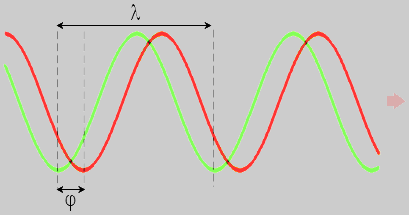
# *PHASE METER FOR ALTERNATING VOLTAGES*
## *PHL165*

- ***Phase angle measurement -180°....+180°***
  *Accuracy: better than 1°*
  *Resolution: 0.1°*
  *Phase angle offset and sign configurable*
  *Frequency range from 40 to 70 Hz*
- ***Two isolated voltage inputs***
  *Two input range 150Vac and 400Vac*
- ***Up to 3 analog outputs***
- ***2 relay outputs option***
- ***Ethernet Modbus TCP link option***
  *Embedded Web server*
  *6 Modbus TCP concurrent connections*
- ***LCD display***
  *2 lines of 16 characters*


**PHL165 allows measuring the phase angle between two signals of the same frequency, insulated entries and internal filters offer a high rejection of common mode disturbances for reliable measurement in an industrial environment.**

**Applications**
- Control of rotating machine.

**Measures and display**
- Frequency of each input, phase difference in degrees.

**Measure inputs**
2 isolated voltage inputs, 2 input ranges (150 V and 400 V).

**Analog output (option /S)**
- 1 to 3 isolated analog outputs. Fully configurable:
Range of angle to monitor (from -180 ° to +180 ° C)
Type and range of analog output (0 .. 10 V, 0 ... 4 ... 20 mA)
response time (filter) and limitation ... adjustable for each output.

**Relay outputs**
- 2 relays (250V / 10A) for threshold on phase angle.
- Threshold, direction, hysteresis and delay individually adjustable on each relay (ON and OFF delays).

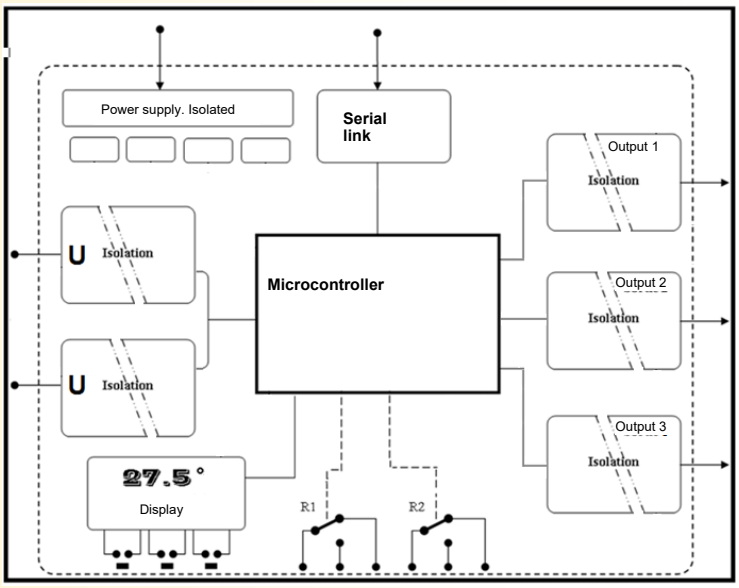
**Communication (option /CMTCP)**
- Ethernet 10/100 T base (RJ45 connection) Modbus TCP
- Embedded Web server for direct visualization of measures by using a web browser.

**Configuration**
- The device can be configured via the front face or the RS232 link. USB to RS232 cable supplied separately.
- Firmware update is possible via the USB serial link.

**Font Face**
- LCD display with 2 lines of 16 characters (back-lighted).
  measurement display ("display" button)
- Three push buttons to configure the product:
  Initial angle offset, change of angle sign, analog output, relays, communication IP address, mask ….

**Feature**
- DIN standard modular housing (9 modules, ~161 mm).
- connection on spring terminal block (max section 1 $mm^2$)
  (option: screw terminal block, max section 2.5 $mm^2$).
- degree of protection: IP20.
- Conformal coating.

**Synoptic:**




Version and order code:

**PHL165** : Phase meter with 1 analog output.

***OPTION***
**/S2** : Phase meter with 2 analog outputs.
**/S3** : Phase meter with 3 analog outputs.
**/R1** : + 1 relay.
**/R2** : + 2 relays.

***Communication option***

**PHL165/CMTCP:** Ethernet MODBUS TCP link

(analog output, relays and Modbus TCP options can be combined)

## MESURE INPUTS U1, U2

| TYPE | RANGE | |
|---|---|---|
| Voltage | 0…150Vac | (low input) |
| Input impedance | > 1 Mohms | |
| voltage | 0…400Vac | (high input) |
| Input impedance | > 4 Mohms | |
| power consumption | < 0.1 Watt | |
| Continuous overvoltage | 2U nominal | |
| Measurement rate | continuously | |
| Frequency | 40 to 70 Hz | |

## METROLOGY

| TYPE | RANGE | ACCURACY | RESOLUTION |
|---|---|---|---|
| Frequency | 40...70Hz | +/- 0.01 Hz | +/- 0.0025 Hz |
| Phase angle | +/- 180° | +/- 1° | +/- 0.1° |

Measuring conditions: Frequency : 40…..70 Hz, peak factor <1.5, sinusoidal signal, voltage from 50 % to 120 % of input range, ambient temperature from 15 to 30°C

**Note: non-compliance with the above conditions (input range underutilization, harmonic distortion, saturated climate conditions, ...) leads to a downgrade of the metrological performances.**

## POWER SUPPLY

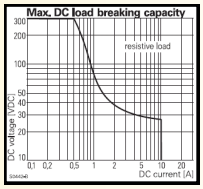
20…265 Vac-dc, 2.5 VA standard

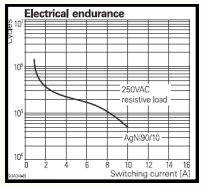
## ANALOGICAL OUTPUT (12 bits resolution)

| TYPE | RANGE | ACCURACY |
|---|---|---|
| Current S1, S2, S3 | 0 ... 4 ... 20 mA | +/- 20 µA |
| admissible load: | 0 … 750 Ohms | |
| Voltage S1, S2, S3 | 0 ... 10 V | +/- 10 mV |
| Output impedance: | 500 Ohms | |

## RELAY OUTPUT (option)

2 changeover relays, potential free, switching capacity 10 A / 250 Vac
Adjustable angular threshold in steps of 1° from -180° to +180°
Tripping and release delay from 0s to 60s, resolution of 0.02 seconds, positive or negative security.




## COMMUNICATION (option)

Ethernet 10 /100 T Base, RJ45 connector.
Modbus TCP protocol: Port 502.
HTTP protocol: Port 80.

## ENVIRONMENT

| | |
|---|---|
| Operating temperature | -20 to 60 °C |
| Storage temperature | -20 to 85 °C |
| Relative humidity | 85 % not condensed |
| Weight | 350 g |
| Protection rating | IP 20 |
| Dielectric strength | 2500 Vrms |

input U1/ input U2 / Power / Relays / Analogical output

| | |
|---|---|
| MTBF (MIL HDBK 217F) | > 2 000 000 Hrs @ 25°C (without Ethernet) |
| Life time | > 150 000 Hrs @ 30°C |

***Electromagnetic compatibility 2014/30/UE / Low Voltage Directive 2014/35/UE***

| Immunity standard for industrial environments EN 61000-6-2 | | Emission standard for industrial environments EN 61000-6-4 | |
|---|---|---|---|
| *EN 61000-4-2 ESD* | *EN 61000-4-8 AC MF* | *EN 55011* | CE |
| *EN 61000-4-3 RF* | *EN 61000-4-9 pulse MF* | | |
| *EN 61000-4-4 EFT* | *EN 61000-4-11 AC dips* | *group 1 class A* | |
| *EN 61000-4-5 CWG* | *EN 61000-4-12 ring wave* | | |
| *EN 61000-4-6 RF* | *EN 61000-4-29 DC dips* | | |

## *WIRING AND OUTLINE DIMENSIONS:*