UNIVERSITY OF Southampton

Estates and Facilities

Briefing Document: Automatic Metering System

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ES/021/C

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Revision Index

Revision	Date of Revision	Revised by	Revision Made
0	5/11/12	JB	First Issue
A	28/11/12	JB	Heat meter spec revised
B	8/02/13	JB	Labelling of meters spec expanded
C	12/03/2018	JB, JA	Update supplier contact details. Electricity and data logger spec revised

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BRIEFING NOTES: AUTOMATIC METERING SYSTEM

1 INTRODUCTION

1.1 Purpose of this Briefing Document

This Briefing Document is intended to give guidance to University design and operations teams as well as external contractors and consultants on the University's standards relating to metering and the collection of electricity, gas, heat and water data.

It is not intended to be a comprehensive specification and the responsibility for ensuring an appropriately designed and installed metering system remains with the design team of the project concerned.

1.2 Scope of this Document

This Briefing Document details the University's requirements for metering and the collection of electricity, gas, heat and water data supplied to the Estate and used within buildings and by the areas and equipment within them.

It sets out general principles about where meters should be provided and which of those meters should be connected to Automatic Metering System (AMS).

It outlines details relating to supply company billing meters including the means of having them installed and replaced, the means of ensuring that they are appropriately read and, where applicable, the ways in which data can be collected and imported into the AMS.

It outlines the University's requirements for privately owned meters and, where applicable, their connection to the AMS.

It outlines details about set up and operation of the Automatic Metering System.

1.3 Liaison Engineers

Every Project will have one or two Liaison Engineers appointed.

Refer to Briefing Document: Liaison Engineers and Consulting Engineers.

The Liaison Engineers are the formal route for communication between the Project and the University's M&E teams including Energy and BEMS and all formal agreements shall be via them.

The Liaison Engineers will work alongside any appointed Project Manager.

1.4 Related Documents

This briefing Document should be read in conjunction with the latest revision of other relevant Briefing Documents, in particular:

Liaison Engineers ES/003

Electrical Services ES/005

Asset Labelling ES/022

Where there is any discrepancy between documents the Liaison Engineers should be consulted.

All current Briefing Documents can be found at http://www.southampton.ac.uk/estates/policies_procedures/standardspecifications/ .

1.5 Preferred Suppliers

Suppliers and equipment stated in this document are the University's preferred. Proposals for alternative must first be agreed, via the Liaison Engineers, with the University's Energy Manager.

2 REQUIREMENT FOR AUTOMATIC METERING

Although metering is often needed for other purposes, for example in order to meet the BREEAM requirements or Planning Regulations the University does not require all such meters to be connected to its Automatic Metering System.

The provision of meters in the following locations and their connection into the AMS is, however recommended as a minimum reasonable standard:

2.1 Services to Be Metered and Connected to AMS

2.1.1 Electricity

2.1.1.1 The main electricity supply to each building with a maximum demand in excess of 20kVA shall be metered separately and connected to the AMS.

2.1.2 Each distribution board with a maximum demand of greater than 20kVA shall be metered separately and connected to the AMS.

2.1.2.1 Each individual piece of equipment or load with an average maximum consumption in excess of 10kVA over a one hour period shall be metered separately and connected to the AMS.

2.1.2.2 Wherever practicable, small power and lighting shall be metered separately and connected to the AMS.

2.1.2.3 In every instance, electricity meters shall be arranged in order to achieve a 'meter chain' that includes the main building electricity meter and as described in 2.2 below.

2.1.3 Gas

2.1.3.1 Each main gas supply to a building shall be metered (whether it be a private meter or a utility company meter).

2.1.3.2 Main building meters of size U16 (a maximum capacity of 16m3/h) and above shall be connected to the AMS.

2.1.3.3 The gas supply to each item of equipment within a building with an input capacity of greater than 200kW shall be metered separately or in groups of similar type (eg a group of 3 boilers) and connected to the AMS and these meters shall be arranged to provide a 'meter chain as described in 2.2 below.

2.1.4 Heat

2.1.4.1 Each building's main supply of heat shall be metered and connected to the AMS.

2.1.4.2 Domestic hot water service (DHWS), variable temperature (VT) and constant temperature (CT) heat shall be metered separately and connected to the AMS.

2.1.4.3 The above arrangement will provide a 'meter chain' as described in 2.2 below.

2.1.5 Water

2.1.5.1 Each Southern Water meter of size of 28mm and above shall also have an internal water meter fitted within each building that the supply feeds and all of these meters shall be connected to the AMS.

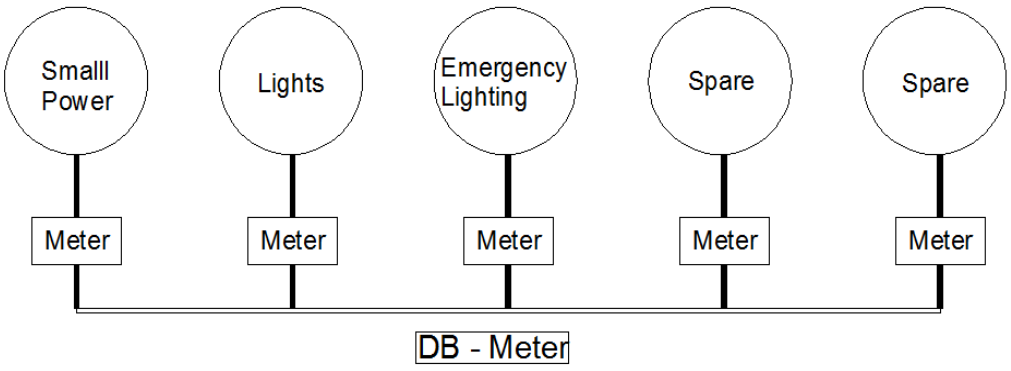
2.1.6 Water shall be metered both at the Southern Water supply meter and at the entry to each building supplied. (NOTE: Any external water supplies should be from a building and not directly from the buried water main). This will allow create a 'meter chain' as outlined in 2.2 below as well as allowing any leakage in the buried mains to be detected.

2.2 Meter Chains

2.2.1 Ensuring the correct operation of meters is key to the reliability and robustness of the AMS.

This is best achieved by the creation of 'virtual meters' within the AMS that constantly check the summation of meters arranged in chains.

2.2.2 Wherever reasonably possible all efforts should be made to set, provide and configure automatic meters so that a 'meter chain' is formed as illustrated in the example below. In this case the DB Meter = the sum of the small power, lights, emergency lighting and two spare ways on the distribution board:



3 SUPPLY COMPANY BILLING METERS

Billing meters are those meters owned, maintained and operated by an external organisation from which the University purchases electricity, gas or water.

3.1 Half Hourly (HH) Electricity

3.1.1 Where a new supply will have a maximum demand in excess of 100kVA and where the annual consumption is estimated at greater than 200,000kWh a half hourly supply meter shall be utilised.

3.1.2 All applications for modifications to or new HH Electricity meters including the installation of the supply, the supply agreement, the meter installation and meter operator agreement and the data collection and aggregation agreement shall be made in consultation with the University's Procurement Services Team.

3.1.3 Meter Operator and Data Collector and Aggregator

The University currently employs IMServ as both its Meter Operator and as its Data Collector and Aggregator.

Applications for new meters and changes in meters should be made to Maxine Osborne Account Manager, Maxine.CRM@imserv.com, Tel: 01908 257 590. The Imserv Customer Care team, customer.care@imserv.com, shall be copied in to all email correspondence to Duncan Griffiths. Please see section 3.1.5 for details of requirements of new meters and their connection to the AMS.

This is separate from the supply installation (refer to Electrical Briefing Document) and supply agreement (refer to University's Procurement Services team).

3.1.4 Access to Meters on Site

For existing buildings, all requests for access for meter maintenance, replacement or removal must be directed through the Estates and Facilities helpdesk. Helpdesk will raise a job for the Estates and Facilities Electrical Maintenance Team to provide access to the meter and provide any plant room access permits if required.

Where billing meters are replaced or removed Estates and Facilities Electrical Maintenance Team are responsible for taking a final read of the old meter and a start read of the new meter. Meter reads must be sent to the BEMS team via email along with the date the read was taken and a picture of the new meter, metering@soton.ac.uk.

3.1.5 Connection to AMS

All new Half Hourly Meters shall have data collected in two ways:

3.1.5.1 Details of the new metered supply and MPAN shall be sent for the attention of the Energy Manager at metering@soton.ac.uk . IMServ shall be instructed to add the new MPAN's data to the list of data transmitted via email on a daily basis, to imserv@soton.ac.uk from where it will be automatically imported into the AMS.

3.1.5.2 IMServ shall be instructed to provide a Customer Connection point, which will provide a volt free contact for connection to the AMS.

3.1.6 In connecting the Customer Connection point to the AMS it is vital to check:

3.1.6.1 The correct polarity – the voltage from the AMS data logger will be approximately 29VDC and it is vital that the positive connection is connected to the positive terminal in the Customer Connection point.

3.1.6.2 The correct pulse rate – which must be entered into the channel description on the AMS.

3.2 Non Half Hourly (NHH) Electricity

3.2.1 For smaller sized electricity meters (below the specification for HH meters defined in 3.1 above3.1.1 above) shall be installed as NHH Electricity Meters.

3.2.2 Any new or replacement of NHH electricity meters shall be applied for in consultation with the University's Procurement Services Team.

3.2.3 Where new or replacement meters are installed, start (and where applicable finish)meter reads shall be taken from the electricity meters by the contractor and emailed to the BEMS Team along with the date the read was taken and a picture of the new (and where applicable old) meter, metering@soton.ac.uk.

3.3 Gas Meters

3.3.1 All new or replacement gas meters of size U16 or above shall be specified as being supplied with an intrinsically safe pulse output for connection into the University's AMS. This will normally be provided as a second pair of volt free contacts from a 'Cello type device as manufactured by Dresser. Meters below this size need not be connected to the AMS.

3.3.2 Any new or replacement gas meters shall be applied for in consultation with the University's Procurement Services Team.

3.3.3 Where applicable, the pulse output from the intrinsically safe device shall be connected from the Cello device into the AMS taking particular care to:

3.3.3.1 Ensure the correct polarity – the voltage from the AMS data logger will be approximately 29VDC and it is vital that the positive connection is connected to the positive terminal on the Cello device.

3.3.3.2 Record the pulse rate of the gas meter output and ensure this is included in the description for the meter channel.

3.3.4 Where gas meters are located in an external meter house, the preferred option is a buried duct connecting the pulse output to the data logger inside the building. Where a new duct would not be practicable, use of a radio system as described in 5.2.1.3 below can be considered as an alternative.

3.4 Water Meters

3.4.1 All new Southern Water meters shall be supplied with facility to connect to the AMS. Where existing meters are to be reused to supply new facilities, the meter shall be upgraded to a pulse output meter

3.4.2 Any new or replacement gas meters shall be applied for in consultation with the University's Procurement Services Team.

3.4.3 Requests for facility to connect to the AMS shall be made to IMServ, contact Richard Roberts, Key Account Manager, Tel: 01908 257 548, email: Richard.roberts@imserv.com. NOTE: Before IMServ can connect their data logger to the water meter they will need to liaise with Southern Water. So the job may take a few weeks to complete.

3.4.4 When applying for a facility to connect to the AMS, the University Energy Manager must be notified when the connect will be completed, the meter ID number, a close up photograph of the meter, a distance photograph showing the meter pit and a site plan showing the meter location.

4 PRIVATELY OWNED METERS

4.1 Electricity Meters

4.1.1 Only electricity meters required to be connected to the AMS are specified here.

NOTE: The majority of the existing electricity meters across the University are simple pulsing devices. This standard has now been superseded by that defined below.

4.1.2 Pulse Count Electricity Meters

4.1.2.1 All new installations shall be ND Cube 400 with pulse count as shown in the photograph below. These are to be supplied by Northern Design Metering Solutions. Contact Paul Lomas, Sales Manager, Tel 01274 750 625.

4.1.2.2 All new meter installations must be located where they can be easily read and maintained.

4.1.2.3 When installing electric meters it is crucial that the all CT's are connected. One missing CT on a 3 phase load would mean a third of the energy is not being recorded. It is also extremely important that the CT's are the right way round. Reversed CT's would result in negative figures.

4.1.2.4 Onsite programming of the meters is required. The meter handbook should be read upon programming of the meter.

4.1.2.5 The meters shall be programmed to the correct CT ratio for the supply.

4.1.2.6 All meters must be clearly labelled, stating exactly what the load is being read in accordance with 7 below.

4.1.2.7 Once commissioned, meters shall be manually read at least twice over a fixed period and on the half hour interval and this shall be compared to the data collected using the AMS to verify correct set up.

4.2 Gas Meters

4.2.1 General Description

It is the University's standard that all new and replacement gas meters are pulse counting. When installing new sub gas meters an intrinsically safe device, such as the Chatterbox must be installed to enable the meter to be safely connected to the RTU and the AMS.

4.2.2 Contractor Responsibility

The contractor is responsible for commissioning the gas meter as well as ensuring the correct data is received by the AMS in the correct channel.

4.2.3 Preferred Meter Type

New gas meters shall be:

Vemm tec IGTM – Wafer Type gas meter together with Chatterbox intrinsically safe connection device supplied by Western Automation, Tel: 02380 641 111.

4.2.4 Pulse Rate

All gas meters shall be specified such that the pulse rate will be a minimum of 20 pulses in any one half hour period at times of minimum demand.

4.2.5 Meter Identification

See 6 below

4.3 Heat Meters

4.3.1 Preferred Meter Type

Heat meters shall be Kamstrup Mulitical 602 similar to that shown in the photograph below (note the photograph is a 601 but the 602 is very similar) with Ultra Flow flow section and PT500 temperature sensors.

These meters can be obtained through Western Automation, Tel: 02380 641 111 and the order form contained in appendix C should be used and the purchase order should refer to the Nottingham Branch of Western Automation, who have specialist knowledge of Kamstrup meters.

For technical information contact Kamstrup, Tel: 01787 319 081

4.3.2 Meter Installation and Programming

The heat meters are programmed at the factory it is therefore imperative that the correct programming information is given to the supplier. This includes the required pulse rate.

4.3.3 Location of Flow Section

It is vital that the flow section must been installed in a long straight piece of pipe away from any bends or other fittings or obstructions and that the system contains clean water with air and dirt eliminated (see ES/001 Mechanical Briefing Notes) in order to avoid turbulent water.

Where possible the flow section should be:

4.3.3.1 In the horizontal but if this is impractical it should be located so that water flows upwards. Water should never flow downwards through the flow section.

4.3.3.2 The flow section must be sited in an easily accessible location for maintenance.

4.3.3.3 In the return pipe

4.3.4 Location of Integrator

The integrator must be located in an accessible location where it can be easily be read and maintained. No higher 1.5m from ground level. Note, however, that the temperature sensors cables must NOT be shortened or extended.

4.3.5 Location of Flow and Return Temperature Sensors

When installing the sensors, heat sink compound plus must be applied to the sensor pins before installing into the sensor pockets to improve the thermal conductivity of the sensors. The sensors pockets need to be inserted into sockets, with one welded into the side of the flow pipe and one welded into the side of the return pipe**.** Care must be taken to ensure that the flow and return temperature sensors are inserted in to the correct pipe. If the flow and return sensors are the wrong way round the integrator will give a false reading.

The sockets need to be the depth of the pipe insulation and the pockets long enough to go in the water flow. The integrator should be hard wired to the power supply via a fuse spur.

4.3.6 Output method

There are two options for output from the heat meter to the AMS as outlined below. The option chosen by the University will vary from project to project and the Energy Manager must therefore being consulted via the project Liaison Engineer for the preferred metering solution.

4.3.6.1 Option 1 Pulse Counting

Pulse Output Connections

It is important that the pulse output is connected correctly to avoid incorrect readings:

When connecting to the pulse output CE terminals 16 and 17 must be used (terminals 18 and 19 will give a measure of volume and not heat). As shown in the picture below. The integrator must be connected to the nearest RTU data logger. The contractor is responsible for commissioning the integrator and flow section as well as ensuring the correct data is received by the AMS in the correct channel.

Pulse Rate

The pulse rate should be a minimum of 20 pulses per half an hour at low load and no more than 1 pulse per second at high load. The pulse rate must be specified upon ordering of the meter as this is programmed at the factory.

4.3.6.2 Option 2 M-bus

Each m-bus meter should have an address (this would need to be supplied by the meter supplier/installer when installed) which is needed to configured parameters within the RTU.

As the baud rate of the meter is set as 2400 the RTU will need to be set with a time between read time of 3 minutes.

The firmware of the RTU must be 3.03.03 or later.

The picture below shows the M-Bus module which replaces the pulse counting module which is shown in the above picture.

4.3.7 Meter Identification

See 6 below

4.4 Water Meters

4.4.1 Meter Type

The water meter shall be Multi-jet Type, Woltmann pulse counting.

Supplied by Western Automation, Tel: 02380 641 111.

4.4.2 Meter Installation

Meters shall be easily accessible for meter reading and maintenance purposes. All water shall be connecting into the AMS and should be connected to the nearest RTU. The contractor is responsible for commissioning of the water meter as well as ensuring the correct data is received by the AMS in the correct channel.

4.4.3 Pulse Rate

Depending on the demand shall be programmed to pulse once every 10 to 100 litres. The pulse rate should be a minimum of 20 pulses per half an hour at low load and no more than 1 pulse per second at high load. The pulse rate must be specified upon ordering of the meter as this is programmed at the factory.

4.4.4 Meter Identification

See 6 below

5 AUTOMATIC METERING SYSTEM

5.1 General Description

The University Automatic Metering System (AMS) is an energy and water monitoring and reporting system that primarily records cumulative consumption over each half hour interval.

In addition it is used to record maximum, minimum and average values of, for example, electrical power, temperature, wind speed and fume cupboard sash position.

The AMS is fundamental to much of the University's operation including its Carbon Management Plan, Devolved Charging System, and mandatory and voluntary internal and external reporting requirements.

The front end software is currently supplied by EnergyICT Ltd. The data loggers are supplied by Synapsys Solutions Ltd.

The front end software and all collected meter data, which is stored on an Oracle database, are both held on a virtual server in the Astro House Data Centre which is maintained and operated by the University's ISolutions Department.

All new meters that are required to be connected into the AMS together with any associated data loggers shall be incorporated into this system.

NOTE: Meters shall NOT be connected to the Trend BMS or any other data collection system.

5.2 Types of Data Logger

5.2.1 The University has recently changed to a new type of data logger, detailed below:

5.2.1.1 SIPe M-Logger supplied by Synapsys Solutions Ltd - can be linked to one or more Pulse Acquisition module(s) to enable it to store data from a number of sub meters. The number of channels/sub meters will depend on which version of the SIPe M-logger is installed; each version has the ability to record a different number of total 'data points'. For example, the 25 data point version can connect to three 12-channel pulse acquisition modules, and thus create a total of 25 data points using 12 from the first, 12 from the second and 1 from the third device. There are also 50 and 100 datapoint versions. The logger transfers data every half hour to the oracle database via the TCP/IP network.

5.3 Installations and Programming

5.3.1 Data logger's must be assigned IP address, connected to a data point and connected directly into the mains power via a fuse spur. It shall be specified that the Contractor obtain a static IP address and data point for each data logger from the iSolutions department. Data and power cables to the Data logger's must be clearly labelled in accordance with clause 7 below. Where possible, data loggers must be installed in the same location as the meters.

5.3.2 When installing a SIPe M-logger and pulse acquisition module(s), if not already required, at least 3 or 10% (whichever is the most) pulse inputs must be left available for future meter connections.

5.3.3 When programming data logger's and connecting meters to the data logger onsite,

Synapsys Solutions Ltd Tel 01444 246 128 should be contacted for guidance. When installing data logger's as part of new builds Synapsys Ltd should be commissioned to carry out the programming and connection to the AMS. (See the SIPe M-Logger Quick Start at Appendix C for further information.)

5.3.4 To enable the data logger's to be programmed into the AMS an data logger's schedule (see Appendix A) sheet must be filled in with the following information about the physical data logger's and supplied to the Energy Management Team via metering@soton.ac.uk.

5.3.4.1 IP address,

5.3.4.2 Serial Number of the device,

5.3.4.3 RTU Type,

5.3.4.4 MAC Address,

5.3.4.5 A schedule that, for each meter that is being supplied, is entirely consistent with details shown on Asset Tags on site (refer to briefing document ES/022 latest revision for details of Asset Tag Labelling), on site record drawings, O&Ms and elsewhere and shows:

a. Planon Reference Number as shown on the Asset Tag (code) affixed to the meter.
b. A unique reference number for the meter concerned in the format shown in 6.1.1 below.
c. Data logger Reference number and channel it has been assigned to.
d. Detailed description of equipment and/or area that is supplied from the service being metered.
e. CT Ratio (electricity meters only)
f. Pulse rate (where applicable)

6 METER IDENTIFICATION

6.1 Meter ID System

6.1.1 Identification in AMS

Each meter (whether electricity, heat, gas or water) that is to be connected to the AMS shall be identified within the AMS using a unique reference number in the format given below:

S Bxx-yy Description (Pulse rate or Modbus Value)

Where:

S denotes	Service type (E for electricity, H for heat or cooling, G for gas, W for water)

xx denotes	Planon building number
yy denotes	A unique sequential number (with 01 normally being the primary supply to the building concerned)
Description denotes	A very brief description of the area or item being metered
Pulse rate or Modbus value denotes	In the case of a Modbus meter the unit being measured or in the case of a pulse reading meter the number of pulses per unit being measured

6.1.2 Examples of Meter IDs:

EB0001-03 Chiller supply (kVA)

Would be the Modbus meter maximum demand on the chiller

WB02-01 Main Supply (1 pulse/10l)

Would be the main water meter supplying Building 2 with a pulse rate of 1 pulse for each 10 litres of water supplied.

6.1.3 Existing Buildings and Avoidance of Duplication

Where working in an existing building the project design team shall liaise, via the Liaison Engineers, with the Energy Manager to ascertain the existing meter numbers in order to avoid duplication.

6.2 Meter ID Schedules

The new AMS and Planon identification details shall be recorded using the standard spreadsheet as attached (appendix A).

7 ON SITE IDENTIFICATION AND LABELLING

On site identification and labelling of the entire metering system is key to its robust and accurate use and the following guidance ensures that this will be achieved. Labelling shall be in accordance with the Planon System as defined in clause 7.1 below as well as the subsequent clauses that are specific to the metering system.

7.1 Meter ID in Planon

Each meter, RTU or other data logger and each radio transmitter and receiver shall be identified in Planon as specified in Briefing Document ES/22 Asset Labelling.

7.2 Label Materials

7.2.1 Planon Asset labels shall be free, issued in accordance with the Briefing Document ES/22 Asset Labelling. The following additional labels shall be self-adhesive Dymo 45013 12mm high black font on white background 28 point font and shall be well affixed to cleaned and prepared surfaces.

7.3 Electricity Meters

7.3.1 Labels shall be affixed adjacent to the CT Coils on each metered circuit stating the Meter Identification as specified in clause 6.1.1 above.

7.3.2 Labels shall be fixed on the panel immediately adjacent to the meter face stating:

7.3.2.1 Meter Identification as specified in clause 6.1.1 above.

7.3.2.2 CT ratio of the associated CT Coils.

7.3.2.3 RTU Number and Channel Number that the meter is connected to.

7.3.2.4 In the case of pulse outputs, the pulse ratio of the meter concerned (kWh/pulse)

7.3.2.5 In the case of Modbus meters a statement 'Modbus meter'

7.4 Heat Meters

7.4.1 Labels shall be affixed in a clearly visible position to the flow section of the heat meter stating the Meter Identification as specified in clause 6.1.1 above and the pulse ratio of the flow section (impulses/litre).

7.4.2 Labels shall be affixed to each temperature sensor (flow and return) stating the Meter Identification as specified in clause 6.1.1 above.

7.4.3 Labels shall be affixed to each integrator (calculator) or in an immediately visible location adjacent to each meter stating:

7.4.3.1 Meter Identification as specified in clause 6.1.1 above.

7.4.3.2 RTU Number and Channel Number that the meter is connected

7.4.3.3 In the case of pulse outputs, the pulse ratio of the meter concerned (kWh/pulse)

7.4.3.4 In the case of Modbus meters a statement 'Modbus meter'

7.5 Gas Meters

7.5.1 Labels shall be affixed to each gas meter or in an immediately visible location adjacent to each meter stating:

7.5.1.1 Meter Identification as specified in clause 6.1.1 above.

7.5.1.2 RTU Number and Channel Number that the meter is connected

7.5.1.3 In the case of pulse outputs, the pulse ratio of the meter concerned (m3/pulse)

7.5.1.4 In the case of Modbus meters a statement ‘Modbus meter’

7.5.1.5 ‘Corrector fitted’ or ‘No corrector fitted’ as the case may be.

7.6 Water Meters

7.6.1 Labels shall be affixed to each water meter or in an immediately visible location adjacent to each meter stating:

7.6.1.1 Meter Identification as specified in clause 6.1.1 above.

7.6.1.2 RTU Number and Channel Number that the meter is connected

7.6.1.3 The pulse ratio of the meter concerned (litres/pulse)

APPENDIX A: DATA LOGGER SCHEDULES

Automatic METERING SYSTEM - Logger xx - xx

Data Logger Schedule Pulse Counting

Data Logger Details	IP Address			Type	
	Sub Mask			Database ID	
	Gateway			Date Installed	
	Mac Address			Location	
	Serial No.			Room	

										Meter Details									
Meter No.	Energy	Location	Location Room	Load	Meter	Channel	Channel Type		Manufacturer	Model No.	Pulse Set				Serial No.	Asset Tag No.	Date Inst.	CT Ratio	Meter	Notes
		Building			Subed to;		Digital	Analog			E= KWhr	G= KWhr	H= KWhr	W= ltr				:5	Varified	
(Example building number as on Planon) E B0001-02	E	B0001	LV Sw Rm	Level 1 Small Power	Incomer 1	1	D		EIMeter	Type M	1:1				123456	18012	01/12/2001	150:5A	Dec-01	Meter pulsed, channel verified, data received by metering system
(Example) H B0001-01	H	B0001	Plant Room 123	Building B0001		2	D		Kamstrup	Multical 601			10:1		789102	18013	02/12/2001		Dec-01	Meter pulsed, channel verified, data received by metering system
						1														
						2														
						3														
						4														
						5														
						6														
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						31														
						32														

Awaiting Information

No Sub

Awaiting Connection

Future Connection

APPENDIX B: KAMSTRUP MULTICAL 601 ORDER FORM

(Please Note: This form can be used to order the Multical 602 meter)

Order Form Kamstrup Multical 601

P.O. Number	
Company Name	
Project Name	
Reference	
Delivery Address	
Contact Name: -	
Telephone Number: -	
Delivery Type - Normal/Express	

Sensor Connection	
PT100 2-wire (T1-T2)	A
PT500 4-Wire T1-T2)	B
PT500 2-wire (T1-T2-T3)	C
PT500 4-wire (T1-T2) w/24 v pulse inputs	D

Top Module	
No Module	0
RTC (Real Time Clock)	1
RTC + PQ or Δt-limiter + hourly data logger	3
RTC + data output + hourly data logger	5
RTC + 66-C compatibility + Pulse Outputs (CE & CV)	6
RTC + M-Bus	7
RTC + 2 pulse O/P for energy/volume + hourly data logger	8

MBus required?	Y/N

Power Supply Module	
No Power Supply module	0
D-celle HiCap Lithium Battery	2
230 VAC	7
24 VAC/DC	8

PT 500 Temperature Sensors	
No sensor set	0
Pocket Sensor pair 1.5 m cable	A
Pocket Sensor pair 3.0 m cable	B
Pocket Sensor pair 5.0 m cable	C
Pocket Sensor pair 10 m cable	D
Short Direct Sensors 1.5 m cable	F
Short Direct Sensors 3.0 m cable	G
3 Pocket Sensors in sets with 1.5 m cable	L
3 Short Direct Sensors in sets with 1.5 m cable	Q3

Threaded Ultraflow Meters	
0.6 m^3/h, 110mm x G$^3/_4$B" (R$^1/_2$), 116	CAAA
0.6 m^3/h, 130mm xG1B" (R$^3/_4$) 116	CAAD
1.5 m^3/h, 110mm x G$^3/_4$B" (R$^1/_2$), 119	CDAA
1.5 m^3/h, 165mm x G$^3/_4$B" (R$^1/_2$), 119	CDAC
1.5 m^3/h, 130mm x G1B" (R$^3/_4$), 119	CDAD
1.5 m^3/h, 190mm x G1B" (R$^3/_4$), 119	CDAF
3.0 m^3/h, 190mm x G1B" (R$^3/_4$), 136	CFAF
3.5 m^3/h, 260mm x G1$^1/_4$B" (R1), 151	CGAG
6.0 m^3/h, 260mm x G1$^1/_4$B" (R1), 137	CHAG
10 m^3/h, 300mm x G2B" (R1$^1/_2$), 178	CJAJ

Flanged Ultraflow Meters	
3.0 m^3/h, 190mm x DN20, 136	CFBA
3.5 m^3/h, 260mm x DN25, 151	CGBB
6.0 m^3/h, 260mm x DN25, 137	CHBB
10 m^3/h, 300mm x DN40, 178	CJBD
15m^3/h, 270mm x DN50, 120	CKBE
25 m^3/h, 300mm x DN65, 179	CLBG
40 m^3/h, 300mm x DN80, 158	**CMBH**
60 m^3/h, 360mm x DN100, 170	**FACL**
100 m^3/h, 360mm x DN100, 180	**FBCL**
150 m^3/h, 500mm x DN150, 147	FCCN
250 m^3/h, 500mm x DN150, 181	**FDCN**
400 m^3/h, 500mm x DN150, 191	**FECN**
400 m^3/h, 500mm x DN200, 191	**FECP**
400 m^3/h, 500mm x DN250, 191	**FECR**
600 m^3/h, 500mm x DN200, 192	**FFCP**
600 m^3/h, 600mm x DN250, 192	**FFCR**
1000 m^3/h, 600mm x DN250, 192	**F1CR**

QUANTITY	

Base Module	
No Module	00
Data + pulse inputs	10
MBus + pulse inputs	20
Radio Router + pulse inputs	21
0/4….20mA outputs	23
LonWorks, FTT-10A + pulse inputs	24
Radio + pulse inputs (internal antenna)	25
Radio + pulse inputs (external antenna connection)	26
Require Top Module (67-x) 6	
Telephone modem + pulse inputs + data	03
MBus + pulse inputs	04
MBus + pulse inputs	08
Radio + pulse inputs (internal antenna)	0A
Radio + pulse inputs (external antenna connection)	0B

MBus Start Number ?	

Flow Sensor/Pick-Up Unit	
Supplied with one pcs. Ultraflow	**1**
Supplied with two pcs. (identical) Ultraflow	**2**
Supplied with Kamstrup Pick-Up unit set	**F**
Prepared for one pcs. Ultraflow	**7**
Prepared for two pcs. (identical) Ultraflow	**8**
Prepared for meters with electronic pulse output	**K**
Prepared for meters with Reed switch output	**L**
Prepared for meters with 24 V active pulses	**M**

Meter Type	
Heat Meter MID approved	**2**
Heat Meter Closed system	**4**
Cooling Meter	**5**
Heat/Cooling Meter	**6**
Volume Meter, Hot water	**7**
Volume Meter, Cooling water	**8**
Energy Meter, Open system	**9**

Ultraflow Pulsecable: 2.5m, 5.0m, 10.0m

Steel Pockets: 65mm, 90mm, 140mm

Couplings: Y/N

Nipples: M10-R$^3/_4$, M10-R$^1/_2$, No

Mounting Bracket: Flat, 90°, No

Flow Sensor in: Flow pipe [F], Return Pipe [R]

Measuring Unit, Energy: Gj, kWh, MWh,

Calibration Certificate: Paper, CD, E-mail, No

APPENDIX C: SIPe M-LOGGER QUICK START

POWER SUPPLY

WARNING THE INSTALLATION ENGINEER MUST ENSURE THE SAFETY AND COMPLIANCE OF ALL EQUIPMENT.

Caution Before connecting power, ensure all connections have been verified and the V- (0V) is NOT earthed/grounded.

CONNECTION

TERMINAL	DESCRIPTION
V+	Live power supply terminal
V-	Neutral power supply terminal

SPECIFICATION

Power Input 24VDC ±15V regulated
Power Consumption 300mA@12VDC, 150mA@24VDC

SERIAL COMMUNICATIONS

P1 supports RS232, RS422 and RS485 protocols, as defined by the DIP switches, see ***Hardware Control***.

Note ***P2***, ***P3***, and ***P4*** are obstructed and may only be used under strict instructions. * M-Bus only, ** *P2* only.

CONNECTION

RJ45 PIN NO.		SIGNAL		
		RS232	RS422	RS485
Pin 1	1 (Wh/Or)	DSR**	N/A	N/A
	2 (Or)	RTS	TXD+	Data+ (A)
	3 (Wh/Gr)	GND*	GND	GND
	4 (Bl)	TXD*	TXD-	Data- (B)
	5 (Wh/Bl)	RXD*	RXD+	N/A
	6 (Gr)	DCD**	RXD-	N/A
	7 (Wh/Br)	CTS	N/A	N/A
	8 (Br)	DTR**	N/A	N/A

SPECIFICATION

Serial Port 1 x TTY RS232/RS422/RS485 port via RJ45 connector
Protocol defined in 'Meter Configuration' page

HARDWARE CONTROL

This configures *P1* interface.

SWITCH NO. (SW1)	SIGNAL		
	RS232	RS422	RS485
1 (SW1:P1)	ON	OFF	OFF
2 (SW1:P2)	ON	ON	OFF
3 (SW1:P3)	N/A	N/A	N/A
4 (SW1:P4)	N/A	N/A	N/A

USER INTERFACE

The LED indicates the current status of the product.

LEDS	DESCRIPTION
Power	Current status of 24VDC power
Ready	Current status of boot up process
Ethernet	Detected TCP/IP communications traffic
Serial Ports	Detected Serial communications traffic

ETHERNET COMMUNICATIONS

This provides connection to the IP network.

Remember Use Cat5e RJ45-to-RJ45 'straight-through' cable for Ethernet hub/switch connections, or 'crossover' cable for direct connections to PCs.

CONNECTION

RJ45 PIN NO.		SIGNAL	EIA/TIA 568B
Pin 1	1	Transmit+	White/Orange
	2	Transmit-	Orange
	3	Receive+	White/Green
	4	N/A	Blue
	5	N/A	White/Blue
	6	Receive-	Green
	7	N/A	White/Brown
	8	N/A	Brown

SPECIFICATION

Ethernet Port 1 x 10/100mbps TCP/IP port via RJ45 connector
1.5KV magnetic isolation

HARDWARE EXPANSION

The product is fitted with USB connections. The USB is used to store historical energy data.

USB Port 2 x USB2.0 high speed host ports

Caution Removing the USB will invalidate the storage of historical energy data.

ENVIRONMENTAL SPECIFICATION

Storage Temperature -20 to 80°C (-4 to 176°F), 0 to 90% Relative Humidity
Operating Temperature 0 to 70°C (32 to 158°F), 0 to 90% Relative Humidity

INSTALLATION

Mounted on a DIN Rail (TS35) or directly to the enclosure in an environment that is suitable for IP20 equipment.

WARNING INSTALLATION MUST BE PERFORMED BY A QUALIFIED ENGINEER.

THIS PRODUCT

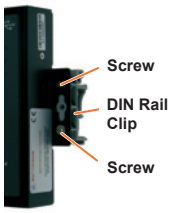
DIMENSIONS	
Height	108mm
Width	102mm
Depth	32mm
Weight (DIN Rail clips inc.)	330g, 410g shipped

WARNING ISOLATE THE POWER SUPPLY TO THE ENCLOSURE BEFORE FITTING THIS UNIT TO PREVENT INJURY AND/OR DAMAGE.

DIN RAIL MOUNTING

1. DIN rail MUST provide good electrical contact with the enclosure.

Note DIN rail clips must be fitted using the screws provided.



2. Position the unit on the top of the DIN rail, and firmly push the bottom until secured in place. This is confirmed by a '**click**'.
3. Ensure clearance to allow the cables to be connected.

DIRECT ENCLOSURE MOUNTING

1. Position and mark the holes in the enclosure.

Note DIN rail clips must be removed.

2. Drill holes in the enclosure.
3. Secure the product to the enclosure using

REGULATIONS

CE Class A, FCC Class A, REACH and, RoHS.

RoHS BANNED SUBSTANCES		MAX. LIMIT (PPM)
Cadmium	(Cd)	100
Lead	(Pb)	10000
Mercury	(Hg)	10000
Hexavalent Chromium	(Cr6+)	10000
Poly Brominate Byphenyls	(PBB)	100
Packing materials: Cadmium, Lead, Mercury, Hexavalent Chromium and its components < 100PPM		100

Dispose of this product and packaging according to WEEE Directive at an appropriate recycling centre. The printed circuit board may be sent to any PCB recovery contractor to recover any metals.

ACCESSORIES

Tip! Please contact the Sales/Service Engineer or Technical Support for information.

PART NO.	DESCRIPTION
PSU/24VDC/1A	24V DC 1A Power Supply
SYN/ESW5	Unmanaged Ethernet switch with 5 x 10/100BaseT(X) ports

Printed: Mar. 2012 in England

synapsys SOLUTIONS LTD
energy controls & integration

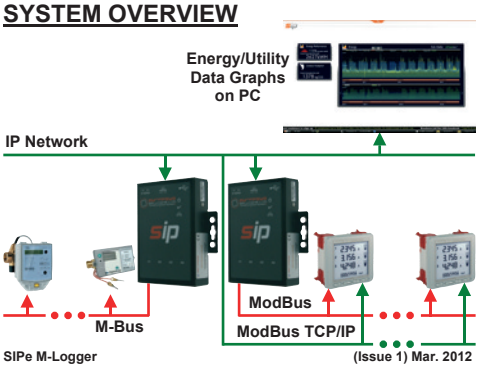
SIPe M-LOGGER

The SIPe M-Logger is one of a range of innovative standalone products available for various applications and protocols. It has been designed as a single point of display, showing real time data, used to identify and target areas of the buildings energy infrastructure that can be improved to reduce energy usage, and utility costs.

- Energy usage graphs
- Energy performance graphs
- Alarm Configuration/Display
- On Demand Data Download
- Scheduled Download to FTP

This product exploits the data capability of ModBus or M-Bus utility meters by retrieving and grouping data as real time energy or utility data points (e.g. Energy (kWh) or Volume (m^3)) and presenting values directly to the data graphs on the internal dashboard.

SYSTEM OVERVIEW



CONNECT TO THE PRODUCT

Connect to this product, using the unique/default IP network settings to view existing energy data graphs, and/or to provide access to the configuration pages.

1. Open a browser and connect to this product.
   - **IP Address (ModBus)** **192.168.1.227**
   - **IP Address (M-Bus)** **192.168.1.66**
   - **Subnet Mask** **255.255.255.0**

Tip! **Requires Adobe Flash Player 10 or later.**

2. Press ' ' to display the '**Login**' page.

Default User name Admin (case-sensitive)
Default Password password (case-sensitive)

3. Click ' ' to show configuration options.
4. Configure the product as necessary, see ***Commission the Networks***.

Remember **This is licence protected. It determines the max. number of registers/points and available 'Datapoints' from a max. number of meters.**

COMMISSION THE NETWORKS

Define the port standards used by meters connected to ***P1*** and this product connected to the IP network.

1. Configure the '**Local IP settings**', for this product on the IP network, as necessary. Click ' ' to show the '**Configuration**' options and press ' '.

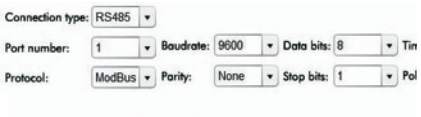
Press '**Network**' and configure the product IP settings, as necessary.

2. Configure the serial network '**Settings**' for the meters connected to ***P1***, as necessary. These are displayed on the '**Meter Config**' page.

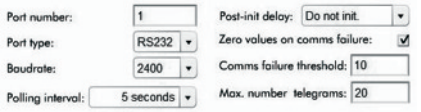
Remember **This must be the same for all meters.**

Click ' ' to show the '**Configuration**' options and press ' '.

3. Configure the serial network connected to ***P1***.
   - Configure ModBus network parameters.



   - Configure M-Bus network parameters.



4. Press '**Send**' to confirm changes.

MAP METER POINTS

Configure the required meter and registers/points (M-Logger typically only raw energy and/or utility data) will be collected by the meters connected to ***P1***.

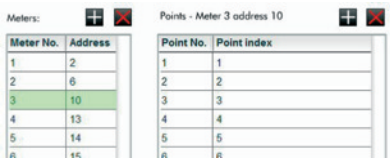
1. Configure the '**Meter points**'. Click ' ' to show the configuration options and press ' '.
2. Add individual meter address (ModBus, ModBus TCP/IP or M-Bus) configuration using ' '.

Tip! **Use ' ' to delete the selected meter configuration. A ModBus meter configuration can be duplicated using ' '.**

3. Add (and configure) registers/points for each meter using ' '.
   - Configure ModBus meters and registers.

Note **Some ModBus registers may require additional 'Scaling' and/or 'Offset' configuration.**

   - Configure M-Bus meters and points.



Tip! **Use 'Copy and paste' to create an M-Bus meter configuration using identical points.**

4. Define the required '**Datapoints**' (see ***Define Datapoints***).

DEFINE DATAPOINTS

Select the existing meter registers/points that provide the raw energy (kWh), gas (m^3), and water (Volume) usage values.

1. Define the '**Datapoints**' required. Click ' ' to show the configuration options and press ' '.
2. Expand '**ModBus point list**' or '**MBus points list**' (as necessary) to show the list of configured registers/points (see ***Map Meter Points***).

3. Select the required meter register/point and press ' ' to add to the '**Data points list**'.
   Press ' ' to remove the selected '**Datapoint**' from the '**Data points list**'.

Note **The 'Data points list' index number provides a reference to the meter register/point in the left hand table.**

Remember **This is licence protected. The max. number of 'Data points' is determined by the licence.**

4. Select the type of graph data (i.e. Energy, Gas, Water, Solar energy, Wind energy, Rain water) recorded by the meter register/point.
5. Change the description '**Label**' for a selected '**Datapoint**' in the '**Data points list**'.
6. Press '**Send**' to confirm changes.
7. Configure the Datapoint '**Groups**' (see ***Configure Groups***).

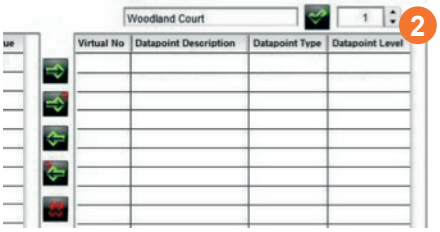
CONFIGURE GROUPS

Group defined '**Datapoints**' to provide energy graphs of an area by grouping individual Datapoints from one or more meters.

1. Click ' ' to show the '**Configuration**' options and press ' '.

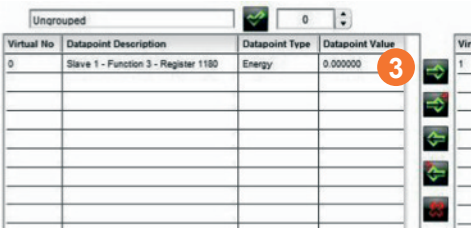
Note **'Ungrouped' Datapoints are automatically assigned to group '0'.**

2. Use ' ' on the right side table to select the '**Group**' number. The left hand table should show the '**Ungrouped**' ('**0**') Datapoints.

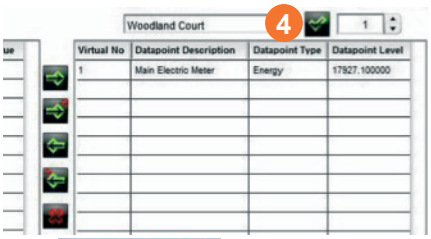


Note **'Datapoints' can be moved and copied between either table.**

3. Select the required '**Datapoint**' and assign to the defined '**Group**'. Press,
   - ' '/' ' to move, or ' '/' ' to copy the selected '**Datapoint**' to the defined '**Group**'.
   - ' ' to remove the selected '**Datapoint**' from the defined '**Group**' and assign to group '0' ('**Ungrouped**').



4. Enter a valid identifier for the selected '**Group**' and press ' ' to confirm. Each '**Group**' appears as an individual energy graph.



5. Click ' ' to show the configuration options and press ' ' to display defined energy data and comparison graphs.