Hamworthy Trigon

WMZ Calorimeter (Heat Meter)

Installation, Commissioning & Operating Instructions

IMPORTANT NOTE

THESE INSTRUCTIONS MUST BE READ AND UNDERSTOOD BEFORE INSTALLING, COMMISSIONING, OPERATING OR SERVICING EQUIPMENT

Hamworthy

Heating *at work.*

Customer After Sales Services

Telephone: **01202 662555**   E-mail: **service@hamworthy-heating.com**   Fax: **01202 662522**

Technical Enquiries

To supplement the detailed technical brochures, technical advice on the application and use of products in the Hamworthy Heating range is available from our technical team in Poole and our accredited agents.

Site Assembly

Hamworthy offer a service of site assembly for many of our products where plant room access is restricted. Using our trained staff we offer a higher quality of build and assurance of a boiler built and tested by the manufacturer.

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Commissioning of equipment by our own engineers, accredited agents or specialist sub-contractors will ensure the equipment is operating safely and efficiently.

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Regular routine servicing of equipment by Hamworthy service engineers inspects the safety and integrity of the plant, reducing the risk of failure and improving performance and efficiency. Service contracts enable you to plan and budget more efficiently.

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Spare Parts

We offer a comprehensive range of spare parts, providing replacement parts for both current and discontinued products. Delivery options are available to suit you. Please refer to our website for more details.

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THE TRIGON WMZ CALORIMETER (HEAT METER) COMPLIES WITH ALL RELEVANT EUROPEAN DIRECTIVES.

Hamworthy Trigon

WMZ Calorimeter

Mounting
Connection
Operation

49011071
00DNOO0207-A

WMZ Calorimeter

en

Manual

WMZ Calorimeter

Safety advice

Please pay attention to the following safety advice in order to avoid danger and damage to people and property.

This product is to be used in accordance with its intended use only (see page 3).

Instructions

Attention should be paid to

- the statutory provisions for prevention of industrial accidents,
- the statutory provisions for environmental protection,
- the Health and Safety at Work Act 1974
- Part P of the Building Regulations 2005
- BS7671 Requirements for electrical installations and relevant safety regulations of DIN, EN, DVGW, TRGI, TRF and VDE.

These instructions are exclusively addressed to authorised skilled personnel.

- Only qualified electricians should carry out electrical works.
- Initial installation must be effected by qualified personnel named by the manufacturer

Errors an technical changes excepted.

Table of contents

Declaration of conformity

The product complies with the relevant directives and is therefore labelled with the CE mark. The Declaration of Conformity is available upon request, please contact the manufacturer.

$$C\epsilon$$

WMZ Calorimeter

- **yield control**
- **increase in efficieny**
- **graphic display**
- **power failure protection**
- **user friendly through easy mounting**
- **easy to mount housing in out-standing design**
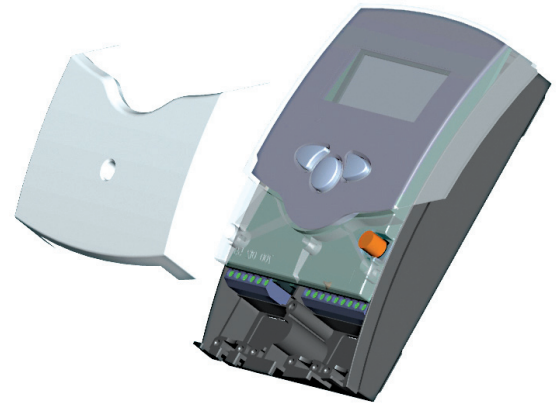
Scope of delivery:

1 x WMZ

1 x accessory bag
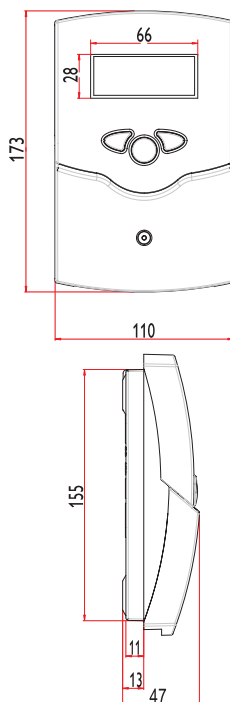   1 x spare fuse T0,8A
    2 x screw and dowel
    4 x strain relief and screw

1 x V40 flowmeter Supplied with:

    2 x Pt1000 Temperature sensors

    2 x ½" BSPP Immersion pockets

The WMZ is a universal calorimeter for thermal solar systems and conventional heating systems. This calorimeter especially takes into consideration that the density and the specific heat capacity of the heat transfer fluid depend on the temperature as well as on the mixing ratio of water/glycol. The calorimeter WMZ calculates the heat amount using these parameters, the measurement of feed flow and return temperature by 2 precision Pt1000 temperature sensors and the evaluation of the impulses of the flowmeter. A power failure protection guarantees that the adjusted system parameters and the calculated heat quantity are maintained in the case of power loss. By means of push buttons, different channels can be chosen and user levels can be changed. In the first level, the temperature at the selected measuring points, the heat gained, the actual power or the volumetric flow rate of the system are indicated on the graphic display. A control lamp is also installed for indication of sensor defects and false sensors connections. A second level is used for displaying system adjustment values and control values, which can be analoguely adapted to changes in the systems. The power supply is effected via a mains plug. Additional modules can be connected to a bus connection. The VBus® connection enables the transmission of display values to a corresponding controller, PC or datalogger in order to be further processed or evaluated.

Technical Data
Housing:
plastic, PC-ABS and PMMA
Protection type: IP 20 / DIN 40050
Ambient temp.: 0 ... 40 °C
Dimensions: 172 x 110 x 46 mm
Mounting: wall mounting, mounting into patch panels is possible
Display: Graphic display as well as 2-color LED
Operation:
3 push buttons in the front

Power supply: 220 ... 240 V~
Power consumption: ca. 2 VA
Adjustment values:
- **Volume concentration of glycol:**
  0 ... 70 % (1%-steps)
- **Pulse rate volumetric flow rate:**
  0 ... 99 l/Imp (1 l/Imp - steps) for flowmeter V40

Temperature measurement:
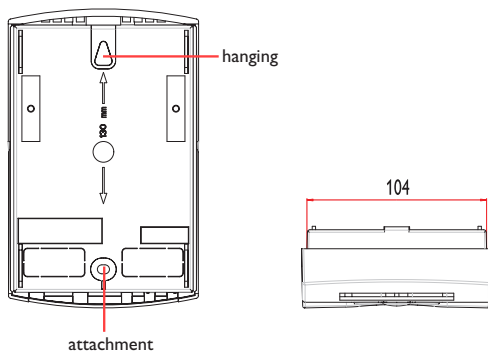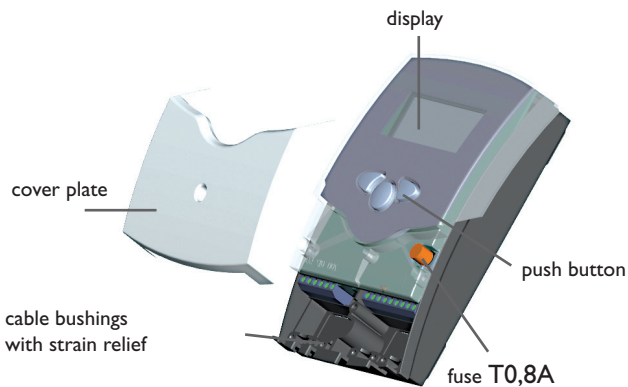with Pt1000 sensors only
Measurement precision: ± 0,3 K
Range of measurement:
-30 ... + 150 °C
Bus: VBus®

CE

3 |

WMZ Calorimeter

Hamworthy

1. Installation
1.1 Mounting

display

cover plate

cable bushings
with strain relief

push button

fuse T0,8A

hanging

attachment

104

Warning!
Switch-off power supply and disconnect from mains before opening the housing!

The device has to be located in a dry interior place. It is not suitable for installation in hazardous locations and should not be installed near to any electromagnetic fields. The device must additionally be equipped with an all-polar gap of at least 3 mm or with a gap according to the valid installaton regulations, e.g. LS-switches or fuses. Please pay attention to a separate laying of the sensor lines and the power supply.

1. Unscrew the cross-head screw of the cover and remove it along with the cover from the housing.
2. Mark the upper fastening point on the underground and pre-assemble the enclosed dowel and screw.
3. Hang up the housing at the upper fastening point and mark the lower fastening point on the underground (hole-center distance 130 mm), afterwards fit the lower dowel.
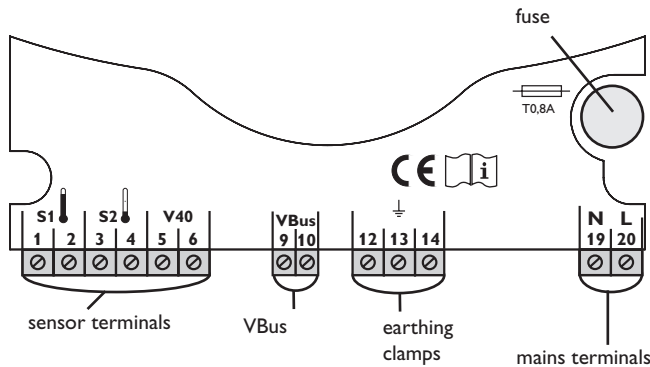4. Hang up the housing at the top and fasten it with the lower fastening screw

Electrostatic discharge can cause damage of electronic components

Warning: high-voltaged components

WMZ Calorimeter

1.2 Electrical connection

The power supply of the controller must be carried out via an external power supply (last step!). The supply voltage must be 220 ... 240 Volt (50 ... 60 Hz). Flexible cables are to be attached to the housing using the enclosed strain reliefs and the respective screws.

In order to use the WMZ along with a flowmeter V40, the following connection is to be carried out (polarity of the separate terminals is arbitrary):

1 / 2 =   sensor S1 (feed flow temperature)

3 / 4 =   sensor S2 (return temperature)

5 / 6 =   flowmeter V40

9 / 10 = VBus®

The **mains connection** is carried out via the terminals:

19 = neutral conductor N

20 = line L

12 / 13 / 14 = gound terminals ⏚

1.3 Flowmeter

A flowmeter V40 is used in order to determine the volumetric flow rate in the solar circuit. The installation is to be carried out taking the flow direction into consideration (consider direction indication on the flowmeter). In order to tranquilise the flow ratio, an inlet and an outlet distance of 30 cm in front of and behind the flowmeter have to be taken into account.

Note: Versions V40 0,6 to 2,5 are suited for horizontal as well as for vertical installation. Versions V40 3,5 to 15 are for horizontal installation only. In order to avoid a pressure surge caused by cavitation in hydraulic systems, the heat transfer fluid should be filled in when it is cold, and de-aerators should be used. Pressure surge and turbulent flow ratios lead to damage of the sensitive measuring instruments.

WMZ Calorimeter

2. Operation and function

2.1 Push buttons for adjustment

backward

forward

2   1

3

SET
(selection / adjustment)
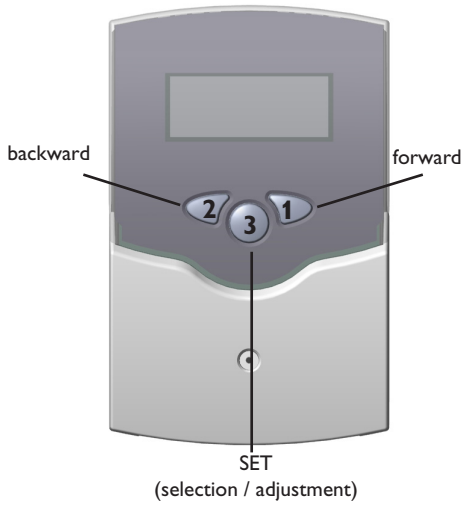
The WMZ is operated by 3 push buttons below the display. The forward-key (1) is used for scrolling forward through the indication menu or to increase the adjustment values. The backward-key (2) is used correspondingly for the reverse function.

In order to change from the display level to the adjustment level, press button 3 shortly. The indication changes to the adjustment mode.

- Select channel with buttons 1 and 2
- Shortly press button 3.
- Adjust value with the buttons 1 and 2
- Shortly Press button 3. Answer the safety prompt „Save ?" with „yes" oder „no" (select with buttons 1 and 2) and confirm with button 3.

In order to get back to the display level, select the item „back", and press button 2 shortly.

Adjust. values:	
back	
▶ Antifr. type	Water
Flow measurem.	V40

Safety prompt:	
Save?	Yes

2.2 Graphic display

15 kWh

Heat

FL   85,6 °C

RE   45,7 °C
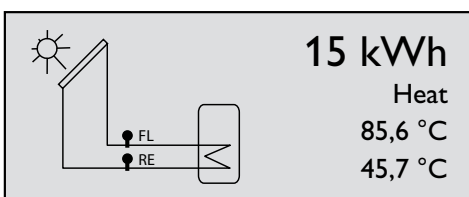
The WMZ has two display levels. In the 1st level, the heat quatity as well as flow and return temperatures are shown. Furthermore, it contains a system screen.

System screen: in the system screen, the system scheme and the sensors used are shown.

The 2nd level is the adjustment level in which various parameters and values can be adjusted.

2.3 LED flashing codes

constant green: everything OK
flashing green: sensor defect
                    (sensor symbol is flashing quickly)

3.   Function

During the calculation of the transferred heat quantity, the WMZ calorimeter takes into account that the specific heat capacity c and the density r depend on the temperature and the mixing proportion (access to limited values). Using these parameters, the measurement of the feed flow and return temperatures with two precision temperature sensors, and the evaluation of the impulses of a volumetric flowmeter, the WMZ calculates the transferred quantity.

This device can be used in systems which use water or water-propylene glycol mixtures as the heat transfer fluid. The proportion (in vol%) used in a system and the specification of the selected flowmeter (in liters per impulse) are adjusted locally after the installation.
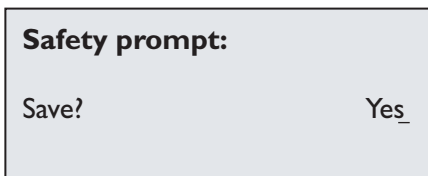
4.   Indication and adjustment channels

Display channels

- FL (flow temperature in °C)
- RE (return temperature in °C)
- heat quantity (in Wh or kWh respectively)
- volumetric flow rate
- power (in kW)

Adjustment channels

- antifreeze type
- antifreeze
- flow measurement (V40 or VTP)
- volume per impulse
- subaddress
- bus mode
- bus master
- sensor offset
- reset
- language

Safety prompt:

Save?   Yes_

Note:

After a change in the adjustment channel has been made, a safety promt appears. The adjustment is saved after the question has been confirmed with "yes".

4.1   Heat quantity

15 kWh
Heat
85,6 °C
45,7 °C
FL
RE
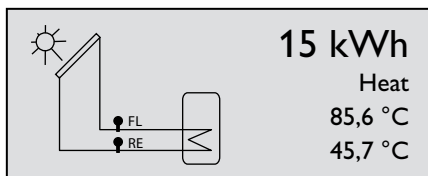
The determined heat quantity is indicated. If the heat quantity is smaller than 1 MWh, the quantity is indicated with the unit Wh. If the quantity is larger, it is indicated using the unit kWh.

4.2   Flow and return temperatures

15 kWh
Heat
85,6 °C
45,7 °C
FL
RE
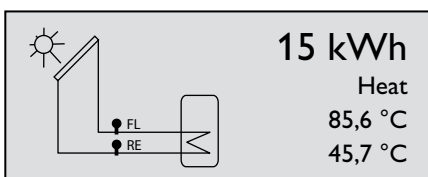
FL = indicates the current flow temperature
(example: 85,6 °C)

RE = indicates the current return temperature
(example: 45,7 °C)

4.3   Volumetric flow rate

200 l/h
Flow
85,6 °C
45,7 °C
FL
RE
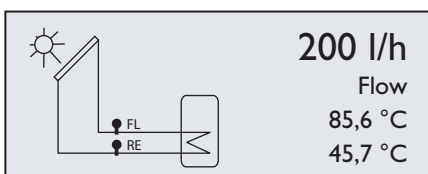
The volumetric flow rate is indicated (l/h).

4.4   Power

9.30 kW
Power
85,6 °C
45,7 °C
FL
RE
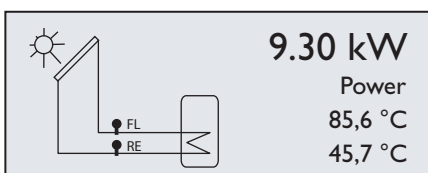
The instantaneous power is indicated (kW).

Note:

The precision of the power indication depends on the flowmeter used. At low flow rates, deviations from the actual value are possible and caused by technical reasons!

4.5 Antifreeze type

```
Adjust. values:
  back
▶ Antifr. type          Water
  Flow measurem.          V40
```

Adjustment channel for the antifreeze type used. There are different types of heat tranfer fluid to choose from. Water or water / glycol mixtures are used:

• water
• propylene
• ethylene
• Tyfo LS

4.6 Antifreeze

```
Adjust. values
  back
  Antifr. type       Propylene
▶ Antifreeze             45 %
```

Adjustment channel for the ratio of water / glycol („antifreeze" is only visible, when the antifreeze type „propylene" or „glycol" has been chosen before).

ajdustment range: 20 % ... 70 vol. %
factory setting: 45 %

4.7 Type of flowmeter

```
Adjust. values:
  back
  Antifr. type          Water
▶ Flow measurem.          V40
```

Adjustment channel for the flowmeter type which is used. The factory setting is Flowmeter V40.

• V40
• VTP

4.8 Impulse Rate

```
Adjust. values:
  Antifr. type          Water
  Flow. measurem.         V40
▶ Volume/Imp.         1,0 L/I
```

This adjustment channel depends on the selected flowmeter type.

If the flowmeter V40 is used, the value is indicated in L/I („Volume/Imp" is indicated on the display).

adjustment range: 0.1 ... 99.9 L/I

If the flowmeter type VTP is used, the value is indicated in I/L („heat" appears on the display)

adjustment range: 1 ... 2000 I/L

Note:

Pay attention to the indicated I/Imp on your flowmeter!

4.9 Subaddress

```
Adjust. values:
  Flow measurem.          V40
  Volume/Imp.         1,0 L/I
▶ Subaddress               0
```

Adjustment of the subaddress. An individual module address for one WMZ can be adjusted. This way it is possible to use several WMZ with an individual address in one system. If several WMZ (up to max. 16) are connected to a PC or a datalogger, the calorimeters have to be numbered serially, starting with 0. The connection sequence at the VBus® is arbitrary.

adjustment range: 0 ... 15

WMZ Calorimeter

4.10 Bus mode

```
Adjust. values:
  Volume/Imp.          1,0 L/I
  Subaddress                 0
▶ Bus mode            Cascded
```

Do not change the factory setting if the WMZ is connected to a controller with VBus® output terminal.

The WMZ modules are linearily numerated starting with 0 (see 5.9).

4.11 Bus master

```
Adjust. values:
  Subaddress                 0
  Bus mode          Cascaded
▶ Bus master?             No
```

The item „bus master" only appears when subadress „0" and bus mode „cascaded" have been selected.

4.12 Sensor offset

```
Adjust. values:
  Bus master?             No
  Sensor 1             0,0 K
▶ Sensor 2             0,0 K
```

In order to offset the sensors, an individual offset can be allocated to each sensor (range -5 K ... +5 K, stepwise 0,1 K).

4.13 Reset

```
Adjust. values:
  Subaddress                 0
  Bus mode          Cascaded
▶ Reset
```

By means of this function, the measured heat quantity can be reset to the value 0.

4.14 Language

```
Adjust. values:
  Bus mode          Cascaded
  Reset
▶ Language            German
```

Selection of the language (German, English, French).

5. Example of connection Cascade with controller

- controller: No adjustments have to be made (**WMZ-module must not be registered!**)
- WMZ 0:   subaddress: „0"

   bus mode: „cascaded",

   bus master: „No"
- WMZ 1 ... 15: subaddress: 1 ... 15*

   Bus mode: „Cascaded"

The connection sequence at the VBus® is arbitrary.

* The maximum number of cascaded WMZ modules is 16. Whether this number can be reached depends on the construction.

Disturbing factors can be the following: distances, voltage-carrying lines etc.

6. Tips for trouble shooting

Please pay attention to the following items, if the calorimeter WMZ is not working properly.

fuse T0,8A

T0,8A

CE

S1		S2		V40		VBus						N	L
1	2	3	4	5	6	9	10	12	13	14		19	20
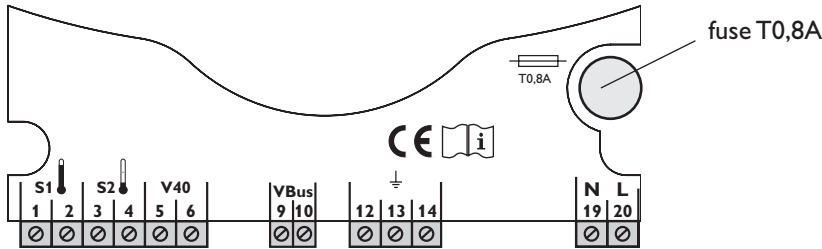
Functional control lamp flashes red.

Sensor defect. An error code instead of a temperature is shown in the corresponding sensor indication channel.

888.8	**- 88.8**

Line is broken. Check the line.	Short circuit. Check the line.

Pt1000 temperature sensors branched off can be checked with an ohmmeter. In the table shown below, the resistance values corresponding to different temperatures are listed.

°C	Ω	°C	Ω
-10	961	55	1213
-5	980	60	1232
0	1000	65	1252
5	1019	70	1271
10	1039	75	1290
15	1058	80	1309
20	1078	85	1328
25	1097	90	1347
30	1117	95	1366
35	1136	100	1385
40	1155	105	1404
45	1175	110	1423
50	1194	115	1442

Widerstandswerte
der Pt1000-Sensoren

Functional control lamp is permanently extinguished.

If the control lamp is permanently extinguished, check power supply.

nein	**o.k.**

The can fuse of the controller is defect. It can be replaced after the front cover has been removed (spare fuse is enclosed in the accessory bag).

Notes

Notes

Notes

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Important notice:
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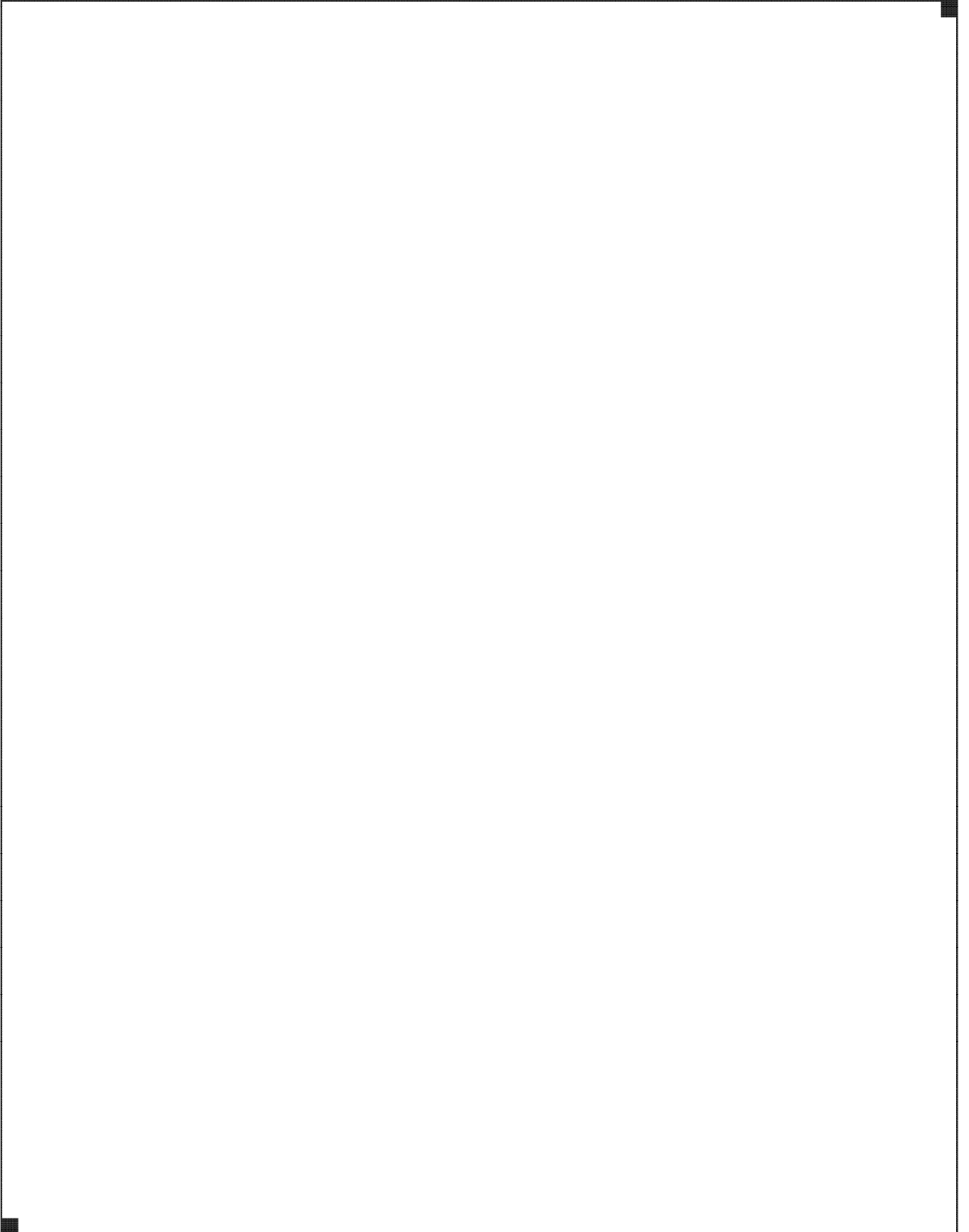
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