

# Polyphase Watt-hour Meters D8L and T8L



**Metering**

**ELSTER** 

The polyphase meters D8L and T8L, for direct metering of up to 200 A, have been designed by Elster - Energy Metering with a commitment to feature high and total quality, thus achieving a better performance and the customer's satisfaction.

The modern single disc technology and the proper selection of materials together with a carefully controlled manufacturing process make the performance of these meters remain practically unchanged even under the most adverse operational and environmental conditions. These meters are little affected by variances in temperature, humidity, position, voltage, frequency, external magnetic fields, short circuits and load unbalance. Their accuracy is maintained throughout the entire operational range from 5% nominal current up to the high value of 800% overload. The main features of D8L meters (two elements) and T8L meters (three elements) are the following:

- High registration accuracy: a factor of the highest importance especially for high consumption installations.
  - Extended useful life: the magnetic repulsion bearing system provides maintenance free virtually unchanged accuracy over the years. Laboratory life tests, confirmed under field conditions, showed an even longer useful life for the bearing system than that of the meter itself (30 years and over). - Low losses, especially in the potential circuits, represent substantial savings for the utility.
  - Extreme versatility of operation: the meters for direct connection of up to 200 A eliminate the use of current transformers and testing switches block.
- Main benefits are:
- Lower installation costs.
  - Lower stock cost for the utility -smaller possibilities of fraud.
  - A better accuracy class (once the error of the current transformers is eliminated).
  - Higher reading accuracy on low loads is obtained due to the low coefficient of nominal current/maximum current.
  - Lower operating costs since there is no need to replace the meter by another with a higher nominal current. This situation frequently arises as the user's normal load increases with time.
  - Smaller possibilities of error since multiplication constants (K) are not necessary.
  - The requirements of the most important domestic and international standards such as IEC (International), COPANT (Pan-American) and ABNT (Brazil) are met.

## TECHNICAL FEATURES

### FRAME

Made of aluminum-silicon pressure injection alloy, this vital piece is sturdy and lightweight. All internal components are assembled on this rigid piece and indefinitely maintain their proper position thus assuring accurate performance of the meter. With accurate machining and the use of self-positioning pins, disassembled components can easily be reassembled in their original position.



### BASE

A solid and sturdy piece injected with the same alloy as the frame. Due to the simplicity of design of the base, a meter with reduced weight was obtained, while maintaining the mechanical integrity of the meter.

### TERMINAL BLOCK

The molded phenolic resin terminal block has excellent dielectric and mechanical properties. The low hygroscopicity of the material and the ample design of the walls assure proper operation even during overvoltage conditions. The terminals are designed for the use of cables with size according to the installation until a current value of up to 200 A.

### METER COVER

Made of polycarbonate or annealed clear glass, without deformations or porosities, the cover is assembled on

a special nonhygroscopic rubber gasket, forming a sealing unit which prevents dust and strange bodies from getting into it. It is fastened to the meter base by two screws and a rim on which the seals are located.

### REGISTER

The revolutions of the disc are transmitted to the reading elements of the register through a high precision and lightweight gear train, which, together with the set of accurately machined shafts, results in a greatly reduced friction assembly.

The register is available in various types (clock type or cyclometer type, with 4 or 5 digits, with constants in the register  $K=1$  or  $K=10$ ). All types have the advantage of being selfpositioning and totally interchangeable, eliminating any type of register mesh adjustment.



### GEARING

An exclusive innovation is the absence of mesh adjustment requirements of the register. The high precision machining operations provide exact and invariable mesh between the worm gear on the shaft of the moving element and the gear train of the register. This provides perfect interchangeability between register and extreme easiness and accuracy of assembly. It is also available in the unidirectional version, which always accumulates the readings, positively, regardless of the disc rotation direction.

### BRAKING ELEMENT

The braking element consists of two special alloy magnets with high coercive force thus highly resistant to demagnetization from causes within or outside the meter. They are embodied in one solid aluminum-silicon pressure injection alloy. With the class I thermal compensation, the system remains stable despite temperature variations.

### BEARINGS

The lower bearing - of magnetic repulsion type - acts through repulsion between magnetic fields of the same polarity. This action asserts itself in the form of a magnetic cushion, which makes the rotor to float thus providing complete operational stability during the entire useful life of the meter. Made of barium ferrite, a non-metallic material, the bearing magnets are immutable in time, and are 350% more resistant to demagnetization than iron magnets.

The magnetic flux maintains the iron core permanently free from ferrous particles. This is known as selfcleaning effect and eliminates the bearing maintenance requirements.

The upper bearing consists basically of a specially polished steel pin, which drives a carefully finished plastic material self-lubricant bushing located at the end of the disc shaft.

### MOVING ELEMENT



The moving element of D8L and T8L meters is of 'single disc' type, because it consists of just one disc. It is made of aluminum with a high grade of purity. The disc of the T8L meter consists of seven blades compacted with high mechanical accuracy. This system provides an excellent performance, also especially regarding interference between elements. The shaft is made of aluminum and has a worm gear machined on it. At the ends of the shaft, the components of the upper and lower bearing are fastened and at its center the disc.

These elements are fastened to the shaft by means of cubes of special alloy injected under pressure.

The disc is made up for meter calibration under many systems; it has divisions for stroboscopic calibration and 100 additional divisions for calibration by comparison-, for calibration with photoelectric systems it has a hole and markings on its surface and periphery.

### CURRENT ELECTROMAGNET

This electromagnet consists of highly permeable iron-silicon core on which the overload compensating set is assembled. The current coil of the electromagnet is

wound on a bobbin made with high-insulated material. The coil consists of an amply dimensioned copper winding which assures the maintenance of low temperatures even when operating at maximum current over long periods. The terminals are welded to its extremities with -spot welding system. The use of two screws on each terminal for fastening the external leads assures a larger contact surface, eliminating undesirable and dangerous overheating.

The winding of the current coil directly on the bobbin, which was previously mounted on the core, provides the set with high mechanical resistance in case of short circuits in the network and also reduces vibrations and noise, which frequently occurs under normal operating conditions.

### VOLTAGE ELECTROMAGNET

This electromagnet consists basically of an iron-silicon core, with the same features as the current electromagnet.

The voltage coil and the light load, balance and power factor adjustments, as well as the voltage and class II temperature compensation systems are assembled on

the voltage electromagnet. The perfect design of the voltage coil and of the magnetic circuit provides high torque and low losses.

The adequate clearance and creepage between the pieces under voltage and the mass, together with insulating materials of low hygroscopicity and high dielectric qualities provide complete safety during overvoltage conditions.

### CALIBRATION AND ADJUSTMENTS DEVICES

The following are the main features of the adjustment devices of D8L and T8L meters:

- Minimum mutual influence
- Action by micrometric system with practically linear response provides predetermination of adjustment.
- Easy access and operation permit that the meters can be adjusted with a simple screw-driver.

These features, together with high independence between elements, provide easy, quick and accurate adjustment of the meters, also on calibration benches with single-phase system.

## SPECIAL VERSIONS AND ACCESORIES

### PANEL

The 2.5(20)A meters for indirect metering can be supplied in 'switchboard type' version. The meter body is assembled on a chassis, which provides a perfect rigidity.

It can be removed from the case for purposes of calibration and testing. It is assembled in a standardized case made of steel blades and has a system to short-circuit the secondaries of the current transformers.

External dimensions: 162 x 265 x 194.5 (LxAxP) in millimeters.

### CLASS 1% METERS

The meters are usually used for large amounts of energy. They meet the domestic and international standards and maintain their accuracy from 5% nominal current up to their maximum current. (ft= 1)

### REACTIVE METERS

They have internal phase shifting and allow the calibration and testing to be processed in the series parallel single-phase system and in the three-phase system. They also have a mechanical detent to prevent the disc from rotating in the reverse direction.

### DEMAND REGISTERS

Available in two versions:

- with electromechanical register of cumulative and maximum demand – clock type
- with a totally programmed electronic register, featuring a liquid crystal display - with 15 functions

### PULSE INITIATOR/SENSOR

If necessary to obtain outside pulses proportionally to the energy registered, D8L and T8L meters permit the installation of internal initiators or internal sensors of high sensitivity and programmable for the use of digital controllers/sensors.

### POTENTIAL INDICATOR LIGHTS

These devices are used on each voltage electromagnet. They feature high luminosity and a practically unlimited useful life, and detect the absence of energy in the voltage coil. In case of lack of energization of these circuits the corresponding lamp turns off, visually indicating the fault. This device with very low consumption consists of a light-emitting diode (LED), which is fed with the flow produced by the voltage electromagnet itself.

### DETENT

This device can be used on D8L and T8L meters to prevent the reverse movement of the moving element due to reversion of energy flow.

### LIGHTNING ARRESTER FOR POLYPHASE METERS

This is a device to protect the voltage and current coils of the meter against overvoltage in the network caused, for instance, by atmospheric discharge, operations in the network, etc.

Its dimensions are 8.5 x 8.5 x 4,2 cm, and it is easily connectable with any type of meter made in Brazil. It does not require any kind of modification.

### OTHER VERSIONES

D8L and T8L meters are also available with other nominal values for voltage, current and frequency. Other version, such as polycarbonate cover, internal link, connection diagram (Load-line or sequential) and special inscriptions in the nameplate also may be supplied.

### MAIN RENEWAL PARTS

ITEM	DESCRIPTION
01	Terminal Block
02	Terminal block cover – short
03	Terminal block cover – long
04	Glass cover
05	Polycarbonate cover
06	Current electromagnet - 2.5, 15 and 30 A
07	Voltage electromagnet - 120 and 240 V
08	Braking element
09	Upper bearing
10	Lower bearing
11	Moving element
12	Register



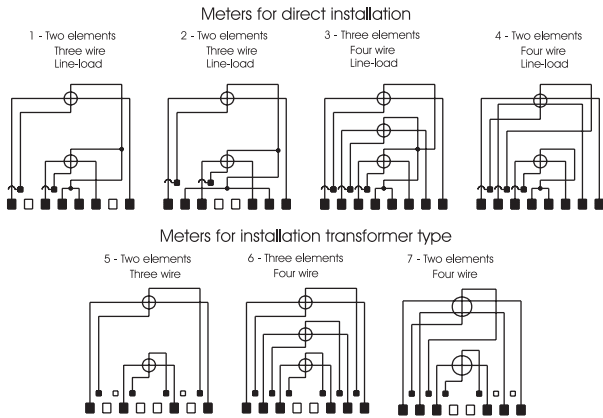
# Polyphase Watt-hour Meters

## D8L and T8L

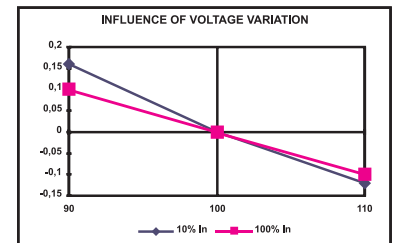
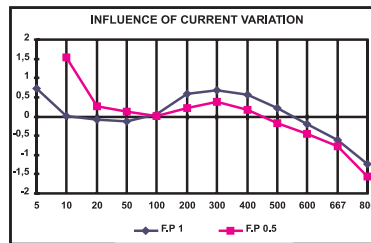
### Technical Data

TECHNICAL DATA	UNID.	MODEL											
		D8L						T8L					
Nominal Voltage (Vn)	V	120V			240V			120V			240V		
Nominal Current (In)	A	2,5	15	30	2,5	15	30	2,5	15	30	2,5	15	30
Maximum Current (I máx.)	A	20	120	200	20	120	200	20	120	200	20	120	200
Frequency	Hz	60	60	60	60	60	60	60	60	60	60	60	60
Disk constant (Kd)	Wh/r	1,2	7,2	14,4	2,4	14,4	28,8	1,8	10,8	21,6	3,6	21,6	43,2
Angular speed of moving element	RPM	81/3	81/3	81/3	81/3	81/3	81/3	81/3	81/3	81/3	81/3	81/3	81/3
Nominal Torque	gf.cm	5,4	5,4	5,4	5,4	5,4	5,4	6,6	6,6	6,6	6,6	6,6	6,6
Losses in potencial circuit (for each element)	W	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98	0,98
Losses in potencial circuit (for each element)	VA	6,60	6,60	6,60	6,60	6,60	6,60	6,60	6,60	6,60	6,60	6,60	6,60
Losses in current circuit at In (for each elem.)	W	0,10	0,22	0,36	0,10	0,22	0,36	0,10	0,22	0,36	0,10	0,22	0,36
Losses in current circuit at In (for each elem.)	VA	0,29	0,31	0,42	0,29	0,31	0,42	0,29	0,31	0,42	0,29	0,31	0,42
Mass of rotor (with magnetic bearing)	g	27	27	27	27	27	27	31	31	31	31	31	31
Total Mass of meter with short cover	Kg	3,2	3,2	4,0	3,2	3,2	4,0	3,9	3,9	4,7	3,9	3,9	4,7

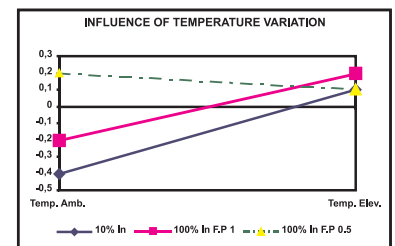
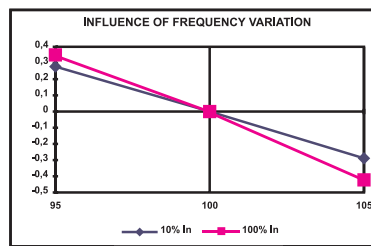
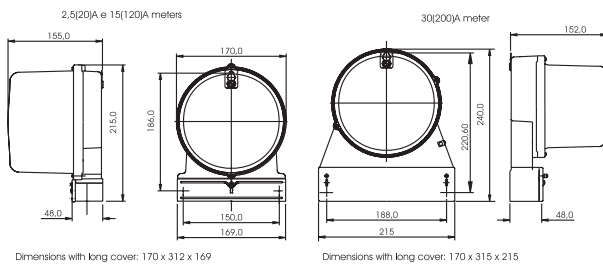
### Internal Connection Diagrams



### Typical Curves



### External Dimensions



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