SIEMENS

4700 Power Meter Electronic Metering Package

Bulletin SG3089


SIEMENS
4700
Volts RMS
Phase
Amps RMS
Power Functions
Phase
Display
Function
Increment
Minimum
Cursor
Maximum
Parameter Select

Specify the 4700 power meter. And turn a page of history.

Imagine combining ammeter and switch, voltmeter and switch, kW hour demand meter, kW meter, power factor meter and five other traditional meters into one comprehensive, easy-to-use digital package. The 4700 power meter by Siemens functionally replaces up to 12 traditional analog devices in a single compact unit with accuracy, flexibility and features the older technology just doesn't offer. For example, its non-volatile memory records out-of-limit events, logs minimum and maximum values for every measured parameter and can periodically capture snapshots of measured values for later analysis.

Based on a 16 bit microprocessor, the 4700 power meter by Siemens is a state-of-the-art digital device for use in industrial, commercial and utility power systems. It can be used in low voltage and medium voltage switchgear, switchboards, motor control centers, high voltage power circuit breakers... just about anywhere accurate electrical power data is required.

With its optional communications module installed, the 4700 meter becomes a powerful data collection point for the Power Monitor™ display and monitoring unit and facility-wide ACCESS™ electrical distribution communication system by Siemens.

Specify the 4700 power meter for simple replacement or to take advantage of the emerging communications technologies. Since it uses the same current and voltage transformer inputs as analog meters, retrofit is a snap.

Ordering is simple—one basic catalog number covers all current and voltage transformer ratios. Field setup is straightforward — the 4700 power meter is programmable and provides clear, concise interactive instructions. Just enter the appropriate current and voltage ratios into the unit's non-volatile memory. It's that simple.

Specify the 4700 power meter by Siemens. And make some history of your own.

Full Metering Capability

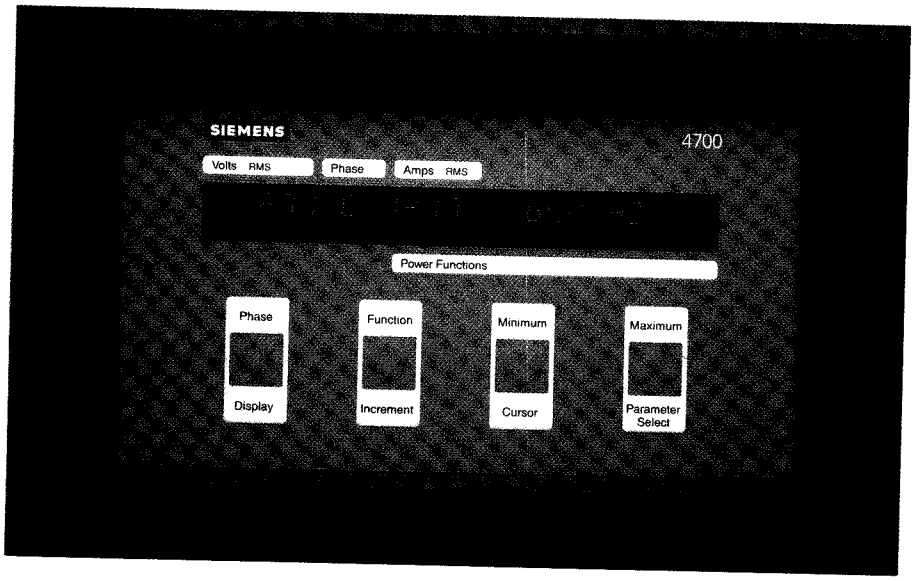
All 4700 power meters feature full three phase RMS metering capability. The table below lists all the electrical parameters measured along with the accuracies for both standard and optional high accuracy versions. An auxiliary voltage input is standard on all meters. This one volt nominal input can be used to monitor additional parameters such as temperature, battery voltage or heater currents.

	Accuracy	
Measured Parameter	Standard	High
Phase currents Avg phase current Ampere demand Phase voltages Avg phase voltage Line voltages Avg line voltage	1.0%	.25%
kW kVA kVAR kW Demand kW Hours kVAR Hours	2.0%	.50%
Power Factor	4.0%	1.0%
Frequency	.5Hz	.2Hz

Reliable Industrial-Hardened Electronics

The 4700 power meter is listed (pending) under UL 1244 and has been developed and field tested to meet demanding requirements in a full range of voltage and equipment applications. The ANSI C37.90.1 requirements for surge withstand and fast transient voltage were an integral part of the design goals. Field experience has shown that surviving these tests is mandatory in order to survive in actual application, particularly where switching surges from vacuum circuit breakers or current limiting fuses are present. The phase voltage, power supply and current input terminals can withstand a full 1500Vac dielectric test to ground without damage.

Reliability is designed into the basic features, too. The standard power supply accepts 125Vdc as well as 120Vac so a battery source can be used for critical monitoring applications. Rugged EEPROMs are used to store critical configuration and relay setpoint information where it is immune to power loss, atmospheric contamination and electromagnetic interference.



The 20 character high-visibility readout clearly displays critical circuit data. This display reports present voltage for the C phase, indication of phase to neutral measurement, present phase amperes, and the frequency power function.

The 4700 power meter automatically scales. The display shows present average kV, present average amperes, and the lagging power factor. A leading power factor would be shown as a negative value.

The 4700 power meter requires that a password be entered in order to change setpoints or to reset min/max or kW/kVAR hour values.

Highly accurate power function data is clearly displayed at the touch of a finger.

High Visibility Display

Readability is a must for a meter that does so much. The 4700 meter's illuminated 20 character integral display is highly visible with its .4 inch tall full alphanumeric character set. Current and voltage for each phase and average are displayed together, along with one power measurement.

Operation is simple. Phase, Min/Max and Power Function keys quickly index through all measured parameters. The keys are sealed membrane type using stainless steel switch elements for long mechanical life and resistance to atmospheric contamination.

Min/Max Values Capture Changing Load Conditions

Every 4700 power meter includes a nonvolatile log of minimum and maximum values for all measured parameters along with their time of occurrence. Typically, min/max data collection periods will coincide with utility billing cycles. The log can be reset at the integral display or remotely over the communications bus.

Read out min/max values on the integral display or review values and times of occurrence remotely. Use the data to allocate energy costs, audit utility bills and better manage power consumption and demand.

Remote Communication Eliminates Legwork, Improves Management

Recording load conditions using the "foot and clipboard" method is a thing of the past. With its communications module installed, the 4700 power meter feeds circuit conditions to power management systems over an industry standard serial bus. Monitor real-time data or alarm limits to identify potential circuit problems. Use the historical data for load analysis, diagnostics and power management.

The communicating 4700 meter can also be programmed over the communications bus. Set data points or relay actions and reset historical values (kW/kVAR hour, min/max) from a remote location. Perform all programming just as if you were standing at the metered equipment.

With communications installed, the 4700 meter becomes a comprehensive data collection point for the Power Monitor display and monitoring unit and the facility-wide ACCESS electrical distribution communications system by Siemens. But the 4700 power meter is not limited to communication with Siemens equipment. It uses an "open" protocol common to all components of the ACCESS system. For example, the 4700 meter's measured values can be sent to a serial port on a programmable logic controller or remote terminal unit for integration into a distributed control or SCADA system. A variety of networking options is available to address your specific application.

Even if you have no immediate plans to implement remote monitoring of your power distribution system, specify the 4700 power meter. Since the communications option is field installable, you'll have the flexibility to add communications at a future time without replacing meters.

Programmable Output Relays Extend Application

Three 10 ampere form C relay contacts can be added to the 4700 meter to extend application to alarm, load shedding, or breaker tripping functions. Each of the relays can be set to activate or release on programmable threshold and time delay values for any of the metered parameters. For example if kW demand exceeds 2500kW for more than two minutes, one of the relays can be set to activate for load shedding, and then release only when kW demand gets below 2200kW for more than 30 seconds. Multiple setpoints can be directed to each of the three relay contacts. Relays can also be set to act as pulse outputs for kW hours and kVAR hours instead of alarm or tripping signals.

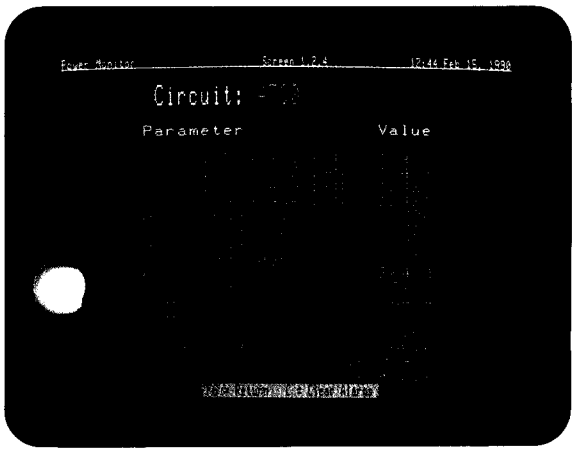
The meter's nonvolatile memory logs time and cause of setpoint operation. Access the event log remotely and use the diagnostic information to prevent recurrence.

Programming setpoints is done by responding to simple English commands from the meter's integral display or, with communications, from a remote monitoring unit. A security password protects setpoints from inadvertent tampering.

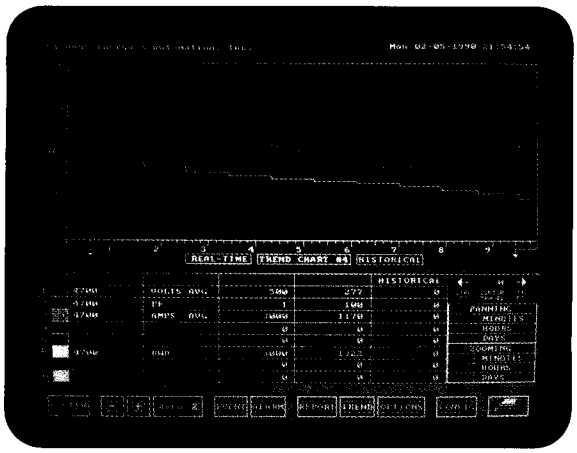
The 4700 meter gives you more user-friendly operation, an extended range of settings, and greater security of setpoints compared to meters which use mechanical DIP switches and special manufacturer's binary programming codes.

Programming Made Easy

All of the 4700 meter's power would be useless if programming and data displays were not designed for simple operation. Programming is completely interactive; the 4700 meter asks for information and you supply it. The twenty character alphanumeric display is a major user advantage. Messages are in easy-to-understand plain English so you don't have to memorize special codes or search through an instruction book for DIP switch settings.



All 4700 power meter data, both real time and historical, can be displayed on the Power Monitor™ display and monitoring unit. This detail data screen provides complete real-time data and present totals for accumulated kW/kVAR hour data.



The ACCESS™ electrical distribution communication system can manipulate 4700 power meter data to develop trend analyses and provide sophisticated operational diagnostics for facility and process engineers.

The 4700 power meter is designed for maximum output with minimal input, leaving you time for productive analysis of circuit data and diagnostics.

Unique Input And Output Functions

The 4700 power meter offers four optional discrete inputs for monitoring any normally open or normally closed contacts. Typical uses include transformer temperature alarms, fan control status, pressure alarms, or breaker and switch position indication. One of the four discrete inputs is also a counter which can record the number of breaker or switch operations, number of tripping operations, or pulses from a utility kW hour meter. Another one of the discrete inputs can be used for synchronizing the 4700 power meter's internal kW demand period with an external utility billing meter pulse. Status and counter values are read over the communications bus.

The 4700 power meter also provides an optional industry standard 4 to 20mA format output tied to any one of the measured parameters. Therefore, the 4700 power meter can replace a transducer and provide an analog output to systems which require analog inputs, e.g. SCADA, distributed control systems, and programmable logic controllers.

A Meter That Remembers

Extended nonvolatile memory is available to allow the communicating 4700 power meter to periodically store up to 100 snapshots of all metered parameters for later retrieval and analysis. This feature is intended for applications where continuous communication is not required but historical data is needed. For example, use a dial-up telephone modem to retrieve snapshot and event log data on demand or at the end of a preset billing cycle. Or use the 4700 meter to temporarily monitor a circuit; retrieve and analyze load profiles with a personal computer.

Guide Form Specification

The following specification can be added to the appropriate metering section of switchgear, switchboard, motor control or other electrical equipment specifications to guarantee important features and functions of the 4700 power meter are provided. Specifications for related Siemens electrical distribution communication system components may also be included, such as the Power Monitor display and monitoring unit and ACCESS host computer:

"A digital power meter shall be used to monitor circuits as shown on the one-line diagram included with this specification (see figure below for recommended symbol and connection). The meter shall measure the real-time RMS values of phase currents, ampere demand, and phase and line voltages, plus power measurements including kW, kW demand, kW hours, kVA, kVAR hours. Power factor and frequency shall also be measured. (optional: A fourth current input shall be provided for monitoring neutral or ground circuits.) Resettable minimum and maximum values for each measured value shall be recorded in nonvolatile memory. The kW and ampere demand period shall be user programmable from one to sixty minutes and provided with the option of using either sliding window or fixed interval method. (optional: The kW demand period shall be capable of being synchronized with an external timing pulse.) A one volt nominal auxiliary voltage input shall also be provided. Accuracy of the current and voltage measurements shall be 1% and kW, kW hour and other power measurements shall be 2% or better. (optional: Accuracy of current and voltage measurements shall be .25% and kW, kW hour and other power measurements shall be .50% or better.)"

"The digital power meter shall be listed under UL 1244 and meet ANSI C37.90.1 requirements for surge withstand and fast transient tests. All configuration information such as CT ratios, voltage scales, and communications address shall be stored in nonvolatile memory so that it can be set either from the integral display or remotely using the communications module, whichever is provided. No batteries shall be required to maintain configuration information indefinitely. Mechanical DIP, BCD or hexadecimal switches shall not be used. The meter shall derive power from (choose one:) ( ) the measured phase voltage ( ) a separate 125Vac source ( ) a separate 125Vdc source."

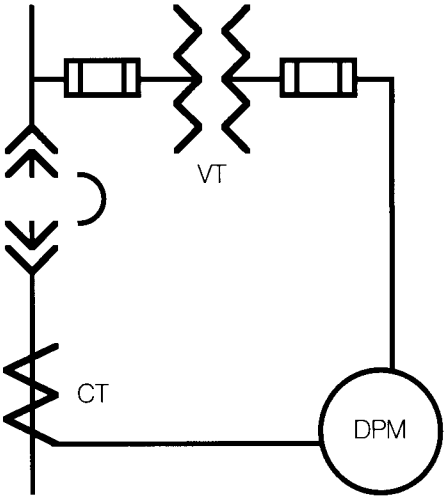
Display option: "The digital power meter shall include an integral illuminated display for reading all real-time and min/max measured values as well as programming initial configuration and any relay setpoints. The display shall consist of at least twenty .4 inch high alphanumeric characters and be operated using clearly labeled sealed membrane keys with stainless steel switch elements for long mechanical life and resistance to atmospheric contamination. The digital power meter with integral display shall be flush mounted on equipment doors or panels in locations shown on general arrangement sketches which may be included with this specification. Operation of the power meter to read real-time or min/max measured values or to program configuration and any relay setpoints shall not require opening doors or removing panels. A user-defined password shall be required to change configuration, reset min/max log and kW/kVAR hours or change any relay setpoints."

Relay option: "Three programmable relay outputs shall be provided to activate and release based on threshold and time-delay values associated with any of the measured parameters. Remote relay operation shall be possible when the communications module is installed. The relays shall be form C rated 10A 120Vac/24Vdc. Activation and release of the relays shall be recorded in a nonvolatile log with cause of operation. The log shall record at least the last 50 events. Four discrete inputs shall be provided to monitor status of NO or NC contacts. One of the discrete inputs shall also be capable of counting state changes. A programmable auxiliary 4 to 20mA analog output shall also be provided. Inputs and outputs shall be wired according to circuit diagrams included as part of this specification."

Communications option: "A communications module shall be provided using an industry standard RS-485 (or RS-232) serial bus to remotely read real-time and min/max measured values, interrogate the event log, reset min/max and kW/kVAR hours and program configuration and any relay setpoints. A means shall be provided to periodically synchronize the meter's internal clock with a master bus clock so that the meter's event and min/max logs are accurately time-stamped to within one second. The RS-485 module shall provide at least 500V galvanic isolation between the meter and other devices on the communications bus."

Extended memory option: "The power meter shall include extended nonvolatile memory to record at least 100 snapshots of each measured parameter. The interval between snapshots shall be readable using the communications module."

Note: At least the Display or Communications options must be selected to provide the means to read data and program the power meter.



DPM=Digital Power Meter

Table 1. 4700 Product Designations

Features	Available Basic Product Designations							
	D	DR	DC	DRC	C	RC	DMC	DRMC
15 metered parameters	X	X	X	X	X	X	X	X
Min/Max log	X	X	X	X	X	X	X	X
Aux voltage (1Vac/1Vdc nominal)	X	X	X	X	X	X	X	X
20 character display	X	X	X	X			X	X
Four discrete inputs		X		X		X		X
Three programmable relay outputs		X		X		X		X
One analog output (4 to 20mA)		X		X		X		X
Extended memory (100 snapshots)							X	X
Communications module installed			X	X	X	X	X	X

4700 Power Meter Catalog Number Designations

4700 - DRMC 3 - 1 2 S N

Basic Product Designations:
(See Table 1.)
D = 20 Character display
R = Relays & discrete inputs
M = Extended snapshot memory
C = Communications module installed

Communications Options:
3 = RS-232 & 485 (set to 232)
4 = RS-485 (with isolation)

Power Supply Voltage:
1 = 120Vac/125Vdc
2 = 240Vac/250Vdc
4 = 48Vdc
5 = 24Vdc

Measured Phase Voltage (Ref to Neutral):
1 = 120Vac (50/60Hz)
2 = 277Vac (50/60Hz)
3 = 350Vac (50/60Hz)

Accuracy Class:
S = Standard accuracy (1.0%/2.0%)
H = High accuracy (.25%/.50%)

Additional Options:
N = Neutral/ground current input
F = 400Hz metering application
T = Extended temperature capability (-30° to +70° C)

Examples:

"4700-C4-11S" defines a power meter without integral display with an isolated RS-485 communications module installed, a 120Vac/125Vdc power supply, 120Vac nominal measured phase voltage inputs and standard 1%/2% accuracy.

"4700-DR-12HN" defines a power meter with integral display, status inputs and relay outputs, 120Vac/125Vdc power supply, 277Vac nominal measured phase voltage inputs, high accuracy (.25%/.50%) and a fourth current input for neutral or ground currents.

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