

Electricity Meters  
Residential BS / IEC

British Standard  
5219 Polyphase, Multi-Rate  
TOU Credit Meter  
User Manual & Technical Specification



# Revision History

Index	Date	Comments
4	18.11.2008	Revised manual to new branding guidelines and layout

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# Table of Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
1.1	Purpose	5
1.2	Meter Overview	5
1.3	Reference Standards	5
<b>2</b>	<b>Safety</b>	<b>6</b>
2.1	Safety Information	6
2.2	Responsibilities	6
2.3	Safety Regulations	7
<b>3</b>	<b>Operational Functions</b>	<b>8</b>
3.1	Measurement	8
3.2	Registers	8
3.3	Reverse / Export Energy Registration	8
3.3.1	Reverse Energy Detection	8
3.3.2	Import Energy Registration	9
3.3.3	Export Energy Registration	9
3.3.4	Unidirectional Registration	9
3.4	Reactive Energy	9
3.5	Maximum Demand	9
3.5.1	Rolling Maximum Demand	10
3.5.2	Slab Maximum Demand	10
3.5.3	Quality of Supply	11
3.6	Phase Indication	11
3.7	Factory / Meter Serial Number	11
3.8	Meter Memory	11
3.9	Anti-creep	11
3.10	Temperature Range	11
3.11	Power Supply	12
3.12	Influence of Supply Voltage	12
<b>4</b>	<b>Core User Interfaces</b>	<b>13</b>
4.1	Display	13
4.2	Energy Registration	13
4.3	Optical Interface	13
<b>5</b>	<b>Optional Functions</b>	<b>14</b>
5.1	Introduction	14
5.2	Pulsed Output	14
5.3	External Rate Switching	14

5.4	No-Power Read _____	14
5.5	Mode-C Data Readout _____	15
5.6	Inductive Serial Data Port _____	15
5.7	Calibration Lock _____	16
5.8	Voltage Isolation Switches _____	16
5.9	Landis+Gyr Switch Mode Power Supply _____	16
5.10	Push Button's _____	16
<b>6</b>	<b>Installation</b> _____	<b>17</b>
6.1	Construction _____	17
6.2	Connections _____	17
6.3	Meter Terminals _____	18
6.4	Sealing Arrangement _____	19
<b>7</b>	<b>Technical Summary</b> _____	<b>20</b>
7.1	Technical Facts _____	20
7.2	Dimensions _____	21
<b>8</b>	<b>Maintenance and Service</b> _____	<b>22</b>
8.1	Meter Check _____	22
8.2	Meter Testing _____	22
8.3	Post Installation Configuration Changes _____	22
<b>9</b>	<b>Measures in the Event of Faults</b> _____	<b>23</b>
9.1	Operating Faults _____	23
9.2	Disconnecting the Meter _____	23
9.3	Repairing the Meter _____	23
<b>10</b>	<b>Decommissioning and Disposal</b> _____	<b>25</b>
<b>11</b>	<b>Glossary of Terms and Standards</b> _____	<b>26</b>
11.1	Acronyms _____	26
11.2	Measurement Units _____	26
<b>12</b>	<b>Appendices</b> _____	<b>27</b>
12.1	Appendix A – Inductive Serial Data Port _____	27
12.2	Appendix B – Readout Data _____	28
12.3	Appendix C – Display Options _____	29
12.3.1	Display Examples _____	30
12.4	Appendix D – Registers _____	31

# 1 Introduction

Introducing the 5219 Polyphase meter

## 1.1 Purpose

This manual covers the operation, installation instructions and technical specifications of the 5219 Polyphase credit meter. The 5219 range includes single rate, externally switched multirate, and single or multirate pulse output variants.

## 1.2 Meter Overview

The meter is a whole current credit meter, capable of measuring Active (kWh) (class 1.0) and Reactive energy (KVArh) (class 2.0).

The Meter has 3 measuring elements capable of being configured as

- 3 phase, 4 wire.
- 3 phase, 3 wire.
- 2 phases of 3 phase, 4 wire.
- Single phase, 2 wire.
- Single phase, 3 wire.

In some of the above configurations the meters is able to act as a true multi- voltage measurement device, remaining class accurate between 120Vac and 240Vac. (Both limits +15% to -20%)

The meter has been given a 20 year certification life by OFGEM, the regulator for the UK. This is based on a reliability of better than 97% over 20 years calculated using an OFGEM model.

An LCD display's all of the meter's data.

## 1.3 Reference Standards

1.	BS EN62053 – 21:2003 Static meters for active energy. (Classes 1 & 2)
2.	BS EN62052 – 11:2003 Alternating current static watt-hour meters for active energy. (Classes 1 & 2)
3.	BS5685: 1979: Part 1 Specification class 0.5, 1.0 and 2.0 Single phase and Polyphase, single rate and multi-rate watt-hour meters.
4.	IEC62056-21:2002 Data Exchange for Meter Reading, Tariff and Load Control. Direct Local Exchange
5.	SI1566: 1998 The Meters (Certification) Regulations 1998;
6.	DIN 43 857 Part 2 1978 Principal dimensions for Polyphase Meters Part 4 1974 Principal dimensions of the terminal cover for Polyphase Meters

## 2 Safety

### 2.1 Safety Information

Attention is drawn as follows in the individual chapters of this user manual with classified word symbols and pictographs to the relevant danger level, i.e. the severity and probability of any danger:



#### Definition of Danger

This symbol is used to indicate a possibly dangerous situation which could result in severe physical injury or a fatality.

---



#### Definition of Warning

This symbol is used to indicate a possibly dangerous situation which could result in minor physical injury or material damage.

---



#### Definition of Note

This symbol is used to indicate general details and other useful information.

---

In addition to the danger level, all safety information also describes the type and source of the danger, its possible consequences and measures to counteract the danger.

### 2.2 Responsibilities

The owner of the meter – normally the utility – is responsible that all persons engaged on work with the meter:

- Have read and understood the relevant sections of this user manual.
- Are sufficiently qualified for the work to be performed.
- Strictly observe the safety regulations and the operating information in the individual chapters.

In particular, the owner of the meter bears responsibility for the protection of persons, prevention of material damage and the training of personnel (Landis+Gyr. provides training courses for this purpose on specific equipment; please contact the relevant agent if interested).

## 2.3 Safety Regulations

The following safety regulations must be observed at all times:

- This equipment does not contain a disconnection device. Means for disconnection from the supply must be provided as part of the building installation. Do not work on the equipment unless the supply is disconnected. If disconnection is done by removal of fuses or other cut-outs, the removed disconnection devices must be kept secure from replacement while work is performed. If disconnection is provided by a switch, the switch shall conform to the requirements of IEC 947-1 and IEC 947-3 or equivalent.
- This equipment does not contain an over current protection device. Over current protection must be provided as part of the building installation. Maximum over current device rating is 125 Amp at 415 Volts, conforming to the requirements of BS1361, or equivalent.
- Only suitably trained and qualified personnel shall be allowed to work on the equipment. Local safety standards shall be observed and shall take precedence over these regulations in points of conflict.
- The meter must be held securely during installation. They can cause injuries if dropped.
- Any meter that has fallen must not be installed, even if no damage is apparent, but must be returned for testing to the service and repair department responsible (or the manufacturer). Internal damage can result in functional disorders or short-circuits.
- The meter must on no account be cleaned with running water or with high-pressure devices. Water penetration can cause short-circuits.
- The meter terminal cover should be secured in place before any load is applied.
- To avoid overheating, the meter must be connected using appropriate cable sizes.
  - Currents up to 60A a cable with minimum 16mm<sup>2</sup> cross-section area.
  - Currents up to 100A a cable with minimum 25mm<sup>2</sup> cross-section area.
  - Currents up to 125A a cable with minimum 35mm<sup>2</sup> cross-section area.

## 3 Operational Functions

The standard operational functions of the 5219

### 3.1 Measurement

The meter has been designed to work with a wide range of voltages, current ranges, and frequency options. Please refer to the technical specifications for details.

The meter measures and registers kWh to class 1.0 and KVARh to class 2.0. There is a meter constant LED mounted on the front panel of the meter for testing purposes, pulsing at a rate of 1,000 pulses per kWh.

The meter may be configured to register Import and Export energy. See section Reverse / Export Energy Registration.

An option is available to 'enable' kVARh registration so that meters can be supplied either 'Active' only or 'Active / Reactive'. See section Reactive energy.

### 3.2 Registers

The meter energy registers have the range 000000.000 - 999999.999 kWh. The registers are displayed to a maximum of 2 decimal places unless programmed via the Flag Port (see User Interfaces) to 3 decimal places for testing purposes only. A complete table of registers is shown in the appendix.

### 3.3 Reverse / Export Energy Registration

The meter is able to recognise reverse energy and deal with it according to the configuration requested by the customer. The options include reverse energy detection 'rEd', import registration only, unidirectional registration and export energy registration. This configuration is done in the factory.

#### 3.3.1 Reverse Energy Detection

The customer may have the meter configured such that when reverse energy is detected the reverse energy warning shown below is displayed. This display will alternate between its normal display and the warning message. This reverse energy power threshold may be set between 0.23 kW and 35 kW, and is calculated over a period of 10 seconds. This threshold is factory configurable and applies irrespective of what forward power may be present during the same period of time.

The warning message can only be reset by LANDIS+GYR software or the use of a HHU using the optical communication port on the front of the meter. When clearing down the reverse energy detected 'rEd message' and reverse Wh registers, the capacitive kVARh registers will not be affected.

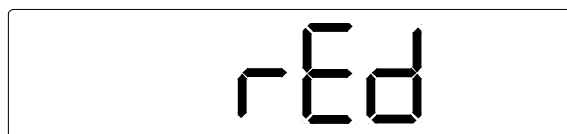


Figure 1 rEd Message



The reverse energy detection is available in the registry modes below.

### 3.3.2 Import Energy Registration

In this configuration only forward Watt hours consumed are noted and added to the Total kWh register.

### 3.3.3 Export Energy Registration

The consumption of each phase is added into the reverse or forward registers as appropriate.

**For example:**

Phase R 5A forward, Phase S 5A forward, Phase T 10A reverse will result in both forward and reverse registers increasing at the same rate. It will not result in zero power being registered.

The impulse LED may be configured to flash when any power is registered, forward or reverse.

### 3.3.4 Unidirectional Registration

The output from each phase will be added directly to the forward registers regardless of the direction of the power.

For the example given above the current consumption will be identified as 20A and the impulse LED will flash accordingly.

## 3.4 Reactive Energy

The 5219 can be configured in the factory to measure and register reactive energy. The reactive energy consumed will be registered as inductive or capacitive as appropriate. The Total Reactive energy register can be configured to show the sum of inductive and capacitive reactive energy or the difference between them.

The 'Total kVArh' display message will therefore show:

Total Inductive kVArh + Total Capacitive kVArh.

Or

Total Inductive kVArh - Total Capacitive kVArh.

## 3.5 Maximum Demand

Maximum demand may be configured to work in either rolling mode as illustrated below or slab. The maximum demand value in either case may be measured in one of the following, kW, kVAr, or kVA.

The MD register has a range 00.00 to 99.99.

The meter stores the most previous Total MD value in memory and it may be displayed if required.

The meter will measure and display the current MD values assigned to the appropriate rates in the multirate variant.

The MD may be reset via the optical port using Landis+Gyr Software or HHU, or front fascia mounted and seal-able MD button.

The display for maximum demand is shown below. KW is for illustration only and will display as kVAr, kVA etc as appropriate.

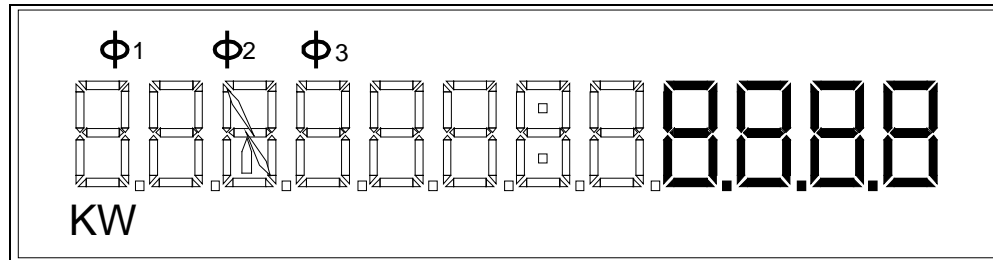
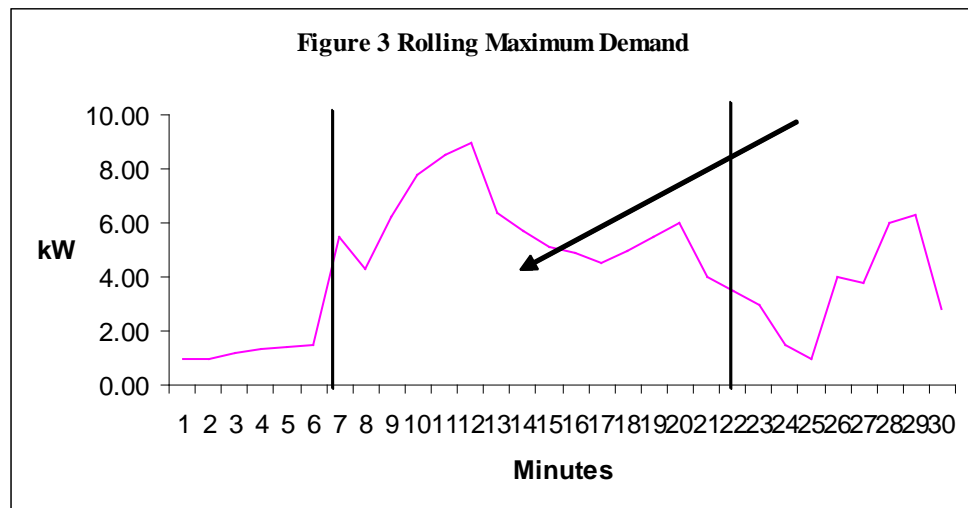


Figure 2 MD Display

### 3.5.1 Rolling Maximum Demand

Maximum Demand is calculated on a fifteen minute rolling period. Every minute the power usage of the last 15 minutes is calculated and multiplied by four to give the equivalent demand for a one-hour period. If this value is larger than the previous largest stored value, this value replaces it in the Maximum Demand register.

Rolling Maximum Demand provides better accuracy than slab MD. As illustrated below the highest demand value will be measured this way, as the peak of demand will be captured by the rolling 15-minute period.



On power up, the MD register will remain at zero until 15 minutes have passed. Maximum demand values will not be calculated until the buffer holds complete data for the preceding 15 minutes.

When an MD store occurs (using the MD reset button), MD will remain zeroed until 15 minutes have passed and the buffer holds data for the 15 minutes since the last MD store.

### 3.5.2 Slab Maximum Demand

This maximum demand method works by calculating the maximum demand over fixed customer specifiable periods of minutes. These periods must be factors of 60 minutes. The first period commences on power up of the meter and continues thereafter until power fail or MD reset.

On powerfail the rising MD value of the current MD period is integrated over the MDP and stored. If this value is larger than the previous largest MD value, on power up the new largest value will become the stored MD value.

On MD reset the current MD value is cleared down, and a new MDP started. The value at reset is stored as the most previous MD total.

### 3.5.3 Quality of Supply

The meter may be customer specified to measure and display RMS voltage and current.

- The Instantaneous Voltage Register has a range 000 to 999 Vac
- The Instantaneous Current Register has a range 000 to 999 Amps.

### 3.6 Phase Indication

The Display will indicate phase voltage present on each phase with the display of the following symbols. Ø1, Ø2, Ø3.

The voltage that the symbol appears can be configured at the factory between 0 and 240V.

Additionally the phase symbol can be configured to flash to indicate reverse connection or reverse energy detection.

### 3.7 Factory / Meter Serial Number

There is the ability within the meter to store a 46-digit serial number. The most significant 20 digits of which can be laser printed to the meters front fascia.

### 3.8 Meter Memory

All the meters data is recorded in Ferroelectric Random Access Memory (FRAM) under the control of the microprocessor. All the kWh and kVAr registers are stored in the FRAM and will be updated periodically and on power-fail. The FRAM is able to be re-written and is stable (no memory losses) throughout the life of the meter.

### 3.9 Anti-creep

Below starting current, the meter will enter into an anti-creep mode. In this state the meter registration LED is permanently lit and the registers do not increment. The LED remains lit until the meter current is increased in either the forward or reverse direction beyond the starting current. See the technical specification section for details of Ib.

### 3.10 Temperature Range

Operating range:	10°C to 45°C
Limit range of operation:	25°C to 60°C
Storage range*:	25°C to 70°C

\*Maximum period of 6 hours at the extremes of this temperature range.

This complies with IEC 62052-11.

### 3.11 Power Supply

The power supply for the meter electronics is derived from all 3 phases. The meter will continue to operate in the event of a loss of any one or two phases.

Rated Voltage: 220 / 380 Vac                      240 / 415 Vac  
Operating Voltage Range: +15% to    20%

### 3.12 Influence of Supply Voltage

The meter complies with IEC 62052-11: Section 7.1.2. and is tested by NMI.

Current Range:                                              5 to125 Amps  
Frequency:                                                      50Hz  
Power Burden:                                                Less than 2 watts

## 4 Core User Interfaces

The inputs and outputs of the 5219

### 4.1 Display

All the meters data is displayed on a LCD on which the size of each value character has a height of 8mm and a width of 3.5mm giving an overall area of 28mm<sup>2</sup> per character. The LCD has a minimum life expectancy of 20 years.

The meter LCD display is designed to have a high angle of readability.

The meter shows six significant digits with a customer configurable number of decimal places, 0, 1 or 2.

The display cycle advance is factory configurable to be:

- An auto cycling system that shows the active rate “flashing” and scrolls through each of the displays according to a configurable time from 1 to 10 seconds.
- By using a cycle display button mounted on the meters face.
- A combination of both modes. The meter will auto cycle, with the button providing a means of moving to the next display immediately.

OBIS display legends are available on request. This is a factory configurable option. See Appendix.

A detailed drawing of the LCD is shown below. Further display illustrations are shown in the appendix, along with a table of all available displays.

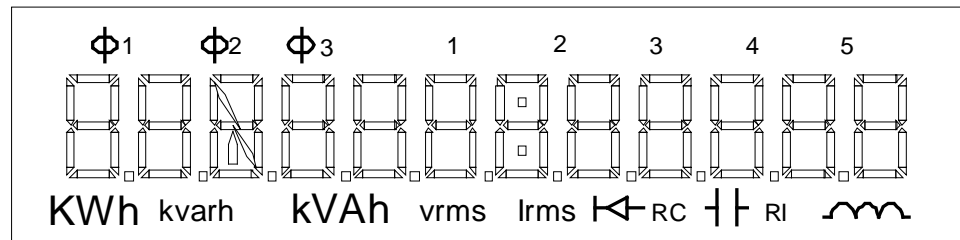


Figure 4 LCD Format

### 4.2 Energy Registration

Separate kWh and kVAh indicator LED's are present on the front aspect of the meter. The pulse value is identified on the meters fascia, at 1000 pulses per kWh/kVAh. The pulses can be used for checking the meter calibration.

### 4.3 Optical Interface

The meter includes a FLAG optical interface based upon IEC62056-21:2002. This optical interface supports the IEC1107 mode-c readout protocol. The baud rate for communication via the optical interface can be set in the meter. See technical summary for details.

## 5 Optional Functions

Optional user interfaces and additional functionality available in the 5219.

### 5.1 Introduction

The features in this section are in addition to the basic 5219 model. These options must be requested when obtaining meter availability and price from Landis+Gyr at the outset of the ordering process.

### 5.2 Pulsed Output

The meter has a pulsed output function, configurable through the optical interface (FLAG) port. The pulse output meets with regulation IEC62053-31: 1998 Class B. The output ratings are shown in the technical specification.

The meter has the option of one voltage free pulse output for kWh. The pulse output is configurable between 1 to 1000 pulses per kWh, (where  $1000/\text{kWh} = \text{whole number}$ ) with pulse duration of 40 to 500 mS in 20 mS steps. Output format is as shown below; using terminals A and B (figure 6).

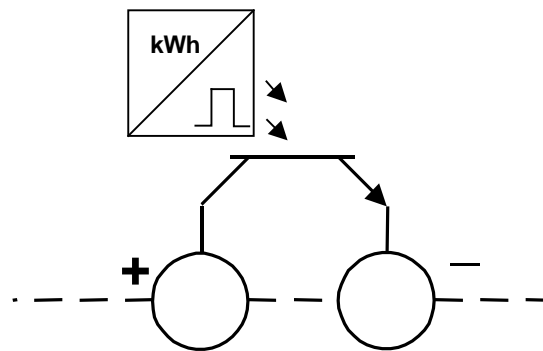


Figure 5 Pulse Output Format

### 5.3 External Rate Switching

The multi-rate variants are externally rate switched. The active rate is selected externally by applying a signal; neutral or live, to the rate switching inputs. The active rate is dependant on the number of rates the meter is configured for 1, 2, 3, or 4 and the switching protocol the customer has specified. Signal is applied to 1 auxiliary terminal, an alternative auxiliary terminal, or both simultaneously to achieve 4 switched rates.

Additionally the meter may be taken with a combination of pulse output and external rate switching. In this circumstance 1 auxiliary terminal is used for rate switching and the meter may only be configured as a 2-rate meter.

### 5.4 No-Power Read

A meter variant is available that addresses the need of some customers to be able to make meter readings while the network voltage is off. A front fascia mounted push button is fitted which when pressed and held for 3 seconds latches the internal power circuit on. This powers the display,

cycle display button, and optical readout port temporarily and allows a 45 second period to read the registers, via display and or FLAG port readout.

After approximately 45 seconds the meter powers off regardless of whether the button is still depressed, and will remain powered off for a period of 45 minutes. This mechanism protects the meters internal power source from being fully discharged by constant button pressing.

The displays available during this function are customer specifiable.

A secondary back-up power source other than the RTC back-up battery is used for this purpose.

## 5.5 Mode-C Data Readout

IEC1107 readout mode C is available via the optical FLAG port. The enabled functions of the meter such as Export kWh registers, kVARh registers, and maximum demand registers are supported and available within this data stream. The conventions for the data are shown in the appendix. The speed of the data readout is the same as for FLAG communications, that is, 9600 baud.

## 5.6 Inductive Serial Data Port

The meter incorporates an Inductive Serial Data Port that transmits data wirelessly. See table of data in the appendix.

This allows meter functionality to be extended at a future date by the addition of an easy to fit add-on module without restricting access to the optical port for the purpose of meter reading. There is no need for a physical connection.

Fitting of modules is limited to removing existing terminal cover and replacing with a module, as illustrated below.

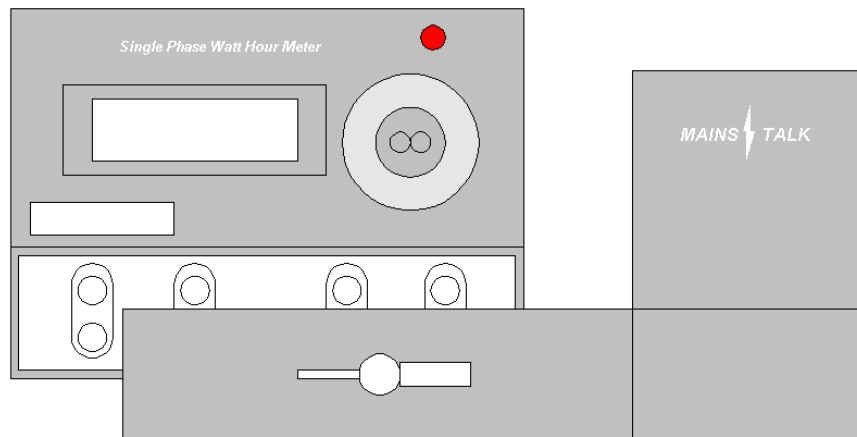


Figure 6 Additional Modules (Future)

The data output provides all information available from within the meter and would support any module including:

- Prepayment
- Power Line Remote Communication
- Radio and Telephone Communication.

## 5.7 Calibration Lock

If required the meter's calibration values can be locked with a combination of hardware and software options. A printed circuit board mounted hardware switch is fitted and on completion of the factory manufacturing process this switch is armed by LANDIS+GYR software. FLAG access to the meter memory locations concerned with calibration values, serial number etc are then prevented. The terminal cover and top cover need to be removed for this switch to be reset and access to these locations re-instated.

## 5.8 Voltage Isolation Switches

The requirement during calibration and certification is for voltage and current signals to be isolated from one another. Some customers require this ability also for their own verification testing. After testing is complete and the meter is installed, the ability to do this is prevented by the fitting of a terminal cover and seals. In markets where additional steps are required to prevent non-technical losses, isolation switches may be fitted to the pcb, that once closed prevent any isolation of voltage from current unless the meter seals are broken and the top cover removed.

Additionally or alternatively mechanical bungs may be fitted behind the terminal cover that serves the same purpose of preventing isolation of voltage from current.

## 5.9 Landis+Gyr Switch Mode Power Supply

The Landis+Gyr switch mode power supply if fitted allows the 5219 to fulfil the requirement of some markets and local approval bodies for the meter to function with any 1 phase or neutral disconnected. This allows the meter to, with balanced loads, move from 3Phase4wire operation to 3phase3wire automatically with no loss of accuracy. This feature may prove useful in some areas of industry where a provision for neutral connection is left off the local distribution system.

## 5.10 Push Button's

One front panel push button may be provided if required to enable manual interaction with the display cycle. That is the display list may be read by scrolling through 1 display with each button press.

This same push button may also be used to operate the no power read functionality if this option has been fitted.



# 6 Installation

Construction, Mounting and wiring of the 5219

## 6.1 Construction

The meter case dimensions conform to the following two standards, BS5685: 1979: Part 1 and DIN 43 857: 1978: Part 2. The terminal cover governed by DIN 43 857: 1974: Part 4. For DIN meters the meter will be supplied with a separate clip-in device to make the design meet the DIN Standard.

The Meter has a double insulated case which meets the requirements of BS5685 and is manufactured from the following materials:

Base - Flame Retardant Polycarbonate

Top – Polycarbonate

Window - UV Stabilised Polycarbonate

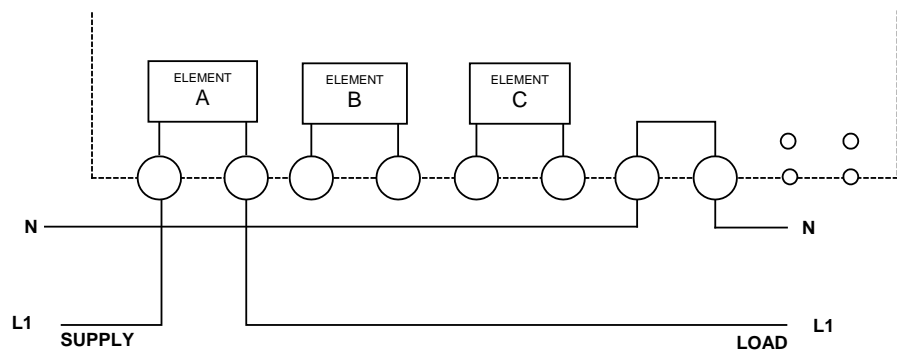
Terminal Cover – Polycarbonate

Dimensions follow in the appendix.

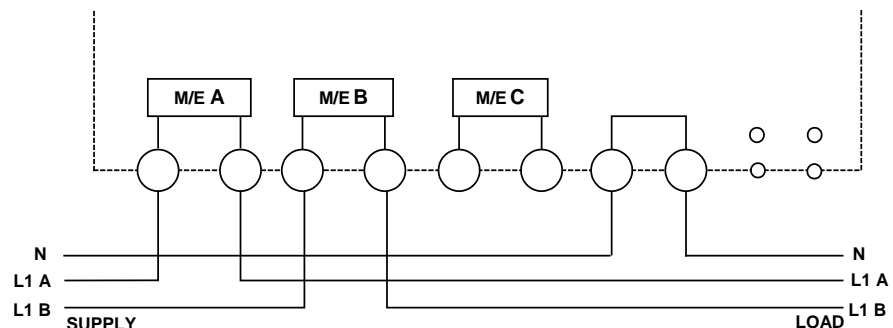
## 6.2 Connections

The Meter has 3 measuring elements capable of being configured as:

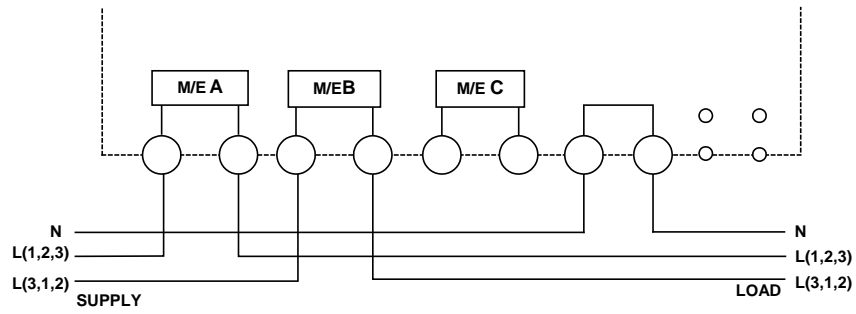
### Single phase 2 wire



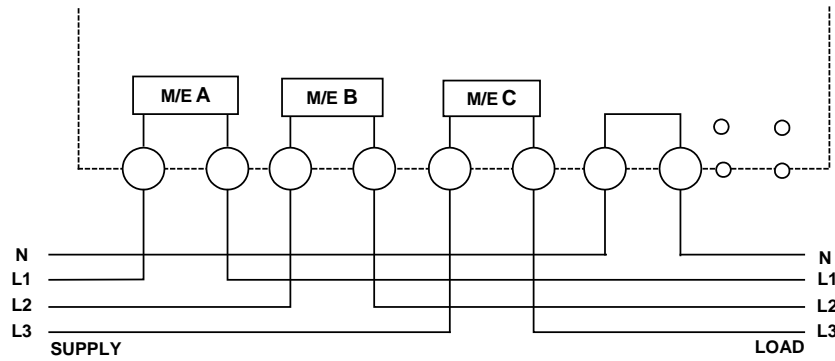
### Single phase 3 wire



### 2 phases of 3 phase 4 wire



### 3 phase 4 wire



## 6.3 Meter Terminals

The main current terminals and auxiliary terminals are manufactured from solid brass to the dimensions and pitch outlined in BS5685: 1979: Part 1 and DIN 43 857: 1978: Part 2.

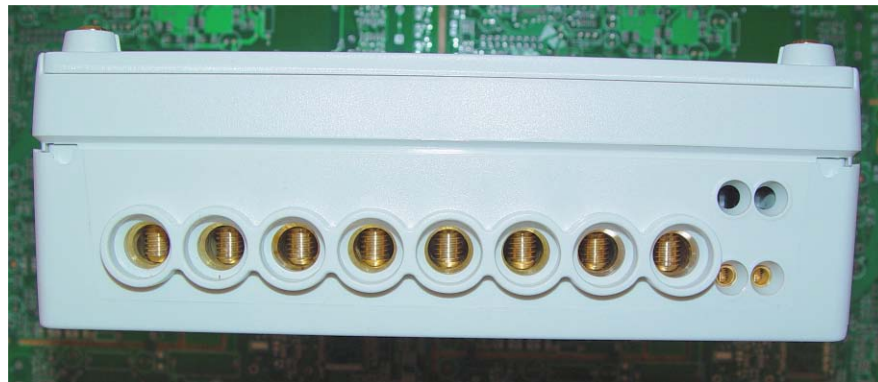


Figure 7 - Terminal Arrangement Photograph

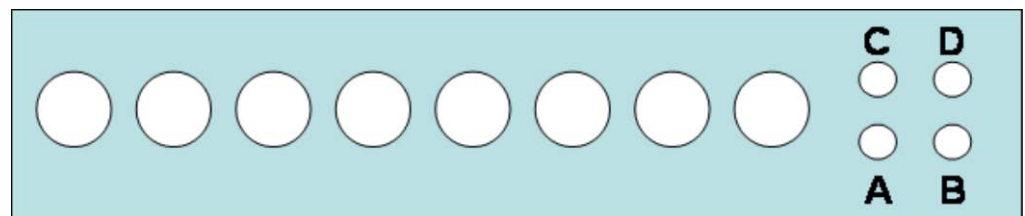


Figure 8 - Terminal Arrangement Plan

For Pulse Output (P/O) only models: Terminals A and B - pulse output

For Externally Switched only models: Terminals A and B - external switches (4 rates)

For Externally Switched and P/O models: Terminals A and B – pulse output, terminal D – external switch (2 rates).

## 6.4 Sealing Arrangement

The meter is sealed conventionally, using sealing wires and the appropriate seal for the intended market. The meter can be sealed for life if the customer requests this service.

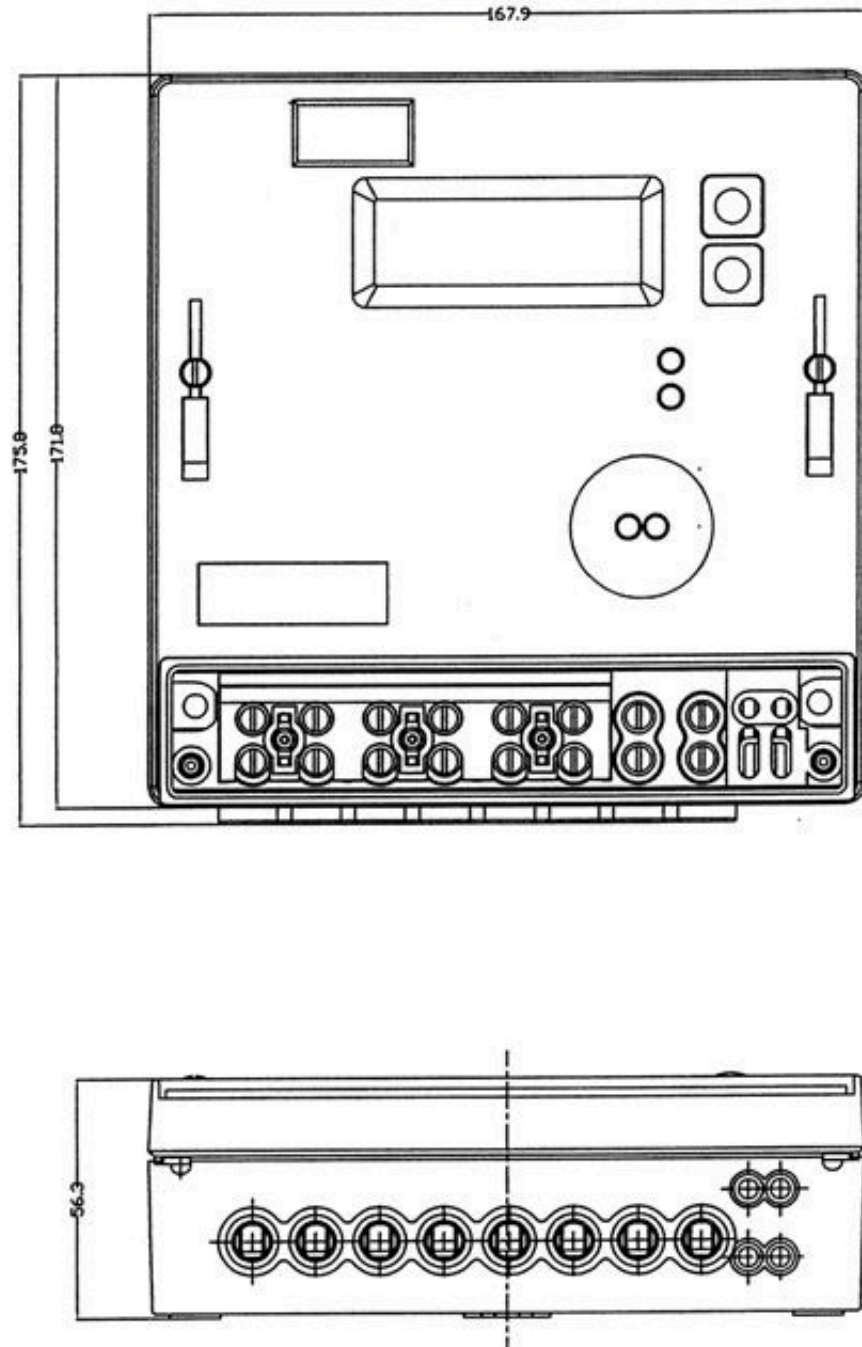
## 7 Technical Summary

The technical specifications of the 5219

### 7.1 Technical Facts

System Voltage	Three element meters	240Vac Phase to Neutral 230Vac Phase to Neutral 220Vac Phase to Neutral 120Vac Phase to Neutral
	Supply variation	+15% to -20%
Current (Base)	Direct Connection I <sub>b</sub>	5A, 10A, 15A, 20A
Current (Max)	I <sub>max</sub>	80A, 100A, 105A, 120A, 125A.
Starting Current	(IEC)	0.4% of I <sub>b</sub>
Max measuring range	(IEC)	20mA up to 125A
	Typically 15mA for a balanced load	
Measuring Accuracy	IEC 62053-21	Class 1 Active (kWh) Class 2 & 3 Reactive (kVARh)
Burdens	Voltage Circuit @ 230Vac	<2W <10VA
	Current Circuit @ I <sub>b</sub>	<0.5VA
	Current circuit @ I <sub>max</sub>	<1VA
Supply frequency		50Hz, 60Hz
	Frequency variation	± 5%
Temperature Range	Limit operating range	-25°C to 60°C
	Storage range	-25°C to 70°C
Meter Constant		1000 imp/kWh
Pulse Output	The output meets IEC 62053-31:1998 Class B	Max voltage 24V d.c.
		Max current 6mA
Display	LCD 7 segment, 12 segments, Icons for kWh, kVARh, inductive & capacitive reactive power, reverse energy, I <sub>rms</sub> and V <sub>rms</sub> .	Character size – 8x3.5mm. 6 significant numbers, 2 decimal places
Quality	Manufactured to:	ISO 9001:2000
OFGEM approval number		981
Certificated life		20 Years
Construction		Flame Retardant Polycarbonate, window UV Stabilised
Terminal Arrangement		BS5685
Terminal Diameter		8.3mm
Weight	(standard terminal cover)	950g
	(extended terminal cover)	1070g
Dimensions (mm)	(standard terminal cover)	H 175.8 x W 167.9 x D 56.3
	(extended terminal cover)	H 245 x W 173 x D 58
Optical interface	FLAG protocol based on standard given above.	
Baud rate options (baud)	Communications via optical interface	300, 1200, 4800, 9600
IP Rating	With Short terminal cover	IP51
	With Extended terminal cover	IP54

## 7.2 Dimensions



## 8 Maintenance and Service

### 8.1 Meter Check

While it isn't necessary, under normal circumstances, to perform any maintenance on the installed meter, the following are check points that should be observed during scheduled periodic meter visits.

- Is the meter dry and clean, particularly the LCD display and the optical interface?
- Does the meter display a legible and sensible display? i.e. does the meter appear in a serviceable condition.
- Check all factory fitted and company fitted seals are in place secure and intact.
- Observe display for any error messages or notifications
- Confirm that the energy registers have changed to a reasonable degree since the last visit.
- If irregularities are found, continue as in section 8.

### 8.2 Meter Testing

The testing of meters, either random sample or on all meters, should be carried out periodically according to national regulations. The meter must be removed as described in section 8.3 and replaced with a meter of similar type for the duration of the tests.

### 8.3 Post Installation Configuration Changes

With the aid of a laptop computer or other suitable hand held device a flag probe and Landis+Gyr specific software, it is possible to amend the factory configured options of the meter. It is beyond the scope of this manual to describe in any further detail the procedure. Landis+Gyr sales team would be happy to discuss specific requirements.

## 9 Measures in the Event of Faults

### 9.1 Operating Faults

If the LCD window is illegible or the data readout does not function, the following points should be checked.

Is the mains voltage present? – Are the preliminary fuses intact?

Has the minimum or maximum recommended ambient temperature been exceeded?

Is the LCD window clear of all debris? – Not misted over, painted over or soiled in any way.

If none of the above are causing the fault the meter should be disconnected as per section 9.2, replaced if required as detailed in section 6 and returned to Landis+Gyr as described in section 9.3.

### 9.2 Disconnecting the Meter



Remove preliminary fuses before continuing

The connecting conductors should not be Live when removing the meter. Electrically Live parts are a life threatening hazard. Preliminary fuses should be removed and kept in a safe place until all work is complete, where they cannot be replaced by anyone unnoticed.

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Proceed as follows:

- Remove the company seal on the terminal cover (if fitted).
- Release the two terminal cover screws and remove terminal cover.
- Check with a suitable voltage testing device that the phase connections are not live. If they are live then remove the preliminary fuses and keep in a safe place until all work is complete, where they cannot be replaced by anyone unnoticed.
- Remove the signal inputs and outputs by releasing the auxiliary terminal screws.
- Remove the phase connections by releasing the main terminal screws.
- If required fit a suitable replacement meter as described in section 6.

### 9.3 Repairing the Meter

There are no user serviceable parts inside the meter. Breaking factory calibration seals will invalidate the calibration status of the meter. In the event of a meter requiring repair, proceed as follows.

- Remove the meter from the installation as detailed in section 9.2.
- Attach a label, which describes the fault as accurately as possible, to the meter and include name and contact details of person responsible in case of inquiries.

- Package the meter to ensure no further damage can occur during transit.
- Send the meter back to Landis+Gyr.



## 10 Decommissioning and Disposal



The procedure for the safe removal of the meter from the installation is described in section 9.3. Please ensure that ALL SAFETY PRECAUTIONS are met before proceeding.

Based on the environmental certificate ISO 14001, the components used to manufacture the meter can, in the main, be broken down into constituent parts and sent for suitable recycling or disposal.



The following are general guidelines and should NOT take priority over local disposal and environmental policies which should be adhered to without compromise.

Component Parts	Disposal
Printed Circuit Boards	
LCD Display	Treated as per disposal of Electronic Equipment
Metal Components	Sorted and delivered to collective recycling point
Plastic Components	Sorted and delivered for re-granulation if at all possible

# 11 Glossary of Terms and Standards

## 11.1 Acronyms

Acronym	Definition
BS	British Standard
DFS	Direct Field Sensor
DIN	Deutsches Institut für Normung (German Institute For Standardisation)
ECD	External Connection Diagram
EEPROM	Electrically Erasable Programmable Read Only Memory (E2)
IEC	International Electrotechnical Commission
ISO	International Standards Organisation
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MD	Maximum Demand
MID	Metering Industry Directive
NPR	No Power Read
OFGEM	The Office of Gas and Electricity Markets
PTR	Photo-transistor
RED	Reverse Energy Detected

## 11.2 Measurement Units

A	Ampere (unit of current)
Hz	Hertz (unit of frequency)
Iref	MID reference current
Kg	Kilogramme (unit of weight)
kVAh	Kilo Volt Ampere hour
kvarh	kilo Volt Amps reactive hour
kWh	kilo Watt-hour
mm	millimetre (unit of distance)
mO	milliohm (unit of resistance)
ms	millisecond
Nm	Newton meter (unit of torque)
°C	Degree Celsius (unit of temperature)
UN	Rated supply voltage of meter
UT	Rated external switch voltage
V	Volt

## 12 Appendices

Additional information for the 5219

### 12.1 Appendix A – Inductive Serial Data Port

The inductive signal is a 26 KHz square wave modulated by the data transmitted at 1200 baud. The stream of bytes representing the data is repeated at 6-second intervals. The table below shows the data available in the transmission.

*Table 1 Inductive Loop Data Stream*

Block Description	Block Byte Count	Comment
STX character	1	Start of transmission
Meter type and hardware version	8	I.e. AMP5219A
Serial number	20	Most significant 20 digits
R1 Import kWh Register (or Total kWh in a single rate meter)	8	In Wh
R2 Import kWh Register	8	In Wh
R3 Import kWh Register	8	In Wh
R4 Import kWh Register	8	In Wh
R1 Export kWh Register (or Total Export kWh in a single rate meter)	8	In Wh
R2 Export kWh Register	8	In Wh
R3 Export kWh Register	8	In Wh
R4 Export kWh Register	8	In Wh
R1 Inductive kVArh Register	8	In Wh
R2 Inductive kVArh Register	8	In Wh
R3 Inductive kVArh Register	8	In Wh
R4 Inductive kVArh Register	8	In Wh
R1 Capacitive kVArh Register	8	In Wh
R2 Capacitive kVArh Register	8	In Wh
R3 Capacitive kVArh Register	8	In Wh
R4 Capacitive kVArh Register	8	In Wh
Active Rate	2	Identification of
Customer ID	2	Configuration file number
ETX character	1	End of transmission
BCC character	1	Block check character

## 12.2 Appendix B – Readout Data

Table 2 Readout Codes Applicable to the 5219

Code	Definition
0.00.6	Serial number
2.18.1	Rate 1 kWh register
2.18.2	Rate 2 kWh register
2.18.3	Rate 3 kWh register
2.18.4	Rate 4 kWh register
2.18.0	Total kWh register
3.28.1	Rate 1 Export kWh register
3.28.2	Rate 2 Export kWh register
3.28.3	Rate 3 Export kWh register
3.28.4	Rate 4 Export kWh register
3.28.0	Total Export kWh register
2.58.1	Rate 1 Inductive (+kVArh) register
2.58.2	Rate 2 Inductive (+kVArh) register
2.58.3	Rate 3 Inductive (+kVArh) register
2.58.4	Rate 4 Inductive (+kVArh) register
2.58.0	Total Inductive (+kVArh) register
2.16.1	Rate 1 MD value, rolling or slab
2.16.2	Rate 2 MD value, rolling or slab
2.16.3	Rate 3 MD value, rolling or slab
2.16.4	Rate 4 MD value, rolling or slab
2.16.0	Total MD value, rolling or slab

This table shows readout codes assigned to date, but these are assigned on an as needed basis and according to customer specifications. Therefore options available are not limited to those in this table.

A typical readout may send out the data stream shown in the left hand column of the table below. There would be some variance dependant on customer specific configuration.

Table 3 Mode-C Readout Formats

Data Stream	Explanatory Notes
/AMP5219-0502	Baud rate (5=9600), hardware (5219) and software issue (0502)
0.00.6.0(SAMPLE31)	Serial number, 16 digits across 2 lines as shown or 9 digits across 1.
0.00.6.1(0374132)	
2.18.1(000000.00)*	Rate 1 kWh register
2.18.2(000000.00)	Rate 2 kWh register
2.18.0(000000.00)	Total kWh register
3.28.1(000000.00)	Rate 1 Export kWh register
3.28.2(000000.00)	Rate 2 Export kWh register
3.28.0(000000.00)	Total Export kWh register
2.58.1(000000.00)	Rate 1 Inductive (+kVArh) register
2.58.2(000000.00)	Rate 2 Inductive (+kVArh) register
2.58.0(000000.00)	Total Inductive (+kVArh) register a
2.16.1(00.00)	Rate 1 MD value

Data Stream	Explanatory Notes
2.16.2(00.00)	Rate 2 MD value
2.16.0(00.00)18	Total MD value and sign off checksum

\*N.B All registers (000000.00) are shown here with no kWh/kVArh values.

### 12.3 Appendix C – Display Options

Table4 Available Displays in the 5219

Description of available displays
Software Version
Hardware variant / software options
Display Test
Total Import kWh
Rate 1 Import kWh
Rate 2 Import kWh
Rate 3 Import kWh
Rate 4 Import kWh
Active Rate Import kWh
Total Export kWh
Rate 1 Export kWh
Rate 2 Export kWh
Rate 3 Export kWh
Rate 4 Export kWh
Active Rate Export kWh
Total Sum/Difference kVArh
Rate 1 Sum/Difference kVArh
Rate 2 Sum/Difference kVArh
Rate 3 Sum/Difference kVArh
Rate 4 Sum/Difference kVArh
Active Rate Sum./Difference kVArh
Total Inductive kVArh
Rate 1 Inductive kVArh
Rate 2 Inductive kVArh
Rate 3 Inductive kVArh
Rate 4 Inductive kVArh
Active Rate Inductive kVArh
Total Capacitive kVArh
Rate 1 Capacitive kVArh
Rate 2 Capacitive kVArh
Rate 3 Capacitive kVArh
Rate 4 Capacitive kVArh
Active Rate Capacitive kVArh
Total Maximum Demand
R1 Maximum Demand
R2 Maximum Demand
R3 Maximum Demand
R4 Maximum Demand
Previous Total Maximum Demand
Cumulative Maximum Demand
Maximum Demand Reset Count

Description of available displays
Phase 1 Vrms
Phase 2 Vrms
Phase 3 Vrms
Phase 1 Irms
Phase 2 Irms
Phase 3 Irms

Table 5 Alternative OBIS Displays

Obis Code	Register
01	MD reset count
20	Total Import kWh
21	Total Export kWh
22	Total Inductive (or sum of L+C) kVArh
23	Total Capacitive kVArh
81	R1 Import kWh
82	R2 Import kWh
83	R3 Import kWh
84	R4 Import kWh

### 12.3.1 Display Examples

The examples below show the symbols used for the various registers.

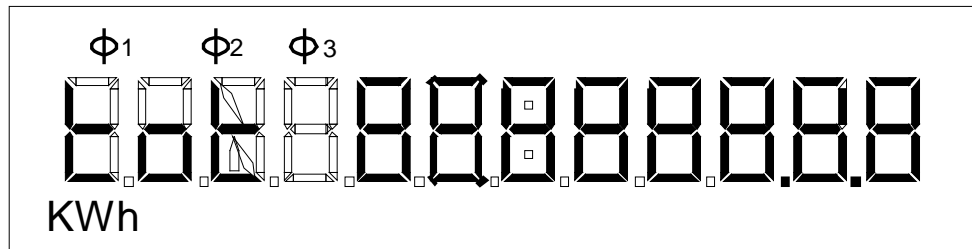


Figure 10 Total kWh

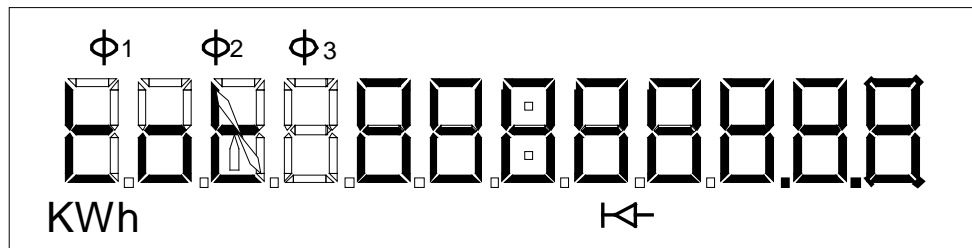


Figure 11 Total Export kWh

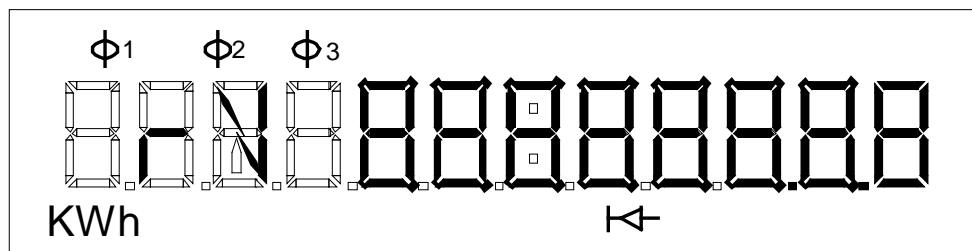


Figure 12 Total Export kWh alternative display

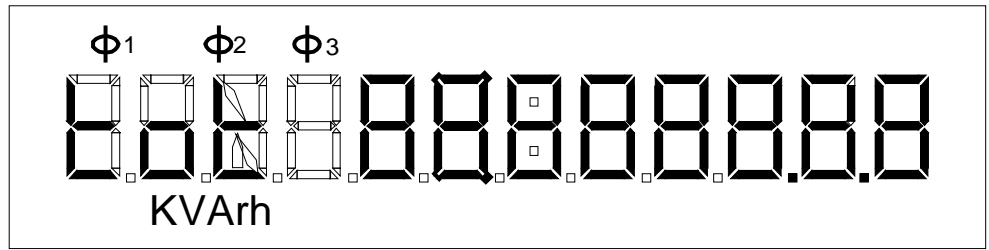


Figure 13 Total Sum or Difference kVArh

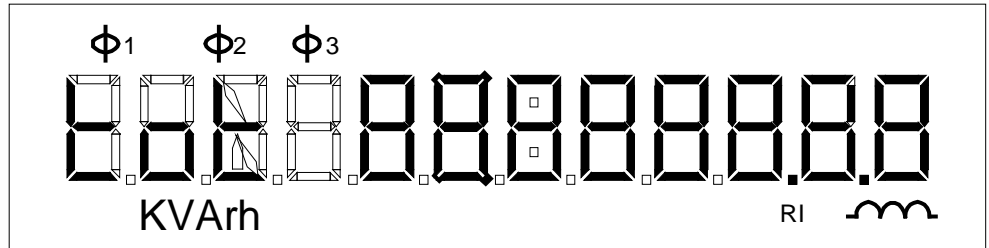


Figure 14 Total Inductive kVArh

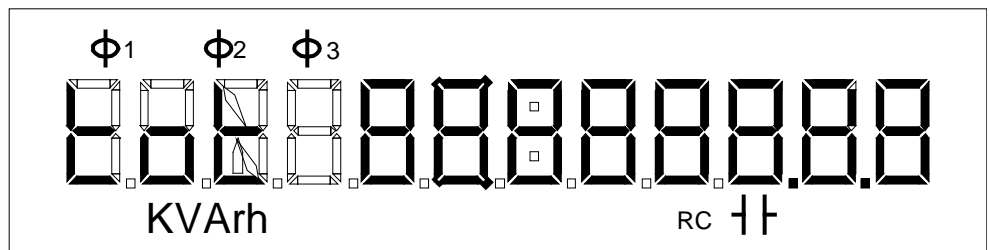


Figure 15 Total Capacitive kVArh

## 12.4 Appendix D – Registers

Table 6 Potential Registers available in the 5219

Potential Registers
Total Import kWh
Rate 1 Import kWh*
Rate 2 Import kWh
Rate 3 Import kWh
Rate 4 Import kWh
Total Export kWh
Rate 1 Export kWh
Rate 2 Export kWh
Rate 3 Export kWh
Rate 4 Export kWh
Total Sum/Difference kVArh
Rate 1 Sum/Difference kVArh
Rate 2 Sum/Difference kVArh
Rate 3 Sum/Difference kVArh
Rate 4 Sum/Difference kVArh
Total Inductive kVArh
Rate 1 Inductive kVArh
Rate 2 Inductive kVArh

<b>Potential Registers</b>
Rate 3 Inductive kVAh
Rate 4 Inductive kVAh
Total Capacitive kVAh
Rate 1 Capacitive kVAh
Rate 2 Capacitive kVAh
Rate 3 Capacitive kVAh
Rate 4 Capacitive kVAh
Total Maximum Demand
R1 Maximum Demand
R2 Maximum Demand
R3 Maximum Demand
R4 Maximum Demand
Previous Total Maximum Demand
Cumulative Maximum Demand

\*N.B Actual register combinations depends upon meter variant used

[Top of the Document](#)