

Domestic Renewable Heat Incentive

Guide to Metering



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www.ofgem.gov.uk/drhi

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Making a positive difference
for energy consumers

Domestic Renewable Heat Incentive

Guide to Metering

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Chapter 1

Introduction

Section 1

About this guide

The DRHI scheme is closing at **midnight at the end of 31 March 2022**. For further information, please see Chapter 1, Section 2 of our [Essential Guide](#) to the Domestic RHI. You may still be required to install metering after scheme closure if we consider that this is needed.

This guide should be read alongside the [Essential Guide](#). It provides additional information for applicants (those seeking to join the scheme) and participants (those already on the scheme) about the different types of metering that may be required for their installation. There is also more detailed technical information provided in the annexes which may be useful for installers.

Not everyone needs to install metering and you should read the Essential Guide first to check if you do. If you only have a solar thermal installation, you don't need to read this document: your installation doesn't need to be metered.

Chapters

The **chapters** are meant to be read by you and your installer. Each one deals with a different type of metering:

- **Chapter 2** covers installing metering for performance (to find out if you need to install metering for performance, see Chapter 2, Section 8 of the Essential Guide)
- **Chapter 3** covers installing metering for payment (to find out if you need to install metering for payment, see Chapter 2, Section 10 of the Essential Guide)
- **Chapter 4** covers Metering and Monitoring Service Packages (MMSP). Introductory information about MMSP can be found in Chapter 2, Section 11 of the Essential guide.

Annexes

The **annexes** are mainly for your installer. They cover technical requirements for different types of meters, eligible meter arrangements and various schematics.

Our website hosts further non-essential information for your interest which will be linked throughout this guide.

There are help sheets for certain tasks, such as making a Domestic RHI application online or advice on whether you need metering. They are linked to throughout this guide.

Chapter 2

Metering for Performance

Section 1

Installing metering for performance

This chapter only applies to heat pumps. If you're installing biomass or solar thermal, you don't need to fit your installation with metering for performance.

In Chapter 2, Section 8 of the [Essential Guide](#), we introduce metering for performance, which is required for all heat pump installations accredited from 22 May 2018. If your installation needs to be metered for performance, it must be in place **before** you submit your application to the Domestic RHI. Metering for performance does not affect how you are paid.

Meter installation

All electrical input to the system that may influence the heat output needs to be metered. When metering for performance is fitted, it's important that it records and displays:

- electricity used by the plant to generate heat
- electrical input into any supplementary electric heater controlled by the same control system as the heat pump, and
- electrical input into any immersion heater for a domestic hot water cylinder where the immersion heater is controlled by the same control system as the heat pump

If there are multiple supplementary or immersion heaters controlled by the same control system as the heat pump, it may be that a single meter can be installed to record the total combined electrical input. However, metering input to each heater separately could help monitor the efficiency of the heat pump and identify if there is an issue with an individual immersion heater/supplementary heater.

See Annex 3 for example schematics that comply with the metering for performance requirements.

Also make sure that the metering installed is:

- fitted by an installer certified to the Microgeneration Certification Scheme (MCS). This could be the person who installed your heating system, or someone different. If you choose someone different, they must be MCS-certified to install the type of heating system that you have.
- compliant with our relevant technical requirements. These are listed for installers in Annex 1 – meter requirements.

Make sure your installer makes you aware of what electricity supply is metered, and properly labels the meters, as you will be asked about this at application.

If you have a heat pump installation which is metered for payment and also needs separate metering for performance, make sure your installer has specified and labelled which meters you must use to submit readings. These will be listed in the Installer Metering Questions they will give you.

Metering types

There are three different types of metering that can be installed to comply with the metering for performance requirements:

- **Standalone electricity meter(s)** which is not contained in your heat pump and can be fitted to an electricity circuit separately. It is likely the electricity meter will have to be purchased in addition to the heat pump and be installed alongside it. This will mean that your electricity meter will measure the electricity consumption of your heat pump accurately in isolation from other devices in your home.
- **On-board electricity meter(s)** contained in your heat pump and is likely to be purchased with it. Some heat pumps have built-in meters and monitoring devices. These are also known as 'on-board meters'. An on-board electricity meter is part of the plant and purchased with your heat pump, rather than separately as a standalone electricity meter. This means you don't have to install the meter separately.
- **Metering and Monitoring Service Package (MMSP)** which is a set of meters you can install to collect data about your installation. MMSPs are exclusive to the Domestic RHI and participants who have them receive extra payments.

For full information on Metering and Monitoring Service Packages, see [Chapter 4](#) of this guide.

Note: Details of the installation's metering for performance status needs to

Chapter 3

Metering for payment

Section 1

Installing metering for payment

Introduction

In Chapter 2, Section 10 of the [Essential Guide](#), we introduce metering for payment and list the circumstances under which it is required. Please refer to this guide to check if you need metering for payment.

If your installation needs to be metered for payment, this chapter details what you and your installer need to do before you apply to the scheme. There are some circumstances where you may be required to install metering for payment even after you join the scheme.

Please refer to Section 3, Chapter 2 of the [Essential Guide](#) for further information about heat uses which are eligible for payment under the DRHI (Domestic Hot water (DHW) and Space heating).

Meter installation

When metering for payment is fitted, it's important that:

- It is only fitted by an installer certified to the Microgeneration Certification Scheme (MCS). This could be the person who installed your heating system, or someone different. If you choose someone different, they must be MCS-certified to install the type of heating system that you have.
- It is compliant with our technical requirements. These are listed for installers in Annex 1 – meter requirements.
- It is fitted as an 'eligible metering arrangement'. This means that the meters are in a configuration that ensures the heat generated by your installation is properly recorded. This depends on the setup of your property's heating system and is detailed in Annex 2 – Metering for payment.
- It is accompanied by the documentation and support from your installer listed in the next section.

Your installer should confirm that they are responsible for ensuring the above requirements are met. They are your first point of contact if you have any problems with your meters.

Please note that onboard metering (see 'Metering types' in Chapter 2 Metering for performance) is not sufficient for metering for payment purposes. For metering for payment, you will require a standalone electricity meter.

Section 2

What to expect from your installer

Once meters have been installed, you should make sure your installer:

- **Hands you a completed and signed copy of the 'Installer Metering Questions' (IMQs).** This is essential as you'll need its answers to complete the metering questions in your application. You can download the document from our website and ask your installer to complete it. There are different versions for heat pumps and biomass installations:
 - [Heat pump installer metering questions](#)
 - [Biomass installer metering questions](#)
- **Labels all your meters** and shows you what each label refers to. Frequently used abbreviations are:
 - HM for a heat meter
 - EM for an electricity meter
 - GM for a gas meter
 - OM for an oil meter

In some cases, the installer may also have written a number next to the reference letters because there is more than one of that type of meter (e.g., HM1, HM2 etc).

- **Gives you the initial meter reading for each meter** once the installation has been commissioned. Make sure they write them into the Installer Metering Questions (IMQs) document. There are different versions for biomass boilers and heat pumps. Without this reading we can't start paying you.
- **Demonstrates how to read the meters** so that you know how to take future readings and informs you when you should do this.
- **Has told you what units your meter is showing.** Your heat and electricity meters should be in kilowatt hours (kWh), megawatt hours (MWh), or a combination of both. Any gas and oil meters should be in m³ or litres.
- **Has told you if your installation requires an 'Alternative Metering Arrangement'.** If it does, you'll need to download our template and make sure they complete and return it to you (you'll need it for your application). There are different versions for biomass boilers or heat pumps (see below).
 - [Heat pump alternative metering arrangement template](#)
 - [Biomass alternative metering arrangement template](#)

It has to include a simple schematic showing the meter placement and a description of why the heat output from your heating system cannot be metered alone. For more detail see Annex 2 Section 2 – Alternative metering arrangements.

- **Provides you with a handover pack** containing:
 - a process to follow to check that the meter is operating correctly
 - any maintenance or calibration requirements
 - instructions on how to use the meters and take readings

In addition, we recommend you ask your installer to confirm in writing that the installation and meters they're installing are intended to be eligible for the Domestic RHI.

Section 3

When you're ready to apply

If your installation is metered for payment, you'll need to answer additional questions when you apply to the scheme. You'll be asked these if:

- **You declare that your heating system needs to be metered for payment**
- **You confirm that the property has been occupied for less than 183 days in the 12 months before the application is submitted** (this does not apply if it is an 'eligible new-build' property which is occupied once the plant is commissioned). For more information, see Chapter 2, Section 10 of the Essential Guide)
- **The MCS certificate number you submit triggers the questions**, based on the answers your installer gave when registering your heating system on the MCS database.

To answer the questions, use the Installer Metering Questions (IMQs) document that your installer signed and gave you (you'll probably find it in your handover pack). Copy the answers into the application metering questions – the questions will be identical.

You must complete the section on metering questions when you apply.

Section 4

Submitting your meter readings

MyRHI

Every participant has an account with us where they can view the details of their accreditation and provide us with information if the need to. This is on our online portal called 'MyRHI'.

For help on how to use MyRHI, see our [Helpsheet: Guide to MyRHI](#).

[Access MyRHI here](#)

How to submit meter readings

If your heating system is accredited to the scheme, you'll be able to sign in to the MyRHI portal of the Domestic RHI website to submit your meter readings every three months (except for alternative arrangements, as detailed in Annex 2, Section 2). Submitting a meter reading will enable us to calculate the payment owed to you for the previous three months.

[See our Helpsheet: How to submit a meter reading](#)

You'll be presented with separate text boxes for each of your meters. The system knows how many meters you have and their type based on the answers on your application form. It also records your previous meter readings, so you can check whether the new readings seem reasonable. The system will alert you if they appear incorrect.

When to submit meter readings

The first meter reading(s) you submit as part of your application provides us with a baseline figure to make your first payment. You must take this baseline reading at application and can do it up to two weeks before the date you apply.

You have to take and submit readings every three months within a specific timeframe. This will be a four-week period, from one week before the meter reading date and up to three weeks after. The exact dates depend on when you're accepted to join the scheme. These meter reading dates are confirmed at the point of approval.

You'll need to submit meter readings every three months for the seven years your installation is accredited to the scheme. You'll receive an email reminder one week before your window opens, and subsequent reminders if you haven't sent your readings.

Missed meter readings

If you forget to submit a meter reading or are unable to do so for any reason, then you'll have to submit the readings at your next opportunity three months later. Once you do this, you'll be paid for the previous six months in one payment.

Payments

We'll use your answers to the Installer Metering Questions on the online application form to create a formula. This formula works out the heat your installation generates, and you can see it in your 'statement of eligibility' once you've answered the questions on the application form.

$$\text{Renewable Heat Payment} = (((\text{HM1}) * 0.97) - (\text{EM1})) * 10.92\text{p}$$

- **HM1** : the meter reading displayed on the heat meter labelled 'HM1'.
- **0.97** : this is a multiplier factor to be applied to the renewable heat output figure to account for the fact that the air source heat pump uses a defrost mechanism that uses re-circulated heated air (with no other heat contribution) from the property.
- **EM1** : the meter reading displayed on the electricity meter labelled 'EM1'.
- **10.92p per kWh** : the air source heat pump tariff

An example payment formula as it would be presented in your 'statement of eligibility'. Please note that this formula is for an air source heat pump with 1 heat meter, 1 electricity meter, and a set tariff rate of 10.92 pence per kWh. Formulas vary according to technology type, the number of meters fitted and the date on which the installation was accredited.

When you submit meter readings to us, we put them into the formula to calculate heat generation, multiply it by the tariff rate applicable to your installation and then pay you.

We only pay for the heat uses that your installation provides heat for (e.g., space heating and/or domestic hot water). Your annual payments will be capped by the heat demand of those uses on your EPC or the heat demand limit– whichever is lower. For more information see Annex 3 and 4 of the [Essential Guide](#).

Section 5

Broken meters

If one of your meters is not in good working order, and this will stop you from taking or submitting your next set of readings, you must tell us within 28 days of you discovering the fault.

What to do

If a meter is not in good working order, let us know but don't submit any readings (including from other meters you may have) until it's been repaired or replaced by an MCS-certified installer.

If you discover that a meter is not in good working order, email us at DomesticRHI@ofgem.gov.uk and we'll inform you of the next steps you must take (including any evidence we may require).

Once the meter has been fixed or replaced, email us the readings from all your meters. We'll then reset your readings.

If a meter needs to be replaced

If the broken meter can't be fixed and needs to be replaced (or if just one component of a heat meter needs replacing, such as the pair of temperature sensors or a flow meter), you'll need to submit the details of this new meter to us.

It's your responsibility to keep the meters in good working order. If you fail to do so or fail to notify us within 28 days of discovering that it is not in good working order, then we'll treat this as non-compliance under the scheme rules, which could lead to the suspension, loss of your payments or revocation of your accreditation.

Chapter 4

Metering and Monitoring Service Packages (MMSP)

Section 1

About MMSP

The scheme is closing to new MMSP registration applications at **midnight at the end of 31 March 2022**. All applications must be submitted by this deadline.

This chapter is about optional Metering and Monitoring Service Packages (MMSPs) available on the Domestic Renewable Heat Incentive (RHI). An **MMSP** is separate to **metering for performance** and **metering for payment** (which are covered in Chapters 2 and 3), however it may also be used to meet those requirements if they apply to your installation.

Unlike the other types of metering, MMSP is a voluntary meter installation. They are exclusive to the Domestic RHI and participants who install MMSP receive extra payments if they allow the government access to the data they collect. This data is used to gain valuable insights into the performance of renewable installations and to aid in future policy design.

You can fit MMSP and apply for registration at any point during your participation in the scheme, but it is normally easiest to do when your installer is commissioning the installation and you're applying for accreditation.

After scheme closure, you will be able to change MMSP installer if your current installer has gone out of business so long as you let us know within 28 days from the date in which you became aware that they have ceased trading. An MMSP installer may also assign all their rights and obligations under the MMSP agreement to another installer, but only after obtaining consent from you first. If the ownership of the installation changes, either the new or previous owner must let the installer know so that your MMSP registration can be transferred.

At its simplest

MMSPs are packages of meters that help you monitor your installation's performance. They provide information to show your installation is working as efficiently as you expected, and to flag any performance issues.

The package includes (as a minimum) high specification heat meters, electricity meters and temperature sensors. These must record data at least every two minutes, and update data at least once a month. You can see the figures and analysis when you log on to a dedicated website or Application on a hand-held device, such as a smartphone or tablet (the data-viewing platform). Your installer will also be able to see the data, so they can help identify any problems with how your heating system is running.

Who are they for?

MMSPs are only available to applicants or participants who have a:

- heat pump, or
- biomass boiler designed and installed to burn only wood pellets

MMSP meters may meet the requirements of metering for payment if your installation needs it (see Chapter 2, Section 10 of the essential guide), but readings may not need to be submitted for all of them. The Installer Metering Questions (IMQs) should identify which MMSP meters are also used for metering for payment.

The process

1. **The MMSP must be installed by an Microgeneration Certification Scheme (MCS) certified installer.** You don't need to understand the detailed technical and accuracy requirements but be sure to check that your installer is aware of them. Your installer will confirm your package meets these requirements in your MMSP agreement.
2. **There must be a signed agreement between you and your installer** that meets specific requirements. The agreement must contain certain clauses and state that they'll provide a continuing advice service. We have worked with the Renewable Energy Consumer Code (RECC) to provide a [model agreement](#).
3. **You must then submit an MMSP registration application to us** including the signed agreement and a screenshot of the Energy Consumption information taken from either the dedicated website or App. For support with taking a

screenshot, see Section 7. We may request information to ensure all of the requirements are met, you will have 12 weeks to provide us with this.

4. **We will process the application.** If we approve it and register the MMSP, you will receive payments every three months along with your normal payments for renewable heat generation.

Section 2

Payments

If your MMSP is registered, to cover some of the costs of installing the MMSP you will receive 'MMSP payments' in addition to the payments you normally receive for the renewable heat your installation generates. If you comply with the rules (listed in Section 5 and 6 of this chapter) these payments will last until the installation's accreditation to the scheme ends.

If your MMSP was registered **before** 22 May 2018, you receive:

- £57.50 every three months for heat pumps
- £50 every three months for biomass boilers

If your MMSP is registered **on or after** 22 May 2018, you receive:

- an initial payment of £805 and £28.75 every three months for heat pumps
- an initial payment of £700 and £25 every three months for biomass boilers

If you apply for MMSP registration alongside your Domestic RHI application, you will get the maximum of up to seven years of MMSP payments (this is how long accreditation lasts). If you apply for the MMSP afterwards, you will only get payments for the remainder of the seven years.

If your MMSP agreement comes to an end or it is terminated, or we withdraw registration, MMSP payments would stop earlier. For the payments to continue, your MMSP must operate continually over this time and the dedicated website (data platform) must continue to display the necessary information.

You can receive payments for the renewable heat your installation generates by either deemed or metering for payment calculations (see Chapter 2, Section 12 of the Essential Guide). This doesn't affect how you receive MMSP payments.

Section 3

Applying for MMSP registration

If you want to register an MMSP at the same time as you apply for Domestic RHI accreditation, select 'yes' when the application form asks: 'Do you have a Metering and Monitoring Service Package (MMSP)?'. Registration applications must be completed prior to scheme closure, at midnight at the end of 31 March 2022.

To register an MMSP after your installation is accredited, you'll need to make your registration application via [MyRHI](#).

In both routes you'll be presented with MMSP-specific questions such as:

- The name, email and telephone number of the package provider
- The package provider's reference number
- The date the MMSP was installed

Once the application to register has been made, we will also get in touch with you to request further information. For example, we may get in touch with you to request for a screenshot of the Energy Consumption information taken from either the dedicated website or App (see Section 7 in this chapter for support).

For either route, share a copy of your completed and signed MMSP agreement (from your MCS-certified MMSP installer) with us. You can do this by:

- Uploading it to MyRHI
- Emailing it to: DomesticRHI@ofgem.gov.uk

Without it, we'll be unable to consider your registration application for your MMSP. We may also request further information if we consider that this is required. If you don't supply the information requested within 12 weeks, your application may be rejected.

Section 4

After registration

Check your data

It's good practice to regularly check the data recorded by your MMSP, especially just after your new heating system has been installed. It will help you spot teething problems and optimise your setup. Your installer should be there to help you.

If you find your data is no longer being recorded, or there's a visible problem with the equipment, you should contact your MMSP installer and Ofgem. Your installer should be able to explain any issues with your data and how your heating system is performing.

In each year, your data-viewing platform must record at least 75% of the information that was possible. If it's not doing that, we might have to stop your payments, so if you're missing data, you should contact your MMSP installer.

Keeping us informed

After your MMSP is registered, you must let us know if:

- There's any change to your signed agreement with the installer.
- any of the people who signed the agreement change (e.g. you or the installer).
- the agreement comes to an end or is terminated.

If you discover that your installer has gone out of business, you can enter into an agreement with a different installer. You must do this within 28 days and let us know.

Annual declarations

When you've registered an MMSP, as part of your annual declarations for the Domestic RHI scheme, we'll ask you to confirm it's still working and that the service contract agreed with your installer is still in place.

For more information on annual declarations, see Chapter 3, Section 6 of the Essential Guide.

Audits

As part of our audit programme, we may ask for evidence that the package is still working, such as a print-out of your data. We may also perform a site audit when we receive your agreement before registering your MMSP.

What happens with my MMSP performance data?

You must provide access to us for any MMSP data collected prior to scheme closure if we request it. BEIS use this data to inform future research and policy development.

If we, another organisation chosen by BEIS, or BEIS request:

- access to any data collected following scheme closure as a part of the Metering and Monitoring Service Package (MMSP),
- information relating to the MMSP agreement, or
- anything else done under this agreement

you'll have 28 days to comply with the request in the manner and form required. The data you provide will be treated in accordance with the Data Protection Act 2018 and the UK General Data Protection Regulation (UK GDPR) 2018.

Failure to respond to the request, or to provide the information, may lead to your MMSP registration being withdrawn.

Section 5

Technical and contract requirements

Your installer must install your MMSP according to the technical requirements set out in [Schedule 7 of the Domestic RHI regulations](#). This includes the installation of certain meters and sensors that meets high accuracy requirements (detailed in Annex 4 of this guide).

The agreement between you and the installer must also include certain clauses which are set out in the Domestic RHI regulations. We recommend the [model agreement](#), hosted by the [Renewable Energy Consumer Code \(RECC\)](#), is used.

Section 6

Taking a screenshot

What should be in the screenshot?

1. Log into the dedicated website or mobile application connected to the MMSP installation
2. Navigate to the Energy Consumption page/section
3. Scroll to the graph/ pie chart that shows energy consumption
4. Take screenshot

How to take a screenshot on a tablet or phone

The method varies slightly from one model to the next, however, the following method should work on most Android phones running Android.

1. Press the Power button and Volume down key at the same time.
2. Hold them down until you hear an audible click, or a screenshot sound.
3. You will get a notification that your screenshot was captured, and that you can share or delete it.
4. By default, your screenshots are saved in your Photos or Gallery app in a separate Screenshots folder.

For help on how to capture a screenshot on your iOS device please follow the steps on <https://support.apple.com/en-us/HT200289>

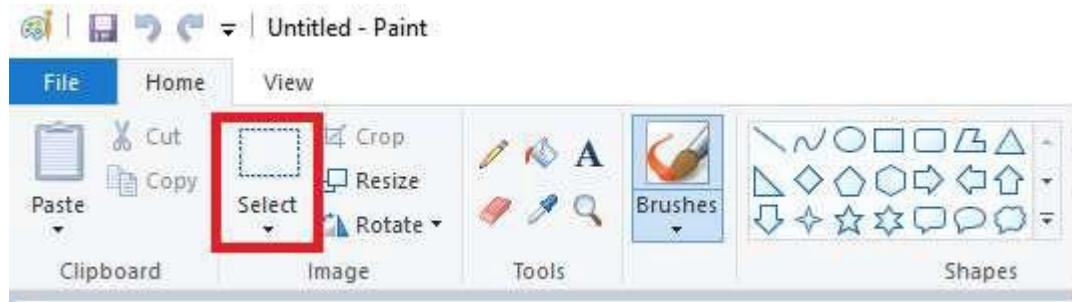
For other android devices the following may be helpful:

<https://support.google.com/android/answer/9075928?hl=en-GB>

How do I take a screenshot on my PC?

1. Press the Alt and Print Screen buttons. The Print Screen button may appear as "PrtScn". This will take a screenshot window you're currently using. Your screenshot has been saved to the 'clipboard'. Make sure you follow the next steps before doing anything else.

2. Open Microsoft Paint (the programme on your computer) and press the Ctrl and V buttons together. This will paste your screenshot from the clipboard.
3. Press the button that says Select. Use this to draw an outline around the part of the screenshot you'd like to keep.



When done, click the button that says 'Crop' next to it. This will crop out everything you don't want from the original picture.

4. Save the document to a folder of your choice.

Chapter 5

More information

Contacts

Further guidance

Aside from this Guide to metering, you may find it useful to consult the following two other guides for further information:

- [Essential Guide](#)
- [Guide to Assignment of Rights](#)

All non-essential scheme information can be found on our website in the [Key Terms](#) webpage.

Contacts and complaints

If you have a question, complaint or recommendation you can find the right contact on our website page [here](#).

If you need help with a Domestic RHI application, you can email us at DomesticRHI@ofgem.gov.uk.

If you have difficulty accessing the internet, you can phone us on 0300 003 0744 or contact us by post at:

Commonwealth House
32 Albion Street
Glasgow
G1 1LH.

Annexes

Annex 1 - Meter requirements

All meters installed under the Domestic RHI must meet certain criteria which are detailed in the following sections.

Section 1

Heat meters

All heat meters must comply with the following accuracy requirements:

- relevant requirements set out in Annex I to the 2014 EU Measuring Instruments Directive (MID)
- the specific requirements listed in Annex VI of the MID
- be of accuracy Class 3 or better as defined in Annex VI of the MID*
- be installed by a competent, suitably qualified and registered person in accordance with industry standards and manufacturer's instructions, including with respect to safety requirements.

All heat meters must also include:

- a flow sensor
- a matched pair of temperature sensors
- a digital calculator

*Although the Domestic RHI Regulations specify that all heat meters must be of Class 3 accuracy or better, it should be noted that 'the better' option is preferable. Class 2 heat meters are likely to last longer than Class 3 heat meters which may need to be replaced after 5 years; it may be more cost-effective for the customer to pay more for a Class 2 meter.

Heat meter installation advice

The following areas are highlighted as having a significant impact on meter readings and as such we would recommend particular attention is given at installation:

- correct installation of temperature sensors, including appropriate mounting to ensure good thermal contact with the thermal transfer fluid, appropriate insulation and sensor cables to be run independently of power cables to limit interference. Sensor cable lengths should be compliant with manufacturer's guidance and must not be shortened or extended under any circumstances. Where sensor pockets are used then the manufacturer's thermal transfer compound shall be used if specified
- appropriate selection of heat meters (including consideration of the meter manufacturer's limit of operating temperature difference and sizing of the meter to suit the heating system's flow rate and pressure drop)
- caution when fitting meters on the suction side of pumps. This should only be carried out in a manner that is compliant with heat meter manufacturer's instructions
- wiring of the heat meter calculator
- placement of heat meters so that the meter display is visible to the customer and easy to read

Heat meters can either be 'packaged' or 'non-packaged'. Our definition of a 'packaged' unit is a heat meter that was bought as a complete unit from one manufacturer. Our definition of a 'non-packaged' unit is a heat meter that is bespoke because it is made up of separate components each potentially developed by different manufacturers.

Section 2

Electricity Meters

All electricity meters must comply with the following accuracy requirements:

- the relevant requirements set out in Annex I to the 2014 EU Measuring Instruments Directive (MID)
- the specific requirements listed in Annex V of the MID
- be of accuracy Class A or better as defined in Annex V of the MID; meters marked Class 1 or 2 are not compliant
- be installed by a competent, suitably qualified and registered person in accordance with industry standards and manufacturer's instructions, including with respect to safety requirements.

On-board electricity meters do not need to comply with these requirements (please see Chapter 2, Section 1, 'Metering types').

Section 3

Gas Meters

All gas meters must comply with the following accuracy requirements:

- the relevant requirements set out in Annex I to the 2014 EU Measuring Instruments Directive (MID)
- the specific requirements listed in Annex IV of the MID
- be of accuracy Class 1.5 or better as defined in Annex MI-IV of the MID
- be installed by a competent, suitably qualified and registered person in accordance with the requirements of the Gas Safety (Installation and Use)

Regulations 1998, industry standards and manufacturers' instructions, particularly with respect to safety requirements

Solid fuel energy outputs:

See note on Section 6.2, Page 17 of the [MCS Domestic RHI Metering Guidance](#).

Section 4

Other requirements

Calibration

Suitably calibrated meters must be chosen for the type of heating system being installed. For example, if the heating system uses glycol rather than water as the heat circulating medium then any meters chosen should be calibrated accordingly.

It may be preferable to select meters that don't need to be re-calibrated during the seven-year payment period of the Domestic RHI. If meters are selected that need re-calibrating, the participant should be made aware when it must be done. It's important to be aware that if meters are found to not be properly calibrated, we would treat this as a non-compliance which could lead to enforcement action.

Properly installing meters

All heat meters must be properly installed and in good working order. To ensure this, installers should follow the [MCS Domestic RHI Metering Guidance](#). In most situations we would expect installers to install meters in line with manufacturer's instructions.

When conducting site audits, we have found instances of:

- meters installed too close to bends
- meters installed too close to valves
- flow meters wrongly orientated
- flow meters installed in the flow pipe rather than the return pipe

- temperature sensors not installed to enable good thermal contact with the thermal transfer fluid (note: standard components should be used – installers may not fabricate their own)

This can affect the accuracy of meter readings which may result in a non-compliance and suspension of payments to the customer.

Labelling

When meters are installed, installers should place clear labels (sticky labels or permanent marker) next to or on all of them. These should indicate the meter type and number. For example:

- 'HM1' for a heat meter ('HM2' for a second heat meter etc)
- 'EM1' for an electricity meter ('EM2' for a second electricity meter etc)
- 'GM1' for a gas meter ('GM2' for a second gas meter etc)
- 'OM1' for an oil meter ('OM2' for a second oil meter etc)

Meter seals

We recommend all heat meters are appropriately sealed. This is useful for the installer and helpful for us if we decide to carry out any audits to detect any post installation tampering.

Meter display

Meters should be selected to read:

- heat meters: kWh
- electricity meters: kWh
- gas meters: m³ or litres
- oil meters: m³ or litres

Annex 2 - Metering for payment

Section 1

Standard metering

The following standard metering arrangements should be suitable for most installations. Refer to Section 2 'Alternative metering arrangements' in this Annex for a list of scenarios in which more complicated arrangements may be needed.

Standard metering for heat pumps

Where a heat pump installation needs to be metered for payment, and 'standard' metering can be used, a minimum of both one heat meter and one electricity meter should be installed, so that the eligible renewable heat output from the Domestic RHI heat pump alone is measured. We subtract the electricity used from the heat generated in order to calculate the amount of eligible heat produced. This is known as 'standard' metering, which should be suitable for most installations. If it's not, please refer to Section 2: Alternative metering arrangements in this Annex.

The number of heat meters required will depend upon the number of heating circuits that the heat pump is feeding, and whether meters can be installed directly as flow and return pipes enter/exit the unit. If this isn't possible due to physical constraints, they may have to be installed after the pipework diverges.

Installers need to ensure that all electrical input to the system that may influence the heat output is metered. The number of electricity meters required will depend on whether the electricity supplying the heat pump uses one connection for all necessary components, or whether two or more connections are required.

This will always, as a minimum, supply the compressor but may also supply one or more of any internal or external supplementary heater(s), an immersion heater(s), any circulation pump(s), a ground loop circulation pump (for ground source heat pumps) or an evaporator fan (for air source heat pumps). Installers must make sure they are aware of what the electricity supply is feeding, as the customer will be asked this in their application.

Standard metering for biomass boilers or stoves

Where a biomass installation needs to be metered for payment, and 'standard' metering can be used, a minimum of one heat meter should be installed as close to the biomass boiler heat output (flow and return pipes) as possible, depending upon the number of heating circuits exiting or entering the biomass boiler.

These meters should be installed to enable the eligible renewable heat output from the Domestic RHI system alone to be measured.

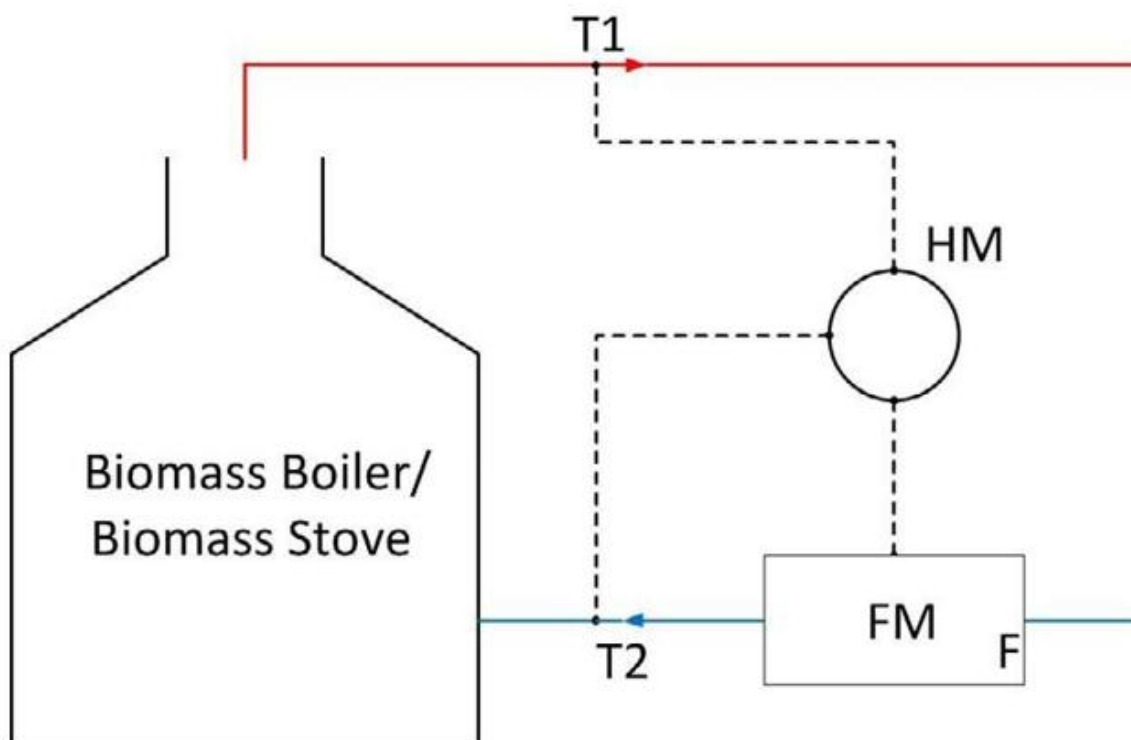
The number of heat meters required will depend upon the number of heating circuits that the system is feeding; and whether meters can be installed directly as flow and return pipes exit/enter the biomass installation. If this is not possible due to physical constraints, meters may have to be installed after the pipework diverges.

Biomass systems that use electricity, gas or oil purely for ignition purposes can ignore the additional fuel input, as it does not need to be accounted for in the metered eligible renewable heat output.

Example schematics

The number of meters and complexity of the arrangement will vary from one installation to another. See Annex C of the [MCS Domestic RHI Metering Guidance](#) for examples of meter installation locations the following example schematics for some of the most commonly anticipated metering scenarios. Please note, they are simplified. Please refer to Section 3, Chapter 2 of the Essential Guide for further information for heat uses (for Domestic Hot water (DHW) and Space heating) which are eligible for payment under the DRHI.

Example 1: Biomass installation using 1x heat meter



Space heating only or space heating and domestic hot water (pipework is likely to diverge to supply different heating loops and/or a DHW loop after this point).

Note: this is a biomass system which may be supplying hot water to multiple heating loops (i.e., the pipes might diverge after the heat meter). It may not always be possible to install a x1 heat meter before the pipes diverge and therefore multiple meters may be required.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

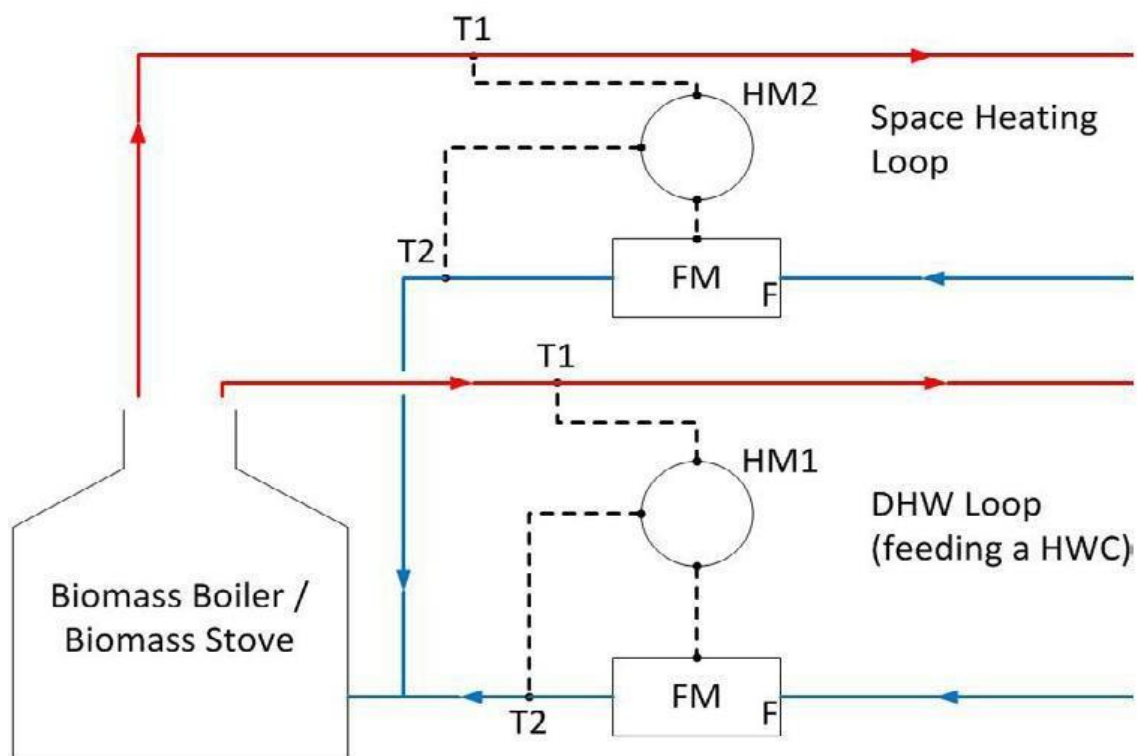
FM = Flow Meter

HM = Heat Meter Digital Calculator

Metering Payment Formulae

Renewable Heat Payment = Tariff x HM1

Example 2: Biomass installation using 2x heat meters



Note: This is a 3-pipe biomass installation using x2 flow pipes and x1 common return. It requires the installation of x2 heat meters.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

HM = Heat Meter Digital Calculator

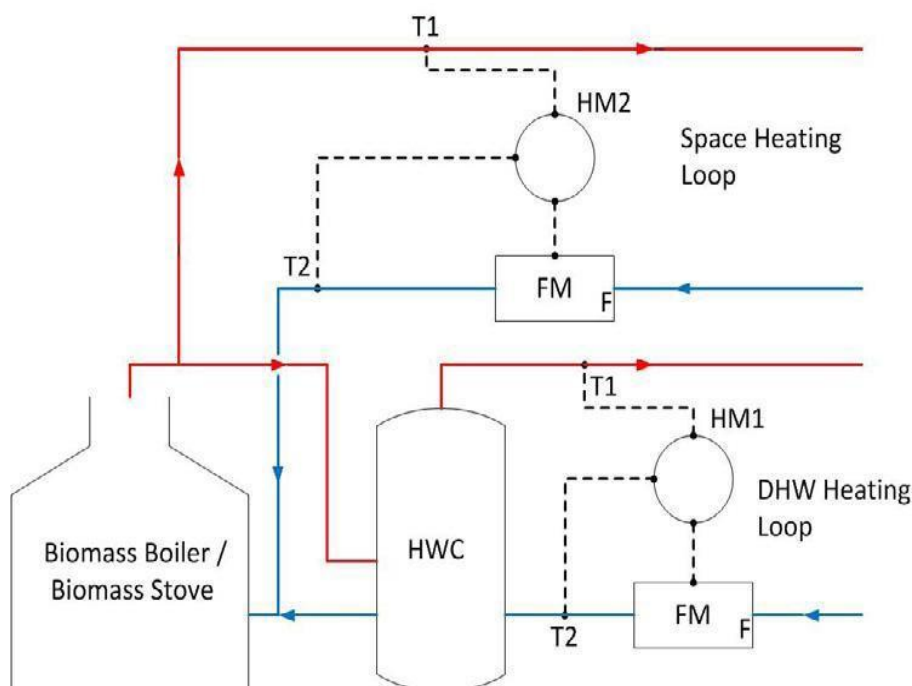
HWC = Hot Water Cylinder

DHW=Domestic Hot water

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times (\text{HM1} + \text{HM2})$$

Example 3: Biomass installation using 2x heat meters



Note: This 2-pipe biomass installation uses x1 flow pipe and x1 return pipe. The pipes diverge after they exit the boiler to feed a space heating loop and a domestic hot water loop. Due to physical/space constraints 1 heat meter alone cannot be installed before the domestic hot water cylinder and as such must be installed just after. In this example, the cylinder does not use any sort of additional heating source (i.e., an electric immersion or is a twin coil) and therefore this is a standard metering arrangement. If it did use an additional heating source the installer should follow the alternative metering arrangements requirements (see the diagram in Example 9 in Section 2 of this Annex).

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

HM = Heat Meter Digital Calculator

HWC = Hot Water Cylinder

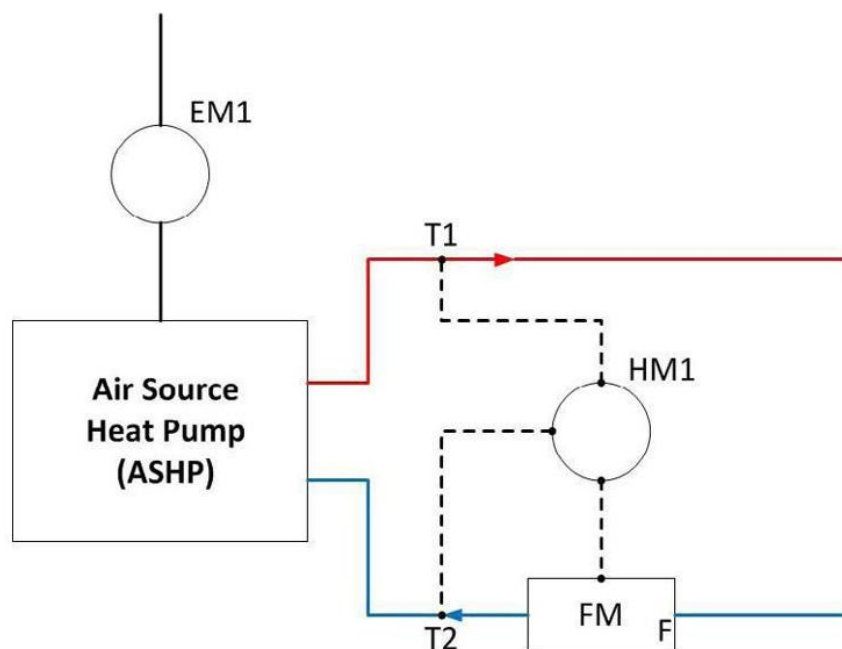
DHW= Domestic Hot water

HWC=Hot Water Cylinder

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times [(\text{HM1} \times 1.43) + \text{HM2}]$$

Example 4: Air source heat pump unit using 1x heat meter & 1x electricity meter



Space heating loop(s) or space heating and Domestic Hot Water (DHW) loops (NB: If feeding a DHW loop it will most likely be supplying a Hot Water Cylinder).

NOTE: The pipes may diverge after they exit the ASHP to feed one (or multiple) space heating loops or a combination of space heating and domestic hot water heating loops. A minimum of one electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input (e.g., for hot water boosting, evaporator fans etc.) that has gone into the generated heat output. Potentially more than one electricity meter may be required.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

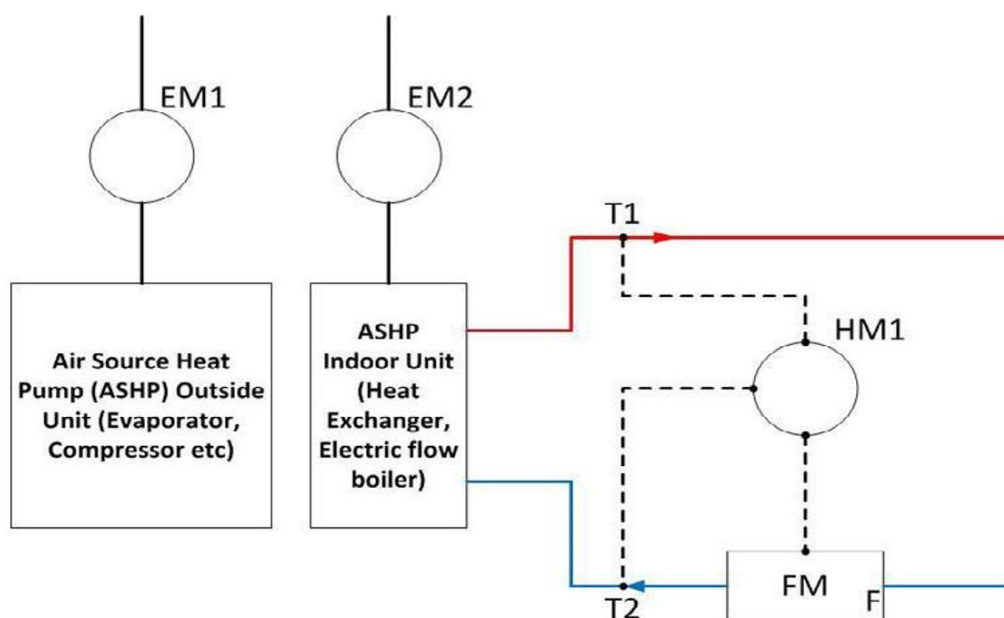
HM = Heat Meter Digital Calculator

EM = Electricity Meter

Metering Payment Formula

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times (\text{HM1} - \text{EM1})$$

Example 5: Air source heat pump unit (with separate outdoor & indoor units) using 1x heat meter and 2x electricity meters



Space heating loop(s) or space heating and Domestic Hot Water (DHW) loops (NB: If feeding a DHW loop it will most likely be supplying a Hot Water Cylinder).

NOTE: The pipes may diverge after they exit the ASHP to feed one (or multiple) space heating loops or a combination of space heating and domestic hot water heating loops. Two electricity meters are required to measure the input electricity required to run the heat pump compressor (outdoor unit) plus one additional electricity meter required to measure the electrical input into the indoor unit to run the electric back up flow boiler.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

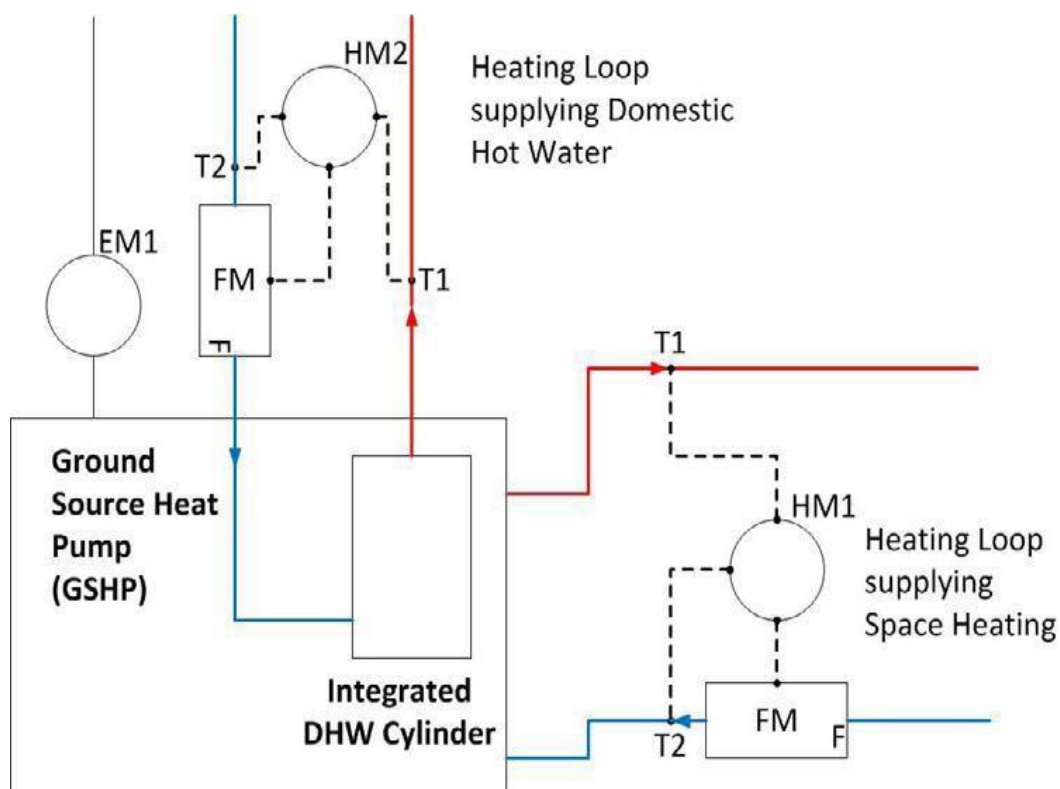
FM = Flow Meter

HM = Heat Meter Digital Calculator

EM = Electricity Meter

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times [\text{HM1} - (\text{EM1} + \text{EM2})]$$



Example 6: Ground source heat pump (GSHP) unit using 2x heat meters and 1x electricity meter

NOTE: Two heating loops exit the GSHP given that it contains an integrated Domestic Hot Water (DHW) cylinder (with no immersion heater). One loop feeds the DHW and the other the space heating.

A minimum of one electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input (i.e., ground loop circulation pumps etc.).

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

HM = Heat Meter Digital Calculator

EM = Electricity Meter

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times [(\text{HM1} + \text{HM2}) - \text{EM1}]$$

Section 2

Alternative metering arrangements

In certain cases, the installation can't have a standard metering arrangement. The installer will have to fit an alternative metering arrangement and provide the applicant with an alternative metering template. These scenarios include where:

- **An ineligible technology contributes to the heat output figure of the installation** (e.g. a hybrid system that combines a heat pump with a gas or oil boiler in the same product).
- **The customer has multiple installations that can't be metered separately** (e.g. a heat pump and a gas boiler that can't be metered separately due to space constraints) so the heat generated must be metered together. Because this total includes heat from the other installation, additional meters are required to measure energy input to the other installation so that it can be deducted from the total heat produced.

Alternatively, where a heat meter has been installed after a stand-alone domestic hot water cylinder that uses some form of supplementary input (e.g. electric immersion heater or a twin coil cylinder with the secondary coil fed from an ineligible technology such as a gas or oil boiler). Please note that a buffer tank should not be confused with a domestic hot water cylinder. It may make a difference to the metering requirements whether a meter is installed before or after a buffer tank.

- **The customer has a heat pump that is intended to provide cooling in summer.** The meter recording the electricity use when in heating mode will continue to work over summer when in cooling mode. Therefore more than necessary will be subtracted from the renewable heat output figure. This would reduce the customer's payments, the customer may wish to have an alternative metering arrangement to account for it, although this is not mandatory.
- **The heating system provides part of its heat output to an ineligible purpose** (e.g. swimming pools). The installation can provide heat to a purpose other than space heating or domestic hot water (e.g. a swimming pool) that is excluded from the annual heat demand figures on the EPC.

- **In cases where the installation is already metered for another reason** (e.g. low occupancy) and the installation is connected to a swimming pool. Heat meters will need to be installed in order to measure all of the heat to the swimming pool, which will be deducted from the total eligible heat generated.
- **The heating system has three or more electricity meters installed.** Our Installer Metering Questions (IMQs) are only applicable to systems with up to two meters. The installer will have to fill out the Alternative Metering Arrangement Template to cover the extra meters.
- **The renewable heat equation needs to be altered for an accredited application.** The IMQs cannot be reset after an application is accredited. If the answers to the IMQs are incorrect and the wrong heat equation is generated, there is no way to alter this. Despite having a standard heat equation, you may have to provide their meter readings using the AMA spreadsheet rather than submitting readings to us.

If one of these scenarios apply, complete the relevant 'Alternative Metering Arrangement Template' and give it to the customer for their Domestic RHI application along with the answers to the Installer Metering Questions document.

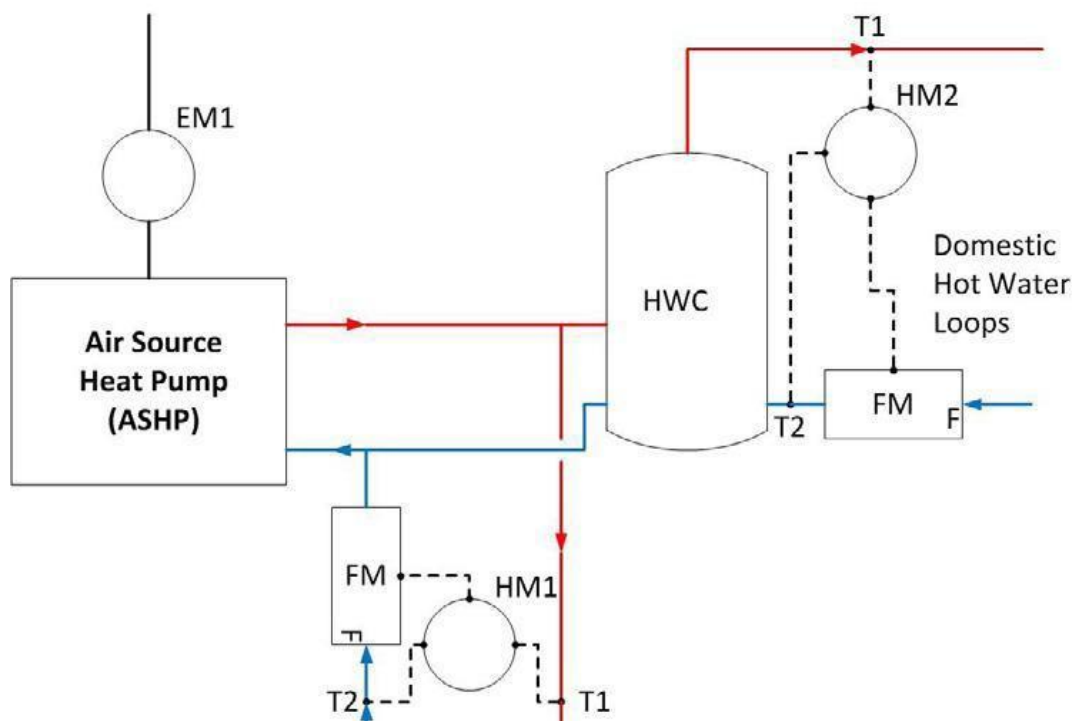
There are different versions:

- [Heat pump alternative metering arrangement template](#)
- [Biomass boiler alternative metering arrangement template](#)

Example schematics

The number of meters and complexity of the arrangement will vary from one installation to another. See Annex C of the [MCS Domestic RHI Metering Guidance](#) for examples of meter installation locations the following example schematics for some of the most commonly anticipated alternative metering arrangement scenarios. Please note, they are simplified. Please refer to Section 3, Chapter 2 of the Essential Guide for further information for heat uses (for Domestic Hot water (DHW) and Space heating) which are eligible for payment under the DRHI.

Example 7: Air source heat pump (ASHP) unit using 2x heat meters and 1x electricity meter



NOTE: One heat meter cannot be installed at the point that the pipes exit the ASHP due to physical constraints therefore must be installed as shown.

A minimum of one electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input (i.e., for hot water boosting, evaporator fans etc.) that has gone into the generated heat output. Potentially more than one electricity meter may be required.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

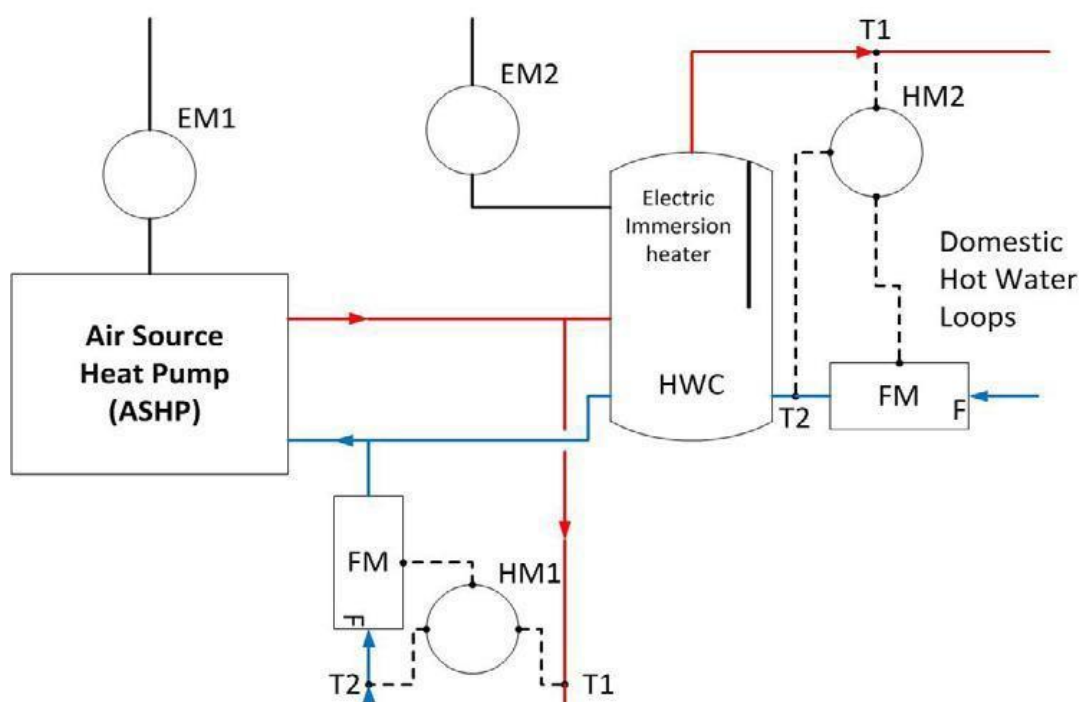
HM = Heat Meter Digital Calculator

EM = Electricity Meter

HWC= Hot water Cylinder

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \left[\left[\text{HM1} + (\text{HM2} \times 1.43) \right] - \text{EM1} \right]$$



Example 8: Air source heat pump (ASHP) unit using 2x heat meters and 2x electricity meters (an alternative metering arrangement)

NOTE: One heat meter cannot be installed at the point that the pipes exit the ASHP due to physical constraints therefore must be installed as shown. One electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input plus given that the HWC cylinder has an additional electrical immersion heater it requires an additional electricity meter to record this electrical contribution to the metered heat output.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

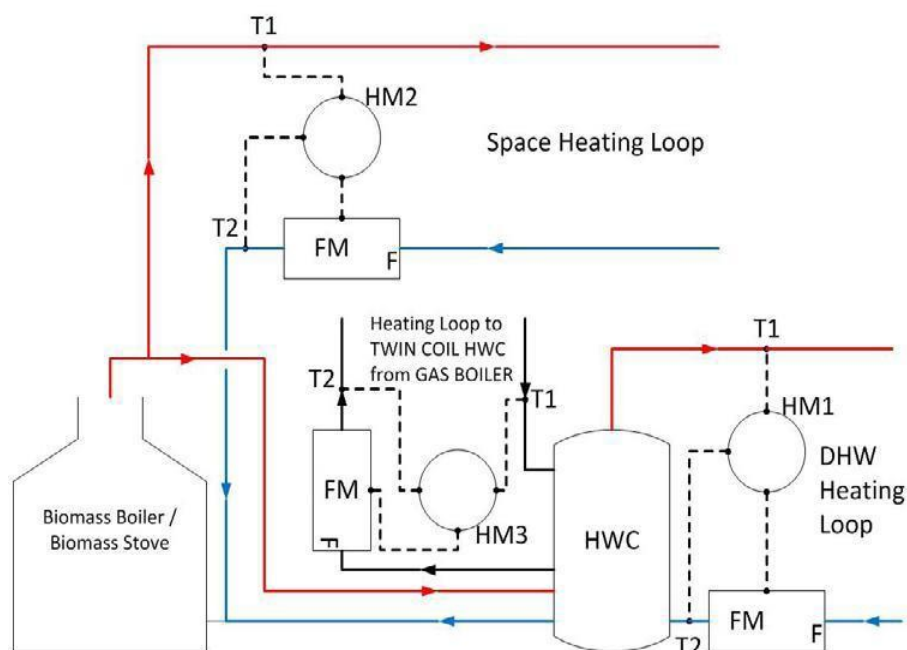
HM = Heat Meter Digital Calculator

EM = Electricity Meter

HWC=Hot Water Cylinder

Metering Payment Formulae

$$\text{Renewable Heat Payment} = \text{Tariff rate} \times [(\text{HM1} + (\text{HM2} \times 1.43)) - (\text{EM1} + \text{EM2})]$$



Example 9: Biomass installation using 3x heat meters (an alternative metering arrangement)

NOTE: This 2-pipe biomass installation uses x1 flow pipe and x1 return pipe feeding a Space Heating and a DHW loop. Due to physical/ space constraints the meters cannot be installed where the pipes feed the heating loops and as such one of the meters must be installed after the Hot Water Cylinder (HWC). The hot water cylinder is a twin coil cylinder with a secondary coil being fed from a gas boiler. This input must be metered (using HM3) as per the alternative metering arrangements requirements to allow this figure to be subtracted from the total heat output figure calculated using heat meters HM1 + HM2.

T1 = Temperature Sensor Flow Pipe

T2 = Temperature Sensor Return Pipe

FM = Flow Meter

HM = Heat Meter Digital Calculator

HWC = Hot Water Cylinder (Twin Coil)

DHW = Domestic Hot water

Metering Payment Formulae

Renewable Heat Payment = Tariff rate x [(HM1 x 1.43) + HM2] – HM3

Process for designing alternative arrangements

This applies where there is an additional technology contributing to the metered heat output figure of the Domestic RHI installation.

Installers need to install one or more heat meters to measure the total combined heat output from the eligible installation and the additional ineligible technology, plus one of the following options:

- a) install a heat meter to measure the heat output being contributed to the heating system by the additional ineligible technology so it can be subtracted from the total combined heat output, or
- b) install one or more gas/oil or electricity meters as necessary to measure the fuel input to the additional technology (includes electric immersion heaters) so that the equivalent heat energy output based on a 100% boiler/immersion heater efficiency can be calculated. This figure will then be subtracted from the total combined heat output.

To complete the Alternative Metering Arrangement template, the installer must provide:

- A simple schematic showing the proposed metering arrangement including all necessary heat meters required and any electricity, gas or oil meters to enable only the eligible renewable heat output to be measured. Refer to the list of what is required for a 'simplified schematic'. Use format of schematics shown Section 2 'Alternative metering arrangement' in this Annex.
- Details of the additional heat source to enable us to factor in any effect on the payment calculation. This will allow us to check the proposed metering arrangement and assign a heat equation to be used for all future payments.

Where the fuel input is being measured instead of the heat output from the additional plant (see option 'b' above) the equivalent heat output figure will be calculated using fuel gross calorific values selected from BEIS' published calorific values in Annex A1 for [DUKES \(Digest of UK Energy Statistics\)](#). Within the DUKES report, we will use the fuel inputs: Propane/Butane for LPG, burning oil (which is the large majority of all oil used in domestic heating) for oil, and natural gas consumed for natural gas.

The equivalent heat output calculation assumes a 100% boiler/immersion heater efficiency figure (100% of the fuel input being converted to heat output).

Section 3

Further considerations

Additional factors will need to be taken into account when we calculate the relevant payment for the customer and, as such, should be considered during the design of the metering arrangement. We will get this information from the Installer Metering Questions (IMQs), which the installer provides to the customer when the installation of the metering is finished.

For biomass boilers or stoves:

If a biomass stove (rather than a biomass boiler) has been installed, a 1.2 multiplier factor will be applied to the metered heat output figure to take account of heat radiated to the room.

If a heat meter has been installed after the Domestic Hot water cylinder, a multiplier factor of 1.43 will be applied to the heat output figure to take account of DHW cylinder heat losses.

Subtract any heat contribution from any additional plant* where this is included in the total heat output figure (i.e., the Domestic RHI installation cannot be metered alone).

Where any additional plant is included in the total heat output figure and it is an ASHP with a defrost coil that uses heat purely from the home (i.e., no additional heat source besides that generated by the ASHP should contribute to the defrost coil mechanism), a multiplier factor of 0.97 should be applied to the heat output figure of the additional plant*.

For heat pumps:

ASHPs which use a defrost coil that uses heat purely from the home (i.e., no additional heat source besides that generated by the ASHP should contribute to the defrost coil mechanism), a multiplier factor of 0.97 should be applied to the heat output figure.

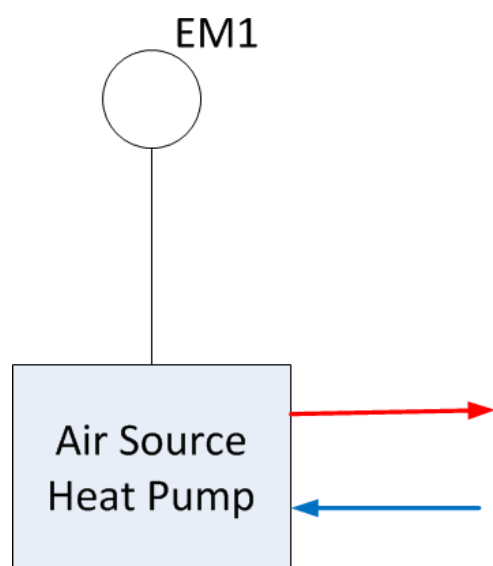
If a heat meter has been installed after the domestic hot water (DHW) cylinder a multiplier factor of 1.43 will be applied to the heat output figure to take account of DHW cylinder heat losses.

Subtraction of any heat contribution from any additional plant* where this is included in the total heat output figure (i.e., the Domestic RHI installation cannot be metered alone).

*Some additional installations are exempted from these rules – see Section 9, Chapter 1 of the Essential Guide.

Annex 3 – Metering for performance schematics

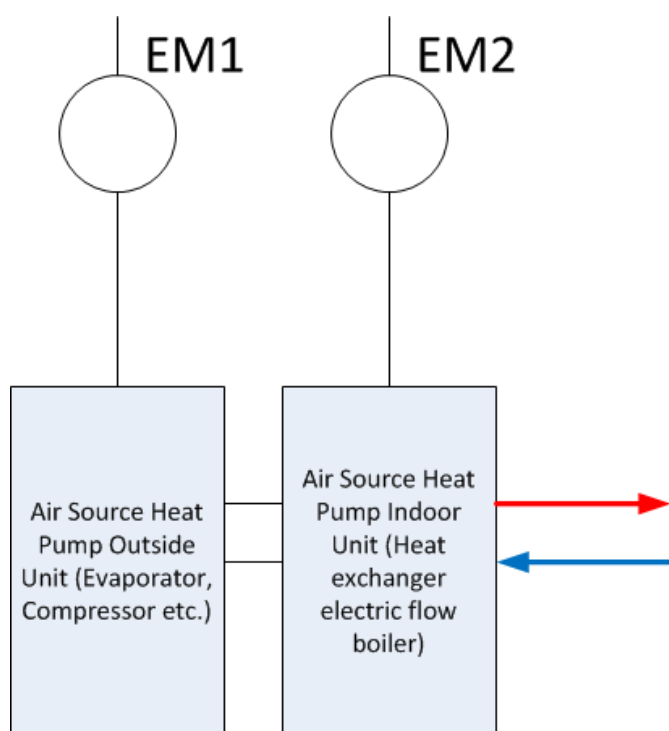
Example 1: Air source heat pump (ASHP) unit using 1x electricity meter



NOTE: The pipes may diverge after they exit the ASHP to feed one (or multiple) space heating loops or a combination of space heating and domestic hot water heating loops. A minimum of one electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input (e.g., for hot water boosting, evaporator fans etc) that has gone into the generated heat output. Potentially more than one electricity meter may be required.

EM = Electricity Meter

Example 2: Air source heat pump (ASHP) unit (with separate outdoor & indoor units) using 2x electricity meters



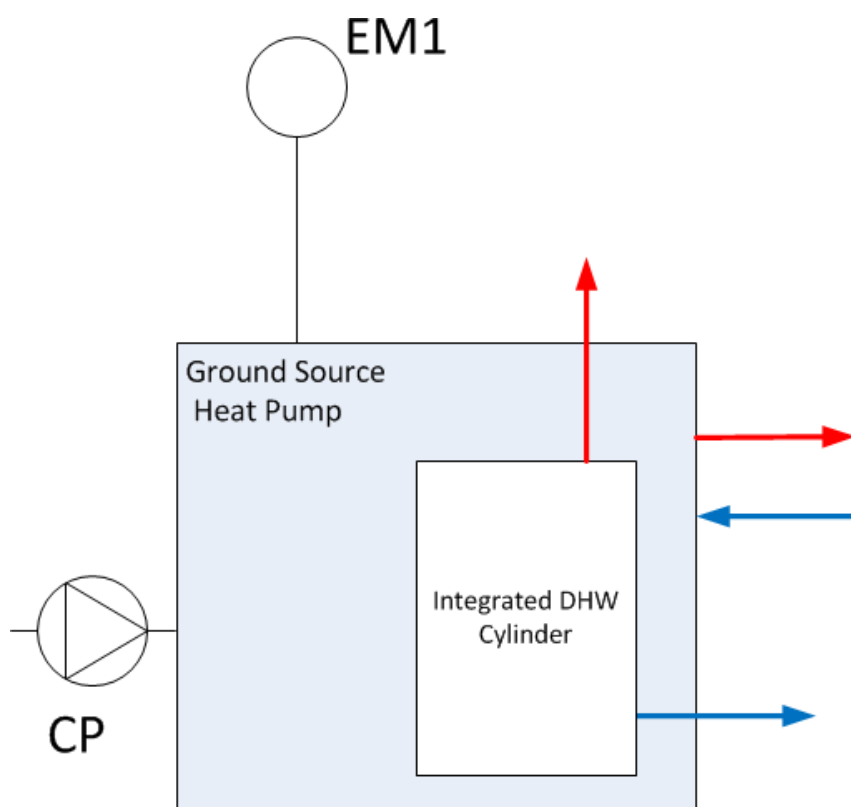
NOTE: The pipes may diverge after they exit the ASHP to feed one (or multiple) space heating loops or a combination of space heating and domestic hot water heating loops.

If there are multiple supplementary or immersion heaters controlled by the same control system as the heat pump, a single meter can be installed to record the total combined electrical input; or each heater can be metered separately. Electricity input means the electricity required to run the heat pump compressor (outdoor unit) plus one additional electricity meter required to measure the electrical input into the indoor unit to run the electric back up flow boiler.

Metering input to each heater separately could help in identifying if there is an issue with an individual immersion heater/supplementary heater.

EM = Electricity Meter

Example 3: Ground source heat pump (GSHP) unit using 1x electricity meter



NOTE: Two heating loops exit the GSHP given that it contains an integrated DHW Cylinder (with no immersion heater). One loop feeds the DHW and the other the space heating.

A minimum of one electricity meter is required to measure the input electricity required to run the heat pump compressor and any other electrical input (e.g., ground loop circulation pumps etc.). Additional electricity meters can be used to measure different electrical inputs of the heat pump (e.g., ground loop circulation pumps and heat pump compressor with one electricity meter, and integrated domestic hot water cylinder with a second electricity meter).

EM = Electricity Meter

CP = Ground Loop Circulation Pump

Annex 4 - MMSP requirements

Section 1

What an MMSP includes

Installers must install MMSP according to the technical requirements set out in [Schedule 7 of the Domestic RHI regulations](#) as amended.

Heat meter(s) to meter heat output from the biomass boiler/heat pump. More than one heat meter may be needed depending on the number of flow/return pipes entering/exiting the installation. Or, where one heat meter cannot be installed immediately, where flow/ return pipework exits the installation before the pipes diverge to feed different heating circuits.

Hardware components

- Heat meter(s) to meter the heat output from the biomass boiler/heat pump. More than one heat meter may be needed depending on the number of flow/return pipes entering/exiting the installation. Or, where one heat meter cannot be installed immediately, where flow/ return pipework exits the installation before the pipes diverge to feed different heating circuits.
- Heat meter(s) to meter the heat output of any additional heaters that are connected to the same heat distribution system. If the heat output cannot be recorded, the fuel or electrical input into these heaters must be metered instead.
- Electrical meter(s) to meter all electrical supplies feeding the installation.
- Electrical meter(s) to meter any electrical input to immersion heaters used for the DHW.
- Gas meter to measure any fuel input into a gas boiler where the gas boiler is connected to the same heat distribution system, but the heat output cannot be metered. Or gas meter to measure any fuel input into a heat pump where it is a hybrid product.

- Oil meter to measure any fuel input into an oil boiler where the oil boiler is connected to the same heat distribution system, but the heat output cannot be metered.
- Electricity meter to measure any input into an electric heater (including boilers) where the electric heater is connected to the same heat distribution system but the heat output cannot be metered.
- Temperature sensor to measure internal room temperature.
- Temperature sensor to measure space heating flow temperature (the temperature sensor incorporated into the heat meter can be used instead of a separate temperature sensor).
- Temperature sensor to measure DHW flow temperature (the temperature sensor incorporated into the heat meter can be used instead of a separate temperature sensor).
- (GSHPs only) Temperature sensors to measure ground loop flow and return temperatures.
- (ASHPs and Biomass installations only) Temperature sensor (or data from a weather station within a 50 mile radius) to measure external air temperature.
- Temperature sensor to measure the indoor air temperature (for all installations).
- (Biomass installations only) Pellet counter to enable biomass fuel input to be calculated, enabling the boiler efficiency to be calculated (alternatively this could be done using flue gas analysis).

Software components

- Data logger (connected via sim card, WiFi or Ethernet).
- A data platform to be able to store the data transmitted by the data logger.
- A computer (or similar) to access the logged data.
- The data platform must be able to provide a percentage figure of the completeness of the recorded information from all the meters and sensors included in the MMSP.

Section 2

Technical specifications

In addition to the above, all the various meters and sensors must meet high accuracy requirements as detailed in the following tables for pellet biomass boilers and for heat pumps respectively (refer to the [MCS Domestic RHI Metering Guidance](#)).

Contact us

If you want to discuss the requirements before you install an MMSP, call 0300 003 0744 or email: DomesticRHI@ofgem.gov.uk and put 'MMSP' in the subject line.

Biomass boiler MMSP summary table

Biomass

	Sensor type	Minimum resolution	Minimum accuracy	Example number required	When needed
1	Heat metering of heat output from biomass boiler and heat metering of any additional heaters that are connected to the same heat distribution system.	[Resolution of heat meter] $\leq 3\%$ multiplied by [min. non-zero heat output in 2 minutes] AND heat meter resolution need not be finer than 1Wh. See the MCS Domestic RHI Metering Guidance Document for more details.	Class 3 of Measuring Instruments Directive.	1x heat meter for 2- pipe output; 2x, 3x or 4x heat meters depending upon whether it is a 3-pipe, 4-pipe etc unit; an additional heat meter required where overall system contains a fossil fuel boiler in addition to the above.	Always: a minimum of one heat meter always required.

2	Metering of all electrical supplies to biomass boiler included in heat measurement plus domestic hot water (DHW) cylinder where this is supplied by biomass boiler (in addition, we recommend that all integrated electric heaters are metered).	[Resolution of electricity meter] $\leq 7.5\%$ multiplied by [min. non-zero electricity input in 2 minutes] (we recommend using high resolution meters, but electricity meter resolution need not be finer than 1Wh).	Class A of Measuring Instruments Directive.	1x electricity meter for biomass unit + 1x electricity meter for immersion heating where appropriate.	Always: a minimum of one electricity meter always required.
3	Gas metering of gas inputs to biomass boiler where required (see Section 2 'Alternative Metering Arrangements' of Annex 2 and Section 7.2 of MCS Domestic RHI Metering Guidance document).	10 litres or equivalent for other units.	Class 1.5 of Measuring Instruments Directive.	1x gas meter to monitor gas input to biomass boiler (if a hybrid system has integrated gas boiler) only if not possible to meter heat output from gas boiler as in Row 1.	Only if appropriate: if an additional gas boiler is used on the system and the heat output alone cannot be metered.
4	Oil metering of any oil inputs to biomass boiler where required (see Section 2 'Alternative Metering Arrangements' of Annex 2 and Section 7.2 of MCS Domestic RHI Metering Guidance document).	0.1 litres or equivalent for other units.	Class 1 of Measuring Instruments Directive.	1x oil meter to monitor oil input to biomass boiler (if a hybrid system has integrated gas boiler) only if not possible to meter heat output from oil boiler as in Row 1.	Only if appropriate: if an additional oil boiler is used on the system and the heat output alone cannot be metered.

5	Measurement of indoor temperature plus flow and return temperatures at approximate location of heat meter. (Note that this could be conducted using the temperature sensor components of a heat meter)	We recommend 0.1 degrees C	We recommend Class B for Resistance Temperature Detectors (RTDs), (equivalent accuracy for other types of temperature sensor at typical measurement temperature).	3x temperature sensors.	Always: Indoor air temperature sensor plus flow and return temperature sensors of hot water exiting/returning to the biomass boiler.
6	Measurement of external air temperature. This sensor should be suitably sited out of direct sunlight and away from other heat sources.	We recommend 0.1 degrees C.	We recommend Class B for RTDs (equivalent accuracy for other types of temperature sensor at typical measurement.	1x temperature sensor.	Always.
7	Efficiency An estimate of efficiency should be provided based on metered fuel input (through measurement of auger revolutions or similar) or flue gas analysis.		This should be done as accurately as possible. We recommend better than 20%.		Always.

Heat pump MMSP summary table

Heat pump

	Sensor type	Minimum resolution	Minimum accuracy	Example number required	When needed
1	Heat metering of heat output from heat pump and heat metering of all additional heaters that are connected to the same heat distribution system.	[Resolution of heat meter] $\leq 3\%$ multiplied by [min. non-zero heat output in 2 minutes] AND heat meter resolution need not be finer than 1Wh (see MCS Domestic RHI Metering Guidance).	Class 3 of Measuring Instruments Directive.	1x heat meter required for heat pump with 2-pipe output; 2x heat meters required for heat pump with 4-pipe or 3-pipe output or bivalent system with 2-pipe heat pump; 3x heat meters required for bivalent system with 4-pipe or 3-pipe heat pump. (Fewer meters may be used if manufacturer has integrated metering to their unit.)	Always: a minimum of one heat meter always required.
2	Metering of all electrical supplies to heat pump included in heat measurement plus domestic hot water (DHW) cylinder where this is supplied by heat pump. (In addition, we recommend that all integrated electric heaters are metered.)	[Resolution of electricity meter] $\leq 3\%$ multiplied by [min. non-zero electricity input in 2 minutes]. (We recommend using high resolution meters, but electricity meter resolution need not be finer than 1Wh.)	Class A of Measuring Instruments Directive.	1x electricity meter where heat pump is incorporated into single unit; 2x electricity meter where heat pump is composed of two units; plus 1x electricity meter for immersion heating where DHW is supplied by heat pump.	Always: a minimum of one electricity meter always required.
3	Gas metering of inputs to heat pump where required (see	10 litres or equivalent for other units.	Class 1.5 of Measuring	1x gas meter to monitor gas input to biomass boiler (if a hybrid system has integrated gas boiler) only if	Only if appropriate: if an additional gas boiler is

	Section 7.1 of the MCS Domestic RHI Metering Guidance).		Instruments Directive.	not possible to meter heat output from gas boiler as in Row 1.	used on the system and the heat output alone cannot be metered.
4	Oil metering of any oil supplied to heat pump where required (see Section 7.1 of the MCS Domestic RHI Metering Guidance).	0.1 litres or equivalent for other units.	Class 1 of Measuring Instruments Directive.	1x meter to monitor oil input to heat pump (if a hybrid system has integrated gas boiler) only if not possible to meter heat output from oil boiler as in Row 1.	Only if appropriate: if an additional oil boiler is used on the system and the heat output alone cannot be metered.
5	Measurement of internal temperature, space heating flow temperature and DHW flow temperature, where this is supplied by the heat pump. (Sometimes this may need to be separate to temperature measurements involved in heat metering).	We recommend 0.1 degrees C.	We recommend Class B for Resistance Temperature Detectors (RTDs), (equivalent accuracy for other types of temperature sensor at typical measurement temperature).	3x temperature sensors - includes space heating flow metering, DHW flow metering (where DHW supplied by heat pump), internal temperature.	Always: Indoor air temperature sensor plus flow and return temperature sensors of hot water exiting/ returning to the heat pump.
6	For ground-source heat pumps (GSHPs), measurement of ground loop flow and return temperatures.	We recommend 0.1 degrees C.	We recommend Class B for RTDs, (equivalent accuracy for other types of temperature sensor at typical measurement temperature).	2x temperature sensors for ground loop flow and return.	Only if appropriate: i.e. only necessary if a GSHP.
7	For air-source heat pumps (ASHPs) only, measurement of external air temperature. This sensor should be	We recommend 0.1 degrees C.	We recommend Class B for RTDs, (equivalent accuracy for other types of temperature sensor at typical	1x temperature sensor (air source heat pumps only).	Only if appropriate: i.e. only necessary if an ASHP.

	suitably sited out of direct sunlight and away from other heat sources.		measurement temperature).		
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