## Characteristies

- Power factor measuring by means of angular dephasing of balanced single-phase or three-phase power nets.
- Output signal with or without supreessed zero.
- Galvanic isolation between in-and output and auxiliary power supply.
- Reduced size for mounting space saving
- Fixed linear measuring field
- Case type housing for fastening with screws, or on rail.
- Minimum input current monitoring (optional).
- Output with load divider (optional).

Application

Conversion of the angular dephasing between voltage and current of single-phase and three-phase nets into a direct current or voltage signal, which is independent on the load.

Functioning

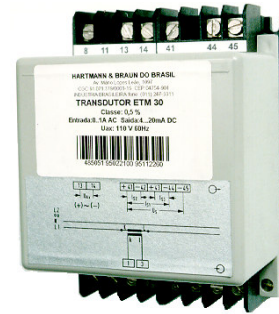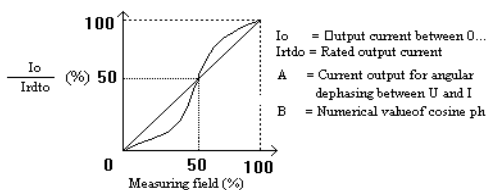The transducer ETL-30 for power factor is a fully electronic instrument.
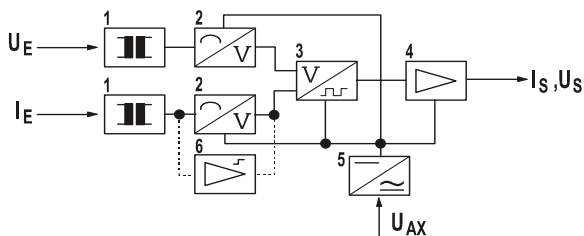
By means of the transformes (1), which effectuate a galvanic isolation between the in- and output signals, the voltage and current input signals are sent to trigging modules (2). The trigging modules control the pulse frequency of a double-stable multi-vibrator (3), being the output voltage directly proportional to the power factor. The resulting signal converted by the amplifier (4) to a direct current or voltage.

The power supply (5) feeds auxiliary power to all intern circuits with galvanic isolation from the power to all net by means of an own transformer.

The current monitor (6) sets the saturation of the output signal, when the input current is less than 0,05 IrtdI**.**

Characteristic curves

Io = Output current between 0...
Irtdo = Rated output current
A = Current output for angular dephasing between U and I
B = Numerical value of cosine ph

Technical data (NBR 8145)

Input

Power factor	cap. 0,8...1...0,3 ind.
	cap. 0,9...1...0,5 ind.
	cap. 0,5...1...0,5 ind.
	Ind. 0,5....0...cap.1 ind....0...0,5 cap.
	geration consumption geration (others on consult)
Rated voltage	110; 220; 380; 500V (others on consult)
Rated current	1; 5A (others on consult)
Signal limit	$\geq 0,2$ UrtdI or 0,2 IrtdI
Consumption	Voltage input: $\leq \pm 1$mA
	Current input: $\leq \pm 0,1$VA
Rated frequency	50;60 Hz $\pm 10\%$ (others on consunt)
Overload	permanently: 1,5 UrtdI ; 2 IrtdI
	briefly: 4UrtdI/1s ; 50IrtdI/1s
	maximum: 250 A/1s
Ground voltage	660V max.

Output

Current	0...1/5/10/20mA,
	4...20mA (others on consult)
	The relation $\dfrac{\text{current output}}{\text{power factor}}$ is not linear
Signal limit	$\leq 1,4\ I_{rtdO}$ ≤ 25V; R_C = infinite
Load limit	$Rc = \dfrac{15.000(mV)}{\text{Max. output signal (mA)}}\ \Omega$
	f.ex.: Rc=750Ω for 20mA
Output with load divider (optional)	To calculate RC use 7.500mV instead of 15.000mV, the results will be the same for both outputs
Voltage	0...10V Rc $\geq$ 500Ω (others on consult)
Residual ripple	$\leq 0,5\%$ (peak to peak)

Auxiliary power supply

20…60Vca/Vcc or 85…265Vca/90…300Vcc
consumption: ±4W

Influence magnitudes

Error limit		0,5%(normal) or 1,00 (according to reference conditions)
Reference conditions	input:	$II = 0,2..1,2.IrtdI$; $UI = 0,2...1,2UrtdI$ (error limit 0,5%) $II = 0,05..1,2.IrtdI$; $UI = 0,2...1,2Urtd$ (error limit 1,0%)
	frequency	frtd ±2%
	Form factor:	1,111
	Auxiliary power supply:	UAX ±2%
	load:	0,5RC max.
	Ambient temperature:	25°C ±2K
	Heat time	± 20 min.

Additional error above 1,2IrtdI or UrtdI	≤ 0,2%	
Linearity deviation	≤ 0,2%	(incluided in error limit)
Load	≤ 0,05%	RC = 0....RC max.(incluided in error limit)
Temperature	≤ 0,2%	/10 K; rated temperature 25°C
Auxiliary power supply	≤ 0,05%	within the permitted tolerance range for the supply range
Response time	≤ 200 ms	
External magnetic fields	≤ 0,5%	for field intensity of 0,4 kA/m
Radio frequency interference	≤ 2%	between 27...460MHz at a distance of 1m; power 1 W

Notes:

When the input current is under $0,05I_{ratI}$, saturation of the output signal occurs.
Linear characteristic curve for 0...20mA output is proportional to 60..0..60° of angular dephasing.
Not linear characteristic curve for 0..20mA output is proportional to cosφ.
Related the final output value.
When using "double output" there is no galvanic isolation between the output signal.
Response times below 200 ms result in bigger residual ripple.

Electrical test

Test voltage	U**AX** = 20… 60Vca/Vcc = 1,5kV/1 min. 60Hz between auxiliary power supply and others U**AX** = 85…265Vca/90…300Vcc = 2,5kV/1 min. 60Hz between auxiliary power supply and others

Peak and transient protection	5kV; 1,2/50 us; 0,5Ws
Hight frequency interference	2,5kV; 1MHz; 400 pulses / 1s

Construction and Mounting

| Type	Case
Housing	Base and cover of plastic
Fastening	Surface mounting with two screws M4, or using DIN rail.
Electrical connection	Frontal terminals for eye and fork type cable shoes
Protection class (NBR 6146)	IP 50 in housing IP 20 at the connection terminals
Weight	± 0,7 kg

Climatic conditions

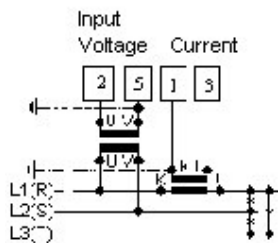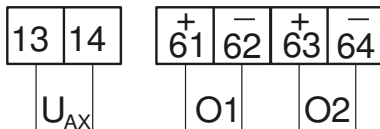|	
Operation temperature	-20...+60°C
Functionin temperature	-25...+70°C
Transport and storage temperature	-40...+80°C
Relative humidity	≤ 75% of annual average with light condensation (others on consult)

Mechanical Test

Impact	acceleration 30g during 11ms
Vibration	acceleration 2g frequency 5..150Hz

Scale of measuring fields
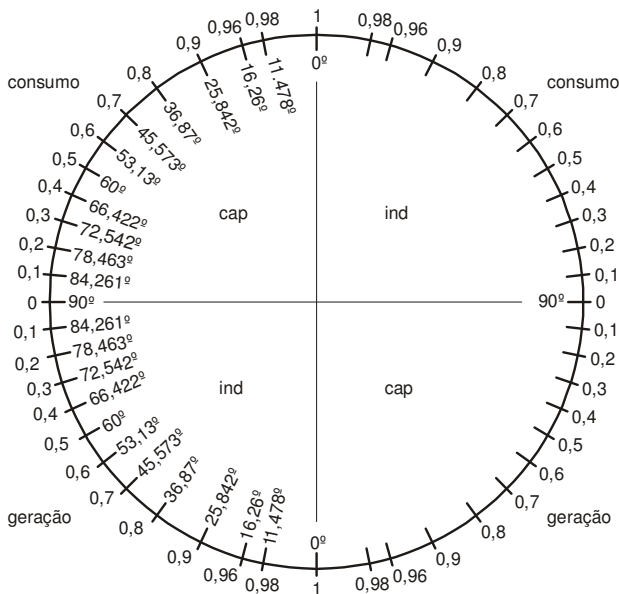
Electric Connections

13	14	$\overset{+}{61}$	$\overset{-}{62}$	$\overset{+}{63}$	$\overset{-}{64}$
U_{AX}		O1		O2	

L 1/N	=	Voltage input for single-phase nets
L 1/L2	=	Voltage input for three-phase 3 wires with equilibrated load
UAX	=	Auxiliary power supply
O1	=	Current or voltage output - normal
O2	=	Output with load divider (double output) - optional

Dimensional drawuing
Dimension in mm
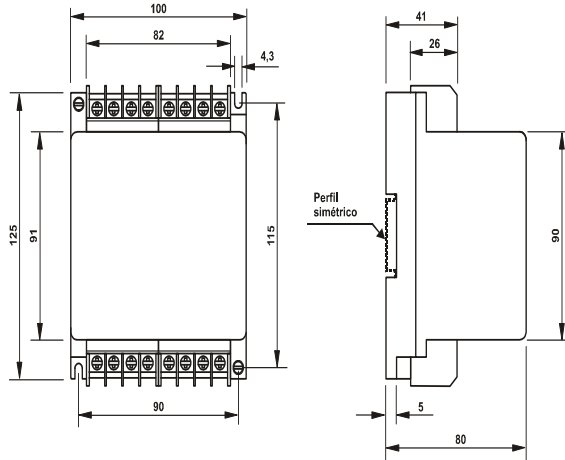
Additional information

The following items contain tips and cautions to br observed by the user for a good functional performance, as well as the maintenance of the instrument and the safety of the installations.

Cautions

Be sure the voltages and current to be connected to the instrument, are compatible.
Loosen all connections from the instrument before removing it from the installation.

Mounting Instructions

Observed the ambient temperature range. At the place of installation, values for vibration, dust, dirt and humidity, which must remain between the limits, established by the protection class of the housing and the climatic group, specified in this data sheet, have to be observed.
For fastening on flat area use two M4 screws. For mounting on DIN rail, use the snap-in device on the rear of the instrument.
The connections can be made with eye or fork type cable shoes.

Instructions for Use

When conncetions have been made, switch on the power supply and check at the output the functioning of the transducer.

Ordering information

	Catalog number														
TRANSDUCER FOR POWER FACTOR ETL-30	N	0	0	3	0	-	-	-	-	-	-	-		-
Housing														
Case						8								
Nominal Frequency														
50 Hz							1							
60 Hz							2							
400 Hz							3							
Others							0							
Nets														
For Single-phase alternating current								1						
For balanced three-conductor, three phase alternating current								2						
Power Factor														
Cap. 0,8...1...0,3 Ind.									1					
Cap. 0,9...1...0,5 Ind.									2					
Cap. 0,5...1...0,5 Ind.									3					
Ind. 0,5...0...Cap. 1 - Ind. 0...0,5 Cap.									4					
Others									0					
Output Signal														
0...1mADC										1				
0...5mADC										2				
0...10mADC										3				
0...20mADC										4				
4...20mADC										5				
0...10VDC										6				
Others(+/- 1mAdc, +/- 20mAdc, +/- 1Vdc and +/- 15Vdc)										0				
Input Signal Voltage (+/- 15%)														
66V											1			
110V											2			
220V											3			
380V											4			
500V											5			
Others											0			
Input Signal Current														
1A												1		
5A												2		
Others												0		
Auxiliary power supply														
20… 60Vca/Vcc													12	
85…265Vca/90…300Vcc													13	
Option														
Error limit 0,25%														1
Output with load divider (double output)														2
Others response times between 50ms and 2s														4
Standard (Class 0,5%)														5
Addition information														
Standard															1
Complement (inform TP and TC)															C