

UNIT ONE

DIAGRAMS AND DESCRIPTION OF OBJECTIVES AND DEVICES

Introduction:

Communication is crucial in technology engineering, and diagrams play a vital role in conveying complex information. In this lesson, we will explore the skills needed to describe technical components accurately.

The objectives of this first unit are for the students to:

- Learn to effectively describe component shapes and features of engineering objects.
- Understand how to articulate the functions of various devices.
- Be able to make accurate statements about diagrams and illustrate texts with diagrams.
- Develop the skill of expressing measurements and purpose in a technical context.

Lesson outline:

Description of Component Shapes and Features: Understanding the shapes and features of components is essential. Consider common engineering objects and engage in activities to practice describing their shapes and features.

Description of the Function of a Device: Knowing the functions of devices is fundamental in technology. Explore examples, discuss primary functions, and engage in activities where students analyze and describe device functions.

Making Statements About Diagrams: Learn to make accurate statements based on diagrams. Understand how to interpret information and express it in written or verbal form. Practice making statements about provided diagrams.

Illustration of a Text with Diagrams: Diagrams can complement written texts. Analyze a sample technical text and create diagrams that visually represent the information. Present and discuss how diagrams enhance understanding.

Expression of Measurement: Precision in expressing measurements is critical in engineering. Learn common measurement units and symbols used in technical diagrams. Participate in exercises converting and expressing measurements.

Expression of Purpose: Understand how to express the purpose of a device or component. Explore how purpose is conveyed through text and diagrams. Discuss the importance of clearly stating purpose in design and documentation.

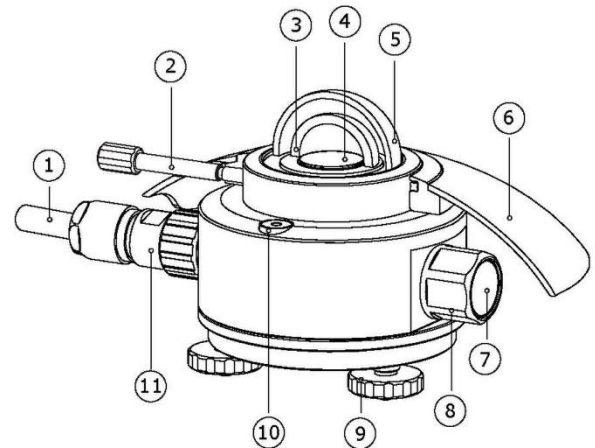
The pyranometer

Understanding Pyranometers: Measuring Solar Irradiance

A pyranometer is a specialized instrument designed to measure solar irradiance (in Watts per square meter), which is the total radiant energy received from the Sun (in Joules) per unit area on the Earth's surface (in meter squared) during a specific period. This essential device plays a crucial role in various fields, including meteorology, solar energy research, and environmental monitoring.

Components and Design:

A typical pyranometer consists of a thermopile sensor, a glass dome, and a housing. The thermopile sensor is the heart of the instrument, converting solar radiation into a small voltage, which is then measured to determine the solar irradiance. The glass dome ensures uniform spectral response and protects the sensor from environmental factors. The essential parts -with reference to the schematic above- of a pyranometer are: cable (1), pyranometer (3), glass domes (5), black detector surface (4), sun screen (6), desiccant indicator (7), levelling feet (9), bubble level (10), connector (11).



Working Principle:

The thermopile sensor operates on the principle of thermoelectricity. When exposed to sunlight, the different absorptivity of the sensor's surface materials leads to a temperature difference (Seebeck effect) between the black absorbing surface and a surface of reference (e.g., white surface or internal surface of detector), the temperature difference generates a voltage. This voltage is directly proportional to the incoming solar radiation (temperature difference), allowing for accurate measurement.

The thermopile sensor has a black coating that absorbs the entire spectrum of solar radiation, spanning from 300 to 50,000 nanometers; while the glass dome limits the spectral response up to 2800 nanometers.

Applications:

Meteorology: Pyranometers are extensively used in meteorological stations **to** monitor and record solar radiation levels. These data are crucial **for** understanding weather patterns, climate changes, and predicting energy availability **for** solar power generation.

Solar Energy Research: In the renewable energy sector, a pyranometers is quite important, it's employed **to** assess the solar potential at a location. Solar energy researchers use the data **to** optimize the placement and efficiency of solar panels and other solar energy systems.

Agriculture: Monitoring solar irradiance is vital for understanding plant growth and photosynthesis. Pyranometers contribute valuable information **for** optimizing agricultural practices and enhancing crop yield.

Types of Pyranometers:

Thermal Pyranometers: Measure solar irradiance by detecting the temperature rise in a material exposed to sunlight.

Photovoltaic Pyranometers: The photovoltaic type utilizes photovoltaic cells **to** generate an electric current proportional to solar irradiance.

Pyrgeometers: Specialized pyranometers that measure infrared radiation from the sky, providing insights into the Earth's radiation budget.

Calibration and Maintenance:

Regular calibration is crucial to ensure the accuracy of pyranometer measurements. This involves comparing its readings with a reference standard under controlled conditions. Routine maintenance, including cleaning the dome and checking for any damage, is essential for reliable long-term performance.

Final note:

In conclusion, pyranometers play a vital role in understanding and harnessing solar energy. Their applications range from meteorology to renewable energy research, contributing valuable data that aids in various scientific and practical endeavors.

References:

<https://en.wikipedia.org/wiki/Pyranometer>

<https://www.britannica.com/science/thermoelectricity>

<https://www.campbellsci.com/blog/pyranometers-need-to-know>

<https://www.britannica.com/science/Seebeck-effect>

Student activity

- Listening: Listen to the technical presentation of the pyranometer.
- Reading: Read the text in turns.
- Understanding:

What’s a pyranometer?

.....

.....

What is it composed of?

.....

.....

What are the uses of pyranometers?

.....

.....

What’s the physical principle of a pyranometer?

.....

.....

- Grammar:

Find in the text examples of prepositions of place:

What do bold “to” and “for” express in the text?

.....

.....

Find in the text words ending in “s” and classify each one in the following table:

/s/	/z/	/iz/

Grammatical rules:

Prepositions of place:

In English language, three prepositions of place are used: *at*, *on*, and *in*.

Their uses are the following:

“At” is used to discuss a certain point.

“On” is used to discuss a surface.

“In” is used to discuss an enclosed space.

Pronunciation of final “s”:

Depending on the final consonant, the final “s” is pronounced in three ways:

/s/: after p, k, t, f, ph, th.

/z/: after b, d, g, l, m, n, ng, r, v, y.

/iz/: after c, s, x, z, ss, ch, sh.

Weak and strong forms:

Grammatical words play a crucial role in sentence construction, yet they lack inherent meaning. Examples include articles, prepositions, conjunctions, auxiliary verbs, and so on.

These words are unstressed and consequently undergo a weakening process known as the "weak form." This is in contrast to the "strong form," which represents the full, stressed pronunciation of the word. The strong form is employed when words are pronounced in isolation or when emphasis is applied. Weak forms are frequently articulated with a schwa sound “/ə/”, rendering them quite weak and occasionally challenging to discern accurately.

Identifying weak forms is often straightforward, as we employ contractions in spelling to indicate them; e.g., I am a student (strong form), I’m a student (weak forms).