

Specification for

Radio teleswitches for tariff and load control

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- BEAMA Metering Association
- Electricity Association
- Energy Systems Trade Association
- Institution of Electrical Engineers
- Office of Electricity Regulation (OFFER)

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Foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee.

Radio, teleswitching is one of several methods for remote switching of electricity energy meters for the control of tariffs and loads. At present this method is used only in the United Kingdom and is not being considered for European Standardization.

A British Standard for radio telemetering is under consideration.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 28, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

Radio teleswitches are components of a system of remote control permitting the operation of a large number of load switchings from a central point. The signals used for this purpose are superimposed upon the 198 kHz national broadcast transmissions, and when decoded by the radio teleswitch will cause a relevant output switch to change state either immediately or at a specified time. Thus electrical power circuits and/or meter registers may be energized or de-energized as required.

Details of the radio teleswitch specified in this standard have been agreed between electricity supply companies and manufacturers. Full details of the message codes and specific security criteria are under the control of the Electricity Association. Those parties requiring such details, available under licence, should contact:

The Electricity Association
30 Millbank
London
SW1P 4RD

1 Scope

This British Standard specifies requirements and the type tests of radio teleswitches that are intended for mounting in those locations in domestic, industrial or commercial premises where electricity meters, tariff and load control timeswitches or ripple control receivers are mounted.

The standard covers radio teleswitches which control two load circuits, i.e. space heating and water heating, and two tariff circuits.

Certain details of the message formats, e.g. "Start time" and "On period" codes, are not specified in this document and prospective manufacturers are advised that compliance with these details is also necessary.

This standard does not extend to receivers that are intended for use in street lighting or traffic signs.

NOTE The units employed in this standard are those specified in BS 5775.

2 References

2.1 Normative references

This British Standard incorporates, by reference, provisions from specific editions of other publications. These normative references are cited at the appropriate points in the text and the publications are listed on page 32. Subsequent amendments to, or revisions of, any of these publications apply to this British Standard only when incorporated in it by updating or revision.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

3.1 General

3.1.1 radio teleswitch

an instrument with a solid state decoder circuit for the reception and the interpretation of digital message strings, superimposed as phase modulation upon the 198 kHz low frequency signal and in which decoding of appropriate messages causes relevant output switches to change state

3.1.2 radio teleswitch system

system for the receipt of message requests and the transmission of message signals from users to their radio teleswitches situated at the premises of their customers

3.1.3 radio teleswitch system user (user)

any organization having contractual rights to use the radio teleswitching system

NOTE 1 Currently, users include the Regional Electricity Companies of England and Wales, the Scottish Electricity Companies and Northern Ireland Electricity.

NOTE 2 Throughout this standard, the term is abbreviated to "user".

3.1.4 address

a two-part identification code allocated to each radio teleswitch, comprising the user identifier and the group code

3.1.5 user identifier

part of the address used to select teleswitches of up to 16 individual users

NOTE User identifiers are allocated by the Electricity Association.

3.1.6 group code

part of the address used to select any one of up to 256 groups

NOTE The allocation of group codes is under the jurisdiction of the individual user.

3.1.7 rated supply voltage (U_n)

value of the supply voltage for which the radio teleswitch is designed

3.1.8**rated supply frequency (f_n)**

value of the supply frequency for which the radio teleswitch is designed

3.2 Functional elements**3.2.1****aerial**

element which receives the 198 kHz signals

3.2.2**code**

the sequence of a given number of code words, check words, binary numbers and binary address values

3.2.3**decoding element**

element which identifies from the signals received the corresponding commands for which it is configured and sends appropriate information to the output element directly or via the programme

3.2.4**programme**

the information held by the radio teleswitch which determines the sequence of operation of the output element

3.2.5**stored programme**

programme, held in memory, in operation at a particular time, derived from the broadcast programme or the fallback programme

3.2.6**broadcast programme**

programme which provides, updates or refreshes the stored programme derived from the signals received as decoded by the decoding element

3.2.7**fallback programme**

programme, held in non-volatile memory, which provides the stored programme or replaces it when the stored programme is not saved upon interruption of supply

3.2.8**non-volatile memory**

storage device which can retain information in the absence of power

3.2.9**output element**

element comprising one or more switches controlled by information provided by the decoding element

3.2.10**rated voltage (U_c)**

the value of the voltage for which the switch or switches are designed

3.2.11**rated breaking current (I_c)**

the value of the current for which the switch or switches break under the conditions specified in 7.4

3.2.12**operation of output element**

change of state of an output switch, i.e. closure or opening

3.2.13**communications port**

physical facility by which data can be transferred from or to a radio teleswitch for purposes of diagnosis or of setting of internal characteristics

3.2.14**diagnostic data interface**

a communications port allowing only data transfer from the radio teleswitch for diagnostic purposes

3.3 Mechanical elements**3.3.1****radio teleswitch base**

the back of the radio teleswitch by which it is generally fixed to the mounting board and to which the electronic board(s) and output elements, the terminals or terminal block and the cover are attached

3.3.2**radio teleswitch cover**

a sealable enclosure in the front of the radio teleswitch

3.3.3**radio teleswitch case**

casing comprising the radio teleswitch base and the radio teleswitch cover

3.3.4**accessible conducting part**

a conducting part which can be touched by a jointed test finger when the receiver is installed ready for use

NOTE The test finger should conform to BS 3042:1992.

3.3.5**terminal block**

a support made of insulating material on which all or some of the terminals of the receiver are grouped together

3.3.6**terminal cover**

a sealable cover which covers the radio teleswitch terminals

3.3.7**clearance**

shortest distance measured in air between conductive parts

3.3.8**creepage distance**

the shortest distance measured over the surface of insulation between conductive parts

3.4 Insulations**3.4.1****basic insulation**

the insulation applied to live parts to provide basic protection against electric shock

NOTE Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.4.2**supplementary insulation**

the independent insulation applied in addition to the basic insulation, in order to provide protection against electric shock in the event of a failure of the basic insulation

3.4.3**double insulation**

insulation comprising both basic insulation and supplementary insulation

3.4.4**reinforced insulation**

a single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation

NOTE The term "insulation system" does not imply that the insulation should be one homogeneous piece. It may comprise several layers which cannot be tested singly as supplementary or basic insulation.

3.4.5**insulating encased radio teleswitch of protective class II**

a radio teleswitch with a case of insulating material in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions, such as double insulation or reinforced insulation, are provided, there being no provision for protective earthing or reliance upon installation conditions

3.5 Influence quantities**3.5.1****influence quantity**

any quantity, generally external to the radio teleswitch, which may affect its working performance

3.5.2**reference conditions**

the appropriate set of influence quantities and performance characteristics, with reference values, their tolerances and reference ranges, with respect to which the working performances are specified

3.5.3**electromagnetic disturbances**

conducted or radiated electromagnetic effects which may affect functionally the operation of the radio teleswitch

3.5.4**reference temperature**

the ambient temperature specified for the reference conditions

3.5.5**operating conditions**

a set of specified ranges for performance characteristics and specified operating ranges for influence quantities, within which the variations of working performances of a radio teleswitch are specified and determined

3.5.6**specified operating range**

a range of values of a single influence quantity which forms a part of the operating conditions

3.5.7**limit range of operation**

the extreme conditions which a radio teleswitch can withstand without damage and without degradation of its characteristics when it is operated under the specified conditions

3.5.8**normal working position**

the position of the radio teleswitch defined by the manufacturer

3.6 Tests**3.6.1****type test**

all the individual tests and examinations intended to establish the characteristics of a type of radio teleswitch and to verify its conformity to the requirements of this standard

4 Electrical values

4.1 Rated supply voltage (U_n)

The rated voltage, U_n , shall be the nominal UK supply voltage, i.e. 240 V.

4.2 Rated supply frequency (f_n)

The rated supply frequency, f_n , shall be the nominal UK supply frequency, i.e. 50 Hz.

5 Mechanical properties

5.1 General

Radio teleswitches shall be designed and constructed in such a way as to avoid introducing any danger in their use and under the conditions for which they are intended, so as to ensure the following:

- personal safety against electric shock;
- personal safety against effects of excessive temperature;
- prevention of spread of fire;
- protection against penetration of solid objects, dust or water.

All parts which are subject to corrosion shall be effectively protected. Any protective coating shall not be liable to damage by handling or damage due to exposure to air.

When tested in accordance with **10.2.3**, components and wiring shall remain fastened and secured against loosening.

5.2 Radio teleswitch case

The radio teleswitch shall have a case which can be sealed in such a way that the internal parts of the radio teleswitch are accessible only after breaking the seal or seals.

The cover shall not be removable without the aid of a tool.

The case shall be so constructed and arranged that any non-permanent deformation cannot prevent the satisfactory operation of the radio teleswitch.

5.3 Terminals and terminal blocks

Terminals shall be grouped in a terminal block(s).

NOTE 1 When choosing insulating materials for the terminal block(s), testing of materials should be taken into account to ensure adequate insulating properties and mechanical strength.

The holes in the insulating material which form an extension of the terminal holes shall be of sufficient size to accommodate also the insulation of the conductors.

The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating. Screw connections transmitting contact force and screw fixings which may be loosened and tightened several times during the life of the receiver shall screw into a metal nut.

The dimensions of the terminals shall be as given in Table 1 and as shown in Figure 1 and such as to receive cables of the following cross section:

80 A circuits:	conductors up to 35 mm ² ;
receiver live circuits:	conductors up to 16 mm ² ;
25 A circuits:	conductors up to 6 mm ² ;
others:	conductors up to 1.5 mm ² .

All parts of every terminal shall be such that the risk of corrosion resulting from contact with any other metal part is minimized.

Electrical connections shall be so designed that contact pressure is not transmitted through insulating material.

Terminals with different potentials which are grouped close together shall be protected against accidental short-circuiting.

NOTE 2 Protection may be obtained by insulating barriers. Terminals of one output circuit are considered to be at the same potential.

5.4 Terminal cover

The terminals of a radio teleswitch, if grouped in a terminal block and if not protected by any other means, shall have a separate cover which can be sealed independently of the radio teleswitch cover. The terminal cover shall enclose the actual terminals and the conductor fixing screws.

5.5 Clearance and creepage distances

The clearance and creepage distances of the terminal block and those between the terminals and the surrounding parts of the metal enclosure shall be as follows:

- installation category III;
- pollution degree 2;
- material group III-b;
- case A, in homogeneous field conditions;
- altitude up to, 2 000 m above sea-level.

NOTE The values are based on PD 6499, and the following influence factors:

- voltage phase to earth: not exceeding 300 V;
- minimum clearance in air: 3 mm;
- minimum creepage distance: 4 mm.

When tested in accordance with **10.4.4**, the radio teleswitch shall withstand the impulse voltage test and the a.c. voltage test respectively.

5.6 Resistance to heat and fire

The terminal block, the terminal cover and the receiver case shall ensure safety against spread of fire. They shall not be ignited by thermic overload of live parts in contact with them.

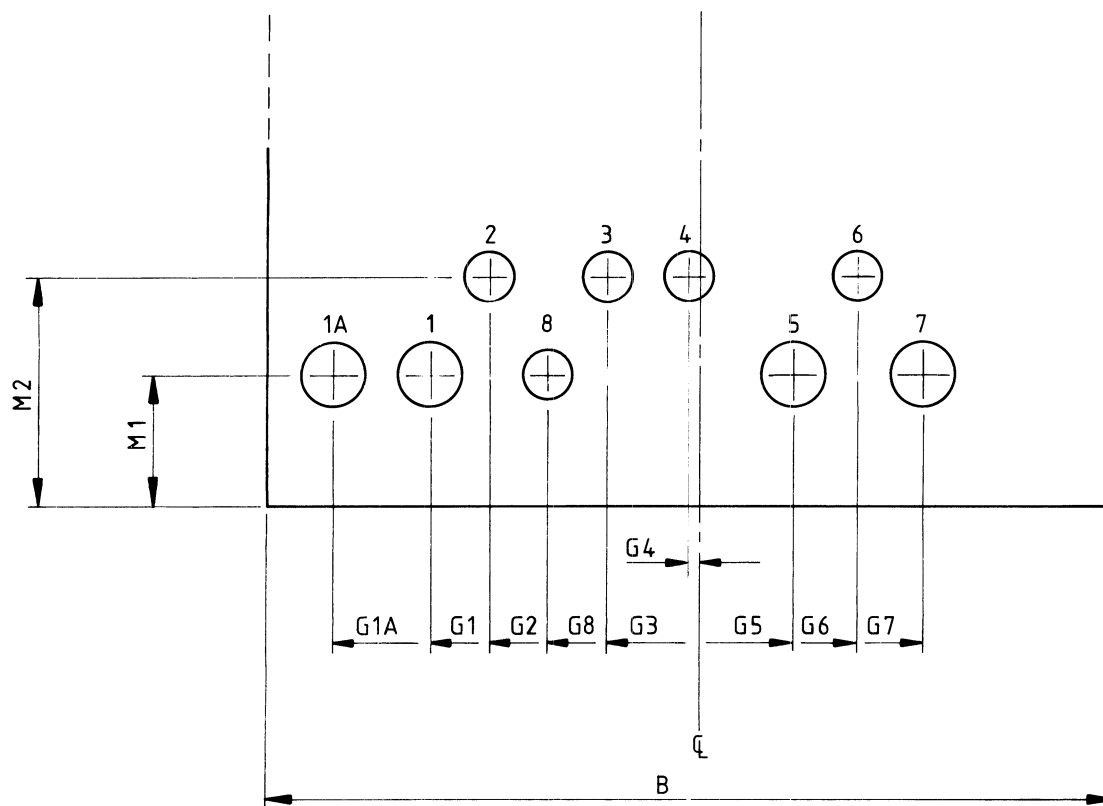
Testing shall be in accordance with **10.2.4**.

5.7 Protection against penetration of dust and water

The radio teleswitch shall conform to the degree of protection IP 51 as given in BS EN 60529:1991, but without suction in the receiver.

Table 1 — Dimensions and spacing of fixing holes and terminals

Letter designation	Dimension	Value mm
A ^a	Maximum overall height (measured from lower face of terminal block)	210
B ^a	Maximum overall width	159
C ^a	Maximum overall projection (measured from front of meter board)	146
D	Vertical distance between centre of top fixing hole and centre line of bottom fixing holes	139.7 ± 1.6
E	Vertical distance from centre line of bottom fixing holes to lower face of terminal block	46.2 ± 1.6
F	Distance between centres of bottom fixing holes and centre line of case	52.4 ± 0.8
G1	From centre line of terminal 1 to centre line of teleswitch	41.9 ± 0.8
G1A	From centre line of terminal 1A to centre line of teleswitch	56.0 ± 0.8
G2	From centre line of terminal 2 to centre line of teleswitch	30.2 ± 0.8
G3	From centre line of terminal 3 to centre line of teleswitch	10.6 ± 0.8
G4	From centre line of terminal 4 to centre line of teleswitch	0.0 ± 2.0
G5	From centre line of terminal 5 to centre line of teleswitch	11.0 ± 0.8
G6	From centre line of terminal 6 to centre line of teleswitch	23.0 ± 0.8
G7	From centre line of terminal 7 to centre line of teleswitch	35.0 ± 0.8
G8	From centre line of terminal 8 to centre line of teleswitch	20.4 ± 0.8
K1	Minimum diameter of bore of terminals 1, 1A and 7	8.2
K2	Minimum diameter of bore of terminals 2, 3, 5 and 8	5.5
K3	Minimum diameter of bore of terminals 4 and 6	4.5
L ^a	Length of parallel portion of bore in terminal plus depth of any lead-in from lower face of terminal block (applied to terminals 1, 1A, 5 and 7)	28.5 (min.)
M1	From front of meter board to centre line of lower row of terminal holes (terminals 1, 5 and 7)	24.1 ± 0.8
M2	From front of meter board to centre line of upper row of terminal holes (terminals 2, 3, 4 and 6)	34.1 ± 0.8
N ^a	Diameter of fixing holes	5.35 ± 0.25
P ^a	Terminal clamping screw flat-ended slightly chamfered (applied to terminals 1, 1A, 5 and 7)	M6 ^b
Q ^a	Length of standard probe to enter the terminal hole (applied to terminals 1, 1A, 5 and 7)	27.0 (max.)
W ^a	Height of centre line of bottom fixing holes above pinch screws	31.0 ± 1.0
Y ^a	From centre line of lower pinch screws to centre line of upper pinch screws (where fitted)	7.5 to 10.5
^a This dimension is not shown in Figure 1.		
^b This screw shall give a suitable grip of any wire from 1 mm ² to 35 mm ² .		



Key

Terminal:

- 1 metered live input
- 1A looped live connected to terminal 1
- 2 receiver live
- 3 receiver neutral
- 4 2 A switched neutral A
- 5 25 A load C
- 6 2 A switched neutral B
- 7 80 A load D
- 8 spare for optical features

For dimensions see table 1.

Optional features of terminal layout

a) Metered supply to electronics:

- terminal 2 blanked off;
- terminal 3 used for supply to electronics.

b) Extra terminal for special purposes:

- terminal 8, minimum bore 5.5 mm, at a distance of G8 ($20.4 \text{ mm} \pm 0.8 \text{ mm}$ from centre line).

This terminal can be used to provide a floating 2 A tariff switch or a floating 25 A load switch.

Terminals not used should be blanked off with a suitable plug.

Figure 1 — Dimensions and spacing of terminals

5.8 Output switches

5.8.1 General

There shall be up to four output switches.

NOTE Output switch references for the purpose of Table 2 are as follows.

- A – 2 A;
- B – 2 A;
- C – 25 A;
- D – 80 A.

Table 2 — Switch breaking current

All units are in amperes

	Switch reference		
	A/B	C	D
Rated breaking current I_c	2	25	80
Linear ohmic load $\cos \theta = 1$: current	2	25	80
Inductive load $\cos \theta = 0.4$: current	1	10	10

5.8.2 Indication of output switch states

The state of the 25 A and 80 A output switches shall be indicated. The state of the 2 A output switches shall not be indicated.

5.8.3 Number of operations

Output switches shall be capable of carrying out correctly either 10 000 on-off cycles of operation under ohmic or inductive load conditions as given in Table 2 or a minimum of 30 000 on-off cycles of operation under no-load conditions.

5.8.4 Manual operation of output switches

A means shall be provided, once a cover is removed, for an authorized person to set manually the 25 A and 80 A switches to the on or off condition without danger to that person. The manual operation means shall be capable of at least 500 switching operations at rated current and rated voltage.

5.8.5 Acoustic noise levels

The operation of all electromechanical output switches when mounted on a meter board fixed to a wall shall not produce acoustic pressure greater than 86 dB (AI) at 0.5 m distance.

5.9 Marking

Every radio teleswitch shall bear the following information, which may be arranged in any order:

- a) the designation of “radio teleswitch”;
- b) manufacturer’s name or trademark;
- c) the type designation;
- d) the serial number and year of manufacture;
- e) the rated supply voltage, U_n ;
- f) the rated supply frequency, f_n , in Hertz;

g) the rated breaking currents, I_cA , I_cB , I_cC and I_cD , for the switches fitted;

h) the country of manufacture;

i) name of owner (user);

j) aerial positions, i.e. A or B or “Omnidirectional” (see Figure 2);

k) the sign of double square

☐ (for insulating encased radio teleswitches of protective class II only).

The radio teleswitch shall be identifiable without its cover at least by its serial number.

A space shall be available sufficient to accommodate a 15 mm diameter label.

5.10 Connection diagrams and terminal marking

Every radio teleswitch shall be indelibly marked with a diagram of connections or an identification reference to the manufacturer’s wiring diagram.

If the radio teleswitch terminals are marked, this marking shall appear on the diagram.

5.11 Dimensions

The overall dimensions of the radio teleswitch and the spacing of fixing holes shall be as given in Table 1.

6 Climatic conditions

6.1 Temperature range

The temperature ranges of the radio teleswitch shall be as shown in Table 3.

Table 3 — Temperature range

Specified operating range	– 10 °C to 45 °C
Limit range of operation	– 20 °C to 55 °C
NOTE The values are based on Table 1 of BS 7527-3.3:1991 with the exception of m) Condensation and p) Formation of ice.	

6.2 Relative humidity

The radio teleswitch shall operate at the relative humidities of Table 4, based on a reference temperature of 23 °C. It shall pass the test in 10.3.

Table 4 — Relative humidity

Annual mean	< 75 %
For 30 days, these days being spread in a natural manner over one year	95 %
Occasionally on other days	85 %
NOTE The limits of relative humidity as a function of ambient temperature are shown in Figure 3.	