  KW
B     72.08  KW
C     72.18  KW
T     216.6  KW

A     33.61  KVAR
B     34.21  KVAR
C     33.96  KVAR
T     101.7  KVAR

A      .90   PF
B      .90   PF
C      .90   PF
T      .90   PF

PDm 207.8KW 12
```

SAMPLE OF A STATUS PRINTOUT
Taken 12 minutes into a 15 minute interval, the tape above indicates true instantaneous RMS values of Volts, Amps, KVA, KW, KVAR and PF for each phase and the appropriate totals for all three phases (A, B, and C). The last line shows the demand projected for the end of the interval.

Reducing Electrical Energy Costs

With today's spiraling energy costs, electric power charges have become a major factor in manufacturing sites, in commercial establishments, and in the home as well. Fortunately, we can reduce energy costs significantly if we know how our electric power is being used and we implement an energy management plan to control it.

THE COST OF ELECTRIC POWER.
Most large commercial and industrial establishments are billed in three ways:

Energy...Every user is charged for the amount of energy consumed which is normally measured in kilowatt hours (KWH).

Demand...Electric utilities are faced with the major problem of handling the largest demand of their customers. Since electric usage varies significantly depending on the month, day, hour, and even minute, your utility must provide standby equipment to generate and de-liver peak loads even when the requirements are for short periods.

The large capital investment required for these extra facilities is paid for by those customers who require peak loads. Therefore, electric utilities have added a "demand" charge (Dm) which is related to the maximum average power each large user "demands" during any one of consecutive time intervals throughout each billing period. (Demand intervals vary from 1 to 120 minutes, depending on the utility.) It is not unusual for the demand charges to be higher than the energy usage charge.

Power Factor...The third way electric utilities charge their customers is by power factor (PF). Defined as the ratio of watts of true power used by volt-amperes, power factor is a measure of the customer's efficiency in accepting the power made available to him. The maximum power factor is 1.00 and some utilities are beginning to charge their customers for anything even slightly less than that (e.g., 0.95). Power factor can become a significant part of your energy bill.

HOW TO REDUCE ELECTRIC COSTS.
Carefully planning and controlling electric usage really pays off. Savings of more than 30% can often be achieved through an energy management program.

There are many energy management systems (EMS) available for use in office buildings, commercial establishments and industrial facilities. These systems can be very effective; however, they can also be very expensive since each installation must be customized to provide the optimum cost reductions. The basic cost of the EMS equipment itself is only part of the cost; the major expense may be in the programming, power wiring, sensors, and control wiring.

```
***********************
Demand Summary
.12-Apr-82 18:00:01

Max Demand Today>
12-Apr-82 01:23:41
    226.0KW    .80PF
12-Apr-82 06:23:41
    226.1KW    .80PF
12-Apr-82 00:23:41
    228.6KW    .78PF
12-Apr-82 16:23:41
    358.8kW    .87PF

Max Demand Monthly>
10-Apr-82 14:23:41
    229.3KW    .80PF
07-Apr-82 18:23:41
    229.5kW    .80PF
09-Apr-82 17:23:41
    235.3KW    .83PF
12-Apr-82 16:23:41
    358.8kW    .87PF


Energy This Day
   3.976MWH   .82PF

Energy This Month
   45.54MWH   .87PF

********************
```

SAMPLE OF A DEMAND SUMMARY PRINTOUT

This tape indicates the four highest daily demands. the four highest monthly demands, accumulated daily energy use, accumulated month to date energy use, and the PF associated with each reading.

THE SERIES 808:
Your Answer to Rising Electric Costs

The Dranetz Series 808 Electric Power/Demand Analyzer is a unique instrument that will supply you with the information you need to achieve the greatest reductions in your electric bill.

Capable of making virtually every measurement needed for energy management, the Series 808 provides instantaneous readings or will operate automatically for up to six months unattended. The Series 808 is easily connected to the main incoming power panel, at different points in the distribution system, or directly to specific high energy loads. Measurements can be taken from single and three phase AC power lines or pulse initiator equipment (such as your electric meter).

The Series 808 will be invaluable to large electric power users in every segment of cost reduction programs. It is truly the ideal instrument for analyzing electric usage.

- Performs the following measurements on individual phases and full WYE and DELTA three-phase configurations: Volts, Amps, KW, KWH, PF, KVA, KVAR, demand, time and date.
- Prints all significant data at the end of each day or at operator's command.
- Dynamic data display for continuous reading of any variable.
- Connects to standard PT's, CT's, and pulse generating electric meters.
- Measures demand on operator-selected fixed intervals (1 to 120 minutes) or sliding intervals (5 to 60 minutes).
- Prints up to four highest demands on daily and month-to-date basis; can be internally or externally synchronized.
- Prints all demands exceeding operator-set threshold values.
- Prints brownout data whenever voltage drops below pre-set level.
- Tamper-proof — locks-in settings by key; software code prevents unauthorized printouts and displays.
- Optional communications capability enables remote operation for low cost energy management.

The key — set up a plan — look before you leap.

The most important aspect of any energy-saving program is that it solves *your* specific problems. An energy survey is a vital part of your EMS program. The six steps to an effective energy program are:

Step 1. Analyze Costs. All three parts of your electric costs (energy, demand, power factor) should be analyzed to find not only the actual costs, but the contributing factors. This means measuring your actual usage during each interval over a reasonable period of time. Some of the factors to consider are the requirements of the larger electrical loads, time of day usage schedules, and equipment efficiencies.

Step 2. Estimate Savings. A rough estimate of potential savings can be based on establishing correlations between your monthly electric bill and the data you gathered in Step 1.

Step 3. Study High Demand Loads. Too many surveys never get to this step, overlooking the opportunity to achieve much greater savings. It is important to take measurements of specific higher power loads to accurately determine their use schedules and their individual impact on your electric costs. Experiments can be run to confirm savings by changing operating times.

Step 4. Study Low Power Factor Equipment. Electrical measurements should also be made at the inputs to all major equipment to determine whether they are operating properly or are candidates for replacement. For example, a motor that is inefficient or is over sized may lead to power factor penalties. Replacing or correcting these situations can be a source of substantial savings.

Step 5. Put the Energy Management Program Together. Armed with all the ammunition from the first four steps, an intelligent plan can be prepared to control the amount and timing of electrical power. In addition to programming the timing of lights, heating, air conditioning, and processing equipment, the EMS plan can include adaptive controlling and alarming for special conditions. Executing the plan would include installing power and control wiring, the necessary controllers and, possibly, substitution of more efficient equipment and changes in operating schedules for the facility.

Step 6. Monitor After Installation. After the energy program is implemented, measuring effectiveness and making adjustments for further cost savings are necessary. Even more important is the need for permanent monitoring and surveillance to assure that subsequent changes in equipment or operating methods do not upset the efficient use that has been established.

SERIES 808
ELECTRIC POWER/DEMAND ANALYZER

KEYLOCK SWITCH PREVENTS TAMPERING

PROMPTING LED's SIMPLIFY SETUP

In addition to messages on the display panel, six LED indicators guide the operator through simple use of the keypad.

SIMPLE TO OPERATE KEYPAD

A 28-key, touch sensitive keypad employs a multicolor coding pattern and "beep" signals to make the Series 808 easy to use. Non-technical personnel can be trained quickly to use the Series 808 and will appreciate its "friendly" design. Full selection of all functions are available from the keypad including measurement parameters, data display and printing, and thresholds.

INTERNAL BATTERY FOR CONTINUOUS OPERATION

If a drop or loss of power occurs, a rechargeable battery maintains uninterrupted operation for fifteen minutes. After that time, the Series 808 will automatically switch over to a standby mode while retaining its memory for up to 15 days.
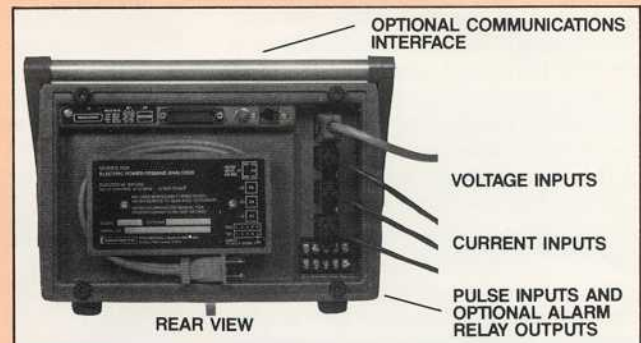
EFFECTIVE DEMAND MONITORING AND ANALYSIS

For effective demand monitoring, the Series 808 provides printouts in a variety of formats. First, is automatic printout at four selected times of each day including midnight. Each printout includes the four highest demands of the day with the four highest demands of the billing period to date, the magnitude of the demand, power factor, and the time and date for each measurement. The printout includes total energy (KWH) used during the day and the billing period to date. Billing dates can be preset twelve months ahead for automatic reset.

Second, is a printout whenever demand (Dm) exceeds a preset level. For example, if 1000 kilowatts is selected as the maximum acceptable demand for an interval , and the operator desires to be informed whenever actual demand exceeds 70% of maximum, the Series 808 will print demand data whenever demand exceeds 700 kilowatts at the end of any interval.

The third manner of demand monitoring is on command. At any time, the operator can request a status printout which includes the number of minutes into the demand interval and the projected demand at the end of that interval.
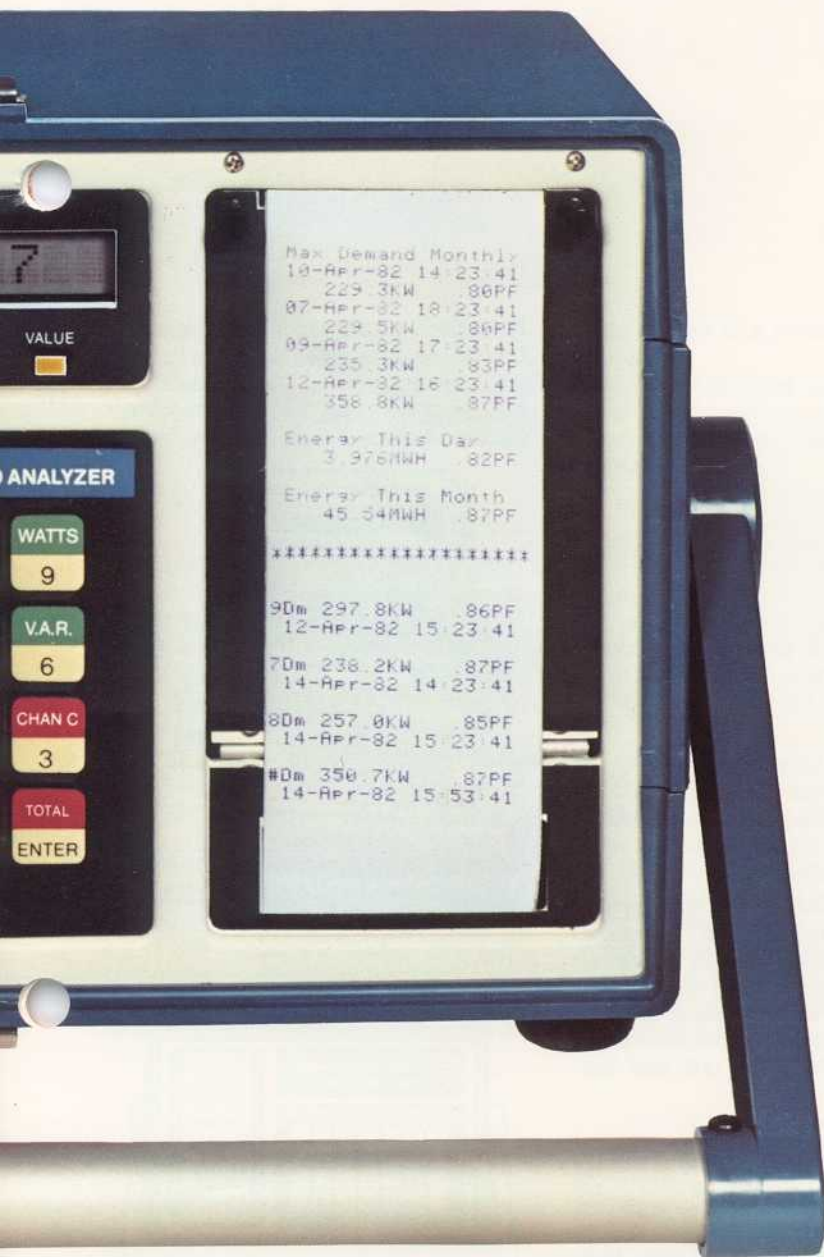
The Series 808 will accommodate the demand interval schedules used by any power company. The operator can easily set fixed time intervals from 1 to 120 minutes in one minute increments or sliding intervals from 5 to 60 minutes in five minute steps with overlapping five minute increments. Either internal or external synchronization can be selected.

SIMPLE, VERSATILE CONNECTIONS

The Series 808 will measure and analyze virtually any

```
Max Demand Monthly
10-Apr-82 14:23:41
     229.3KW    .86PF
07-Apr-82 18:23:41
     229.5KW    .86PF
09-Apr-82 17:23:41
     235.3KW    .83PF
12-Apr-82 16:23:41
     358.8KW    .87PF

Energy This Day
   3.976MWH    .82PF

Energy This Month
   45.54MWH    .87PF

***********************

9Dm 297.8KW    .86PF
12-Apr-82 15:23:41

7Dm 238.2KW    .87PF
14-Apr-82 14:23:41

8Dm 257.0KW    .85PF
14-Apr-82 15:23:41

#Dm 350.7KW    .87PF
14-Apr-82 15:53:41
```

(keypad) VALUE · ANALYZER · WATTS 9 · V.A.R. 6 · CHAN C 3 · TOTAL ENTER

CLEAR DISPLAY PANEL

Any measurement can be displayed on command. The clear, alphanumeric LCD display also prompts the operator through setup routine to make only the measurements needed.

SELF-CONTAINED PRINTER FOR PERMANENT RECORDING

CHOICE OF PRINTOUTS PROVIDES ONLY INFORMATION DESIRED

Printouts are automatic or can be called for at any time. Typical printouts include:
1) *STATUS:* Complete status of all input functions (refer to sample on page 2),
2) *DEMAND:* Prints whenever a preset level is exceeded (sample shown),
3) *DEMAND SUMMARY:* Prints automatically up to four times daily (sample on page 3),
4) *SETUP DATA:* A complete record of all setup data. The operator can select the desired combination of measurements, demand times, and the detail of printout.

AUTOMATIC PRINTOUTS

Illustration shows automatic printouts indicating demand has exceeded user preset limits. First printout shows demand exceeding 90% of preset limit, followed by 70%, 80% and 100% printouts. (Both maximum demand limit and percent of limit are user selected.)

electrical system or equipment by making the appropriate current and voltage connections.

Input voltage leads from the instrument can be connected to circuits of up to 600 volts RMS. External voltage transformers can be used to extend the range. Input current channels are for use with standard external current transformers (including conventional one amp and five amp CT's). Dranetz clamp-on current probes are available for currents up to 3000 amps RMS. Dranetz Isolated CT Terminations are required for use with the Dranetz TR-2015 CT and all CT's not supplied by Dranetz.

For those special cases where voltage cannot be conveniently measured, the operator can enter an estimated voltage and power factor on the keypad. The instrument will then compute all other parameters using only current inputs.

The Series 808 is capable of measuring almost limitless power, limited only by the rating of the external input device (CT, PT, or pulse initiator) selected. To permit direct reading, without manual conversion, scale factors (k factors) can be easily entered into the unit at the keypad to accommodate the specific CT, PT, and initiator ratios.
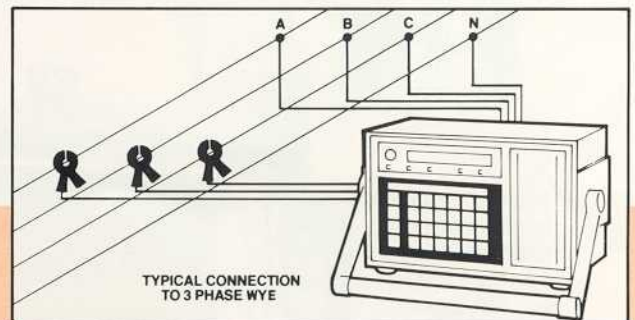
TYPICAL CONNECTION TO A THREE-PHASE WYE CIRCUIT REQUIRES THREE CURRENT TRANSFORMERS (CT's), SUCH AS THE DRANETZ MODEL TR-2012 SHOWN, AND FOUR VOLTAGE CONNECTIONS. SINGLE PHASE CIRCUITS USE ONLY ONE CT AND TWO VOLTAGE CONNECTIONS.
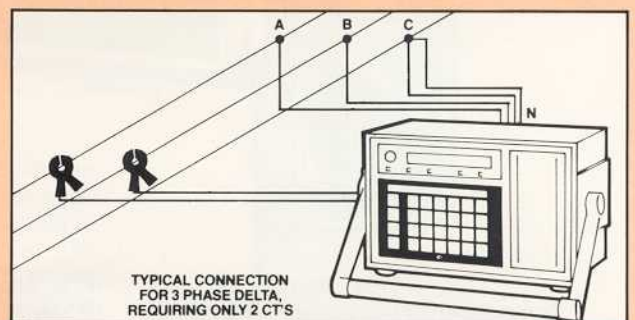
TYPICAL CONNECTION TO A DELTA CIRCUIT REQUIRES ONLY TWO CT's AND THREE VOLTAGE CONNECTIONS.
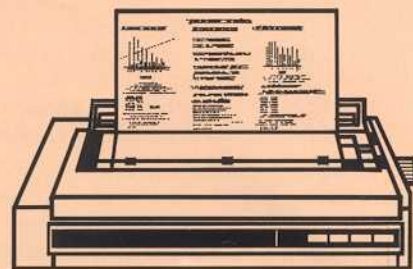
DRANETZ
Series 808, 809, 810, 812

Select the configuration you need
Dranetz analyzers are designed to fit in with your application. This versatile design enables many different interconnection modes.

Using a computer permits "intelligent" operation and data analysis from any number of Dranetz analyzers.

Models 809 and 810—Designed for permanent, rack mounted installation, the 809 Remote Power/Demand Analyzer provides remote monitoring of power usage in industrial, commercial, and electric utility applications. A built-in 32K character buffer memory, RS-232C port and Bell 103 compatible modem provide full duplex communication for telemetering load data for computer analysis. The display version illustrated above, Model 810, provides visual monitoring in addition to, and independent of, its remote transmission capability. A Model 809 is the same unit less the visual display.

One Series 808 can control all setups and data outputs from any other Dranetz analyzer with communications capability.

Model 812—This Remote Power/ Demand Analyzer features the same analysis and communication capabilities as the Models 809 and 810, but is designed for heavy duty environments in industrial, commercial and utility applications. Analyzer is plug-in mounted in NEMA-12 enclosure for complete protection indoors against dust, dirt and light splashing of oil and water. Model 812, illustrated, includes a visual display panel.

The simplest configuration is directly to a printer or other recording device.

6

- Save time and cut costs by operating your Dranetz analyzer with communications abilities.
- Analyze local or remote energy usage quickly and conveniently by inputting data directly to a printer, terminal or computer.
- Take fast corrective action by using your Dranetz analyzer as an intelligent power transducer for your EMS equipment.

There are three ways to use your Dranetz analyzer via remote communications:

"Modem link for public telecommunications"

To satisfy the needs in plants, buildings and utilities for remote monitoring of power and energy, Dranetz now offers communications capabilities in the Series 808, 809, 810, 812 Analyzers. Common applications include: monitoring several critical power lines or loads within a facility, multiple facilities, or a single point from a convenient location.

Whether you select the Series 808 with Option 106 or one of the Series 809/810 or 812 units (see descriptions on left), you will have full duplex communications in standard seven bit ASCII format. Each unit contains a built-in Bell 103 compatible modem, an RS-232C port and a 32K character buffer memory which can hold all automatic data print-outs for the user, with battery backup. Communication can be made with a CRT, printer, magnetic tape device or a computer. Baud rates are 300 for the built-in modem, and user selectable at 300, 1200 or 9600 for the RS-232C port.

Two outputs are provided. One is an EIA standard RS-232C connector which provides data directly (or from the buffer memory if automatic printout data has been held) for transmission to a remote device up to 50 feet away. The other is an RJ11 modular phone jack that is connected to the built-in modem. In this manner, data flows (from the buffer if held in memory) through the modem and directly over a telephone line.

The Model 808 with Option 106: adds full duplex communications: a 32K character buffer memory, an RS-232C port for transmissions up to 50 feet and a built-in, FCC approved, auto-dial/auto-answer modem for use over phone lines. An optional rack adaptor kit is available for installing the unit in a standard 19-in rack. *Option 105 for the Model 808* includes a 32K buffer and an RS-232C port (no modem).

Dedicated "Telephone Modem Link"

Choice of Reporting Modes

All commands that can be made from the front panel of the Series 808 are also available with Option 106/105 or with Models 809/810 or 812.

Two reporting modes can be selected according to the intended application. In the *Standard Reporting Mode,* data is transmitted when an automatic printout would ordinarily be made or on command from the user. A provision in the Standard Reporting Mode allows the unit to transmit information at a rate of once per second. For Models 810 and 812, front panel LED's can display various circuit parameters, totally independent of the computer interface. (Note Model 809 does not have display panel.)

The Model 810 Remote Power/Demand Analyzer incorporates the capabilities of the Model 808 with its communications interface, mounts in a 19-inch rack and is designed to operate in severe RFI and EMI environments. The front panel includes a security keyswitch and its LED indicator.

"RS-232C Data Communications Link"

The second reporting mode is *Raw Data Transmission.* In this mode, the unit functions as a true digital power transducer constantly sending out a compressed data stream. All data—volts, amps, watts, VARS, Watthours and VAR-hours—are continuously transmitted, checked for validity, and repeated every 1½ to 3 seconds, depending upon the baud rate selected. All the user need supply is a relatively simple program to convert the 808's raw data stream into an acceptable format for his needs (more sophisticated data manipulations would, of course, require further programming.)

The Model 812 Remote Power/Demand Analyzer, similar to the Model 810 is built into a NEMA Type 12 steel enclosure.

Specifications

OUTPUTS

Measured Parameters (single and three phase)

	VOLTAGE (VOLTS)	CURRENT (AMPS)	POWER (KW)
Type	True RMS Volts	True RMS Amps	True Instantaneous Power
Basic Range (k = 1.0)	60 — 600 Volts	0.5 — 10 Amps	30 — 6000 Watts
Range with k Factor (Corres. to PT and CT ratios.)	0.06 — 500 Mega Volts	0.001 — 10 Mega Amps	0.001 Watts — 999.9 Tera Watts*
Accuracy without CT, PT	±0.4% of Reading ±0.1% of f.s.	±0.4% of Reading ±0.1% of f.s.	±0.8% of Reading ±0.2% f.s.
Frequency Range	20-100 Hz sinusoidal, other accuracies at higher frequencies including DC and distorted waveforms		

*Tera = x 10^{+12}

Computed Parameters (single and three phase)

	APPARENT POWER (VA)	IMAGINARY POWER (VAR)	POWER FACTOR (PF)	DEMAND (Dm)	ENERGY (WH)
Method	Volt-amps (VA)	Volt-amps reactive $(VAR) = \sqrt{VA^2 - W^2}$ Provides magnitude and sign.	$\dfrac{Watts}{Volt\text{-}amps}$ (PF) Provides magnitude and sign to indicate leading or lagging PF.	Avg. Demand in Period (KW, KVA or KVAR)	Summation of $\dfrac{Watt\ Min}{60}$ (WH)
Range (k = 1.0)	30-6000 VA	30-6000 VAR	0.00-1.00 lead or lag (independent of k factors)	0.001 Watts — 999.9 Tera Watts	0.001 WH — 999.9 Tera WH
Range with k Factor (Corres. to PT and CT ratios.)	.001 VA — 999.9 Tera VA	.001 VAR — 999.9 Tera VAR			
Accuracy without CT, PT	±0.8% of Reading ±0.2% of f.s.	Dependent on power factor	±0.02 Typical (±0.04 Max.)	±0.8% of Reading ±0.2% of f.s.	±0.8% of Reading ±0.2% of f.s.

INPUTS

Analog

	VOLTAGE	CURRENT
Number	One, Two, or Three	One, Two or Three
Type	Differential voltage for 3 phase Wye or Delta (Referenced to a common neutral for 3 phases, See drawing on page 5) or up to 3 single phase with common neutral.	Individual differential voltage for use with the Dranetz isolated CT termination, or a Dranetz clamp on CT (Model 808 Only).
Range	60-600 Volts RMS. (Autoranging)	5-200% of full scale. (Autoranging) (Note 1)
Input Impedance	Phase: 10 MegOhms, 3.3 MegOhm to neutral.	200 K Ohms each lead to ground.
Common Mode Voltage	500 V peak to ground with 350 V RMS measuring signal. 300 V peak to ground with 600 V RMS measuring signal.	±5 Volts peak to ground lead.
Ground Leakage Current	0.5 ma, with all inputs at 600 V RMS to ground.	Not applicable.
Scaling	Keypad entered scale factors.	Keypad entered scale factors.

NOTE 1: The Clamp-On Current Transformers (TR-2012 and TR-2013) and the Isolated CT Termination convert a current input to a voltage output for use by the Series 808. Internally, the Series 808 is calibrated such that a voltage input of 2.5 V RMS is read as 5 Amps RMS.

Pulse

Initiator Pulse: Accepts pulses from revenue meters; scale factor set through keypad; three-wire pulse inputs 12-48 volts DC, optically coupled; duration 0.2 ms minimum on time, 0.5 ms minimum off time. (Voltage source is user supplied.)

External Sync: Synchronizes demand interval to external systems; 12-48 Volts DC, optically coupled, pulse duration 0.5 ms-0.5 sec. (Voltage source is user supplied.)

Specifications (Cont'd.)

DISPLAYS AND PRINTOUTS

Displays on Command (Continuously):
Volts, Amps, VA, VARS, PF, KW, KWH, demand accumulation (KW, KVA or KVAR), and projected demand (updated once a minute). Model 808 also displays date, time (updated once a second) and energy rate (KW Min.).

Prints on Command:
Prints parameter as defined above.

Setup Data: Prints all mode selections and setup data.

Demand Summary: (Including PF, date and time of occurrence.) Four highest daily demands, four highest billing period demands to date, energy used daily, and energy used this billing period to date. Data can be presented by time of day billing.

Status: User may select number of channels, Volts, Amps, KW, KVA, KVAR, PF and demand projection (or all of them). Includes date, time of printout and readings at that time.

Automatic Printouts:
Scheduled: Prints demand summary and status as defined above at three user selectable print times plus midnight. Monthly summary at the end of billing period.

Demand Limit: At end of each demand interval if the demand exceeds user selected percent of demand limit (10% increments). Status printout can be included.

Energy Rate: At the end of each minute if the energy for that minute exceeds the preset limit.

Low Limit: Prints date, time and channel identification, if any measured voltage drops below the user preset limit.

Paper Low: Prints when less than 20 feet of print paper remains.

Power On: Prints when unit is initially energized.

Auto Standby On/Off: Prints date and time when unit automatically switches to or returns from standby mode due to low operating voltage.

Set Standby On/Off: Indicates date and time when unit is placed on or off standby by user.

PROGRAMMING AND CONTROLS

Front Panel Display
16 character alphanumeric, liquid crystal type. (See Note 2).

Printer
20 character alphanumeric, 5 × 7 dot matrix, thermal type with auto paper take up. (See Note 2).

Speed: Approx. 2 lines/second.
Paper Size: 2.25 in. wide, approx. 140 feet in length.

Clock
24 hour clock: Hour, minute, second (updated each second).

Accuracy: 2 sec/day at 25°C
10 sec/day, +5°C to +45°C

Calendar
Day, month, year (updated daily).

Billing Dates
Billing dates for twelve months can be preset by user.

Demand Interval
Fixed: 1 to 120 minutes in 1 minute increments. (Interval timing can be stopped automatically if measured power drops below user set limit).

Sliding: 5 to 60 minutes in 5 minute increments.

Keypad
Touch sensitive with audible tone; provides access to all functions for setup, display and printing of measured and computed data. Prompting LED lamps aid in selection of keypad functions.

Security Locks
Three position (Off-Operate-Setup), key removable in "Operate" position to permit monitoring without access to setup parameters. Four digit software locking code provides additional security by preventing unauthorized printouts and displays.

k Factors
Keyboard entered scaling factors for use with CT's, PT's or other input devices (6 digits max., 3 digits after decimal point).
Voltage k Factor: 0.001 to 999,900 volts per volt. Same factor for all channels.

Current k Factor: 0.001 to 999,999 amps per ampere. Same factor for all channels.

Initiator Pulse k Factor: 0.001 to 999,999 watthours per pulse.

Alarms
Audible 1 second burst, can be turned on or off by keypad. (See Note 2).

Demand Limit Alarm: Audible, if demand limit set by user is exceeded. (See Note 2).

Energy Rate Alarm: Audible, if the rate of energy consumption exceeds the limit set by the user. (See Note 2).

Alarm Relays (Option 101): Optionally, relays can be provided for external alarm devices. Low voltage contacts for each will close for approx. 1 second.

MISCELLANEOUS

Rear Connections
Voltage Connector: Rated for 600 VAC, includes three channel inputs, common neutral, and safety ground connection. (Unit is supplied with ten foot, 600 VAC cable equipped with mating voltage input connector.)

Pulse Input: Screw terminals for connection to pulse initiators and external interval sync pulse.

Optional Alarm Relays: Provides terminals for two sets of low voltage contacts, for connecting to external alarm devices.

Power Requirements
Factory set at 115±10 V RMS (Model 808) or 230±20 V RMS (Model 808A).
Frequency: 47-65 Hz   *Consumption:* 10 watts approx.

Brownout, Blackout Protection
Internal Battery: Unit inherently operates on internal battery on continuous charge by power line. Approx. 24 hours for full charge.

Sustained Battery Operation: Loss of charging power for more than 10 seconds causes an alert display. Unit will provide full operation (with occasional printing) for 15 minutes after which it will switch to standby mode. Standby mode will retain clock, calendar, stored data, and setup data for up to 15 days. Display blanks out.

Physical (See Note 2).
Size: Approx. 12.5 in. wide, 8.5 in. high, 10 in. deep (320mm x 220mm x 250mm)
Weight: Approx. 10 lb. (4.5 kg)
Shipping Weight: 15 lb. (6.8 kg) approx.

Temperature
Storage: −20°C to +60°C.   *Operating:* +5°C to +45°C.

Note 2: Model 808 only.

Specifications (Cont'd)

	Model 808	Models 809 and 810*	Model 812*
Front Panel Features	Keyswitch, LCD display, keypad, printer	Keyswitch and power indicator. Four sets of four digit LED displays provide V, A, W, VARS, energy, Total VA, Total PF, or demand readings.*	
Enclosure	Portable carrying case (optional rack mount adaptor available).	19 in. aluminum rack mount for severe RFI and EMI environments.	NEMA Type 12 steel for severe RFI and EMI environments.
Dimensions	8.5 in. H x 12.5 in. W x 10 in. D (220 x 320 x 250 mm).	7 in. H x 19 in. W x 8 in. D (180 x 480 x 200 mm).	16 in. H x 12 in. W x 8 in. D (410 x 300 x 200 mm).
Approx. Weight	10 lb. (4.5 kg)	16 lb. (7.2 kg)	39 lb. (17.5 kg)
Connections Voltage and Current Inputs:	Voltage connector, rated for 600 VAC, includes three channel inputs, common neutral and safety ground connection (unit is supplied with ten foot, 600 VAC cable equipped with mating input connector). Three U.L. rated current connectors provided for connection to Dranetz clamp-on Current Transformers or to Isolated CT Terminations.	Screw terminal block, 600 V RMS rated, includes three channels of voltage inputs, common neutral and ground. Includes three sets of current inputs and their respective built-in five amp CT isolated terminations.	
Pulse Input	Screw Terminals for connection to pulse initiators and external interval synchronization pulse.		
Optional Alarm Relays	Provides terminals for two sets of low voltage contacts, for connecting to external alarm or other devices.		
Input Power	Built-in, two-prong, six foot power cord for 115 VAC.	115 or 230 VAC, switch selectable. Standard three-prong power connector.	Screw terminal block having line, neutral and chassis ground connections for permanent hard wiring.
Communications Format	Full duplex operation in seven bit ASCII format—32K character buffer memory via RS-232C output or Bell 103 compatible modem.		
Baud Rate		300 for built-in modem; user selectable at 300, 1200 or 9600 for RS-232C port.	
Option 106	300 for built-in modem; user selectable at 300, 1200 or 9600 for RS-232C port.		
Option 105	User selectable at 300, 1200 or 9600 for RS-232C port.		

*LED displays (independent of remote operation) on Models 810 and 812 only (updated on average every 1.5 secs.):

1. Volts	CHAN A, CHAN B, CHAN C, and Average.	5. Summary	Volt-amps, Power Factor, Watts, VARS.
2. Amps	CHAN A, CHAN B, CHAN C.	6. Demand	Projected Demand, Demand PF, Minutes into period, Daily Energy. (updated each minute in demand period)
3. Watts	CHAN A, CHAN B, CHAN C, and Total.		
4. VARS	CHAN A, CHAN B, CHAN C, and Total.		

MODEL 808 STANDARD ACCESSORIES

The Series 808 Electric Power/Demand Analyzer is supplied with three rolls of thermal paper, a six foot power cord and a ten foot, five-conductor 600 VAC voltage input cable terminated with mating input connector. This cable has stripped and tinned leads for permanent installation or for hook-up with user supplied connectors. Optionally available is a Connector Kit (P/N 110,656) consisting of a spare UL rated 600 VAC mating voltage connector and three UL rated mating current connectors for input connection. A User's Guide, sized to fit inside the Series 808 cover lid, is included.

MODEL 808 AVAILABLE ACCESSORIES

CT's and CT Terminations

The following Dranetz Clamp-on CT's and Isolated CT Terminations are designed for ease of use with the Series 808. Each device is prewired with a 10 foot cable. All units (except TR-2015) are wired with a connector for plug-in to a current channel of the instrument.

The Standard and Available Accessories apply only to the Model 808. The Models 809/810 and 812 already include built-in five amp Isolated CT Terminators.

MODEL/PART #	CLAMP-ON CURRENT TRANSFORMERS			ISOLATED CT TERMINATIONS	
	TR-2012	TR-2013	TR-2015	P/N 110, 635-G5	P/N 110, 635-G1
Current Range	Switch Selectable: 0.2-10 A RMS or 6-300 A RMS	Switch Selectable: 1-30 A RMS or 20-1000 A RMS	100-3000 A RMS	0.2-10 A RMS Nom.: 5 A RMS	0.05-2 A RMS Nom.: 1 A RMS
Burden	5VA Max.	10VA Max.	50VA Max.	Insertion Z <0.02 Ohms	Insertion Z <0.2 Ohms
Accuracy* at 47-65 Hz (adds to basic 808 accuracy)	Low Range: ±1.5% R ±.05% f.s. High Range: ±1% R ±.05% f.s.		±2% of R ±2% of f.s., ±2 deg. (Includes CT Termination Error)	1-10 A RMS: ±0.5%R ± 0.5 deg.	0.2-2 A RMS: ±0.5%R ± 0.5 deg.
	±2 deg. @ 1-300A	± 2deg.@3-1000A		0.2-1 A RMS: ±1%R ± 2 deg.	0.05-0.2 A RMS: ±1%R ± 2 deg.
Insulation	600 V RMS		600 V RMS	600 V RMS	
Dielectric Test	2200 V RMS		2200 V RMS	2200 V RMS	
Opening Size	2 in (50mm) Dia.		Circ: 3.3 in. (85mm) Rect: 4.75 in. x 1.75 in. (120mm x 45mm) and 3.9 in. x 2.1 in. (100mm x 55mm)	Not Applicable	
Approx. Overall size	8.25 in. x 4 in. x 1.6 in. (210mm x 100mm x 40mm)		13 in. x 5.75 in. x 1.9 in. (330mm x 145mm x 49mm)	4 in. x 2 in. x 2.3 in. (100mm x 50mm x 60mm)	
Wt. Ea.	1.2 lb. (545g)		3.75 lb. (1.7Kg)	0.5 lb. (250g)	
Connection	Plugs directly into Series 808 current channel (Termination internal to CT)		Use with CT Termination P/N 110, 635-G5	Plugs directly into Series 808 current channel	
Fault Current				Will withstand 100 A RMS for 3 sec. without damage	

*R means reading.

Reusable Container

Designed for carrying, shipping and storage of Series 808 plus three Clamp On Transformers, three Isolated CT Terminations, and other accessories. (P/N 103, 100).

Size: 10.5 in. x 20.5 in. x 15 in. (260mm x 510mm x 380mm)
Weight: 13 lb. (5.8 kg)
Shipping Weight: 18 lb. (8.1 kg)

ORDERING INFORMATION

Model 808 Electric Power/Demand Analyzer: *Operates on 115 VAC input power. For 230 VAC input, specify Model 808A.*

Option 101—Alarm Relays: Two factory-installed relays will activate external alarm devices. One relay is for a demand limit alarm, the other is for an energy rate alarm. Both relays are normally open; will close for approximately one second when activated and have single pole contacts rated at 0.1A @ 24 VDC.

Reusable Container: (P/N 103,100) See page 11.

Clamp-on Current Transformers: See page 11.

Rack Mount Adaptor Kit: Easy to assemble rack adaptor kit for permanent or semi-permanent installation of the Series 808. Measures 8¾" high by 19" wide (17½" wide on the inside, to surround the 808) by 10" deep (allows sufficient connection space).

Option 105—Communications Interface: Consists of 32K character data buffer memory and RS-232C port (no modem).

Option 106—Communications Interface: Provides the 800 Series with full duplex communications in 7 bit ASCII format. Includes RS-232C interface, built-in FCC approved, auto dial/auto answer telephone modem and 32K character data buffer memory.

Isolated CT Terminations (See page 11)
For use with Dranetz Model TR2015 CT and all current transformers that are not supplied by Dranetz.

Thermal Paper Rolls (P/N 102,714).

Connector Kit (P/N 110,656) Contains a UL rated 600 VAC mating voltage connector and three UL rated mating current connectors for input connection. Includes connector accessories.

Extra Voltage Cable, 600 VAC (P/N 110,686) This ten foot, five-conductor cable is terminated with matching input connector and tinned leads.

Model 809 and 810 Remote Power/Demand Analyzers: Incorporates all of the communications capabilities of the Series 808 with communications option 106. These 19" rack mounted units are designed for permanent mounting and can be used alone or in power monitoring systems with Dranetz Autopolling Software and a PC. Model 810 has front panel displays of V, A, W, VARs, VA, total PF, Energy and Demand on-site. Built in 5 amp CT terminators are standard for each channel, switch selectable for 115 VAC or 230 VAC.

Model 812 Remote Power/Demand Analyzer: Similar to the 809-810 except that it is built into a NEMA 12 steel enclosure measuring 16" × 12" × 8". Easily installed, the enclosure protects against dust, dirt and light splashing of oil and water and can be permanently wall mounted indoors. Switch selectable for either 115 VAC or 230 VAC input power. Like Model 810, Model 812 includes front panel displays for convenient readouts on-site.

POWER-STAR™ Software: Allows a central site to communicate and control up to 96 remote Dranetz 808, 809, 810 and 812 analyzers. POWER-STAR is user friendly, menu driven and self-prompting and allows for reporting of V, A, W, VA, VARs, PF, DM, KWH and VARHRS plus other critical power related measurements. When used with LOTUS 1-2-3™, data can be presented graphically or in spread sheet format.

About Dranetz . . .

Dranetz Technologies has been designing and building precision electrical test instruments for over 20 years. The company's energy management, computer, industrial and general instrumentation products have earned an enviable reputation for high quality, reliability, state-of-the-art technology and thoughtful design.

Our sales and customer service staffs are fully qualified and always ready to help you with your specific applications. Our Technical Training Center was established to provide professional level education in the power and computer related specialties. Courses taught include the analysis and correction of power line and environmental problems, techniques in monitoring complex operations and processes and energy management strategies. Equipment training in Dranetz instrumentation is also available.

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