Engineering Specification 335

Issue 3 June 1997

TELECONTROL WATTS and VARS TRANSDUCERS

Contents

Approved for issue by the Technical Policy Panel

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Amendment Summary

Amendmt No.	Date	Brief Description and Amending Action	Prepared by	Approved by
0	Jan 1990	Issue No 1	SJ	DJH
1	April 1995	Issue No 2	EH	DJH
2	June 1997	Issue No 3	EH	

FOREWORD

This specification applies to transducers used by Electricity North West Limited in association with its telecontrol system. The following measurements are covered:

(i) Active Power (Watt)

(ii) Reactive Power (VAr)

The requirements of this specification are largely based on those of BS6253 part 1 (Associated Standard BS EN 60688) and this document should be read in conjunction with that Specification. Reference is also made to BS 5458 (Associated Standard IEC414).

1. GENERAL REQUIREMENTS FOR APPROVALS AND TESTING

1.1 Product not to be changed

1.1.1 No change in the products, their packaging or labelling shall be made without prior notice to and agreement of The Network Policy and Standards Manager in writing to the proposed change.

1.2 Electricity North West Limited Technical Approval

1.2.1 The tenderer shall submit, with his tender, proposals for testing which will demonstrate to the satisfaction of The Network Policy and Standards Manager compliance with this Specification. Such tests shall be carried out without expense to the Company.

1.2.2 Alternatively, the tenderer may submit technical reports or other data which he considers will demonstrate compliance to the satisfaction of The Network Policy and Standards Manager.

1.3 Quality Assurance

1.3.1 The tenderer shall confirm whether or not approval is held in accordance with the provision of either the ESI Quality Assurance Registration Scheme or with BS 5750 (Associated Standards: EN29000, ISO9000). If not, he shall advise The Network Policy and Standards Manager of details of quality assurance procedures employed to control the quality of the product, including the performance of suppliers and sub-contractors.

1.3.2 The right is reserved for The Network Policy and Standards Manager to require from time to time the repeat of such tests as he may deem to be reasonably necessary to demonstrate continued compliance with the Specification.

1.3.3 The tenderer shall submit with his tender a list of tests and inspections which are carried out on the product prior to despatch which shall demonstrate, to the satisfaction of The Network Policy and Standards Manager, fitness for installation and service.

1.3.4 The tenderer shall provide free of charge to Electricity North West Limited such samples as may be, in the opinion of The Network Policy and Standards Manager, reasonably required

for inspection and/or retention as quality control samples. The requirement for samples will be confirmed by The Network Policy and Standards Manager at the time of tendering.

1.3.5 The right is reserved for The Network Policy and Standards Manager to make from time to time such inspection of the tenderer's facilities as he may deem to be reasonably necessary to ensure compliance with this Specification and any Contract of which it forms a part.

1.4 Identification Markings

1.4.1 The tenderer shall submit with his tender details of marking which it is proposed to apply to the product or its packaging to identify manufacturing batches or items. The form and content of such markings shall be subject to approval by The Network Policy and Standards Manager.

1.5 Manufacturers Already Approved

1.5.1 Clauses 1.2.1, 1.2.2, 1.3.1, 1.3.3, 1.3.4, 1.4 and 1.5 will be waived in the case of currently approved products.

2. ENVIRONMENT AND DESIGN

2.1 General

2.1.1 The case or enclosure shall provide adequate protection during transport and use. Plastics used in construction shall not support combustion.

2.1.2 Input current terminals shall be to EA Technical Specification 50-28, Category 1; other terminals may be to either Category 1 or 2.

2.1.3 A safety earth terminal shall be provided unless the case is double insulated.

2.1.4 Terminals shall be marked to enable connections to be made correctly, if necessary a diagram shall be permanently marked on the case.

2.1.5 The following particulars shall also be permanently marked on the case:

Manufacturer's name
Manufacturer's type reference
Serial number
Rated input current(s) and voltage
Input/output characteristics
Auxiliary supply voltage

2.1.6 Transducers shall be capable of operating continuously at any temperature between -5°C and 40° without damage.

2.1.7 The burden imposed by transducer input circuits at full rated input shall not exceed the following values: Current 0.5VA, Voltage 1.0VA and auxiliary power supply 5VA.

2.1.8 Transducers shall be designed to withstand indefinitely, without damage, a short circuit or open circuit on the output terminals when the input circuits are carrying rated current and voltage, with power factor or frequency such that the transducer is producing its maximum output. The maximum current supplied by a transducer under any conditions shall not

exceed 25mA. Watt and VAr transducers shall be capable of producing an output up to 16mA; the manufacturer shall indicate the accuracy for outputs between 10mA and 16mA.

2.1.9 The time period for the output to reach and remain above 80% of the final steady value for a step change in input corresponding to a change in output from zero to 10mA shall not exceed 0.5s.

2.1.10 An adjuster or adjusters having a stable resolution of 0.1% at rated output shall be provided to allow adjustment of the output current to be made to compensate for the errors of primary circuit transformers. Adjustment may be continuous or in fixed steps. A range of ± 2% adjustment in the output current shall be provided at any point in the effective range.

2.1.11 Transducers shall withstand excessive inputs of short duration without damage, as specified in IEC 688-1

2.1.12 Transducers shall withstand 110% rated voltage continuously applied to both measuring and auxiliary inputs.

2.1.13 Transducers shall operate for voltage inputs in the range 50%-110% of rated voltage, in both measuring and auxiliary circuits.

2.1.14 Transducers shall comply with the relevant limits of error of this specification for a period of at least five years from the date of delivery.

2.1.15 The output shall be direct current, free from any reference voltage, including earth.

3. NOMINAL VALUES

3.1 General

3.1.1 The transducers shall be 50 Hz, 2 element three phase suitable for 3 wire, unbalanced loads.

3.1.2 Auxiliary power supply voltage shall be 110V dc nominal, (approx 125V working).

3.1.3 The dc output shall normally operate into a load of 100ohm resistive.

3.1.4 The rated measured line voltage shall be 110V.

3.1.5 The current input shall be 1A or 5A (as determined from the associated standard diagrams or specification).

3.1.6 Transducers with 5A current input shall be set so that a three phase 1000 Watts or 1000Vars input represents 100% and produces 10mA output.
(NB - this is a deliberate choice which does not correspond to 1.73x110x5 at unity or zero pf respectively for watts or vars)

3.1.7 Transducers with 1A current input shall be set so that a three phase 200 Watts or 200Vars input represents 100% and produces 10mA output.
(NB - this is a deliberate choice which does not correspond to 1.73x110x1 at unity or zero pf respectively for watts or vars)

3.1.8 Transducers are required with the characteristics contained in the following tables. It shall be noted that they are normally fitted on the lower voltage circuit breaker side of transformers which provide power to an associated lower voltage switchboard. The adopted convention is that watts and lagging var flow is positive when exported away from the lower

voltage switchboard's busbars. Consequently the system's normal direction of transformer supplied watts and vars, which are incoming towards the busbar, is negative (import).

For the lower voltage side of 33/11kV or 33/6.6kV Primary Transformers:

CT Sec 5 Amp
VT Sec 110 Volts
Aux Supply 110 Volts d.c.

Transducer Input	Output
Watts 0 - 100% Import	0 - 10mA
VArs 25% Export - 0 - 100% Import	0 - 2 - 10mA

For the lower voltage side of 132/33kV bulk supply transformers:

CT Sec 1 Amp
VT Sec 110 Volts
Aux Supply 110 Volts d.c.

Transducer Input	Output
Watts 25% Export - 0 - 100% Import	0 - 2 - 10mA
VArs 100% Export - 0 - 100% Import	0 - 5 - 10mA

4. PERMISSIBLE LIMITS OF INTRINSIC ERROR AND PERMISSIBLE VARIATION

4.1 General

4.1.1 Watt and VAr transducers shall have an intrinsic error of ± 0.5% in accordance with Class 0.5 transducers to BS 6253 (Associated Standard BS EN 60688).

4.2 Electrical Interference

4.2.1 The change in error in the output current shall not exceed ± 0.2% at full rated output when the output circuit is subjected to a common mode potential of 100V rms, 50Hz, with respect to earth.

4.2.2 The change in error in the output current shall not exceed ± 0.5% at full rated output when 1V rms, 50Hz, is acted on in series with the output circuit.

4.3 Operations at Low Voltage

4.3.1 The manufacturer shall state the errors applicable for Watt and VAr transducers when operated at 80% of rated voltage, for both auxiliary or measuring voltage, or both together.

4.4 Harmonics

4.4.1 The variation in error caused by 3% total distortion of the waveform of the input current shall not exceed 0.5%. The predominant distortion factor shall be third harmonic and the variation in percentage error shall be measured under the most unfavourable phase displacement of third harmonic in the current compared with the fundamental current.

5. TYPE TESTS AND ROUTINE TESTS

5.1 Type tests

5.1.1 Type tests shall be carried out if deemed appropriate by Electricity North West Limited. These tests may be carried out by either the manufacturer or by Electricity North West Limited, as Electricity North West Limited may decide.

5.2 Routine tests

5.2.1 Routine tests shall be carried out on every transducer supplied to Electricity North West Limited. The tests shall be agreed between Electricity North West Limited and the manufacturers, but unless otherwise specified comprises the following:

(i) limits of intrinsic error BS6253 (Associated Standard BS EN 60688)
(ii) insulation withstand BS5458 (Associated Standard IEC414)
(iii) insulation resistance BS5458 (Associated Standard IEC 414)