Department of consumer and corporate affairs / Ministère de la consommation et des corporations

STANDARDS BRANCH - DIRECTION DES NORMES

NOTICE OF APPROVAL

E-94

OTTAWA March 22, 1971.

Landis & Gyr Types "FFK2fx" 2-element Active Energy, "FFK3mx" 3-element Active Energy, "FFK2fxØ" 2-element Reactive Energy and "FFK3mxØ" 3-element Reactive Energy, Solid State Telemeter Transducers

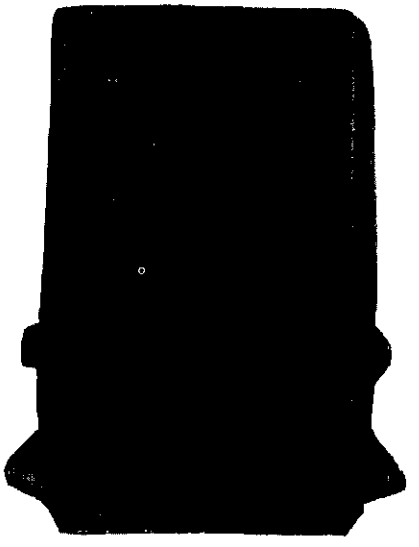
Rated Voltage	115-120 volts (240 volts on "-mx" and "-mxØ" only)
Nominal Current	5 amperes
Reference Current for Calibration I_g	6.3 amperes
Frequency	60 hz
Nominal Input	FFK2fx ± 1200 watts FFK3mx ± 1800 watts (at 120 volts) FFK2fxØ ± 1200 vars FFK3mxØ ± 1800 vars (at 120 volts)
Nominal Output	-5··0·· + 5 ma dc
Max. External Resistance	1700 ohms
Output Device	Precision resistor. See instructions in technical circular
Burden of Measuring Unit	
Each Voltage Coil	0.1 va
Each Current Coil	1 va
Power Factor Range	Unrestricted
Power Supply to Unit	120 volts 60 hz

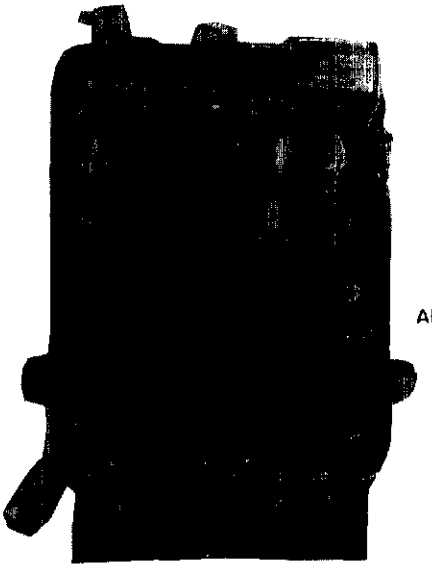
The dc output polarity with the polarities of the various instrument transformers are shown in the schematic wiring diagrams on page 4.

If the direction of power flow reverses, the dc output polarity will reverse also, so that these transducers are suitable for and are approved for import-export service, and any transducer used in this application requires verification for both directions of power flow.

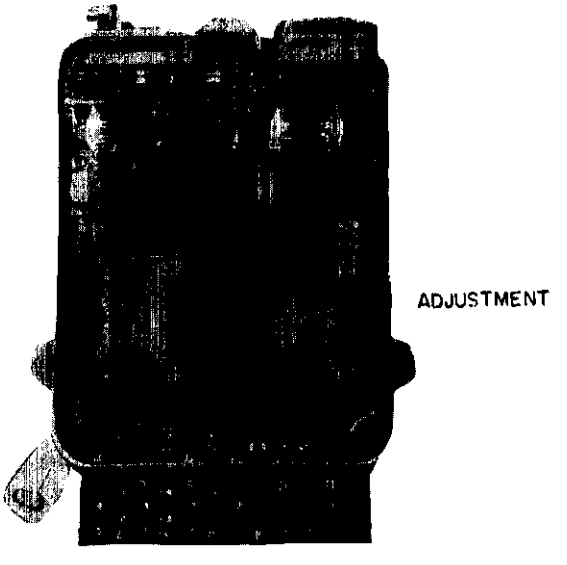
The recording potentiometer used with a transducer in this application would normally have a raised zero.

LANDIS & GYR TYPES "FFK2fx" 2-ELEMENT ACTIVE ENERGY, "FFK3mx" 3-ELEMENT ACTIVE ENERGY, "FFK2fxØ" 2-ELEMENT REACTIVE ENERGY AND "FFK3mxØ" 3-ELEMENT REACTIVE ENERGY SOLID STATE TELEMETER TRANSDUCERS





FFK2fxØ



FFK2fx

The transmission line from the transducer to the recorder may have any value up to a maximum of 1700 ohms.

Line resistances up to this value have no effect on the accuracy of the transducer.

For practical purposes, the output from these transducers can be considered to be pure dc and does not require filtering, but because it is in milliamperes, it cannot be applied directly to a recording potentiometer, but by passing this current through a resistor a drop in millivolts will be produced which can be applied to a recording potentiometer.

This dropping resistor must be at the recorder end of the transmission line so that transmission is done with a milliampere signal as this leads to greater freedom from influences of induced or capacitive stray voltages.

Note As this is the only approved method of converting the outputs of these transducers to millivolts, all installations are subject to inspection by the Department.
See circular letter.

Description

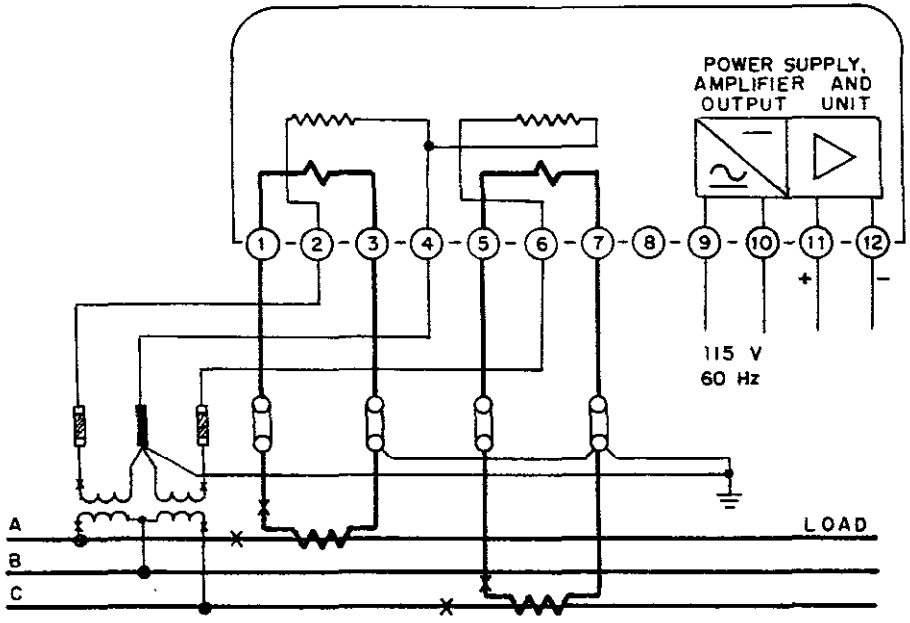
These solid state transducers are completely transistorized and operate on what is termed mark-space-amplitude multiplication.

The current and voltage inputs to the transducer feed separate small transformers giving complete isolation.

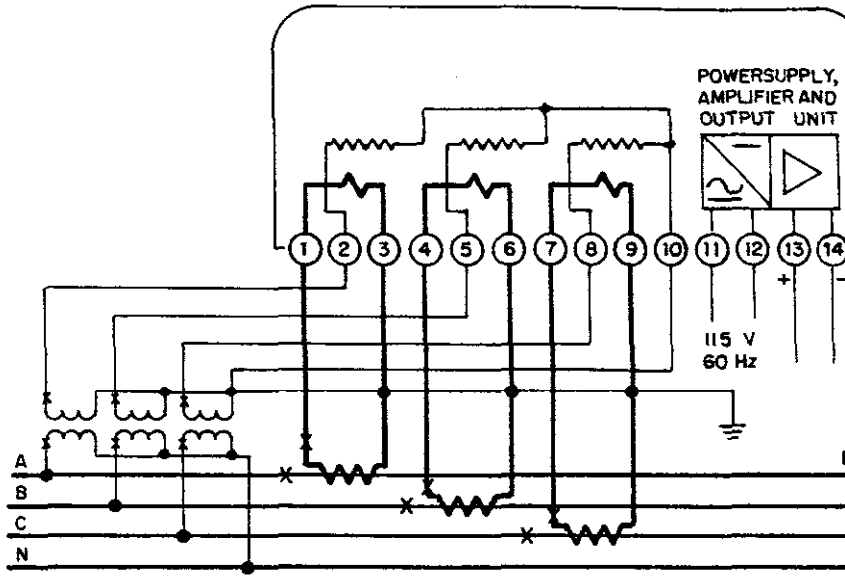
A small internal transistorized multivibrator produces a continuous high frequency square wave which is acted upon by the secondaries of the internal transformers in such a way that the applied circuit current affects the amplitude of the square wave and the applied circuit voltage changes the duration of one half of the square wave in relation to the other according to the relative polarities of the circuit voltage and current.

The resultant square wave is amplified, rectified and filtered and appears at the output terminals as a direct current proportional to the instantaneous product of the input volts and amperes with a nominal value of 5 milliamperes with nominal inputs.

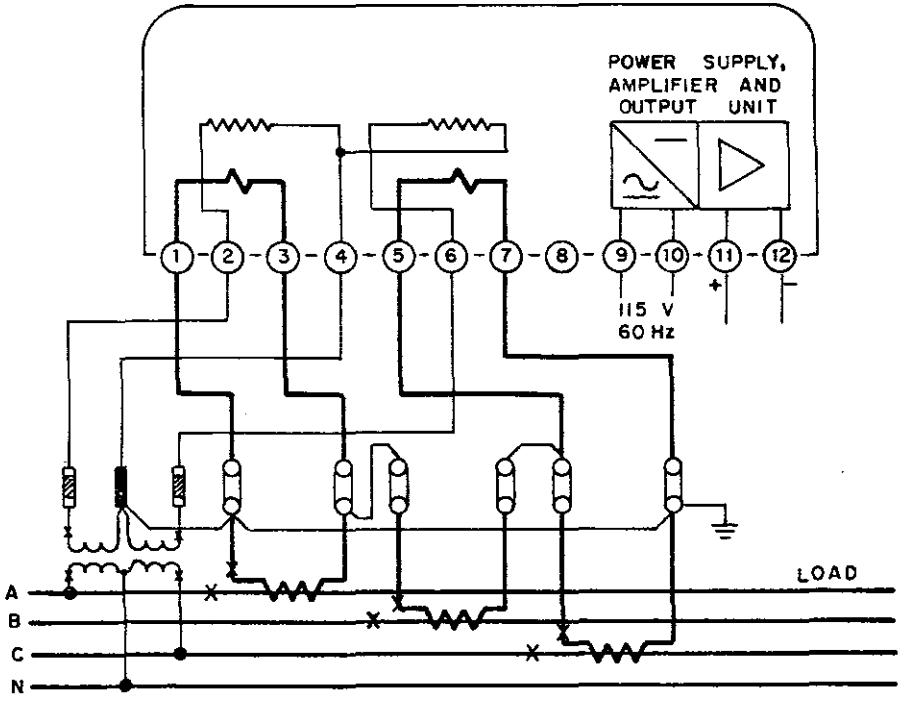
Because of the utilization of the instantaneous product of voltage and current, the output milliamperes are proportional to power factor and a wattmeter may be used as reference when verifying the watt transducer.



FFK2fx and FFK2fxØ



FFK3mx and FFK3mxØ



The circuitry of the var transducer is the same as the watt transducer except for phase shifting networks in the secondaries of each of the internal transformers which shift the phase of each of the voltages and currents by 45° in opposite directions for a total of 90° so that the instrument produces an output proportional to the vars in the primary circuit.

Thus, when verifying the var transducers on single phase, the output milliamperes will be zero on unity power factor and maximum on zero power factor.

The watts and vars in a 3-phase 3-wire circuit may be measured by the 2-element transducers and the watts and vars in a 3-phase 4-wire Y circuit may be measured either by a 2-element transducer fed from the secondaries of 3 current transformers in delta or by the 3-element transducers, subject to the maximum current marked on the nameplate not being exceeded.

Schematic wiring diagrams of these approved methods are given on page 4.

The 3-element transducers are similar to the 2-element versions illustrated on page 2, except that they have 3 elements and a terminal block having 14 terminals.

The adjustments arrowed in the illustration act on the output milliamperes only. They are for fine adjustment and have only a limited range. No adjustments are provided for balancing the elements.

If the power supply to either of these units should fail there will appear a constant output current of negative sign which will manifest itself on the recorder as a straight line.

A reference varmeter* will be supplied on request to any district where a reactive energy meter of either of the approved types is presented for verification.

* Var transducer and 20 ohm precision resistor.

Approval granted to

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