**GENERAL**

Model CM6G Gas Calorimeter is used to measure and control the calorific value or Wobbe Index (WI) of the sample gas. In this calorimeter the sample gas is burnt at the burner with air and the temperature difference between the combustion exhaust gas and the feed air at the burner inlet is detected by using a thermocouple.

This calorimeter detects the flow rate of both the sample gas and the air as the differential pressure by using the orifice and converts the differential pressure to the digital signal then compensates the flow rate variation by the digital calculation. This method gives an excellent high reliability, therefore it can be used for the control of thermal input for the various type furnaces in the steel mill and petrochemical industries, also for the calorie control of the town gas.

**COMPONENTS AND FUNCTIONS**

<table>
<thead>
<tr>
<th>Item</th>
<th>Function / Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calorie detector</td>
<td>Detects WI or calorific value. Generates an alarm and takes protective actions when the burner flame goes out or abnormal combustion occurs.</td>
</tr>
<tr>
<td>Computing station (digital)</td>
<td>Calculates WI or calorific value. Displays selected parameters, e.g., each differential pressure and calorific value. Adjusts zero / span and others.</td>
</tr>
<tr>
<td>Density meter</td>
<td>Measures density used for calculation of calorific value. Not required for WI measurement.</td>
</tr>
<tr>
<td>Differential pressure transmitter</td>
<td>Detects differential pressure of gas and air before and after orifice, and converts it to an electrical signal.</td>
</tr>
<tr>
<td>Orifice assembly</td>
<td>Gas and air orifices housed in the constant temperature chamber.</td>
</tr>
<tr>
<td>Solenoid valve</td>
<td>Serves as a safety valve to shut off the sample gas flow.</td>
</tr>
</tbody>
</table>
1. **Town Gas Application**

**Measurement Object:**
Measurement and control of WI or the calorific value of fuel gas for town gas.

**Measuring Range:** 3 to 62 MJ/Nm³

**Sample Conditions:**
- Dust: 5 mg/Nm³ or less
- Temperature: 50°C or less
- Humidity: dew point of 0°C or less
- Pressure: (1) 10 to 20 kPa
  (2) 10 kPa or under: with pump
  (3) 100 to 600 kPa: with pressure reducing valve

**Range:**
Select scale range (Span):
- General Gas: 30 to 50% of maximum value of the span.
- Butane or Butene + Air:
  - 20 to 30% of maximum value of the span.
- Propane or Propylene + Air:
  - 25 to 40% of maximum value of the span.
- Output:
  - 1 to 5 V DC, 4 to 20 mA DC (simultaneously), non-isolated, load resistance 750 Ω or less

**Alarm Contact Output:**
- Flame off alarm; 100 V AC, 5 A, closed when alarm occurs (resistance load) when contact is open, the leakage current is 2mA or less (100V AC)
- Temperature alarm; 100 V AC, 3 A, closed when alarm occurs (resistance load)

**Contact Input:**
- Remote ignition (Custom order); 24 V DC, 0.1A or more

**Repeatability:**
- Less than 13 30 sec or less 45 sec or less
- 13 or more, less than 32 36 sec or less 50 sec or less
- 32 or more, less than 50 39 sec or less 60 sec or less
- 50 or more 30 sec or less 60 sec or less

**Measurement and control of WI or the calorific value of fuel gas for town gas.**

**Utility:**
- Instrument Air: Approx. 50 Nl/min, pressure 300 to 700 kPa, dew point of 0°C or less
- Power Supply: 100 V AC ±10%, single phase, 50/60 Hz (Note 3), 860 VA max.

**Note 1:**
- High calorific value means 6.3 MJ/Nm³ or higher.
- Low calorific value means below 6.3 MJ/Nm³.

**Note 2:**
- Response time varies depending on the WI of a sample gas. This is due to the different sample gas flow rate of the calorimeter. The flow rate is preset depending on the WI of the sample gas to prevent the calorific value at the detector burner from exceeding the upper limit.

**Note 3:**
- In case of low calorific value measurement, frequency variation should be within ±0.4%.
- If frequency variation exceeds ±0.4%, consult with Yokogawa.

**Panel:**
- Construction: For indoor installation, rack panel
- Paint Color: Munsell 3.2PB7.4/1.2 (inside and outside)
- Ambient temperature:
  - 0 to 40°C and no rapid change in ambient temperature is allowed.
  - Rapid change here means a change of approximately 10°C within 30 minutes.

2. **Steel Mill Application**

**Measurement Object:**
Measurement and control of WI or the calorific value of fuel gas for a steel mill.

**Measuring range:** 3 to 62 MJ/Nm³

**Sample Conditions:**
- Dust: 100 mg/Nm³ or less
- Temperature: 50°C or less
- Pressure: (1) 8 kPa to 15 kPa
  (2) 8 kPa or under: with pump

**Range:**
Select scale range(Span):
- General Gas: 30 to 50% of maximum value of the span.
- Butane or Butene + Air:
  - 20 to 30% of maximum value of the span.
- Propane or Propylene + Air:
  - 25 to 40% of maximum value of the span.
- Output: 1 to 5 V DC, 4 to 20 mA DC (simultaneously), non-isolated, load resistance 750 Ω or less

**Alarm Contact Output:**
- Flame off alarm; 100 V AC, 5 A, closed when alarm occurs (resistance load) when contact is open, the leakage current is 2mA or less (100V AC)
- Temperature alarm; 100 V AC, 3 A, closed when alarm occurs (resistance load)

**Contact Input:**
- Remote ignition (Custom order); 24 V DC, 0.1A or more

**Repeatability:**
- Less than 13 30 sec or less 45 sec or less
- 13 or more, less than 32 36 sec or less 50 sec or less
- 32 or more, less than 50 39 sec or less 60 sec or less
- 50 or more 30 sec or less 60 sec or less

**Measurement and control of WI or the calorific value of fuel gas for town gas.**

**Utility:**
- Instrument Air: Approximately 700 Nl/min, dew point of 0°C or less
- Power Supply: 220 V AC 50 Hz (Note 3), 2500 VA max.

**Construction:**
- For indoor installation, rack panel
- Paint Color: Munsell 3.2PB7.4/1.2 (inside and outside)
- Ambient temperature:
  - 0 to 40°C and no rapid change in ambient temperature is allowed.
  - Rapid change here means a change of approximately 10°C within 30 minutes.

**Note 1:**
- High calorific value means 6.3 MJ/Nm³ or higher.
- Low calorific value means below 6.3 MJ/Nm³.

**Note 2:**
- Response time varies depending on the WI of a sample gas. This is due to the different sample gas flow rate of the calorimeter. The flow rate is preset depending on the WI of the sample gas to prevent the calorific value at the detector burner from exceeding the upper limit.
- When the orifice protective filter is added, the time constant becomes 30 seconds longer.

**Note 3:**
- In case of low calorific value measurement, frequency variation should be within ±0.4%.
- If frequency variation exceeds ±0.4%, consult with Yokogawa.

**Panel:**
- Construction: For indoor installation, rack panel
- Paint Color: Munsell 3.2PB7.4/1.2 (inside and outside)
- Ambient temperature:
  - 0 to 40°C and no rapid change in ambient temperature is allowed.
  - Rapid change here means a change of approximately 10°C within 30 minutes.
**MODEL AND SUFFIX CODE**

1. **Gas Calorimeter**

<table>
<thead>
<tr>
<th>Model</th>
<th>Suffix Code</th>
<th>Option Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM6G</td>
<td></td>
<td></td>
<td>Gas calorimeter</td>
</tr>
<tr>
<td>—</td>
<td>-S6</td>
<td></td>
<td>Always - S6</td>
</tr>
<tr>
<td>Gas</td>
<td>1</td>
<td></td>
<td>Gas pressure 10 to 20 kPa for town gas, quake-proof</td>
</tr>
<tr>
<td>Pressure</td>
<td>2</td>
<td></td>
<td>Gas pressure 10 to 20 kPa for town gas</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>Gas pressure 10 kPa or under for town gas</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td></td>
<td>Gas pressure 100 to 600 kPa for town gas</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td></td>
<td>Gas pressure 8 kPa to 15 kPa for steel mill, without preheating</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td></td>
<td>Gas pressure 8 kPa to 15 kPa for steel mill, with preheating</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td></td>
<td>Gas pressure 8 kPa or under for steel mill, without preheating</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td></td>
<td>Gas pressure 8 kPa or under for steel mill, with preheating</td>
</tr>
</tbody>
</table>

Measurement

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Power supply</th>
<th>Range</th>
<th>Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>-5</td>
<td>R</td>
<td>°C</td>
</tr>
<tr>
<td>10</td>
<td>-6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **WI measurement**
- **Calorific value measurement (GD400G should be purchased separately)**
- **100 VAC 50 Hz**
- **100 VAC 60 Hz**

2. **Standard Accessories**

- **Calorie Detector**

<table>
<thead>
<tr>
<th>Name</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mirror</td>
<td>1</td>
<td>For checking the burner flame</td>
</tr>
<tr>
<td>Fuse</td>
<td>2</td>
<td>3.15 A (Part No.: A1113EF)</td>
</tr>
</tbody>
</table>

- **Orifice Assembly**

<table>
<thead>
<tr>
<th>Name</th>
<th>Q’ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>O-Ring</td>
<td>1</td>
<td>P16 (Viton) (Part No.: Y9114XB)</td>
</tr>
<tr>
<td>O-Ring</td>
<td>3</td>
<td>P20 (Silicon) (Part No.: L9817MT)</td>
</tr>
<tr>
<td>Hexagon Wrench</td>
<td>1</td>
<td>Nominal size 1.5 mm</td>
</tr>
<tr>
<td>Hexagon Wrench</td>
<td>1</td>
<td>Nominal size 2.5 mm</td>
</tr>
</tbody>
</table>

3. **Density Meter**

Gas Density Meter is required for density compensation in calorific value measurement. It is not required for WI measurement. Converter: GD400G-N-10-N-□/PA Detector: GD300S-J-□/KU Measuring range and unit (specific gravity or density) should be specified.

4. **Option**

<table>
<thead>
<tr>
<th>Name</th>
<th>Part no.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probe</td>
<td>H7800HA</td>
<td>Insertion length 650 mm</td>
</tr>
<tr>
<td>Probe</td>
<td>H7800HB</td>
<td>Insertion length 1150 mm</td>
</tr>
<tr>
<td>Probe</td>
<td>H7800HC</td>
<td>Insertion length 1650 mm</td>
</tr>
<tr>
<td>Fulflo filter</td>
<td>G7043XJ</td>
<td>Element material: Polypropylene Pore size: 50 μm, Body: SUS 316, Connection: Rc 1/2</td>
</tr>
<tr>
<td>Pressure reducing valve</td>
<td>G7008XF</td>
<td>Primary pressure: 15 MPa max. Secondary pressure: 0 to 200 kPa, Material: Brass</td>
</tr>
</tbody>
</table>
**EXTERNAL DIMENSIONS**

1. For Town Gas Application

CM6G-S6200, S6210, S6300, S6310, S6400, S6410

Unit: mm

<table>
<thead>
<tr>
<th>Mark</th>
<th>Name</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMPLE GAS IN</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE GAS OUT OR VENT</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>C</td>
<td>INST.AIR IN</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>D</td>
<td>STD.GAS IN</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>E</td>
<td>STD.GAS IN</td>
<td>Rc1/4</td>
</tr>
</tbody>
</table>

* CM6G-S6□10 (with density meter) only

Maintenance Space

Weight: Approx. 300kg

* Dim-6210.ai
2. For Town Gas Application (Quake-proof Type)

CM6G-S6110

Unit: mm

Wiring to switch box should be made through the bottom.

Weight: Approx. 350kg
3. For Steel Mill Application

CM6G-S6500, S6510, S6600, S6610, S6700, S6710, S6800, S6810

<table>
<thead>
<tr>
<th>Mark</th>
<th>Name</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SAMPLE GAS IN</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>B</td>
<td>SAMPLE GAS OUT</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>C</td>
<td>SAMPLE GAS OUT</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>D</td>
<td>STD.GAS IN</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>E</td>
<td>WATER IN</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>F</td>
<td>DRAIN OUT</td>
<td>Rc1/2</td>
</tr>
<tr>
<td>G</td>
<td>INST.AIR IN</td>
<td>Rc1/4</td>
</tr>
<tr>
<td>H</td>
<td>SAMPLE GAS VENT</td>
<td>Rc1/4</td>
</tr>
</tbody>
</table>

Unit: mm

* CM6G-S6□10 (with density meter and flowmeter)
** CM6G-S67□0, CM6G-S68□0 (with pump)

Weight: Approx. 350kg
Dimentions of Options

1. Probe

<table>
<thead>
<tr>
<th>Part number</th>
<th>L</th>
</tr>
</thead>
<tbody>
<tr>
<td>H7800HA</td>
<td>Approx. 650</td>
</tr>
<tr>
<td>H7800HB</td>
<td>Approx. 1150</td>
</tr>
<tr>
<td>H7800HC</td>
<td>Approx. 1650</td>
</tr>
</tbody>
</table>

Unit: mm

2. Fulflo Filter (Part no.: G7043XJ)

Unit: mm

3. Pressure Reducing Valve (Part no.: G7008XF)

Unit: mm
## Standard Systems for Each Application

<table>
<thead>
<tr>
<th>Application</th>
<th>Measurement</th>
<th>System specification</th>
<th>Suffix code*</th>
</tr>
</thead>
</table>
| Town Gas    | WI          | Without density meter | Gas pressure 10 to 20 kPa  
Gas pressure 10 kPa or under: With pump  
Gas pressure 100 to 600 kPa: With pressure reducing value | -S6200  
-S6300  
-S6400 |
|             |             | With density meter    | Gas pressure 10 to 20 kPa: Quake-proof  
Gas pressure 10 kPa or under: With pump  
Gas pressure 100 to 600 kPa: With pressure reducing value | -S6110  
-S6210  
-S6310  
-S6410 |
|             |             |                      | Gas pressure 8 to 15 kPa : Without preheating  
Gas pressure 8 kPa or under: Without preheating  
Gas pressure 8 kPa or under: With preheating | -S6500  
-S6600  
-S6700  
-S6800 |
|             |             |                      | Gas pressure 8 to 15 kPa : With preheating  
Gas pressure 8 kPa or under: Without preheating  
Gas pressure 8 kPa or under: With preheating | -S6510  
-S6610  
-S6710  
-S6810 |
| Steel Mill  | WI          | Without density meter | Gas pressure 8 to 15 kPa : Without preheating  
Gas pressure 8 kPa or under: Without preheating  
Gas pressure 8 kPa or under: With preheating | -S6500  
-S6600  
-S6700  
-S6800 |
|             |             |                      | Gas pressure 8 to 15 kPa : With preheating  
Gas pressure 8 kPa or under: Without preheating  
Gas pressure 8 kPa or under: With preheating | -S6510  
-S6610  
-S6710  
-S6810 |
|             |             |                      | Calorific value  
MJ/Nm³ | -S6500  
-S6600  
-S6700  
-S6800 |

*: Corresponding Suffix Code of “-S6”, gas pressure and measurement.

Note: A wet sample gas in the town gas application is outside the scope of the standard specifications. Consult with Yokogawa.

## Instructions for System Selection

1. The quake-proof type gas calorimeter is always equipped with the density meter.

2. The CM6G Gas Calorimeter controls the flow rate under a constant differential pressure. In the calorific value measurement, if the density of a sample gas changes, a flow rate error proportional to the reciprocal of the square root of the density of the sample gas, \( \frac{1}{\sqrt[3]{p_g}} \), will be generated, which directly affects the calorific value. Therefore, density compensation is required using a density meter.

For the WI measurement, a density meter is not required since the WI is a value proportional to \( \frac{1}{\sqrt[3]{p_g}} \).
## Standard Flow Sheet

1. **Town Gas Application (Standard Type)**

![Flow Chart](FLOW-6410.ai)

### Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Calorie detector</td>
</tr>
<tr>
<td>1-2</td>
<td>Solenoid valve</td>
</tr>
<tr>
<td>1-3</td>
<td>Orifice assembly</td>
</tr>
<tr>
<td>1-4</td>
<td>Differential pressure transmitter (air)</td>
</tr>
<tr>
<td>1-5</td>
<td>Differential pressure transmitter (gas)</td>
</tr>
<tr>
<td>1-6</td>
<td>Computing station</td>
</tr>
<tr>
<td>1-7</td>
<td>Air set</td>
</tr>
<tr>
<td>1-8</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>2-1</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>2-2</td>
<td>Preheating chamber</td>
</tr>
<tr>
<td>2-5</td>
<td>One touch coupler</td>
</tr>
<tr>
<td>3-1</td>
<td>Line filter</td>
</tr>
<tr>
<td>3-2</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>3-3</td>
<td>Flowmeter</td>
</tr>
<tr>
<td>3-4</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>3-5</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>3-6</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>3-7</td>
<td>Diaphragm pump</td>
</tr>
<tr>
<td>3-8</td>
<td>Pressure reducing valve</td>
</tr>
</tbody>
</table>

*1: CM6G-S6□10 (with density meter)
*2: CM6G-S6□3□0 (with diaphragm pump)
*3: CM6G-S6□4□0 (with pressure reducing valve)

---

2. **Town Gas Application (Quake-proof Type)**

![Flow Chart](FLOW-6110.ai)

### Table

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Calorie detector</td>
</tr>
<tr>
<td>1-2</td>
<td>Solenoid valve</td>
</tr>
<tr>
<td>1-3</td>
<td>Orifice assembly</td>
</tr>
<tr>
<td>1-4</td>
<td>Differential pressure transmitter (air)</td>
</tr>
<tr>
<td>1-5</td>
<td>Differential pressure transmitter (gas)</td>
</tr>
<tr>
<td>1-6</td>
<td>Computing station</td>
</tr>
<tr>
<td>1-7</td>
<td>Air set</td>
</tr>
<tr>
<td>1-8</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>2-1</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>2-2</td>
<td>Preheating chamber</td>
</tr>
<tr>
<td>2-5</td>
<td>One touch coupler</td>
</tr>
<tr>
<td>3-1</td>
<td>Line filter</td>
</tr>
<tr>
<td>3-2</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>3-3</td>
<td>Flowmeter</td>
</tr>
<tr>
<td>3-4</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>3-5</td>
<td>Pressure gauge</td>
</tr>
<tr>
<td>3-6</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>3-7</td>
<td>Pressure reducing valve</td>
</tr>
<tr>
<td>5-1</td>
<td>Density meter detector (when specified)</td>
</tr>
<tr>
<td>5-2</td>
<td>Density meter converter (when specified)</td>
</tr>
<tr>
<td>5-3</td>
<td>Flowmeter for density meter (when specified)</td>
</tr>
<tr>
<td>6-1</td>
<td>Standard gas cylinder (supplied by customer)</td>
</tr>
<tr>
<td>6-2</td>
<td>Pressure reducing valve for cylinder (optional)</td>
</tr>
<tr>
<td>7-2</td>
<td>Pressure reducing valve for cylinder (optional)</td>
</tr>
</tbody>
</table>

---

Maximum back pressure is 1.5 kPa and no pressure fluctuation is allowed.

---

*No. Item:
1-1 Calorie detector
1-2 Solenoid valve
1-3 Orifice assembly
1-4 Differential pressure transmitter (air)
1-5 Differential pressure transmitter (gas)
1-6 Computing station
1-7 Air set
1-8 Pressure reducing valve
2-1 Pressure gauge
2-2 Preheating chamber
2-5 One touch coupler
3-1 Line filter
3-2 Pressure gauge
3-3 Flowmeter
3-4 Pressure reducing valve
3-5 Pressure gauge
3-6 Pressure reducing valve
3-7 Diaphragm pump (when specified)
3-8 Pressure reducing valve (when specified)
4-1 Pressure reducing valve
5-1 Density meter detector (when specified)
5-2 Density meter converter (when specified)
5-3 Flowmeter for density meter
6-1 Standard gas cylinder (supplied by customer)
6-2 Pressure reducing valve for cylinder (optional)
7-2 Pressure reducing valve for cylinder (optional)
V1...16 Ball valve, needle valve
### 3. Steel Mill Application

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>No.</th>
<th>Item</th>
<th>No.</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1</td>
<td>Calorie detector</td>
<td>3-1</td>
<td>Pressure gauge</td>
<td>5-1</td>
<td>Density meter detector (when specified)</td>
</tr>
<tr>
<td>1-2</td>
<td>Solenoid valve</td>
<td>3-2</td>
<td>Washing bubbler</td>
<td>5-2</td>
<td>Density meter converter (when specified)</td>
</tr>
<tr>
<td>1-3</td>
<td>Orifice assembly</td>
<td>3-3</td>
<td>Full flow filter</td>
<td>5-3</td>
<td>Flowmeter for density meter (when specified)</td>
</tr>
<tr>
<td>1-4</td>
<td>Differential pressure transmitter (air)</td>
<td>3-4</td>
<td>Pressure regulating pot</td>
<td>6-1</td>
<td>Water Flowmeter</td>
</tr>
<tr>
<td>1-5</td>
<td>Differential pressure transmitter (gas)</td>
<td>3-5</td>
<td>Dehumidifier</td>
<td>7-1</td>
<td>Probe (optional)</td>
</tr>
<tr>
<td>1-6</td>
<td>Computing station</td>
<td>3-6</td>
<td>Pressure reducing valve</td>
<td>7-2</td>
<td>Full flow filter (optional)</td>
</tr>
<tr>
<td>2-1</td>
<td>Air set</td>
<td>3-7</td>
<td>Line filter</td>
<td>9-1</td>
<td>Pressure reducing valve for cylinder (optional)</td>
</tr>
<tr>
<td>2-2</td>
<td>Pressure reducing valve</td>
<td>3-8</td>
<td>Diaphragm pump (when specified)</td>
<td>9-2</td>
<td>Pressure reducing valve for cylinder (optional)</td>
</tr>
<tr>
<td>2-3</td>
<td>Pressure gauge</td>
<td>3-9</td>
<td>Drain pot (when specified)</td>
<td>10-1</td>
<td>Standard gas cylinder (supplied by customer)</td>
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<tr>
<td>2-4</td>
<td>Preheating chamber</td>
<td>4-1</td>
<td>Pressure reducing valve for cylinder</td>
<td>10-2</td>
<td>Standard gas cylinder (supplied by customer)</td>
</tr>
<tr>
<td>2-5</td>
<td>One touch coupler</td>
<td>4-2</td>
<td>Flowmeter</td>
<td>11-1</td>
<td>Seal pot (supplied by customer)</td>
</tr>
</tbody>
</table>

*1: CM6G-S6500, S6510, S6600, S6610, S6700, S6710, S6800, S6810

*1: CM6G-S6500, S6510 (with density meter)
*2: CM6G-S6710, CM6G-S6710 (with diaphragm pump)
Installation Procedures

Installation Site

1. Adequate space for maintenance should be provided around the gas calorimeter.
2. The base should be horizontal.
3. Ambient temperature is 0 to 40°C and no rapid change in ambient temperature is allowed. Rapid change here means a change of approximately 10°C within 30 minutes.
4. Install the instrument in the place where it is not directly exposed to the current of a conditioned air.
5. Minimal vibration is allowed (if much vibration is unavoidable, take an appropriate measure to absorb shock, e.g., use of vibration-proof robber).
6. A ventilation system should be provided.
7. Corrosive gases and dust are present in small quantities and humidity is low.
8. The water of the sampling system and the drain line do not freeze up.

Installation of the Optional Probe (Reference)

1. The open probe should be installed at an angle that does not allow drain generated at the probe outlet to flow back into the probe.
2. Steam piping should be installed, if necessary, to prevent drain from freezing.
3. Steam piping for probe blowback should be installed, if necessary.
4. Safe space for maintenance should be considered.

Installation of the Seal Pot (Reference)
The seal pot should be positioned so that drain generated in the sample gas between the probe and the seal pot flows into the seal pot.

Others (Reference)

Calibration gas cylinders for the gas calorimeter should be installed and connected. Calibration gas cylinders are heavy, so they should be installed in a place allowing easy replacement. The installation place should also be as close to the gas calorimeter as possible.

Wiring Work

1. Use conduits for power and other wiring.
2. Select the appropriate nominal conductor size of the power line based on the power consumption and wiring distance. For example, if the power consumption is 200 VA, the one-way resistance of the wire should be within 1.25 Ω. (If a wire with a nominal size of 1.25 mm² is used, the maximum wiring distance is 75 m.)
3. Upon completing the wiring to the calorimeter, make sure that the wiring is made correctly.
4. For ground wiring, use an insulated wire with a nominal size of at least 2 mm². The ground resistance should be 100 Ω or less (JIS Class D grounding).
5. For signal wiring, use insulated wires. Wiring work should be appropriately done in accordance with the wiring distance and allowable load resistance.

Piping Work

1. Before the piping to the gas calorimeter, wash the inside of the pipes to remove oil, dist and other impurities, and dry it.
2. After the piping, be sure to perform a leak test applying a pressure greater than the operating pressure.
3. Sample gas may contain dangerous gases such as combustible gas, oxygen-depleted gas, and toxic gas. The gas should be safely discharged through vent pipes in accordance with local regulations. (In principle, the pressure of the discharge point is atmospheric pressure.)
4. Instrument air to be used must be clean and dehumidified. After installing the pipe for instrument air, make sure that the inside is not stained.
5. After installing pipes for standard gases, make sure that the inside is not stained.
6. Vent the outlet of the blow piping as shape U, and prevent it from the rain penetration. Set the location of the outlet at higher position as much as possible where there is little fear of danger. To let the gas flow smoothly, be sure to make the piping to the vent without any loose part. It will cause moist inside that hamper the gas flow.
7. Drain piping shall be conducted so that it stays below the drain outlet and no drain accumulated on the panel bed.
8. It is necessary for the sample line of the steel mill use instrument to provide a slope of more than 1/3, so that there happens no blockade to the gas line by the drain at the bending part of the piping. Make piping as short as possible. Equip the sample line with thermal insulation so as to prevent drain in the pipe line to be freezed.
(9) Locate the standard gas cylinders at the place where they are not exposed to direct sunshine and comparatively cool.

Probe Sampling Point

Steam for thermal insulation

Steam for blowing back

Valves for maintenance should be installed

Tetoron Braid Hose

Filter

Filter

Sample Gas Inlet

Std. Gas Inlet

Pressure Reducing Valve

Power Supply

100 V AC±10% 50/60Hz
Max. approx. 1100 VA

Output Signal

Alarm Contact

Output Signal

Camera Gas Calibration

Pressure Reducing Valve

Pipe SUS 15A

Drain Outlet

Pipe SUS 15A or greater

Pipe SUS 15A

Drain

Pipe SUS 15A or greater

Pipe SUS 15A

Drain

House Requirements
Temperature: 0 to 40˚C
Not rapid temperature change allowed.
Adequate ventilation and lighting provided.

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Note: ▲ denotes that piping should be installed at an angle that allows drain to flow downstream and smoothly.

△H: Water sealing greater than pressure at sampling point is required.
GAS CALORIMETER ENQUIRY SHEET

Thank you for enquiring about our gas calorimeter. Please specify your requirements by making checks in each applicable □ and writing in the underlined parts.

1. General Information
   Customer: Contact person: Sect: (phone:
   Name of plant:
   Measuring point:
   Purpose: □ measurement □ control □ alarm □ trading
   Power supply: □ 100 V AC □ 50 Hz □ 60 Hz

2. Process Conditions
   Sample gas: □ town gas □ fuel gas in steel plant
   Measurement: □ WI □ calorific value
   Measuring range: □ to □ (specify in the range of 3 to 62 MJ/Nm³)
   Gas pressure: □ For town gas □ 10 to 20 kPa □ 10 kPa or under □ 100 to 600 kPa
   □ For steel plant □ 8 to 15 kPa □ 8 kPa or under
   Gas temperature: to °C (normally °C)
   Gas humidity: dew point °C
   Dust content: □ No dust □ Little □ Much □ to g/Nm³
   Gas composition:
<table>
<thead>
<tr>
<th>Gas composition</th>
<th>Nor %</th>
<th>Max %</th>
<th>Min %</th>
<th>Gas composition</th>
<th>Nor %</th>
<th>Max %</th>
<th>Min %</th>
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<tbody>
<tr>
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</tr>
</tbody>
</table>

3. Installation
   Ambient temperature: to °C
   Vibration: □ NO □ YES
   Others:  

4. Specification Requirements
   Measuring range: 
   Output: 1 to 5 V DC, 4-20 mA DC (simultaneously)
   With gas density meter: □ YES □ NO
   Others:  

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