COMMITTEE EL-054

DR AS/NZS 4755.3.2

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Draft for Public Comment Australian/New Zealand Standard

LIABLE TO ALTERATION—DO NOT USE AS A STANDARD

BEGINNING DATE FOR COMMENT:	**21 January 2014**
CLOSING DATE FOR COMMENT:	**25 March 2014**

***Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document*.**

Demand response capabilities and supporting technologies for electrical products
Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units
(Revision of AS/NZS 4755.3.2:2012)

STANDARDS Australia

STANDARDS NEW ZEALAND PAEREWA AOTEAROA

Draft for Public Comment
Australian/New Zealand Standard

The committee responsible for the issue of this draft comprised representatives of organizations interested in the subject matter of the proposed Standard. These organizations are listed on the inside back cover.

Comments are invited on the technical content, wording and general arrangement of the draft.

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Please place relevant clause numbers beside each comment.

Editorial matters (i.e. spelling, punctuation, grammar etc.) will be corrected before final publication.

The coordination of the requirements of this draft with those of any related Standards is of particular importance and you are invited to point out any areas where this may be necessary.

Please provide supporting reasons and suggested wording for each comment. Where you consider that specific content is too simplistic, too complex or too detailed please provide an alternative.

If the draft is acceptable without change, an acknowledgment to this effect would be appreciated.

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Draft for Public Comment

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Committee EL-054—Remote Demand Management of Electrical Products

DRAFT

Australian/New Zealand Standard

Demand response capabilities and supporting technologies for electrical products

Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units

(Revision of AS/NZS 4755.3.2:2012)

(To be AS/NZS 4755.3.2:201X)

Comment on the draft is invited from people and organizations concerned with this subject. It would be appreciated if those submitting comment would follow the guidelines given on the inside front cover.

Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document

This document is a draft Australian/New Zealand Standard only and is liable to alteration in the light of comment received. It is not to be regarded as an Australian/New Zealand Standard until finally issued as such by Standards Australia/Standards New Zealand.

PREFACE

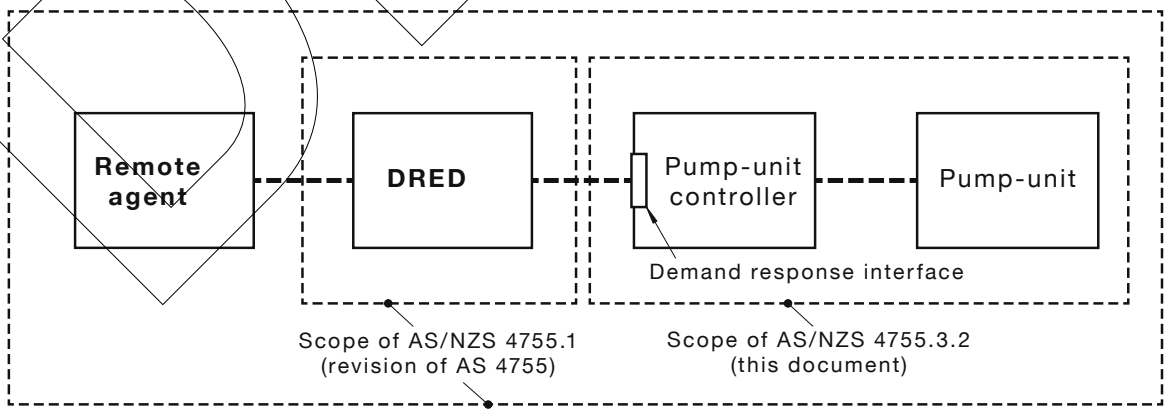
This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-054, Remote Demand Management of Electrical Products to supersede AS/NZS 4755.3.2:2012.

This Standard forms part of a series of Standards that is intended to define the nomenclature, architecture and operational instructions for systems that can be used to remotely control electrical products, and to define the demand response capabilities of products. AS 4755—2007, *Framework for demand response capabilities and supporting technologies for electrical products* will have its title and designation changed to become AS/NZS 4755.1. When complete, the series will comprise the following:

AS/NZS
4755 Demand response capabilities and supporting technologies for electrical products
4755.1 Part 1: Framework for demand response capabilities and requirements for demand response enabling devices (DREDs)
4755.3.1 Part 3.1: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for air conditioners
4755.3.2 Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units (this Standard)
4755.3.3 Part 3.3: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for electric storage and electric-boosted storage water heaters
4755.3.4 Part 3.4: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for grid-connected charge/discharge controllers for electric vehicles

The figure below depicts the structure of the AS/NZS 4755 series. This Standard covers the interaction of pump-unit controllers with demand response enabling devices (DREDs) and with pump-units.

This Standard does not cover all aspects of construction and performance, which may be subject to other standards.



It is recommended that this Standard be read in conjunction with AS/NZS 4755.1.

The AS/NZS 4755 series creates a framework that will allow off-the-shelf equipment, communications technologies and electrical products to be integrated and adapted, so that demand management solutions may be developed and deployed in a timely and economical fashion.

Although the series has been developed to support situations where demand response is initiated or managed by a remote agent, with the consent of the owner or user of the electrical product, there is no technical reason that prevents the owner or user taking direct responsibility for demand response, by managing the DRED independently of any remote agent, provided the DRED meets the requirements of AS/NZS 4755.1.

This Standard pertains to a particular electrical product, the swimming pool pump-unit controller. The Standard specifies, for pool pump-unit controllers—

(a) a standard demand response interface;

(b) a standard set of operational instructions;

(c) the markings to be applied to products complying with the Standard; and

(d) the methods of testing to verify compliance.

Detailed standards covering demand response operational instructions and interfaces with DREDS for other electrical products may also be prepared as needs are identified.

This Standard is intended to support demand response programs that optimize the operation of the electricity supply system and allow the efficient planning and use of capital equipment, while minimizing the risks to the amenity of swimming pool users.

Where pump-units with integral or separate controllers subject to this Standard are installed for use in pools where pump-unit operation is subject to health and safety requirements, or a user does not accept interruption to operation for other reasons, the demand response interfaces should not be used.

The costs and benefits of making this Standard mandatory are the subject of consideration by Australian and New Zealand Governments. If compliance were mandated, it would also be mandatory to register product details with the regulators of the national energy labelling and minimum energy performance standards program. Information about the status of this Standard and registration procedures (if required) is available at the Australian Government Energy Rating website (http://www.energyrating.gov.au).

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

This revision of the Standard covers the following areas:

(i) The scope of the Standard has been clarified with regard to integral and hard-wired controllers.

(ii) A new Clause 2.9 has been added to clarify the required response in the event that the DRED asserts more than one OI at a time. This section will take effect from the date of publication of this amendment. However, Australian regulatory authorities have indicated that, in the event that compliance with this standard were to become mandatory, they intend to accept products that would otherwise comply with this standard (i.e. other than with Clause 2.9) as compliant, for up to 3 years from publication of this amendment. Users of this Standard should check the Australian Government Energy Rating website (http://www.energyrating.gov.au) to find out its status for regulatory purposes.

(iii) A new Clause 3.7—'Optional low voltage power supply' has been added. This does not oblige manufacturers to provide such a power supply but provides guidelines in case they do.

(iv) The definitions and terminology have been updated to make this Part consistent with other Parts of the Standard.

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Part 3.2: Interaction of demand response enabling devices and electrical products—Operational instructions and connections for devices controlling swimming pool pump-units

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard—

(a) applies to pump-unit controllers that do not contain a DRED, and have a demand response interface intended to connect with a DRED;

(b) specifies a set of operational instructions that will meet the requirements of remote agents wishing to control the energy consumption of pump-units; and

(c) specifies two alternative methods of connecting the demand response interface to the DRED.

Pump-unit controllers covered by this Standard include, but are not restricted to, the following:

(i) Controllers integral with pump-units within the scope of AS 5102.1.

(ii) Separate pump-unit controllers, including the following:

(i) Time clocks intended for installation between the mains electricity supply and the pool equipment.

(ii) Sanitization controllers intended to regulate the operation of the pump-unit as well as the sanitizer.

(iii) Heater controllers intended to regulate the operation of the pump-unit as well as the heater.

A pump-unit controller is not covered by this Standard if—

(A) it uses three-phase power; or

(B) it incorporates a chlorinator with an output of 50 g/h or greater.

NOTE: If compliance with this Standard is made mandatory by the relevant Australian and New Zealand regulatory authorities then any exclusions of product types or other criteria for limiting regulatory scope will be included in the regulations.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

4755 Framework for demand response capabilities and supporting technologies for electrical products (series)

5102 Performance of household electrical appliances—Swimming pool pump-units (series)

5102.1 Part 1: Energy consumption and performance

5102.2 Part 2: Energy labelling and minimum energy performance standard requirements

62052 Electricity metering equipment (ac)—General requirements, tests and test conditions

62052.21 Part 21: Tariff and load control equipment (IEC 62052-21, Ed. 1.0 (2004) MOD)

AS/NZS

3000 Electrical installations (known as the Australian/New Zealand Wiring Rules)

4755 Demand response capabilities and supporting technologies for electrical products

4755.1* Part 1: Framework for demand response capabilities and requirements for demand response enabling devices (DREDs)

60335 Household and similar electrical appliances—Safety

60335.1 Part 1 General requirements

ISO/IEC

8877 Information technology—Telecommunications and information exchange between systems—Interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T

1.3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS 4755.1† and those below apply.

1.3.1 Asserted

The condition of a mechanical switch when the switch is closed, or the condition of an electronic switch when the load current of the switch is turned on.

1.3.2 Automatic override

A return to normal operation during a demand response event that is not initiated by the user or by the remote agent.

NOTE: This feature is intended to address the possibility of malfunction in the DRED.

1.3.3 Circumvention device

Any control, control device, software, component or part that alters the operating characteristics during any test procedure, resulting in measurements that are unrepresentative of how that product would perform under comparable conditions in normal operation.

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* To be published as a revision of AS 4755.

† The definitions now in AS 4755—2007 will be included in the forthcoming AS/NZS 4755.1.

1.3.4 Demand response (DR)

The automated alteration of an electrical product's normal mode of operation in response to an initiating signal originating from or defined by a remote agent.

1.3.5 Demand response capability

The ability of an electrical product to provide demand response.

NOTE: The capability may reside in the electrical product itself, or in the combination of the product and a separate demand response enabling device. If the demand response capability requires any additional external device to interface with the remote agent's system, details need to be specified by the manufacturer or supplier.

1.3.6 Demand response enabling device (DRED)

A device that provides the functionalities and capabilities to achieve demand response.

1.3.7 Demand response event

The period between the initiation and termination of an operational instruction.

1.3.8 Demand response interface

The physical connections and associated functions that enable an electrical product to receive operational instructions from a DRED, or the physical connections and associated functions that enable a DRED to convey operational instructions to an electrical product.

1.3.9 Demand response mode (DRM)

A mode of operation within specified conditions, constraints or parameters during a demand response event (see Table 1).

1.3.10 Electrical product

A system or device designed to provide an energy service such as cooling, heating or motive power or energy storage. Includes all elements required for normal operation and which are generally supplied or installed with the product, such as thermostats or user-operated remote controls.

NOTE: Examples include air conditioners, water heaters, swimming pool pump-unit controllers, and charge/discharge controllers for electric vehicles.

1.3.11 Extra low voltage

An extra-low voltage system in accordance with AS/NZS 60335.1.

1.3.12 Filtration pump-unit

A pump-unit that pumps water through the filter of a pool.

1.3.13 Input energy

The total of the energy used by the motor, controller and related accessories.

1.3.14 Input power

The total of the power used by the motor, controller and related accessories.

1.3.15 Integral pump-unit controller

A pump-unit controller that is attached and permanently wired to, or integral with, the pump-unit, and is not intended for separate sale.

The assembly attaching the electricity supply cable to a single-speed pump-unit does not constitute a pump-unit controller for the purposes of this standard.

1.3.16 Manual override

The capability for the user to initiate a return to normal operation during a demand response event.

1.3.17 Model

One of a range of products, all of one brand, to which a single set of test reports is applicable and where each product has the same relevant physical characteristics and performance characteristics.

1.3.18 Normal operation

Operation under user settings. Includes timer operation as set by the user.

1.3.19 Operational instruction (OI)

A signal instructing an electrical product to enter a specific demand response mode (see Table 1).

1.3.20 Original user settings

Controller settings immediately prior to the demand response event.

1.3.21 Pool equipment

Ancillary equipment that is directly controlled by the pump-unit controller or whose safe operation depends on the operation of the pump-unit.

1.3.22 Pump-unit

A combination of electric motor and pump that conforms to AS 5102.

1.3.23 Pump-unit controller

A device that is normally part of, or installed with, a pump-unit and regulates the supply of mains electricity to, or otherwise controls the operation or speed of, the pump-unit motor. A pump-unit controller may also function as a sanitization controller or may control other pool equipment.

The assembly attaching the electricity supply cable to a single-speed pump-unit does not constitute a pump-unit controller for the purposes of this standard.

1.3.24 Remote agent

A person, organization or entity, other than the user, who initiates demand response.

NOTES:

1 Examples include electricity distributor, electricity retailer, electricity system manager and demand response aggregator.

2 The remote agent will generally have a contractual relationship with the user in which the user gives prior consent for the remote agent to initiate demand response under agreed conditions.

1.3.25 Response time

The time interval determined in accordance with Clause 2.5 of this Standard.

1.3.26 RJ45 connector

The common name for the 8P8C modular connector that is generally used to terminate communications cables.

1.3.27 Run-time adjustment

The capability of the pump-unit controller to adjust the duration or start of scheduled on-time following a demand response event.

1.3.28 Sanitization controller

A device that controls the operation of a chlorine generator, liquid chlorine pump, dry chlorine dispenser or other sanitizing device. A sanitization controller may also function as a pump-unit controller.

1.3.29 Scheduled off-time

A period when the pump-unit would be off in normal operation.

1.3.30 Scheduled on-time

A period when the pump-unit would be on in normal operation.

1.3.31 Safety extra-low voltage (SELV)

Voltage not exceeding 42 V between conductors and between conductors and earth, with the no voltage load not exceeding 50 V.

NOTE: There are differences between the definitions and requirements of SELV provided in AS/NZS 3000 (where SELV refers to separated extra-low voltage) and AS/NZS 60335.1 (where SELV refers to safety extra-low voltage).

1.3.32 Separate pump-unit controller

A pump-unit controller that is separate from the pump-unit and is intended for or capable of separate sale.

1.3.33 Shall

Indicates that a statement is mandatory.

1.3.34 Should

Indicates a recommendation.

1.3.35 Switch

A device for making and breaking the connection in an electrical circuit.

A switching device which may be an electromechanical or solid-state switching device.

1.3.36 User

A person or entity that normally regulates the operation an electrical product.

SECTION 2 OPERATIONAL INSTRUCTIONS AND DEMAND RESPONSE MODES

2.1 GENERAL PRINCIPLES

The pump-unit controller shall be capable of operating normally with or without a DRED connected to the interface.

The pump-unit controller should comply with the operational instructions in a way that minimizes inconvenience and discomfort to the user and in a way that avoids drawing the user's attention to changes in operation at the beginning, during or at the end of a demand response event.

NOTE: Subject to the principles above, the pump-unit controller may indicate to users that it is in a demand response mode by means of indicator lights or the display of text or graphic symbols (on fixed indoor or outdoor components or portable remote control units) or other means, so that a user who notices a change in normal operation can verify that this is due to demand response rather than malfunction.

A pump-unit may be installed with more than one pump-unit controller present. If so, the DRED shall be connected to only one of the controllers, and the controllers shall be configured or set so that—

(a) the pump-unit motor is not prevented from responding to any demand response signals by any intermediate or additional controllers (except under conditions of 'manual override' as described in Clause 2.3);

(b) the pump-unit motor is both compatible with the controller and capable of the demand response actions the controller is configured to facilitate;

(c) there is no possibility of conflict between controllers; and

(d) all pool equipment that depends for its safe operation on the operation of the pump-unit under control shall not operate once the pump-unit ceases operation and not restart until the pump-unit restarts.

2.2 DEMAND RESPONSE MODES

2.2.1 Mandatory and optional demand response modes

Pump-unit controller demand response modes are indicated in Table 1.

A pump-unit controller complying with this Standard shall be capable of at least demand response mode 1 (DRM 1).

A pump-unit controller shall ensure that all filtration pump-units under its control enter at least demand response mode 1 (DRM 1) in accordance with this Standard.

If a pump-unit controller controls the operation of more than one pump-unit (e.g. separate pump-units for filtration and solar water heater circulation), and one or more plug sockets is clearly marked for filtration pump use, pump-unit connected to any of the plug sockets so marked shall respond to a demand response event. Pump-units connected to the other plug sockets may respond. If there is more than one plug socket and none are marked for use by a filtration pump-unit, a pump-unit connected to any of the plug sockets shall respond to a demand response event.

The pump-unit controller shall ensure that a pump-unit operating at the start of a demand response event or switched on during a demand response event (either directly by the user or via a timer setting) shall enter the relevant demand response mode (if capable of that mode) within the time period specified by Clause 2.5, and shall remain in that mode for the remainder of the demand response event (i.e. the user cannot override the demand response event solely by switching the pump-unit or the controller off then on again).

When a demand response event is completed, the pump-unit controller shall return the system to normal operation (which could be either scheduled on-time or scheduled off-time when the demand response event is completed).

The pump-unit controller may give an audible or visible warning at the termination of the demand response event, if the termination occurs during a scheduled on-time period.

NOTE: If any user settings other than 'on' and 'off' are affected by a demand response event, the pump-unit should revert to the original user settings once the demand response event terminates. This is intended to preserve user preference settings and programming.

TABLE 1

PUMP-UNIT CONTROLLER DEMAND RESPONSE MODES

Operational instruction (OI)	Demand response mode (DRM)*	Description of operation in this mode	Mandatory for compliance with this Standard
OI 1	DRM 1	The pump-unit is off	Yes
OI 2	DRM 2	The pump-unit continues to operate during the demand response event, under either of the following options: (a) At an input energy consumption over any half hour period that is not more than 3 times the input energy consumption over the 5 min period before the demand response event. *or* (b) If a variable speed or multiple speed pump, at the lowest input power consumption mode of which the pump-unit is capable, while still continuing to provide sufficient water flow to provide serviceable filtering according to the manufacturer's instructions.	No
OI 3†	DRM 3	DRM 3 does not apply to pump-unit controllers	No
OI 4	DRM 4	The pump-unit commences (or, if on, continues). Operation continues irrespective of timer settings until either the demand response event terminates, or the total of user-programmed operating time remaining between the start of the demand response event and midnight of the same day is reached (whichever comes first). Once that time is reached, no further operation occurs before midnight of that day, irrespective of the user's timer settings‡	No

* Other electrical products may have additional demand response modes beyond those included in this Table.

† OI 3 is included to maintain consistency with other standards.

‡ A pump-unit controller complying with DRM 2 or DRM 4 may also operate a chlorinator or other sanitizer during a demand response event.

A pump-unit controller shall have no demand response modes other than those in Table 1.

NOTE: Electrical products covered by other parts of AS/NZS 4755 may have additional demand response modes beyond those in Table 1.

A pump-unit controller shall only respond to the OIs corresponding to the DRMs of which it is capable. It shall not change its mode of operation in response to other OIs—if it is in normal operation at the time, it shall remain in normal operation, and if it is in a demand response mode, it shall remain in that mode.

NOTE: This applies to OIs asserted one at a time, see Clause 2.9 regarding multiple OIs.

2.2.2 DRM2 and DRM 4 operation

Operation in DRM 2 (option 1) can be described by Equation 1—

$$E_{30m} \leq E_{5m} \times 3 \quad \ldots (1)$$

where

E_{30m} = input electrical energy (kWh) over a 30 min period (P)

E_{5m} = electrical energy (kWh) measured over a period of 5 min immediately prior to the demand response event

Example of DRM 2 (option 1)

If a pump-unit-controller records that the average input power over the last 5 min period leading up to the demand response event is 1.00 kW, then the energy used is $1.00 \times 5/60 = 0.0833$ kWh. Under DRM 2 the input electrical energy used during each complete 30 min period of a demand response event shall not exceed $0.0833 \times 3 = 0.25$ kWh.

NOTES:

1 It is possible, indeed likely, that in practice the duration of demand response events will not be exact multiples of 30 min. However, when responding to OI 2 (via option 1), a pump-unit controller's logic will need to:

(a) Be capable of continually monitoring input power or energy use, so that it can calculate energy over the previous 5 min whenever a OI 2 might be asserted.

(b) Anticipate the duration of the event so that it can manage operations to meet DRM 2. For the purposes of this Standard, the anticipated duration should be 30 min. If the duration of the event extends beyond 30 min, the pump-unit controller should anticipate that the duration will be a further 30 min, and so on. Verification of compliance will be carried out over one or more complete 30 min periods.

2 In compliance testing, a 5% tolerance is permitted. In the above example, a tested model would comply if the input electrical energy used during each complete 30 min period of a demand response event does not exceed $0.25 \times 1.05 = 0.263$ kWh.

Example of DRM 4 (option 2)

The user programs a pump-unit controller to operate the pump-unit between 07:00 and 10:00 and between 16:00 and 19:00 (24 hr clock times). DRM 4 is called at 12:00 and terminates at 13:30. The pump-unit controller operates during that period, and then switches the pump-unit on again at 16:00 as programmed, but switches it off at 17:30 because the 3 h of scheduled on-time between the initiation of DRM 4 and midnight of that day has been achieved.

2.3 MANUAL OVERRIDE

All demand response modes should be subject to manual override. The control for initiating the manual override, if provided, shall be located in an accessible position on the pump-unit controller. The manual override, if provided, shall be capable of operation only once during each demand response event. The period of normal operation initiated by the manual override shall not exceed 1 h. If the demand response event is still in progress after the manual override period terminates, the pump-unit controller shall enter the relevant demand response mode (if capable of that mode).

2.4 AUTOMATIC OVERRIDE

All demand response modes should be subject to an automatic override, in which the pump-unit controller resumes normal operation not less than 8 h and not more than 12 h after the initiation of the demand response event. The automatic override, if provided, shall return the pump-unit controller to normal operation until a switch is newly asserted (i.e. there is a sequence of a cessation and a new assertion).

2.5 RESPONSE TIMES

After receiving from the DRED an operational instruction for a demand response mode of which the pump-unit controller is capable, the pump-unit controller shall execute the operational instruction within 5 min of receiving that instruction.

The interval of up to 5 min may be used to switch off other controlled pool equipment such as chlorinators and heaters, which may need a few minutes of water flow to render them safe. Any randomization (i.e. variation of the time delay between the receipt by the DRED of a signal from the remote agent and the signalling of an operational instruction to the pump-unit controller) shall take place in the DRED.

The pump-unit controller, when switched on during a demand response event corresponding to a demand response mode of which it is capable, shall enter that demand response mode within 10 s.

2.6 OPERATION OF AUXILIARY EQUIPMENT

During a demand response event, timers, control systems and control circuits in the pump-unit controller may remain energized.

2.7 RUN-TIME ADJUSTMENT

A pump-unit controller may have run-time adjustment.

When a demand response event terminates during a period of scheduled on-time, the period of on-time may be extended, but by no more than the scheduled on-time that was lost during that demand response event (taking into account any reduction in lost on-time due to the activation of a manual override).

If the following scheduled on-time period commences during such a period of on-time extension, the period of on-time extension shall be permanently terminated and the pump-unit controller shall return to normal operation (i.e. on-time originally lost cannot be carried forward further than the scheduled on-time period immediately following).

When a demand response event terminates during a period of scheduled off-time, the next period of scheduled on-time may be extended, but by no more than the scheduled on-time that was lost during that demand response event (taking into account any reduction in lost on-time due to the activation of a manual override). The extension period may occur prior to the commencement or following the cessation of the next scheduled on-time (or both).

Any run-time lost during a demand response event that is not made up between the termination of that demand response event and the termination of the next period of scheduled run-time that commences after the termination of the demand response event shall be permanently lost (for this calculation, the scheduled termination of the next period of run-time is adjusted to take account of the lost run-time).

Examples:

The user programs a pump-unit controller to operate the pump-unit between 07:00 and 10:00, and between 16:00 and 19:00. DRM 1 is called between 15:00 and 18:00, so 2 h of scheduled on-time (16:00 to 18:00) would be lost. However, at 17:30 the user activates manual override, so gaining a half hour of operation during the demand response period. This reduces the 'lost' on-time to 1.5 h.

The controller resumes normal operation at 18:00, and would then run until 19:00. As the DR event terminates during scheduled on-time, the operation may be extended to 20:30 to make up the 1.5 h of run-time lost during the demand response event. Had the demand response even terminated during scheduled off-time, the lost run-time could only be made up at the next on-time period (this is to prevent a demand surge from pool pump-units all coming on simultaneously at the termination of a demand response event).

If DRM 1 is called between 15:00 and 20:00, the time settings are as above, and the user activates manual override at 17:30, the lost run-time is 2 h. As the demand response event terminates during scheduled off-time, operation does not need to commence immediately. The lost run-time may be added to the next scheduled on-time period (07:00 to 10:00), by commencing operation at 05:00 instead of 07:00, or commencing at 07:00 but terminating at 12:00, or running for any 5 h period between 05:00 and 12:00.

2.8 STANDBY POWER

The standby power consumption of a pump-unit controller shall not exceed 15.0 W, whether in normal operation or during a demand response event.

If the pump-unit controller acts as the mains power supply to the pump-unit and to other pool equipment, its standby power shall be calculated as the difference between the power in to the controller and the sum of power out to the pump-unit and other controlled pool equipment, if any. This shall be measured both when all controlled equipment is on, and when all controlled equipment is off.

NOTE: It is intended that the maximum standby power consumption will be progressively reduced in future revisions of this Standard.

2.9 MUTIPLE OPERATIONAL INSTRUCTIONS

If a DRED connected to a pump-unit controller asserts more than one of OIs corresponding to DRMs of which the pump-unit controller is capable, the pump-unit controller shall—

(a) if in normal operation, continue in that mode of normal operation; or

(b) if already operating in a demand response mode, revert to normal operation.

NOTES:

1 Normal operation includes all operating modes, off-modes, standby modes and other modes that may be set by the user directly or by pre-programming.

2 The intention so that pump-unit controllers should not respond to any assertions of OI 3 or OIs 5 to 8, which a DRED may be asserting for other types of electrical products.

SECTION 3 INTERFACES

3.1 GENERAL

A pump-unit controller shall be capable of detecting the assertion and non-assertion of any switch in a connected DRED that is assigned to a DRM of which the pump-unit controller is capable, when the electrical properties of the physical connection comply with Table 4.

A pump-unit controller shall enter a demand response mode of which it is capable when the circuit between the terminal corresponding to that demand response mode and the terminal 'common' is completed.

3.2 PHYSICAL INTERFACES

The provision for the physical connection with the DRED shall be either via a terminal block or via an RJ45 connector. If the interface connector is an RJ45 socket, all voltages shall be safety extra-low voltage (SELV) in accordance with AS/NZS 60335.1. If the interface is a terminal, all voltages may be SELV or extra-low voltage (ELV) in accordance with AS/NZS 60335.1. No voltage shall exceed 42 V d.c.

3.3 TERMINAL BLOCK

3.3.1 Terminal block pin assignments

If the provision for the physical connection is a terminal block, it shall be configured so that it corresponds to the DRMs of which the pump-unit controller is capable. The four possible options are illustrated in Figures 1 to 4.

NOTE: Figures 1 to 4 are configuration specifications, not marking directions, which are covered in Clause 4.4

FIGURE 1 CONFIGURATION OF THE TERMINAL BLOCK—OPTION 1

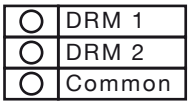

FIGURE 2 CONFIGURATION OF THE TERMINAL BLOCK—OPTION 2

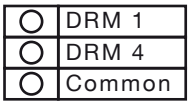

FIGURE 3 CONFIGURATION OF THE TERMINAL BLOCK—OPTION 3

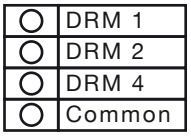

FIGURE 4 CONFIGURATION OF THE TERMINAL BLOCK—OPTION 4

3.3.2 Terminal block specifications

The terminal block on the pump-unit controller shall comply with AS/NZS 60335.1.

3.4 RJ45 SOCKET

3.4.1 RJ45 socket pin assignment

If the provision for the physical connection is an RJ45 connector, it shall have its terminals configured as illustrated in Table 2.

TABLE 2

RJ45 SOCKET PIN ASSIGNMENT

Pin	Assignment
1	OI 1
2	OI 2
3	Not connected (see Note 1)
4	OI 4
5	Not connected (see Note 1)
6	Common
7	V+ (see Note 2)
8	V– (see Note 2)

NOTES:

1 Only OIs 1, 2, and 4 are relevant to pump-unit controllers. Pins 3 and 5 may be used in electrical products covered by other parts of the AS/NZS 4755 series.

2 The pump-unit controller may be equipped with a power supply suitable for use by a DRED, in which case, pin 7 and 8 may be used for a direct current power supply (≤42 V d.c.) with polarity as indicated in this Table, should it be required. If power is not provided pins 7 and 8 shall be shorted.

If the DRED completes the circuit between pin 1 and pin 6, OI1 is asserted for the pump-unit controller.

If the DRED completed the circuit between pin 2 and pin 6, OI2 is asserted for the pump-unit controller.

If the DRED completes the circuit between pin 4 and pin 6, OI4 is asserted for the pump-unit controller.

3.4.2 RJ45 socket specifications

The RJ45 connector shall meet the criteria in Table 3.

TABLE 3

RJ45 SOCKET SPECIFICATIONS

Property	Value	Symbol	Unit
Current rating	≥1.5	A	ampere
Voltage rating (VAC RMS)(VAC r.m.s.)	≥125	V	volt
Dielectric strength (VACRMS. 50 Hz, 1 min)	≥1000	V	volt
Insulation resistance (MΩ min 500 V)	≥1000	MΩ	megohm

3.5CIRCUIT TO DRED

The pump-unit controller shall be capable of detecting the status of the DRED switch (open or closed) with a circuit defined in Figure 5, when the circuit and signals between the DRED and the pump-unit controller meet the criteria in Table 4.

The voltage provided by the pump-unit controller between OIx and Common shall be either d.c. or sinusoidal a.c. at the mains supply frequency.

NOTE: Each connection to the DRED may be represented in terms of the basic circuit unit in Figure 5. Connecting circuits corresponding to three separate demand response modes would require three such basic units with their common wires connected together at terminal Common in Figure 4.

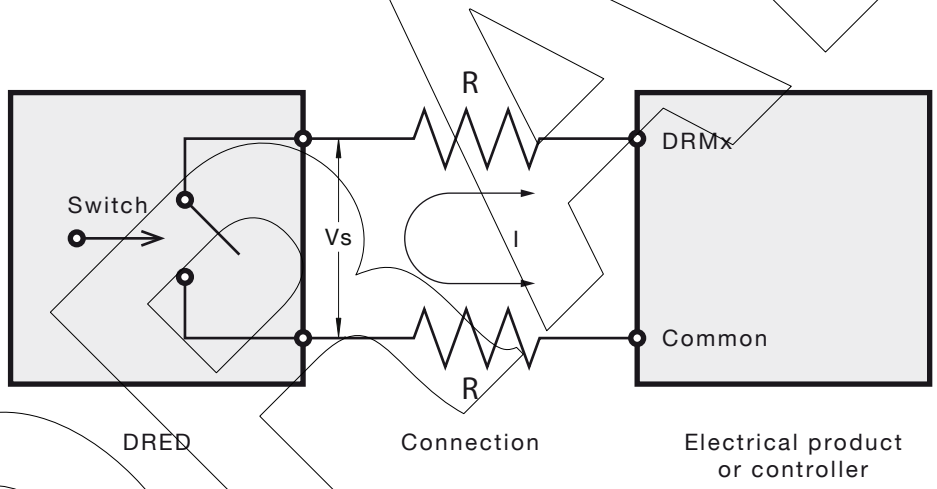

FIGURE 5 BASIC CIRCUIT UNIT

TABLE 4

CIRCUIT AND SIGNAL PARAMETER VALUE RANGES

Parameter	Value	Symbol	Unit
V	≤34.5	V	volt
Vs (d.c.) when carrying 0.03 A d.c.	≤1	V	volt
I (d.c.)	≤0.03	A	ampere
Switch open resistance	≥1	MΩ	Megohm
R	≤10	Ω	ohm

NOTES:

1 In the 'make' state, the switch, submitted to a 0.030 A (30.0 mA) current, will cause a voltage drop not larger than 1 V.

2 R represents the connection d.c. resistance of each cable conductor.

3.6 OPTIONAL 230 V AVELECTRICAL SUPPLY

The pump-unit controller may also be equipped with an installer-accessible permanent 230 V, 0.5 A power supply suitable for use by a DRED The power supply, if provided, shall comply with AS/NZS 60335.1.

3.7 OPTIONAL EXTRA LOW VOLTAGE POWER SUPPLY

Where the interface is an RJ45 socket and the pump-unit controller provides power on pins 7 and 8 the power supply shall not exceed 42 V d.c. between conductors and shall not exceed 0.577 A. If no power is supplied, pins 7 and 8 shall be shorted.

NOTE: The power supply should be capable of supporting telemetry modems as used in Advanced Metering Infrastructure (AMI)-ready electricity meters. Such modems have a typical rated operating range of 6 to 32 V d.c. The power supply should be capable of delivering at least 0.500 A at 6 V d.c.

3.8 LOCATION AND ACCESS

The interface, whether RJ 45 connector or terminal block, shall only be accessible with the removal of a non-detachable part in accordance with AS/NZS 60335.1

All power supplies, if provided, shall be co-located with the interface, and with clearances and separations in accordance with AS/NZS 60335.1.

SECTION 4 LABELLING AND MARKING OF DEMAND RESPONSE CAPABILITY

4.1 GENERAL

This Section specifies requirements for the marking, labelling and registration of pump-unit controllers that comply with this Standard.

NOTE: It is important for both buyers and installers to be able to easily identify whether a pump-unit controller complies with this Standard, and if so, the demand response modes of which it is capable. For an integral pump-unit controller, the most direct way to inform buyers is by including information about compliance with this Standard on the pump-unit energy rating label, which displays the energy star rating in accordance with AS 5102.2. For a separate pump-unit controller, information about AS/NZS 4755.3.2 compliance in the form specified in this Standard may be included on packaging or on a point-of-sale label. Installers can also check the model number and registration details on the Australian Government Energy Rating website (http://www.energyrating.gov.au) in case details for that model are registered. The registration details will include a statement of whether or not the model complies with AS/NZS 4755.3.2.

4.2 REGISTRATION

If a pump-unit controller (whether integral or separate) complies with this Standard, the demand response mode or modes of which the controller is capable shall be indicated on the pump-unit registration form in Appendix A of this Standard.

4.3 POINT OF SALE LABELLING

The supplier of an integral pump-unit controller may elect to indicate the demand response mode or modes of which the controller is capable, using the energy rating label for the pump-unit with which the controller is integral, in AS 5102.2.

NOTE: It is intended that in the next revision of AS 5102.2, the energy label design will be revised to allow for the disclosure of AS/NZS 4755.3.2 compliance.

The supplier of a separate pump-unit controller may elect to indicate the demand response mode or modes of which it is capable on a user-removable label or on the packaging, for consumer information at the point of sale.

The format of the label is illustrated in Figure 6. Each box shall contain a tick (if the pump-unit controller has that capability) or remain blank (if it does not have that capability).

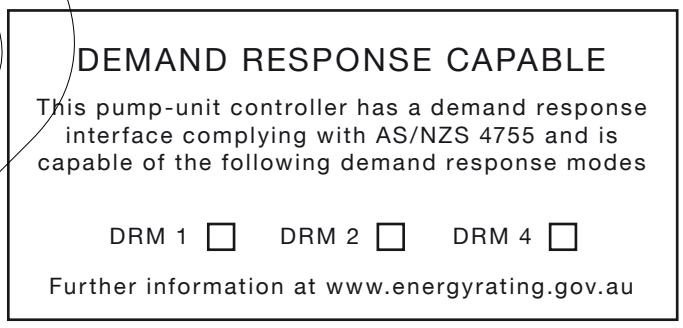

FIGURE 6 EXAMPLE OF POINT OF SALE LABEL
[Actual size: 8 cm × 5 cm]

4.4 MARKING

The pump-unit controller shall be provided with clear and permanent markings, readily accessible and readable in the installed position.

The markings shall include—

(a) the text ‘AS/NZS 4755’;

(b) an indication of the demand response modes of which the unit is capable;

(c) an indication of whether the interface is SELV; and

(d) an indication of the provision of a d.c. power supply and if so the specification of this supply.

Figure 7 illustrates an acceptable form of marking. If this form of marking is used, each box shall contain a tick (if the pool pump-unit controller has that capability) or remain blank (if it does not have that capability).

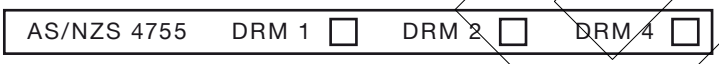

FIGURE 7 EXAMPLE OF MARKING ON PRODUCT

If the physical interface is a terminal block, then either—

(i) each terminal shall be engraved or permanently marked, with a digit ‘1’, ‘2’ or ‘4’ indicating the corresponding demand response mode, and the letter ‘C’ for the common; or

(ii) a permanent label with ‘AS/NZS 4755’ and numbers or characters, or both, indicating which terminal corresponds to each demand response mode and to the common, and how they shall be affixed near the terminal block.

4.5 DOCUMENTATION

The following information shall be provided in the documentation supplied with the pump-unit controller:

(a) A statement of compliance with this Standard, that is AS/NZS 4755.3.2.

(b) The demand response modes of which the pump-unit controller is capable.

(c) Clear wiring diagrams for the interface circuits.

(d) Instructions on how the product should be installed to provide the stated and required demand response capabilities without conflict from other controllers or pool equipment.

(e) If the physical interface is a terminal block, whether it meets SELV or ELV requirements.

(f) If the physical interface is an RJ45 socket, whether there is a direct current power supply available using pins 7 and 8 and if so, the specifications of the power supply.

SECTION 5 TESTING AND VERIFYING DEMAND RESPONSE CAPABILITY

5.1 VERIFICATION OF CLAIMED DEMAND RESPONSE CAPABILITY

When tested, the pump-unit controller shall demonstrate the claimed demand response capability under any condition that the tester selects, provided the condition is within the range of operating conditions of which it is claimed to be capable.

The pump-unit controller shall be tested for response to all the demand response modes of which it is claimed to be capable, and for any other features that it is claimed to have (e.g. run-time adjustment).

Where the behaviour of a pump-unit controller before, during or after testing indicates the possible presence of a circumvention device, this finding shall be included in the test report.

If the pump-unit controller has an RJ45 socket, then the response shall also be tested by completing the circuits between the Common and pin 3, and between pins 1 and 5, 2 and 5, 3 and 5, 4 and 5 and 5 and 6, for a period of not less than 1 min. Not more than one switch shall be closed at a time. If the pump-unit controller responds by altering the operation of the pump-unit it would indicate that the pin assignments do not conform to Table 2.

NOTE: This is to guard against an unwanted response to a OIs that may be intended for other types of electrical products.

A pump-unit controller does not comply with this Standard if one or more of the following occur during testing:

(a) The pump-unit controller, while operating, fails to enter the demand response mode of which it is claimed to be capable within the response time.

(b) The pump-unit controller, when switched on during a demand response event corresponding to a demand response mode of which it is claimed to be capable, fails to enter that demand response mode immediately (i.e. without starting the pump-unit) or, if it starts the pump-unit, within the response time in Clause 2.5

(c) The pump-unit controller does not operate in accordance with the requirements of the demand response mode (see Clauses 5.3, 5.4 and 5.5).

(d) The pump-unit controller maintains power to equipment whose safe operation would rely on filtration water flow, while switching off power to the filtration pump-unit.

(e) A feature claimed for the pump-unit controller (manual override, automatic override, audible or visible warning or run-time adjustment) is not present or does not operate as required in this Standard.

(f) The standby power consumption of the pump-unit controller exceeds 15.0 W.

(g) The pool-pump controller changes its mode of operation in response to the completion of any circuit corresponding to an OI, other than OI 1, OI 2 (if the pump-unit controller is capable of DRM 2) or OI 4 (if the pump-unit controller is capable of DRM 4).

(h) The information provided in accordance with Clause 4.5 is incorrect.

5.2 SET-UP FOR TESTING

An integral pump-unit controller may be tested in any of the following situations:

(a) While the pump-unit is installed in a swimming pool.

(b) While the pump-unit is on a test rig as specified in AS 5102.1.

(c) While removed from the pump-unit, with the pump-unit replaced by an equivalent electrical load. A separate pump-unit controller shall be set up so that it is connected to all equipment that it is capable of controlling (one or more pump-units, a chlorinator, a heater, etc.) or, if testing for DRM 1 or DRM 4, to equivalent electrical loads. If actual equipment is connected, that equipment shall be capable of safe operation during the test.

For DRM 2 testing, an actual pump-unit that is either installed in a swimming pool or on a test rig as specified in AS 5102.1 shall be connected to the separate pump-unit controller.

If the physical interface on the pump-unit controller is an RJ45 socket, the switches shall be set up and connected to the RJ45 socket so that the pin assignments in Table 2 and the specifications in Table 3 can be achieved.

If the physical interface is a terminal block, the switches shall be set up and connected to the terminal block so that the circuit and signal parameter value ranges in Table 4 can be achieved.

A separate pump-unit controller shall be programmed, according to the manufacturer's instructions, with a sequence of pump-unit on-times, run-times and off-times. After programming, the input energy consumption of the pump-unit controller shall be monitored for a period of at least 15 min before any testing begins.

The input energy to the pump-unit controller shall be monitored for the duration of the test, with readings recorded at not more than 1 s intervals.

The electricity supply to the point of connection of the pump-unit during all tests shall be maintained within the following limits:

(i) For single-phase units: Voltage—230 V a.c. ±1%.

(ii) Frequency—50 Hz ±1%.

5.3 VERIFICATION OF CLAIMED COMPLIANCE WITH DRM 1

5.3.1 Sequence of operations

The controller unit shall be switched to activate the pump-unit, which shall be permitted to operate for a period of not less than 15 min before the test commences. The DRM 1 switch shall be closed for a period of not less than 15 min, then immediately opened for the same period, closed for the same period, opened for the same period and closed for the same period, so that a sequence of at least 3 closures and 2 openings are completed within 120 min. After the last period of closure the pump-unit controller shall be operated for at least 10 min.

Examples:

15 min closed, 15 min open, 15 min closed, 15 min open, 15 min closed, 10 min open (total test duration 85 min); or 20 min closed, 20 min open, 20 min closed, 20 min open, 20 min closed, 10 min open (total test duration 110 min).

5.3.2 Integral pump-unit controller

5.3.2.1 *Interrupting operating during a DRM 1 event*

The operation of an integral pump-unit controller shall be monitored during the sequence of operations in Clause 5.3.1 to check the following:

(a) The controller enters DRM 1 within 5 min of switch closure.

(b) During periods with DRM 1 switch closed, the motor is off.

(c) During periods with DRM 1 switch open, the motor resumes normal operation.

5.3.2.2 *Switching on during a DRM 1 event*

After the completion of the previous test, the pump-unit shall be left switched off for a period of not less than 30 min. The switch corresponding to DRM 1 on the pump-unit controller shall then be closed.

Not less than 10 min after the closure of the switch, the controller shall be manually switched to turn the pump-unit on.

NOTE: If there is not a separate switch on the controller, then switching off and on should be achieved by switching the electricity supply off and on.

The operation of the pump-unit shall be monitored for at least 15 min to ensure that the pump-unit remains off.

The appearance of text or any other indication that the controller is in demand response mode shall be noted.

The controller shall be manually switched off within 30 min. The switch shall be opened not less than 15 min after the controller is switched off. The controller shall be monitored for a period of not less than 15 min to ensure that it remains off.

Not less than 30 min after it was last switched off, the controller shall be manually switched on. The operation of the pump-unit shall be monitored to ensure that it returns to normal operation.

If the controller is capable of being switched on and off by presetting a timer, the test shall be repeated, with the times preset for the controller to switch on, off and on again within the time constraints described in Clause 5.3.1.

5.3.3 Separate pump-unit controller

5.3.3.1 *Interrupting operation during a demand response event*

The operation of a separate pump-unit controller and the availability of power to all controlled equipment (or equivalent loads) shall be monitored for the duration of the test, to check the following:

(a) The controller switches off power to equipment that would rely on filtration water flow for safe operation (i.e. to actual chlorinators, thermal heaters, or equivalent electrical loads if used) before switching off power to the filtration pump-unit (or equivalent electrical load).

(b) The controller enters DRM 1 within 5 min of switch closure.

(c) During periods with DRM 1 switch closed, there is no power to the ‘filtration’ pump-unit (or equivalent electrical load) or to equipment that would rely on filtration water flow for safe operation.

(d) During periods with DRM 1 switch open, there is power to the ‘filtration’ pump-unit (or equivalent electrical load).

5.3.3.2 *Switching on during a DRM 1 event*

Test as in Clause 5.3.2.2.

5.4 VERIFICATION OF CLAIMED COMPLIANCE WITH DRM 2

The DRM 2 switch shall be closed for a period of 30 min (the 'first period'), then immediately opened for 30 min, then closed for 60 min (the 'third period'), then opened for 10 min (i.e. the test duration is 130 min).

5.4.1 Integral pump-unit controller

5.4.1.1 *Interrupting operation during a DRM 2 event*

The test shall be carried out with an actual pump-unit that is installed on an actual swimming pool or on a test rig as specified in the AS 5102 series.

Two-speed, multi-speed or variable-speed pump-units shall be tested at their highest and their lowest operating speeds.

If the manufacturer's instructions indicate that the method of compliance with DRM 2 is via option 1, the procedure shall be as follows:

(a) Operate the pump-unit for a period of at least 15 min before the first switch closure.

(b) Record the input energy consumption at not more than 1 s intervals over the 5 min period immediately preceding each closure of the DRM 2 switch and calculate the average input energy consumption over the period.

During the sequence of switch closures and openings, the operation of the pump-unit controller shall be monitored to check the following:

(i) The motor enters a lower power mode within 5 min of DRM 2 switch closure.

(ii) During the period of low power mode with DRM 2 switch closed, the input energy consumption over any half hour period is not more than three times the input energy consumption recorded over the 5 min period before the demand response event.

NOTES:

1 There is a period of up to 5 min from switch closure to the start of low-power operation. The input energy shall be calculated over the actual period of low-power operation.

2 A 5% tolerance is permitted. See example in Clause 2.2.2.

(iii) When the DRM 2 switch is opened, the controller resumes its normal settings such that the motor resumes normal operation.

If the manufacturer's instructions indicate that the method of compliance with DRM 2 is via option 2, the procedure shall be as follows:

Operate the pump-unit for a period of at least 15 min before the first switch closure.

During the sequence of switch closures and openings, the operation of the pump-unit controller shall be monitored to check the following:

(A) The motor enters the lowest power mode of which it is capable, while continuing to provide sufficient water flow to provide serviceable filtering according to the manufacturer's instructions, within 5 min of DRM 2 switch closure.

(B) When the DRM 2 switch is opened, the pump-unit resumes normal operation.

5.4.1.2 *Switching on during a DRM 2 event*

After the completion of the previous test, the controller shall be left switched off for a period of not less than 30 min. The switch corresponding to DRM 2 shall then be closed.

Not less than 10 min after the closure of the switch, the controller shall be manually switched on.

The operation of the controller shall be monitored to ensure that the controller operates in accordance with DRM 2 (option 1 or option 2), using the sequence of tests in Clause 5.4.1.1.

If the controller responds using option 1, the pump-unit may operate normally for a period of up to 5 min before entering DRM 2, in order to establish a reference input energy level for subsequent operation in DRM 2. A further period of 5 min shall be allowed for orderly switching off or adjusting the operation of pool equipment whose safe operation depends on the operation of the pump-unit.

The appearance of text or any other indication that the controller is in demand response mode shall be noted.

The controller shall be manually switched off within 30 min of the completion of the tests in Clause 5.4.1.1. The switch shall be opened not less than 15 min after the controller is switched off. The controller shall be monitored for a period of not less than 15 min to ensure that it remains off.

Not less than 30 min after it was last switched off, the controller shall be manually switched on. The operation of the pump-unit shall be monitored to ensure that it operates normally.

If the controller is capable of being switched on and off by presetting a timer, the test shall be repeated, with times preset for the controller to switch on, off and on again within the time constraints described above.

5.4.2 Separate pump-unit controller

5.4.2.1 *Interrupting operation during a DRM 2 event*

The test shall be carried out with a controller operating an actual pump-unit that is installed in a swimming pool or on a test rig as specified in the AS 5102 series. For other equipment under control, either actual equipment or equivalent electrical loads may be used.

If the manufacturer's instructions specify a model or type of pump-unit that is capable of achieving DRM 2 operation with that controller, that model or type of pump-unit shall be used in the test. If the specified pump-unit is two-speed, multi-speed or variable-speed, the controller shall be tested with the pump-units at their highest and their lowest speeds.

If the manufacturer does not specify a model or type of pump-unit that is capable of achieving DRM 2 operation with that controller, then any single-speed pump complying with the AS 5102 series shall be used.

If the manufacturer's instructions indicate that the method of compliance with DRM 2 is via option 1, the procedure shall be as follows:

(a) Set the controller to time the pump-unit to switch on for the full period of the test, with an allowance for operation for at least 15 min before the first switch closure.

(b) Record the input energy consumption at not more than 1 s intervals over the 5 min period immediately preceding each closure of the DRM 2 switch and calculate the input energy consumption over the period.

During the sequence of switch closures and openings, the operation of the pump-unit controller and the pump-unit shall be monitored to check the following:

(i) The controller switches off power to equipment that would rely on filtration water flow for safe operation (i.e. to actual chlorinators, thermal heaters or equivalent loads, if used) before switching off power to the filtration pump-unit.

(ii) The controller switches the filtration pump to lower power mode within 5 min of switch closure.

(iii) During the period of low power mode with DRM 2 switch closed, the input energy consumption over any half hour period is not more than three times the input energy consumption recorded over the 5 min period before the demand response event.

There is a period of up to 5 min from switch closure to the start of low-power operation. The average input energy shall be calculated over the actual period of low-power operation.

(iv) When the DRM 2 switch is opened, the motor resumes normal operation at the speed or mode it was in preceding the closure of the switch.

If the manufacturer's instructions indicate that the method of compliance with DRM 2 is via option 2, set the controller to time the pump-unit to switch on for the full period of the test, with an allowance for operation for at least 15 min before the first switch closure.

During the sequence of switch closures and openings, the operation of the pump-unit controller and the pump-unit shall be monitored to check the following:

(A) The motor enters the lowest power mode of which the pump-unit is capable while continuing to provide sufficient water flow to provide serviceable filtering, according to the pump-unit manufacturer's instructions, within 5 min of DRM 2 switch closure.

(B) When the DRM 2 switch is opened, the motor resumes normal operation at the speed or mode it was in preceding the closure of the switch.

5.4.2.2 *Switching on during a DRM 2 event*

Test as in Clause 5.4.1.2.

5.5 VERIFICATION OF CLAIMED COMPLIANCE WITH DRM 4

5.5.1 Interrupting operation during a DRM 4 event

This test may be carried out with either an actual pump-unit connected to the controller or with an equivalent electrical load.

The controller shall be programmed so that the filtration pump-unit is set to come on at between 17:00 and 17:30 controller clock time, and operate for between 100 and 120 min.

The DRM 4 switch shall be closed between 12:00 and 13:00 controller clock time, and remain closed for between 60 and 80 min.

The appearance of text or any other indication that the controller is in demand response mode shall be noted.

The operation of the pump-unit shall be monitored from the DRM closure until 00:30 controller clock time on the next controller clock day (i.e. test duration is between 11.5 and 12.5 h) to ensure the following:

(a) The pump-unit switches on within 5 min of switch closure.

(b) The pump-unit operates until DRM 4 switch is opened.

(c) The pump-unit controller accurately deducts run-time during the DRM 4 event from its programmed on-time.

5.5.2 Switching on during a DRM 4 event

After the completion of the previous test, the controller shall be left switched off for a period of not less than 30 min. The switch corresponding to DRM 4 shall then be closed.

Not less than 10 min after the closure of the switch, the controller shall be manually switched on.

The operation of the controller shall be monitored to ensure that the controller operates in accordance with DRM 4, using the sequence of tests in accordance with Clause 5.5.1.

The appearance of text or any other indication that the controller is in demand response mode shall be noted.

The controller shall be manually switched off within 30 min of the completion of the tests in Clause 5.5.1. The switch shall be opened not less than 15 min after the controller is switched off. The controller shall be monitored for a period of not less than 15 min to ensure that it remains off.

Not less than 30 min after it was last switched off, the controller shall be manually switched on. The operation of the pump-unit shall be monitored to ensure that it operates normally.

If the controller is capable of being switched on and off by presetting a timer, the test shall be repeated, with times preset for the controller to switch on, off and on again within the time constraints described above.

5.6 TEST REPORT

For a laboratory verifying compliance, a report of the verification of claimed demand response capability shall be in the form set out in Appendix B.

Registration authorities may accept the form in Appendix A as sufficient for purposes of registration of compliance with this Standard (AS/NZS 4755.3.2) or may request a report in the form of Appendix B.

APPENDIX A

REGISTRATION INFORMATION FOR PUMP-UNIT CONTROLLERS

(Normative)

In jurisdictions where registration of compliance with AS/NZS 4755.3.2 is mandatory for pump-unit controllers, the following information shall be submitted to the regulators, who may place it on a public register.

In jurisdictions where registration of compliance with AS 5102.2 is also mandatory, information regarding the integral controller's compliance with AS/NZS 4755.3.2 shall be submitted to regulators in the form included in AS 5102.2, along with the other information required for that pump-unit.

SECTION 1 APPLICATION DETAILS

Name of applicant	
Company name of applicant	
Company Australian Business Number	
Company street address of applicant	
Company postal address of applicant	
Contact person (A name, address and contact details for a person in Australia shall be provided)	Name
	Address
	Position/title
	Telephone
	Facsimile
	E-mail

SECTION 2 DESCRIPTION OF PUMP-UNIT CONTROLLER

DECLARATION—Compliance with Australian Standard AS/NZS 4755.3.2	
Brand name	
Is the controller a separate controller or integral? (Integral means attached and permanently wired to, or integral with, the pump-unit, and not intended for a separate sale.)	
Model designation (List all models covered by this application. This can be by number or name or a combination of numbers and characters that will identify the particular products.)	
For integral pump-unit controllers that can only achieve demand response with specific models or types of pump-unit, list the specific model numbers or types (e.g. single speed, multi-speed or variable speed). If no types are listed, applicant warrants that the controller can achieve the stated demand response capabilities with any pump-unit within the scope of AS 5102.	
Date of manufacture	
Name of manufacturer	
Does the product have demand response mode capability DRM 1 as specified in AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have demand response mode capability DRM 2 as specified in AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have demand response mode capability DRM 4 as specified in AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have manual override in accordance with Clause 2.3 as specified in AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have automatic override in accordance with Clause 2.4 as specified in AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have audible or visible warning in accordance with Clause 2.2 of AS/NZS 4755.3.2?	yes ☐ no ☐
Does the product have run-time adjustment in accordance with Clause 2.7 of AS/NZS 4755.3.2?	yes ☐ no ☐
Name and contact details of supplier’s authorized representative	
Signature of supplier’s authorized representative	
Date	

APPENDIX B

VERIFICATION OF CLAIMED DEMAND RESPONSE CAPABILITY FOR PUMP-UNIT CONTROLLERS, IN ACCORDANCE WITH AS/NZS 4755.3.2

(Normative)

All references are to Clauses in AS/NZS 47455.3.2			
Name of testing agency or laboratory			
Testing agency or laboratory address			
Name or identifier of person doing this test			
Name of contact person for inquiries			
Address of contact person			
Position/title			
Telephone			
Facsimile			
E-mail			
Type of controller? Integral/separate	Integral controller name/number	Integrally controlled pump name/number	Separate controller name/number
Type of interface?		RJ45/Terminal block	
If terminal block, number of sockets?			
If terminal block, are sockets correctly marked (See Clause 4.4)?		yes ☐ no ☐ (if not, write in reason)	
When all connectable switches are closed (one at a time), is there any non-activation of claimed demand response modes, activation of unclaimed demand response modes or activation of demand response modes that do not correspond to terminal markings or RJ45 pins assignment?		yes ☐ no ☐ (if not, write in reason)	
Is unit capable of this demand response mode?	**DRM 1**	**DRM 2**	**DRM 4**
	yes ☐ no ☐	yes ☐ no ☐ If Yes, option 1 or 2?	yes ☐ no ☐
Attach a photo and diagram of test setup	Indicate whether test uses actual pool, the AS 5102 series test rig or equivalent electric resistive loads	If actual pump-unit used with separate controller, model name, number, and whether single-, multi- or variable-speed	For separate controllers, list other pool equipment connected for test

Does controller meet the 15 W standby limit?	yes ☐ no ☐	DRM 1 Test cycling periods?	Period (min)
DRM 1 Test. Does the controller enter DRM 1 within 5 min of each switch closure?	yes ☐ no ☐	For separate controller, is all equipment switched off before pump?	yes ☐ no ☐
Is pump-unit motor off once controller enters DRM 1?	yes ☐ no ☐	Does pump-unit resume operation once DRM 1 ceases?	yes ☐ no ☐
Switching on (manually) with DRM 1 switch already closed			
Enters DRM 1 as required?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Note any light, text etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Switching on (preset timer) with DRM 1 switch already closed			Timer Yes/No
Enters DRM 1 as required?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Note any light, text etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
DRM 2 Test: option 1		**Test with highest pump speed**	**Test with lowest pump speed**
Input energy, 5 min before first switch closure		kWh (2 dpl)	kWh (2 dpl)
Does motor enter low-energy mode within 5 min of switch closure?		yes ☐ no ☐	yes ☐ no ☐
Input energy during first switch closure period		kWh (2 dpl)	kWh (2 dpl)
Input energy during next switch open period		kWh (2 dpl)	kWh (2 dpl)
Input energy, 5 min before second switch closure		kWh (2 dpl)	kWh (2 dpl)
Does motor enter low-energy mode within 5 min of switch closure?		yes ☐ no ☐	yes ☐ no ☐

Input energy during second switch closure period		kWh (2 dpl)	kWh (2 dpl)
Input energy during next switch open period		kWh (2 dpl)	kWh (2 dpl)
Switching on (manually) with DRM 2 switch already closed			
Enters DRM 2 as required?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Note any light, text etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Switching on (preset timer) with DRM 2 switch already closed	Timer? yes ☐ no ☐		
Note any light, text etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
DRM 2 Test: option 2		**Test with highest pump speed**	**Test with lowest pump speed**
Does motor enter lowest-power mode within 5 min of switch closure?		yes ☐ no ☐	yes ☐ no ☐
Does motor resume pre-demand response event settings following opening of switch?		yes ☐ no ☐	yes ☐ no ☐
DRM 4 Test			
Filtration pump-unit program		On-time setting	Off-time setting
Programmed run-time		Min	
DRM 4 switch closure		Closure time	Opening time
Does the pump-unit come on within 5 min of DRM 4 closure?		yes ☐ no ☐	
Total run-time during DRM 4 closure		Min	
Does the pump-unit cease operating after switch opened?		yes ☐ no ☐	After how many min?
If other equipment connected to controller, is it switched off before pump-unit stops?		yes ☐ no ☐	
Actual run-time following DRM 4 event (under control of controller)		Start time	Stop time

Reduction in actual run-time compared with programmed run-time		Min	Stop time
Is reduction in actual run-time equal to or greater than total run-time during DRM 4 closure?		yes ☐ no ☐	
Switching on (manually) with DRM 4 switch already closed			
Enters DRM 4 as required?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Note any light, text, etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Switching on (preset timer) with DRM 4 switch already closed			Timer yes ☐ no ☐
Enters DRM 4 as required?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Note any light, text, etc. indicators			
Remains off when demand response event ceases?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Operates normally when restarted?	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐	yes ☐ no ☐ n/a ☐
Does the controller contain a circumvention device that alters the operation during a test but that is not normally activated during normal use?			yes ☐ no ☐ n/a ☐
Does the product meet the SELV requirement?			yes ☐ no ☐
Other comments?			
Date of test			
Tester signature			

*** END OF DRAFT ***

PREPARATION OF JOINT AUSTRALIAN/NEW ZEALAND STANDARDS

Joint Australian/New Zealand Standards are prepared by a consensus process involving representatives nominated by organizations in both countries drawn from all major interests associated with the subject. Australian/New Zealand Standards may be derived from existing industry Standards, from established international Standards and practices or may be developed within a Standards Australia, Standards New Zealand or joint technical committee.

During the development process, Australian/New Zealand Standards are made available in draft form at all sales offices and through affiliated overseas bodies in order that all interests concerned with the application of a proposed Standard are given the opportunity to submit views on the requirements to be included.

The following interests are represented on the committee responsible for this draft Australian/ New Zealand Standard:

Airconditioning and Refrigeration Equipment Manufacturers Association of Australia

Australian Industry Group

Clean Energy Council

Consumer Electronics Suppliers Association

Consumers Federation of Australia

Copper Development Centre—Australia

CSIRO

Department of Industry, Commonwealth

Electricity Engineers Association, New Zealand

Electricity Networks Association New Zealand

Energy Networks Association

Heating, Ventilation and Air Conditioning New Zealand

Smart Grid Australia

Swimming Pool and Spa Association of Australia

Standards Australia

Standards Australia is an independent company, limited by guarantee, which prepares and publishes most of the voluntary technical and commercial standards used in Australia. These standards are developed through an open process of consultation and consensus, in which all interested parties are invited to participate. Through a Memorandum of Understanding with the Commonwealth government, Standards Australia is recognized as Australia's peak national standards body.

Standards New Zealand

The first national Standards organization was created in New Zealand in 1932. The Standards Council of New Zealand is the national authority responsible for the production of Standards. Standards New Zealand is the trading arm of the Standards Council established under the Standards Act 1988.

Australian/New Zealand Standards

Under a Memorandum of Understanding between Standards Australia and Standards New Zealand, Australian/New Zealand Standards are prepared by committees of experts from industry, governments, consumers and other sectors. The requirements or recommendations contained in published Standards are a consensus of the views of representative interests and also take account of comments received from other sources. They reflect the latest scientific and industry experience. Australian/New Zealand Standards are kept under continuous review after publication and are updated regularly to take account of changing technology.

International Involvement

Standards Australia and Standards New Zealand are responsible for ensuring that the Australian and New Zealand viewpoints are considered in the formulation of international Standards and that the latest international experience is incorporated in national and Joint Standards. This role is vital in assisting local industry to compete in international markets. Both organizations are the national members of ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission).

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