

- **Phase angle measurement  $-180^{\circ} \dots +180^{\circ}$**

Accuracy: better than  $1^{\circ}$

Resolution:  $0.1^{\circ}$

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**

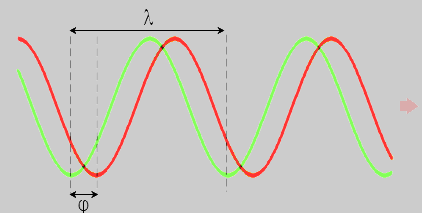
- **Ethernet Modbus TCP link option**

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  $-180^{\circ}$  to  $+180^{\circ}$  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.

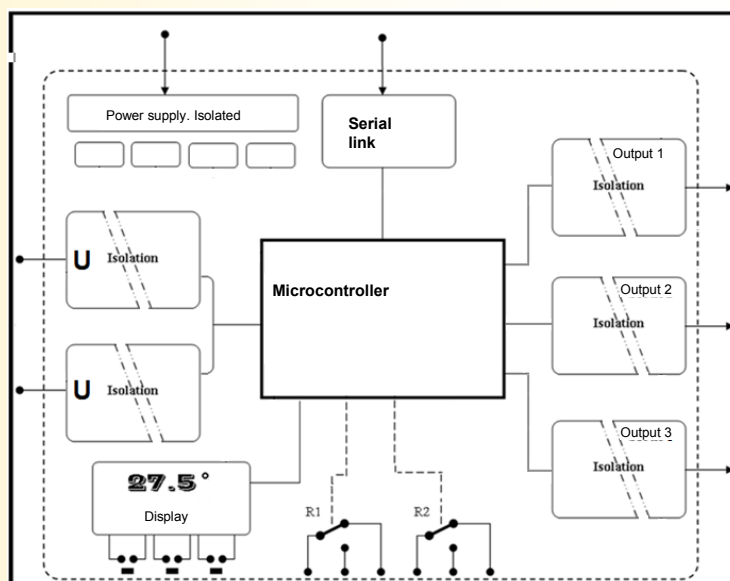
#### Font Face

- 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  $1 \text{ mm}^2$ )  
 (option: screw terminal block, max section  $2.5 \text{ mm}^2$ ).  
 - degree of protection: IP20.  
 - Conformal coating.

#### Synoptic:



Version and order code:

[Request a quote](#)

**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**

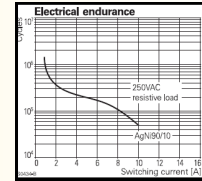
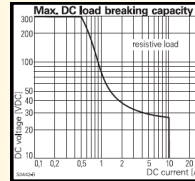
20...265 Vac-dc, 2.5 VA standard

**ANALOGICAL OUTPUT (12 bits resolution)**

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

**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 group 1 class A
EN 61000-4-3 RF	EN 61000-4-9 pulse MF	
EN 61000-4-4 EFT	EN 61000-4-11 AC dips	
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:**

