DIGITAL PHASE COMPARATOR
Type DPC1400

Revision 0 of 18 March 2026



HIGHLIGHTS & FEATURES

- *Omologated according to IEC 62271-215*
- *Suitable for phase comparison with voltage detecting system VDIS/LRM IEC62271-213*
- *Retrofit compatible with old standard IEC 61243-5 type HR and MR*
- *Compatible with ENEL DY1811 VDS/MR and older type*
- *Automatic multirange of measurement*
- *Accessories included to adapt to any kind of measuring testing points*
- *Large display for easy reading and backlite for dark environment*
- *Local indication of phase balance or unbalance (audible signal too)*
- *Local indication of measured degree of phase rotation*
- *Test button and cable test available*
- *ClassA (>30°) or ClassB (>60°) selectable*
- *Indication of phase sequence: direct or inverse*
- *Battery powered, status of battery displayed*
- *Auto power off for long duration*

Functional Scope & Application

Overview

The phase comparator is a precision safety instrument engineered to verify the phase synchronism between two separate energized sections of a high-voltage network. By interfacing directly with the capacitive test points of a **Voltage Detecting and Indicating System (VDIS)**, the device provides operators with a definitive "In-Phase" or "Out-of-Phase" status, ensuring secure and error-free switching operations.

Core Applications

- **Safe Network Coupling:** Essential for validating the phase relationship between two high-voltage circuits sharing the same nominal voltage and frequency prior to interconnection.
- **Operational Safety:** Designed to prevent catastrophic equipment failure and personnel injury by eliminating the risk of coupling out-of-phase systems.
- **Standardized Interfacing:** Optimized for seamless integration with VDIS interfaces compliant with **IEC 62271-213**.

System Integration & Compatibility

- **VDIS Connectivity:** The unit is purpose-built for plug-in connection to standardized LRM or MR testing points.
- **Versatile Functionality:** Beyond dedicated comparators, the performance criteria outlined in **IEC 62271-215** may be applied to other VDIS-integrated diagnostic tools, subject to manufacturer and end-user specifications.
- **Standard Compliance:** This device strictly adheres to **IEC 62271-215**. It is designed specifically for indirect measurement; it must not be used for direct contact with bare, live high-voltage conductors (which are governed by the **IEC 61481** series).

Key Performance Highlights

- **Reliable Decision Support:** Delivers clear, unambiguous evidence of synchronization status.
- **Safety-First Design:** Operates through isolated test points, keeping the user physically separated from primary high-voltage components.
- **Network Integrity:** Specifically tuned for high-voltage networks to ensure that phase relationships are maintained across complex distribution grids.

All specs are subject to change without notice

1 INTENDED USE

The Digital Phase Comparator is the mobile part of a voltage detecting system according to IEC 62271-215, with capacitive coupling to live parts. According to this standard the DPC1400 also a universal phase comparator (UPC) for LRM, HR systems and ENEL DY1811
The following features are combined in this device:

- Detection of 'voltage present' and 'voltage not present'.
- Phase comparison 'phase balance' and 'phase unbalance'.
- Measurement and display of phase angles for phase comparison.

2 DESCRIPTION OF THE DEVICE

2.1 SCOPE OF DELIVERY

- A complete set of DPC1400 device includes:
- 1 display unit
- 1 set of LRM measuring cables (2 measuring leads)
- 2 HR-LRM adapters for the connection to HR interfaces
- 2 DY1811-LRM adapters for connection to ENEL sockets
- 1 case

2.2 DISPLAY UNIT

- Handheld housing: 216 x 105 x 40 mm
- Voltage supply: battery powered by 2 mignon cells, size AA, 1.5 V



Fig.1

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2.3 MEASURING CABLES

The measuring cable kit comprises two measuring cables. One end of each cable is provided with two plugs for the connection to the VDS, whereas a BNC connector is provided on the other end to be connected to the DPC1400

2.4 DY1811 ADAPTER

For tests on DY1811 interface types the adapters are to be connected to the GND measuring cables

2.5 MULTI-COLOUR LED

Each colour of the multi-colour LED indicates a specific operating condition of the DPC1400.

- Voltage detection and interface testing (green and red)
- Phase comparison (green and red)
- Phase-sequence (green and red)
- Battery status (green and red)

2.6 CONNECTIONS

The DPC1400 is provided with three electrical connections which are accommodated in the housing.

- 2 BNC jacks to connect the measuring cables at the upper end of the housing
- 1 test socket to plug in the measuring heads of the measuring cables at the top of the housing

3 DEVICE FUNCTION

3.1 PHASE COMPARISON

Phase comparison is performed as follows:
Step 1: Put the DPC1400 into operation
Step 2: Insert the plug-in connectors into the desired phases of the interfaces (in case of HR interfaces with HR/LRM adapter or DY1811)

NOTICE!

Put the plug-in connectors into the test sockets of the DPC1400 ensuring correct polarity!
Pay attention to the ⏚ symbol

The results are indicated by LED and LCD



Fig. 2 Missing Signals



Fig. 3 Out of Phase + Audible buzzer



Fig. 4 In Phase

NOTICE!
The proper operation of the phase comparison is checked by the self-test.

3.2 PHASE ANGLE MEASUREMENT

The DPC1400 displays the phase-angle between measurement channel 1 and 2 while it performs phase comparison. The measured value is indicated in '°' (degree).
For phase-angle measurement, proceed as follows:
Step 1: Perform phase comparison (see chapter 6.3.1).
Step 2: Read measured values (see Fig.3)

3.3 PHASE SEQUENCE INDICATION

For phase-sequence indication, proceed as follows:
Step 1: Perform phase comparison (see chapter 6.1)
Step 2: For the clockwise rotating field adhere to the following plugging sequence:
Phase L1 / Phase L2
Phase L2 / Phase L3
Phase L3 / Phase L1

3.4 BATTERY STATUS

Replaceable batteries power the DPC1400. The battery status is shown on the ON-LED



Fig.5

LED	Meaning
Green permanent light	Batteries are full
Green flashing light	Batteries are almost empty
Red permanent light	Replace the batteries as soon as possible

Open the compartment on the rear of the device to replace the battery. Ensure that the new batteries are assigned to the correct poles.

NOTICE!
Use only batteries with a rated voltage of 1.5 V and of LR6 or AA type

3.5 SWITCHING OFF & DISPLAY

- Manually with long press of  button
- Automatically after 5 minutes if no one press the  button
- Battery exhaustion

After switching off, all displays are switched off!

The display backlight switch automatically OFF after 15 seconds, can be activated again with a short press of the  button

3.7 SENSITIVITY CLASS

Unscrew the 4 screws on the back of the device and locate the dip switch located in the bottom left of the main circuit board
1) Class A balance/unbalance threshold of 30° with the dip-switch setting 1 & 2 both OFF or ON
2) Class B balance/unbalance threshold of 60° with the dip-switch setting 1 ON and 2 OFF
2) Class C balance/unbalance threshold of 45° with the dip-switch setting 1 OFF and 2 ON
A restart of the device is mandatory in order to set new class

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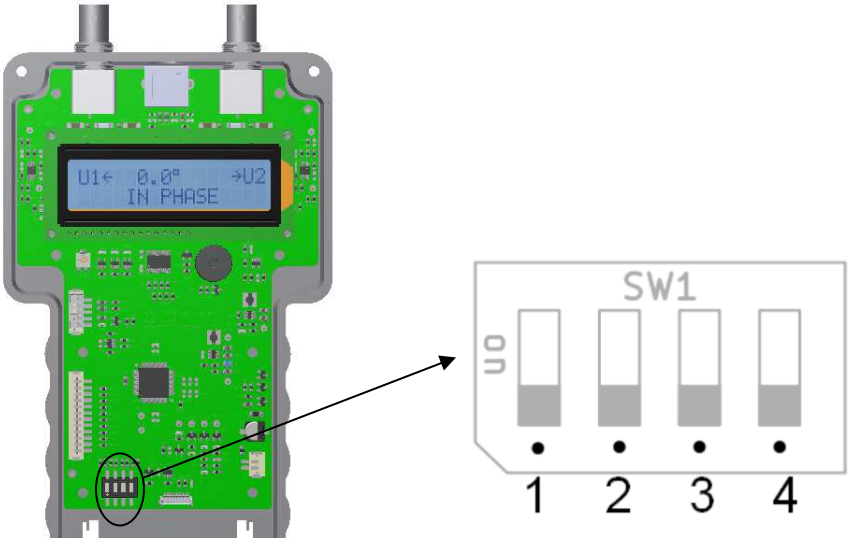


Fig.6

STORAGE

If the complex must be storage before use, please keep dry and repaired.
Do not leave outdoor.
Device is strongly sensitive to humidity hence avoid to store where relative humidity is more than 90%

STORAGE TEMPERATURE: -30°C ÷ +70°C
RELATIVE HUMIDITY: max 90% @ +40°C

MAINTENANCE

Maintenance of instrument must be done compulsory in factory. We recommend every 2 years to send back instrument for calibration check and inspection.

WARRANTY

Device is covered by 24 months after installation or max 36 months after delivery.
In case of service the instrument must be sent back to factory for inspection.

WARNINGS

CAUTION
Do not drop or hit the instrument. The sensor is fragile and may break from sudden shock.
When transporting the manometer, use the original shipping box from Electronsystem.

NOTE
Keep the instrument dry and clean.

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