• Characteristics

- Active power measuring in balanced and unbalanced single-phase or three-phase mains. Power measuring for sinusoidal signals.
- Output signal with or without suppressed zero.
- Galvanic isolation between input and output and auxiliary power supply
- Reduced size for mounting space saving.
- Case type housing for fixing with screws or in din-rail
- Output with load divider (optional).

• Application

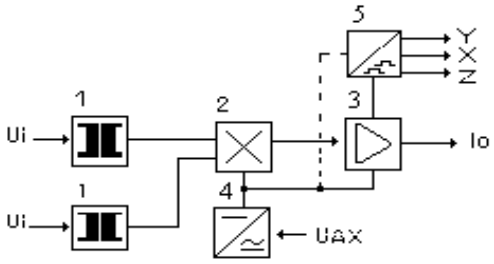
Conversion of the active and reactive power of single-phase and three-phase mains into a direct current or voltage signal, which is independent on the load.

• Functioning

The transducers ETP-30 and ETQ-30 are fully electronic instruments. The electrical power is calculated as follows:

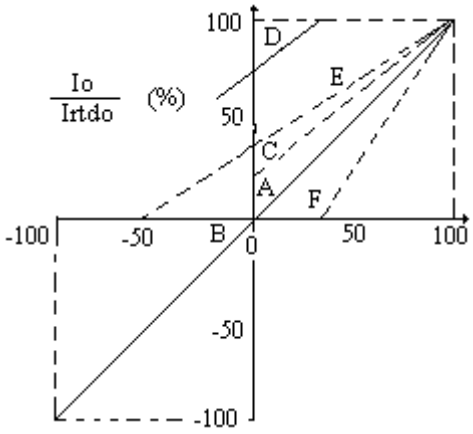
$$P = \frac{1}{T}\int_0^T u.\, i\, dt$$

That means: The instantaneous voltage and current values are multiplied between each other and integrated in the time interval of 0…T.



The transforming units (1) attenuate the voltage and current input signals, condition them to the multiply module (2) and establish a galvanic isolation between the input and output signals
The multiplier (2) uses the TDM (time-division-multiplication) principle working with an insignificant deviation from the above mentioned equation. The result is a voltage signal proportional to be measured power. The amplifier (3) filters this signal and converts it into a direct current or voltage signal. The power supply (4) feeds auxiliary power to all intern circuits with galvanic isolation from the power net by means of an own transformer. The output module (5) transmits 180° displaced pulses via two transmission channels in a frequency, which is proportional to the input signal.

Characteristic curves



Examples of zero-displacement.

Power direction	Characteristics	Measuring Field (kW)	Output (mA)	Zero-displacement
Unidirectional	A	0....100	0...20	no
	C	0....100	4...20	yes
	F	20..100	0...20	yes
Bi-directional	A/B	-100..0...+100	-20...0...+20	no
	A/B	-20....0...+100	-4...0...+20	no
	E	-50....0....+100	0...20	yes
	D	-75....0....+50	4...20	yes

Io = Output current between 0...IrtdO.
IrtdO = Rated output current.
A = Unidirectional measuring for input without zero-displacement and with constant inclination.
A/B = Bi-directional measuring for input without zero-displacement and with constant inclination.
C = Unidirectional measuring for output with suppressed zero.
D = Bi-directional measuring for output with suppressed zero.
E = Bi-directional measuring for input with zero-displacement.
F = Unidirectional measuring for expanded measuring field.

Technical data (NBR 8145)

Input

Rated voltage	0..110/220/380/500V
Current	0..1//5 A (other on consult)
Signal limit	UrtdI = 10...660V IrtdI = 0,5...5 A
Calibration factor (cf)	0,5...1,5 (others on consult) The scale end value has to be calculated with a factor between 0,5...1,5 times the value of the apparent power. The apparent power (S) is calculated using the value of the primary winding of the transformers: S = U x I (single phase circuit) S = U x I x √3 (three phase circuit) cf = P or Q = wanted power (scale end) S apparent power
Zero displacement	max. 75%
Consumption	voltage input: ≤ ± 1mA current input: ≤ ± 0,15VA
Rated frequency	50;60:400 Hz ±10% (others on consult)
Overload	permanently: 1,5 x UrtdI ; 2 x IrtdI briefly: 4 x UrtdI/1s; 50 x IrtdI/1s maximum: 250 A/1s
Ground voltage	660V max. (IEC 348)

Output

Unidirectional measuring	0...1/5/10/20mA, 4...20mA (others on consult)
Bi-directional measuring	-5...0...+5mA -10..0..+10mA } max. zero displacement ≤ 75% -20...0...+20mA 4....20mA max. zero displacement ≤ 75% (others on consult)
Signal limit	Unidirectional measuring: 1...20mA 1...10V ; Rc ≥ 500Ω Bidirectional measuring: ± 1... ± 20 mA ± 1… ±10V ; Rc ≥ 500Ω maximum: ≤ 1,5 IrtdO, ≤ 25V; Rc = infinite
Load limit	Rc = 15.000(mV) / max output signal (mA) Ω
Residual ripple	≤ 0,5% (peak to peak)
Output with load divider (optional)	To calculate Rc use 7.500mV instead of 15.000mV, the results will br the same for both outputs.

Power supply

a) 20…60Vac/Vdc
b) 85…265Vac/90…300Vdc
consumption: ± 4W

Influence magnitudes

Error limit 0,5%(normal) or 0,25% (optional)

Reference conditions	Input	II = 0...IrtdI; UI = 0...UrtdI
	Frequency	frtd ±2%
	Form factor:	1,111
	Auxiliary power supply:	UAX ±2%
	Power factor	c o sφ = 1 (active power) s e nφ = 1 (reactive power)
	Load:	0,5RC max.
	Ambient temperature:	25°C ±2K
	Heat up time:	± 20 min.

Additional error above 1,2IrtdI or UrtdI	≤ 0,2%
Linearity deviation	≤ 0,2% (included in error limit)
Load	≤ 0,05% RC = 0....RC max. (included 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 voltage
Response time	≤ 200 ms
External magnetic interference	≤ 0,5% for field intensity of 0,4 kA/m
Radio frequency interference	≤ 0,5% between 27...460MHz at a distance of 1m; power 1 W
Crest factor	≤ 4 for alternating not sinusoidal electrical magnitude

Electrical test

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

Peak and transient protection	5kV; 1,2/50 Uo; 0,5Wo
High 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 (NBR6146)	IP 50 in housing IP 20 at the connection terminals
Weight	± 0,7 kg

Climatic conditions

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

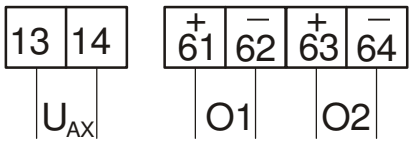
Mechanical test

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

Notes:

- Umin = 50V for single-phase circuit power or equilibrated three-phase circuit with a simulated phase.
- Frequency deviation = ± 0,6% max. for active power measuring in single-phase circuit or reactive power measuring in equilibrated three-phase circuit with a simulated phase.
- Unidirectional measuring related to the end value of the output signal. Bi-directional measuring related to the end value of the biggest signal range.
- Response times below 200 ms result in bigger residual ripple.

Electrical Connections

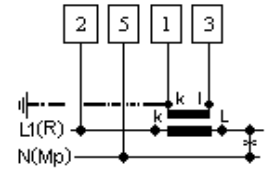


Uax	=	Auxiliary power supply
O1	=	Current or voltage output - normal
O2	=	Output with load divider (double output) - optional

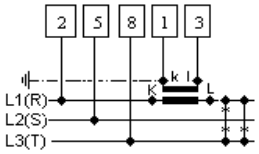
Notes

- When using only O2 jump terminals 61 and 62
- When using “double output”, there is no galvanic isolation between the output signals.

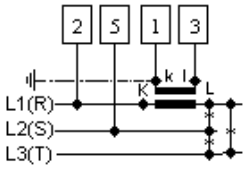
Input without PT



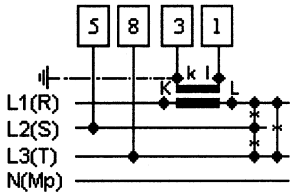
a) ∾OU 3N∾1E



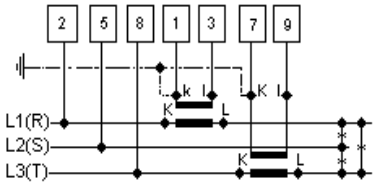
b)3∾1E



c)3∾1E

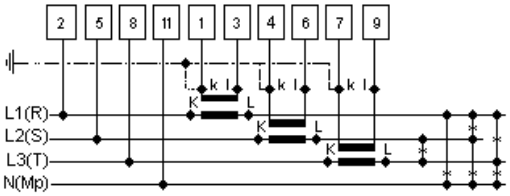


d) 3∾1E OU 3N∾1E



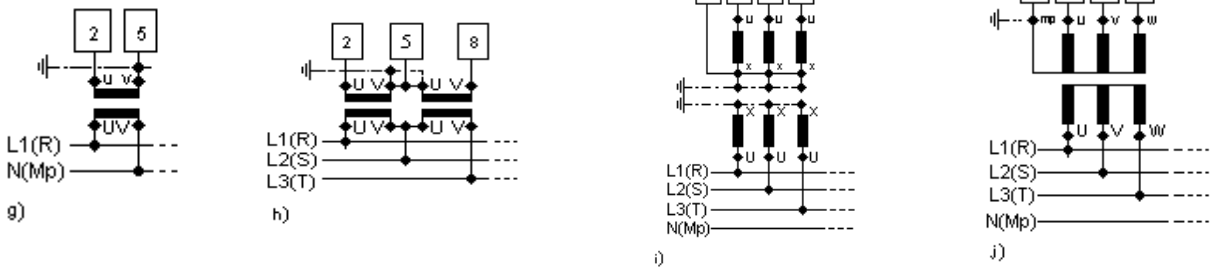
e)3∾2E

|∗|



f)3N∾2E OU 3N∾3

Input with PT

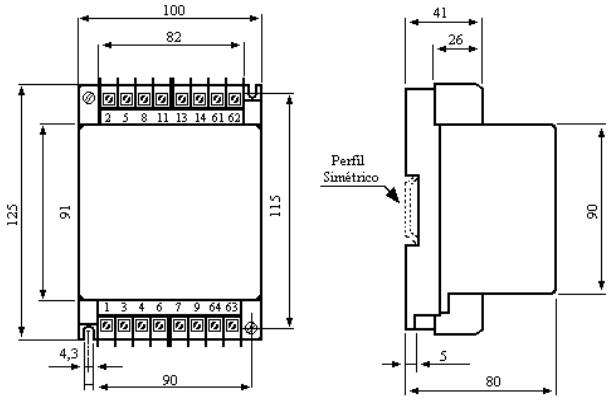


a) Active or reactive power for single-phase AC or active power for 4-wire 3-phase with balanced load.
b) Active power for 3-wire 3-phase with balanced load (ETP-30).
c) Active power for 3-wire 3-phase with balanced load, one phase simulated only with (ETP-30).
d) Reactive power for 3-wire or 4 wire 3-phase with balanced load only with (ETQ-30).
e) Active or reactive power for 3-wire 3-phase with unbalanced load.
f) Active or reactive power for 4-wire 3-phase with unbalanced load
g) Voltage transformer for connection diagram (a), (c) and (d).
h) Voltage transformer in V circuit for connection diagram (b), (e) and (f).
i) 3 single-pole isolated voltage transformers for connection diagram (b), (e) and (f)
j) 3-phase transformer for connection diagram (b), (e) and (f).

(*) 4-wire 3-phase with unbalanced load:
Terminal connection 11 is omitted only in transducer ETQ-30 and ETP-30 with 2 multipliers (UL1 + UL2 + UL3 = 0).

Dimensional drawing

Dimension in mm



Additional information

The following items contain tips and cautions to be 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 connections have been made, switch on the power supply and check at the output the functioning of the transducer.

For quoting and ordering please issue your order according to the specification text.

Example:
Transducer ETP-30

Housing:	Case
Rated frequency:	60Hz
Measuring circuit:	Single-phase
Input voltage and current:	0...110V/ 0...5A
Auxiliary power supply:	85…265Vca/90…300Vcc
Calibration factor:	0,909
Output signal:	4...20mADC
Measuring field:	200..500W
Optional:	Class 0,5%

Code number: N0031221221355C

Ordering information

	Catalog number													
TRANSDUCER FOR POWER, housing case	**N**	**0**	**0**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Model / Variable														
ETP-30 – active power						**2**								
ETQ-30 – reactive power						**4**								
Rated Frequency														
50 Hz							**1**							
60 Hz							**2**							
400 Hz							**3**							
Others							**0**							
Measuring Circuit														
Single-phase								**1**						
3-wire 3-phase balanced load 3 ~1 E								**2**						
3-wire 3-phase unbalanced load 3 ~2 E								**4**						
4-wire 3-phase unbalanced load 3N ~3 E								**7**						
Input Voltage (+/- 15%)														
66V									**1**					
110V									**2**					
220V									**3**					
380V									**4**					
500V									**5**					
Input Current														
1A										**1**				
5A										**2**				
Others										**0**				
Power Supply														
20… 60Vca/Vcc											**12**			
86…265Vca/90…300Vcc											**13**			
Output Signal														
0...1mADC												**1**		
0...5mADC												**2**		
0...10mADC												**3**		
0...20mADC												**4**		
4...20mADC												**5**		
0...10VDC												**7**		
Others(+/- 1mAdc, +/- 20mAdc, +/- 1Vdc and +/- 15Vdc)												**0**		
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**	
Additional Information														
Standard														**1**
Complement (Inform measuring field, TP, TC, etc)														**C**

ABB Ltda - ATLV/IE Electrical Instrumentation
Av. Dos Autonomistas, 1496 - 06020-902 - Osasco - SP
Tel: +55 11 3688-8320 / 8323 / 8347 - Fax: +55 11 3688-8322
instrumentacao@br.abb.com