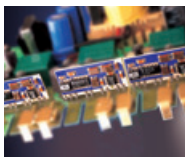
TRIAD 2 Range

Programmable digital transducers with 1 to 4 analogue outputs
Programmable accuracy class

▲ Measurement and instrumentation Programmable digital transducers

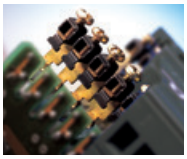
PRODUCT ADVANTAGES

- Up to 4 **PROGRAMMABLE ANALOGUE OUTPUTS**
- **4 kV INSULATION**
- **CONFIGURABLE AND MODIFIABLE** using the TRIADJUST 2 software
- **ADJUSTABLE** accuracy within Class 0.1 as per IEC 60688
- **ADJUSTABLE RESPONSE TIME** down to 50 ms
- **DIGITAL OUTPUT** available as an **OPTION**



Multi-function, economical instrument with 4 functions in the same casing

Communication, Ethernet RS 485 or optical head



Accessibility and safety: large-dimension terminals Insulated circuits

Ergonomic: easy mounting on DIN rail or switchboard

► Main specifications

Quantities measured: 1, 2, 3, 4 to be chosen from I, V, U, F, FP, P, Q, S, cosφ, φ, φU, φV, tanφ
Configuration of TRIAD 2: in factory or by the user with the TRIADJUST 2 software
Accuracy (programmable): Class 0.1 / 0.15 / 0.2 /0.5 / 1
Current inputs: 1 A, 5 A and 10 A
Voltage inputs: 100 to 480 V (ph-ph) or 100 / √3 to 480 / √3 V (ph-N)
Transfer curves: linear, 2 slopes or quadratic
Output signals: ± 1 mA, ± 5 mA, ± 20 mA, ± 1 V, ± 10 V
Response time in Class 0.2: 200 ms
Operating frequency: 50 or 60 Hz
Auxiliary power supply with wide dynamic range: 80 to 265 V ac/dc or 19 to 58 V dc
Compliance with CE directive
Digital technology

TRIAD 2 Programmable model

Factory-programmable

- **The transducer delivered is ready to operate and can be connected to the electrical network in order to deliver output signals tailored for your installation.**
- To benefit from this, you simply need to know the exact specifications of your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase , 3 or 4 wires.
  - Type of electrical connections.
  - Number of electrical quantities to be measured: 1, 2, 3 or 4.
  - Precise measurement ranges of the input/output quantities to be measured.

Users can modify a factory configuration at any time with the TRIADJUST 2 software if the specifications of the electrical network change.

Programmable via TRIADJUST 2

- **With the TRIADJUST 2 software and one of the 3 communication modes available (Ethernet, RS485 or optical head) you can program all the parameters characterizing a TRIAD 2 transducer.**
- To do so, simply choose a model which suits your electrical installation:
  - Type of network: split-phase, balanced or unbalanced three-phase, 3 or 4 wires.
  - Number of analogue outputs required (1, 2 3 or 4).
  - Value of the auxiliary source.
- You are then free to configure the TRIAD 2 transducer delivered as you wish and to print out the stickers corresponding to the parameters programmed.

Environment and standards

EMC IMMUNITY (standard of reference: IEC 60688, IEC 61326-1, IEC 61000-6-5)	
Shock voltage as per IEC 61000-4-5	2 kV in differential mode 4 kV in common mode
Oscillating wave as per IEC 61000-4-12	1 kV in differential mode 2.5 kV in common mode
Fast electrical transients in bursts as per IEC 61000-4-4	2 kV on power supply 2 kV on inputs/outputs
Electrostatic discharge as per IEC 61000-4-2	8 kV in the air 6 kV in contact
EM radiated field as per IEC 61000-4-3	10 V/m (80 MHz to 3 GHz)
Voltage dips as per IEC 61000-4-11	30% reduction during 20 ms 60% reduction during 1 s
Voltage interruptions as per IEC 61000-4-11	100% reduction during 100 ms 100% reduction during 100 ms

EMC emissions	
Radiated and conducted	As per CISPR11
Climatic specifications (IEC 60068 2-1/2-2/2-30)	
Operating temperature	-10°C to +55°C
Storage temperature	-40°C to +70°C
Relative humidity	≤ 95% to 55°C
Safety specifications (IEC 61010-1)	
Installation category	3
Pollution level	2
Fire resistance	UL94, severity V0
Mechanical specifications (IEC 60068 2-6/2-27/2-29/2-32/2-63)	
Protection rating	IP 20
Mechanical shocks	IEC 60068-2-27
Vibrations	IEC 60068-2-6
Drop test with packaging	NF 0042-1

Mounting accessories

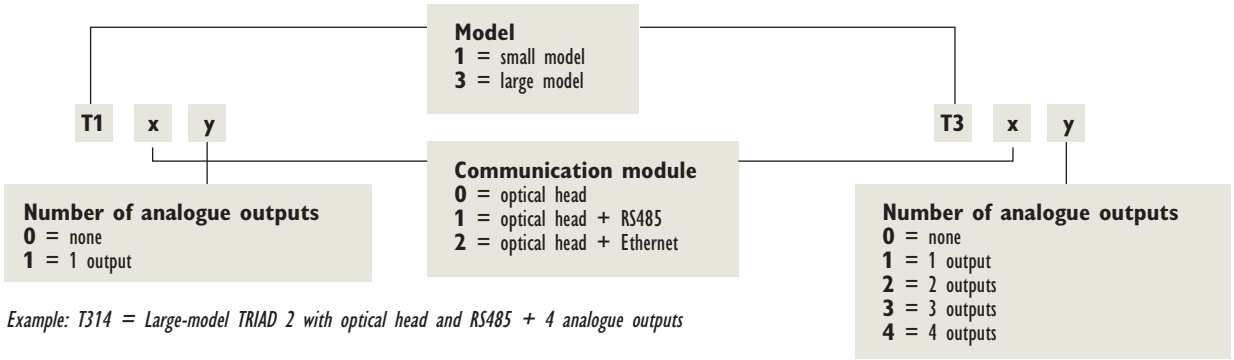
Model	Reference
Plate mounting for T1xy	ACCT 1007
Plate mounting for T3xy	ACCT 1006

Casing

Weight	320 g (T1xy) / 700 g (T3xy)
Mounting	DIN rail 43700 or plate mounting
Connection	Terminals with mobile stirrup clamp with screw for 4 single-wire 6 mm² conductors or 2 multi-wire 4 mm² conductors

Hardware identification

The TRIAD 2 T1xy and T3xy are fully configurable with the TRIADJUST 2 software which allows users to modify the characteristics of their products right up to the last minute.



Example: T314 = Large-model TRIAD 2 with optical head and RS485 + 4 analogue outputs

TRIAD 2 Range

Network	Function	T1xy model	T3xy model
Single-phase	V	•	•
	I	•	•
	F	•	•
	P	•	•
	Q	•	•
	S	•	•
	FP	•	•
	Tanφ	•	•
	Cosφ	•	•
	φ	•	•
Balanced 3-phase, 3 wires	U12, U23, U31	•	•
	I1, I2, I3	•	•
	F	•	•
	Pt	•	•
	Qt	•	•
	St	•	•
	FPt	•	•
	Tanφ	•	•
	Cosφt	•	•
	φt	•	•
	I1, I2, I3 signed	•	•
Balanced 3-phase, 4 wires	V1, V2, V3	•	•
	U12, U23, U31	•	•
	I1, I2, I3	•	•
	F	•	•
	P1, P2, P3, Pt	•	•
	Q1, Q2, Q3, Qt	•	•
	S1, S2, S3, St	•	•
	FP1, FP2, FP3, FPt	•	•
	Tanφ	•	•
	Cos (φ1, φ2, φ3, φt)	•	•
	φ1, φ2, φ3, φt	•	•
	I1, I2, I3 signed	•	•
Unbalanced 3-phase, 3/4 wires	V1, V2, V3		•
	U12, U23, U31		•
	I1, I2, I3		•
	F		•
	P1, P2, P3, Pt		•
	Q1, Q2, Q3, Qt		•
	S1, S2, S3, St		•
	FP1, FP2, FP3, FPt		•
	Tanφ		•
	Cos (φ1, φ2, φ3, φt)		•
	φ1, φ2, φ3, φt		•
	φ (U12/U23, U23/U31, U31/U12)		•
	φ (V1/V2, V2/V3, V3/V1)		•
	I1, I2, I3 signed		•
Split-phase	V1, V2		•
	U12		•
	I1, I2		•
	F		•
	P1, P2, Pt		•
	Q1, Q2, Qt		•
	S1, S2, St		•
	FP1, FP2, FPt		•
	Tanφ		•
	Cos (φ1, φ2, φt)		•
	φ1, φ2, φt		•
	φ (V1/V2)		•
	I1 signed, I2 signed		•

TRIAD 2
Programmable model

Electrical specifications

Voltage input		
Rated value	T1: from 57.7 Vac to 276 Vac max. T3: from 57.7 Vac to 480 Vac max.	
Frequency	50 Hz: 42.5...57.5 Hz 60 Hz: 51...69 Hz	
Max. measured voltage on primary	1,000 kV (ph-ph)	
Acceptable overloads	T1: 300 Vac permanent - 460 Vac / 10s T3: 520 Vac permanent - 800 Vac / 10s	
Consumption	< 0.2 A	
Input impedance	400 kΩ	
Current inputs		
Rated value	0 to 10 A max.	
Max. measured current on primary	40,000 A	
Acceptable overload	50 In / 1 s	
Consumption	< 0.15 VA	
Auxiliary power supply		
High level	80 / 265 Vac (50/60 Hz) – 110 to 375 Vdc	
Low level	19 / 58 Vdc	
Consumption	**High level**	**Low level**
	T1: 8.5 VA max. T3: 20 VA max.	T1: 5 W max. T3: 10 W max.
Analogue outputs		
Rated values	**Current**	**Voltage**
	± 1 mA, ± 5 mA, ± 20 mA	± 1 V, ± 10 V
Acceptable resistive load	15 V / Io [1]	≤ 1 kΩ
Acceptable capacitive load	0.1 µF	0.1 µF
Overrun	1.2 Io [1]	1.2 Uo [1]
Peak-peak residual wave	± 0.2% of Io [1]	± 0.2% of Uo [1]
Programmable response time	50 ms – 100 ms – 200 ms – 500 ms – 1 s	
Transfer curve	Linear, 2 slopes or quadratic	

[1] Io = output current, Uo = output voltage

Communication

	Optical head	**Ethernet**	**RS485**
Connection	USB (PC) Optical (product)	RJ45	2 wires Half-duplex
Protocol	MODBUS RTU mode	MODBUS / TCP RTU mode	MODBUS / JBUS RTU mode
Speed	38,400 baud	10 base T	2,400 to 115,200 baud
Parity	-	-	Even, odd or none
JBus addresses	-	-	1 to 247
Transmission length	2 m	100 m	1.2 km as EIA 485

Metrological specifications

Measurements	**Accuracy class over measurement range** (as per IEC 60688)				
	RT = 50 ms	RT = 100 ms	RT = 200 ms	RT = 500 ms	RT = 1s
V, U, I, F, P, Q, S, FP, Tanφ, Cosφ, φ, φU, φV	± 1%	± 0.5%	± 0.2%	± 0.15%	± 0.1%

* RT: Response time for F = 50 Hz

** Phase angle between voltages

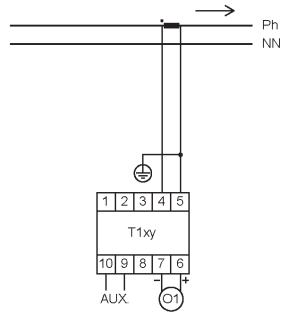
TRIAD 2 Range

Electrical connections

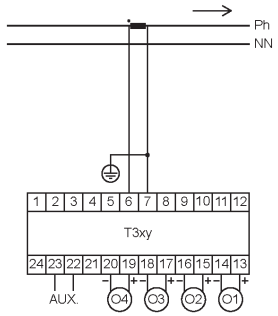
Single-phase network

I1, F:

TD201

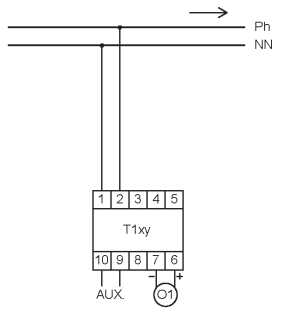


TD202

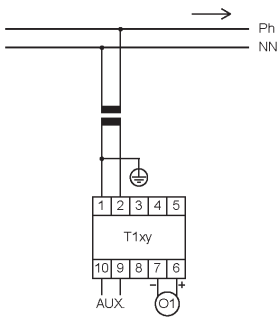


V1, F:

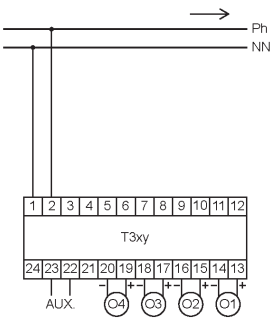
TD203



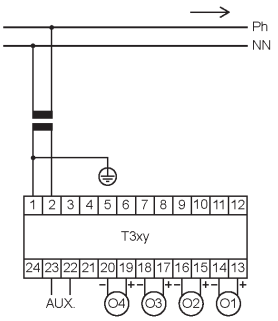
TD204



TD205

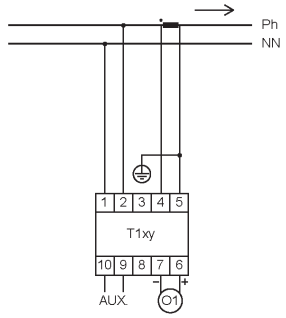


TD206

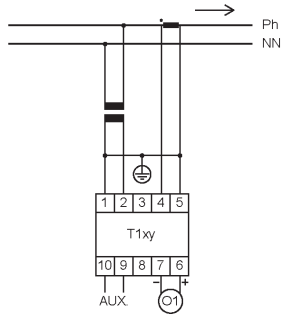


V1, I1, I1 signed, P1, Q1, S1, FP1, F, TANφ, Cosφ1, φ1:

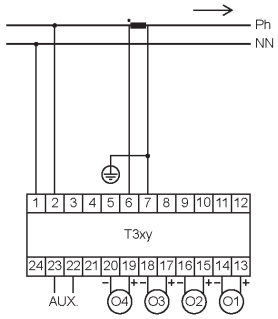
TD207



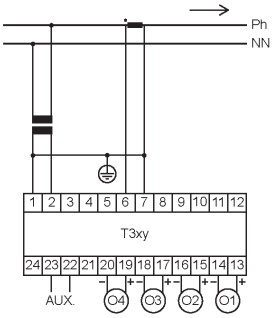
TD208



TD209



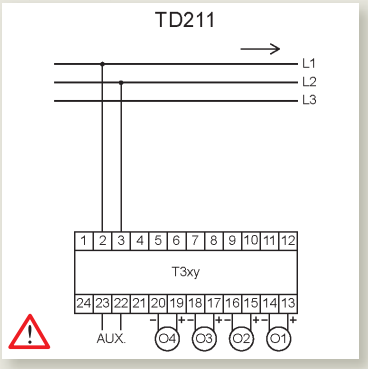
TD210



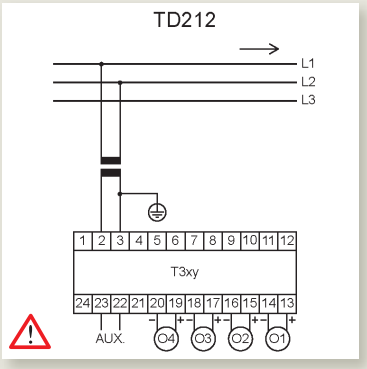
Balanced 3-phase, 3-wire network

U12, U23, U31, F:

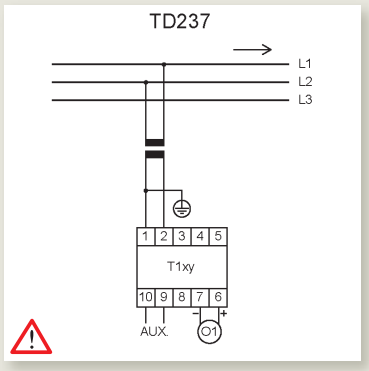
TD211



TD212

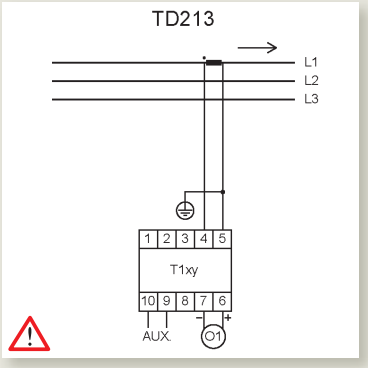


TD237

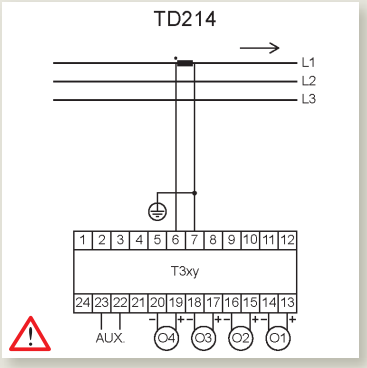


I1, I2, I3, F:

TD213

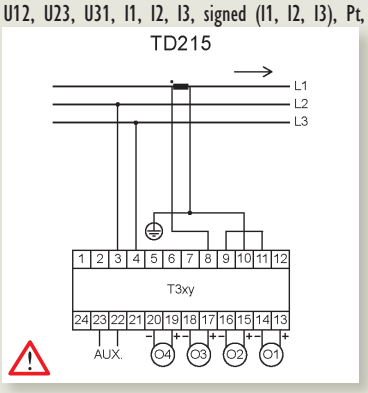


TD214

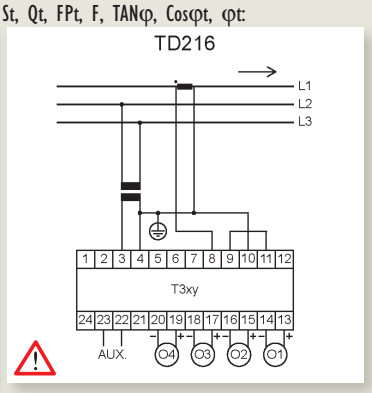


U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), Pt, St, Qt, FPt, F, TANφ, Cosφt, φt:

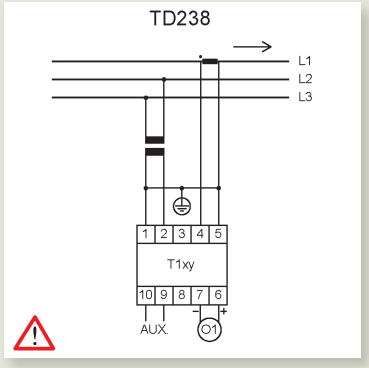
TD215



TD216



TD238



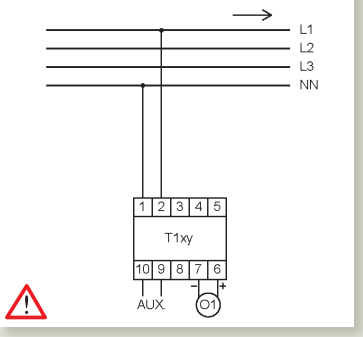
⚠ Phase rotation authorized

TRIAD 2 Range

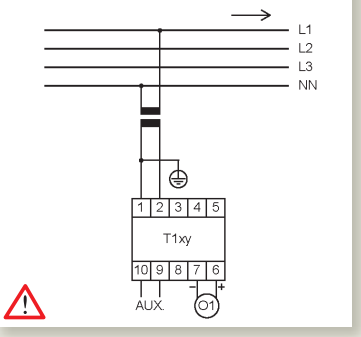
Balanced 3-phase, 4-wire network

V1, V2, V3, U12, U23, U31 F:

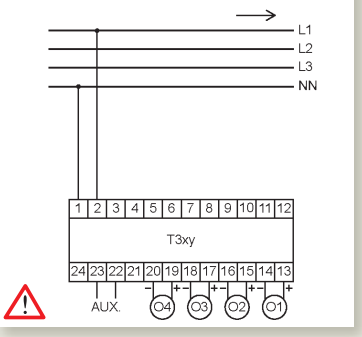
TD217



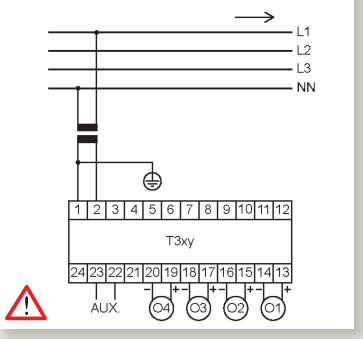
TD218



TD219

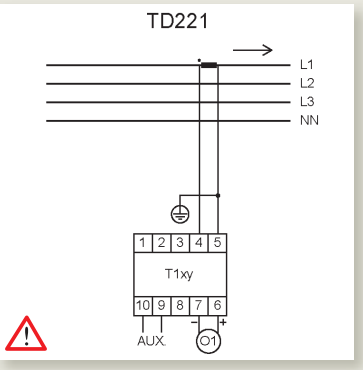


TD220

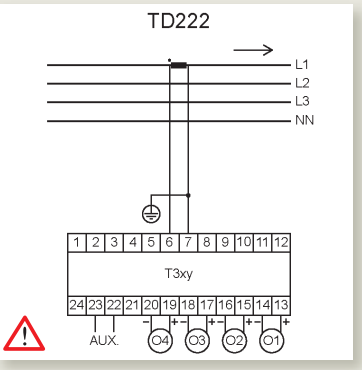


I1, I2, I3, F:

TD221



TD222

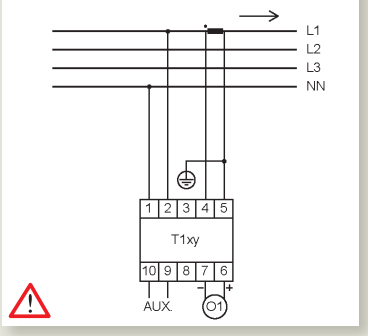


⚠ Phase rotation authorized

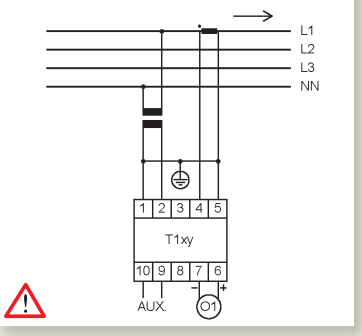
Balanced 3-phase, 4-wire network (continued)

V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt:

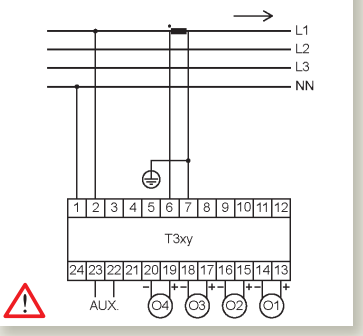
TD223



TD224



TD225



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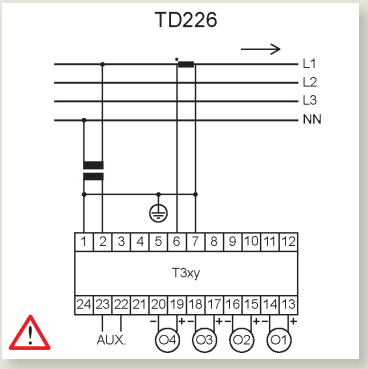
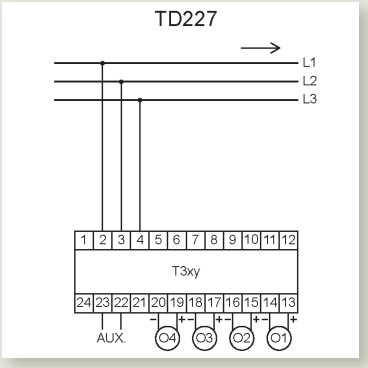


Phase rotation authorized

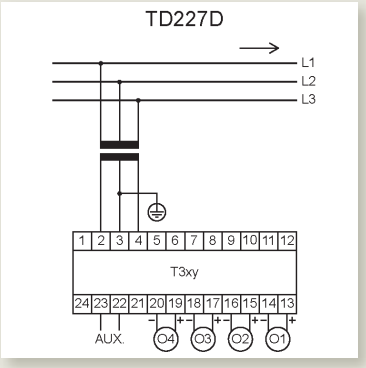
Unbalanced 3-phase, 3-wire network

U12, U23, U31, F, Angle (U12/U23, U23/U31, U31/U12):

TD227

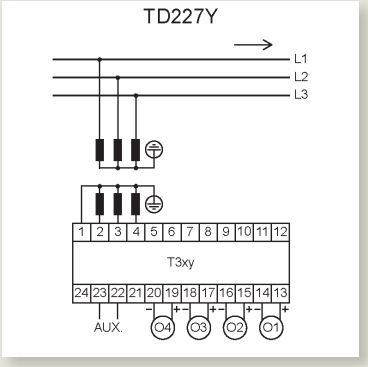


TD227D



V1, V2, V3, U12, U23, U31, F,
Angle (V1/V2, V2/V3, V3/V1),
Angle (U12/U23, U23/U31, U31/U12):

TD227Y

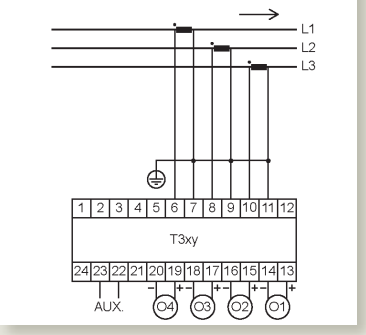


TRIAD 2 Range

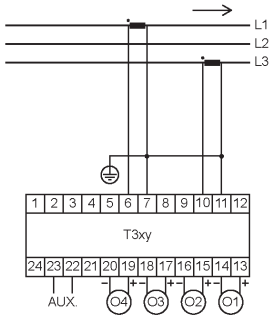
Unbalanced 3-phase, 3-wire network (continued)

I1, I2, I3, F:

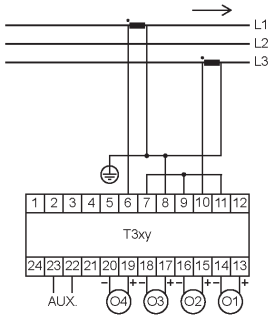
TD228



TD229

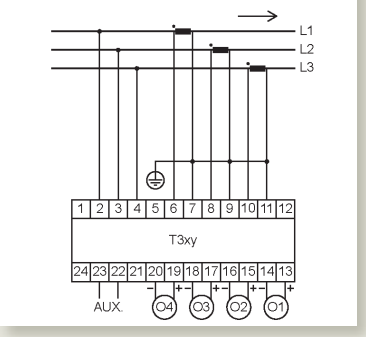


TD230

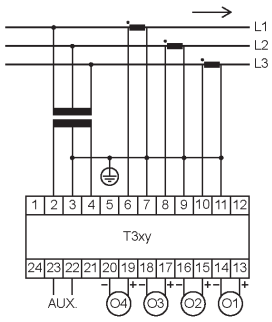


U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), Pt, St, Qt, FPt, F, TANφ, Cosφt, φt, Angle (U12/U23, U23/U31, U31/U12):

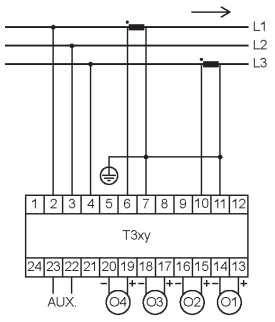
TD231



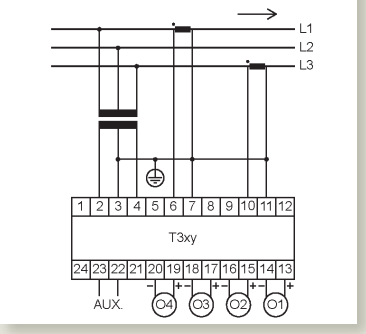
TD231D



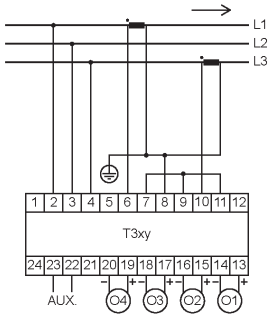
TD232



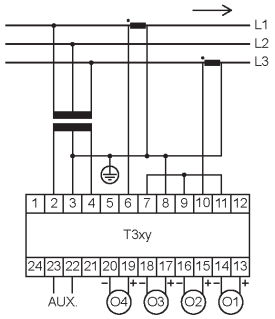
TD232D



TD233

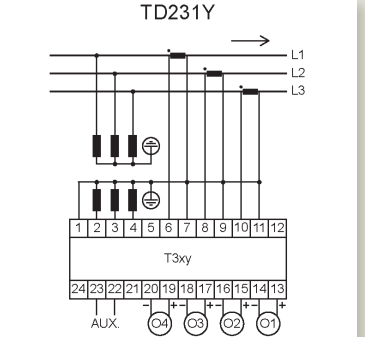


TD233D

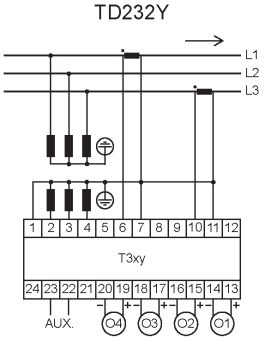


V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

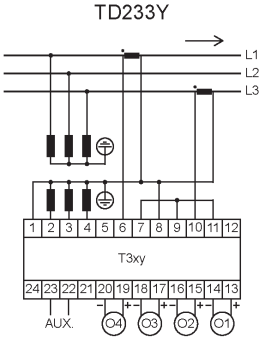
TD231Y



TD232Y



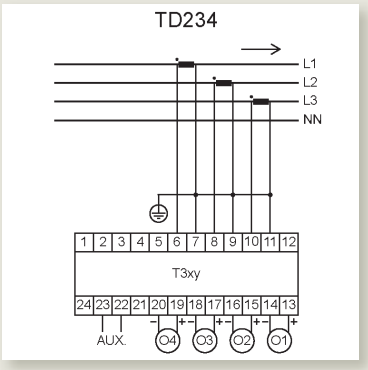
TD233Y



Unbalanced 3-phase, 4-wire network

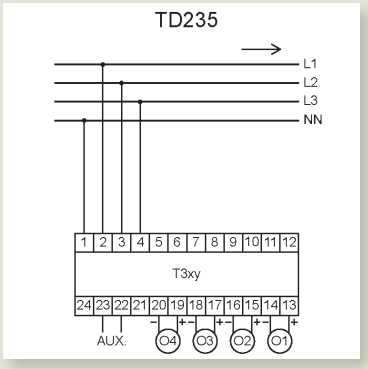
I1, I2, I3, F:

TD234

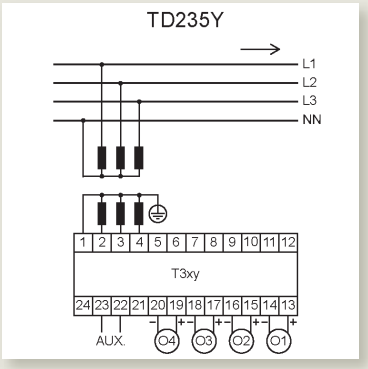


V1, V2, V3, U12, U23, U31, F, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD235

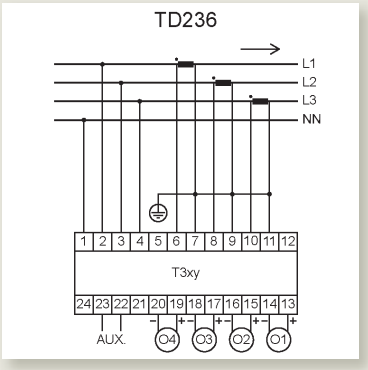


TD235Y

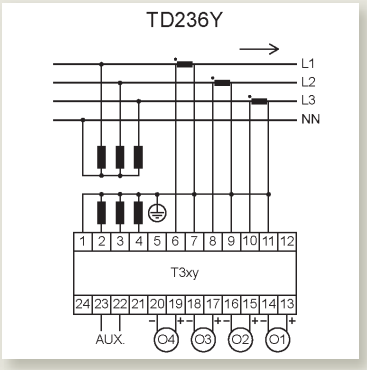


V1, V2, V3, U12, U23, U31, I1, I2, I3, signed (I1, I2, I3), P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφt, φ1, φ2, φ3, φt
Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

TD236



TD236Y

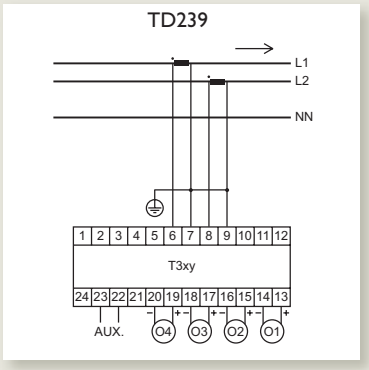


TRIAD 2 Range

Split-phase

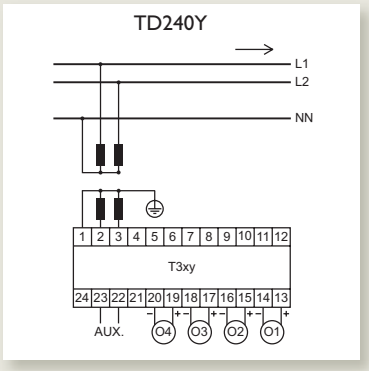
I1, I2, F:

TD239

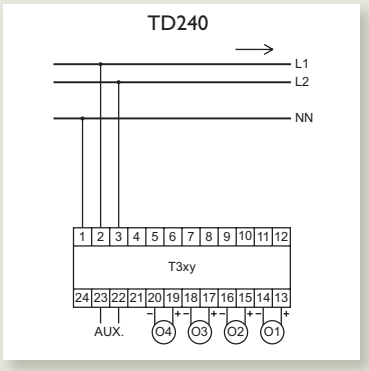


V1, V2, U12, F, Angle (V1/V2) rad, Angle (V1/V2) deg:

TD240Y

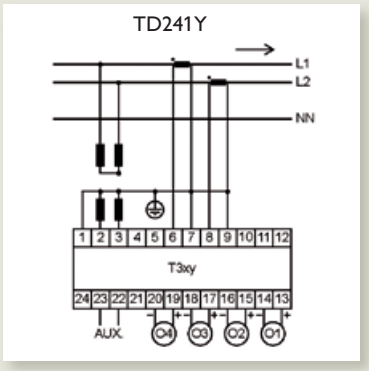


TD240

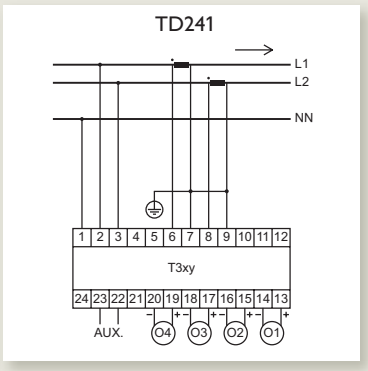


V1, V2, U12, I1, I2, P1, P2, Pt, Q1, Q2, Qt, S1, S2, St, FP1, FP2, FPt, F, tan φ, Angle (V1/V2) rad, Angle (V1/V2) deg, cos φ1, cos φ2, cosφt, φ1 Fonda rad, φ2 Fonda rad, φt Fonda rad, φ1 Fonda. deg, φ2 Fonda. deg, φt Fonda. deg, Angle V1/V2 Fonda deg, I1 (signed), I2 (signed):

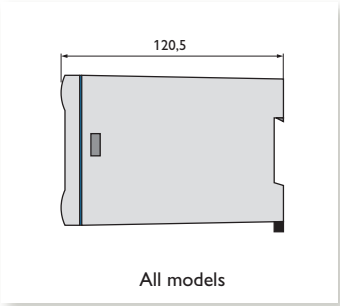
TD241Y



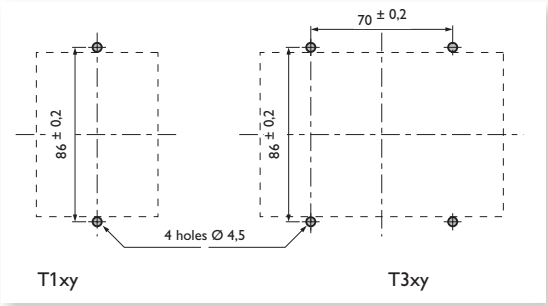
TD241

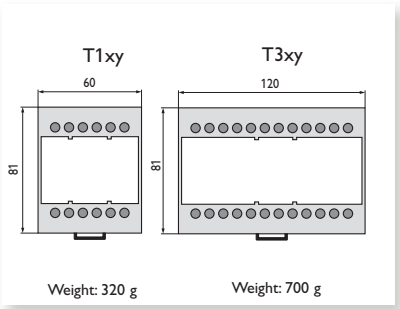


Dimensions (in mm)

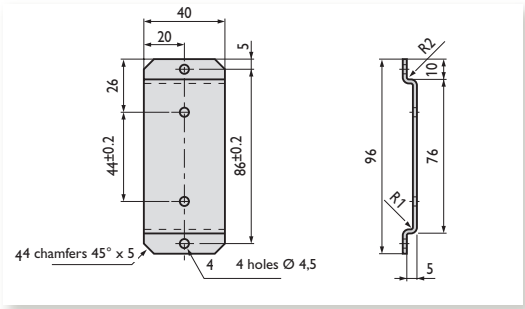


Panel drilling diagram for plate mounting





Accessory for plate mounting with screw (option)



TRIAD 2 Range

TRIAD 2 programmable via TRIADJUST 2

TO ORDER

► T1 – SMALL MODEL (60 x 81 x 120.5 mm)

			Without tropicalization	With tropicalization
			Number of output	Number of output
Link	Output	Supply	1	1
Optical	± 20 mA	80-265 V AC/DC	P01380001	P01380002
		19-58 V DC	P01380003	P01380004
	± 10 V	80-265 V AC/DC	P01380005	P01380006
		19-58 V DC	P01380007	P01380008

► T3 – LARGE MODEL (120 x 81 x 120.5 mm)

			Without tropicalization				With tropicalization			
			Number of output(s)				Number of output(s)			
Link	Output	Supply	1	2	3	4	1	2	3	4
Optical	± 20 mA	80-265 V AC/DC	P01380101	P01380103	P01380105	P01380107	P01380102	P01380104	P01380106	P01380108
		19-58 V DC	P01380109	P01380111	P01380113	P01380115	P01380110	P01380112	P01380114	P01380116
	± 10 V	80-265 V AC/DC	P01380117	P01380119	P01380121	P01380123	P01380118	P01380120	P01380122	P01380124
		19-58 V DC	P01380125	P01380127	P01380129	P01380131	P01380126	P01380128	P01380130	P01380132

► TRIAD 2 factory-programmable

1 Model - Frequency
T1: small model – 1 analogue output
T3: large model – 1 to 4 analogue output(s)

0: 50 Hz
1: 60 Hz

2 Network
0: Single-phase
1: Balanced 3-phase, 3 wires
2: Balanced 3-phase, 4 wires
3: Unbalanced 3-phase, 3 wires
4: Unbalanced 3-phase, 4 wires
5: Split-phase

3 Communication - Connection
0: Without
1: RS485
2: Ethernet
Indicate the diagram number. E.g. TD204

4 Supply
0: 80-265 V AC/DC
1: 19-58 V DC

5 Tropicalization
0: Without
1: With

6 Inputs
Indicate direct voltage to be measured or the VT ratio
Indicate direct current to be measured or the CT ratio

7 Number of analogue outputs
0: Without (Choice of a minimum communication)
1: 1 output
2: 2 outputs (T3 model only)
3: 3 outputs (T3 model only)
4: 4 outputs (T3 model only)

8 Analogue outputs
Indicate for each output:

a- Quantity to be measured
b- Transfer curve *
c- Input signal: Min – Breaking point - Max
d- Input unity
e- Output signal: Min – Breaking point - Max

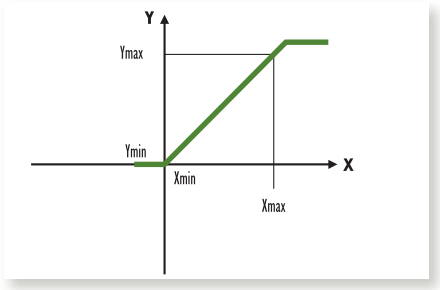
**Example transfer curves are given on the next page*

9 Analogue output calibres
0: -20 mA to +20 mA
1: -5 mA to +5 mA
2: -1 mA to +1 mA
3: -10 V to +10 V
4: -1 V to +1 V

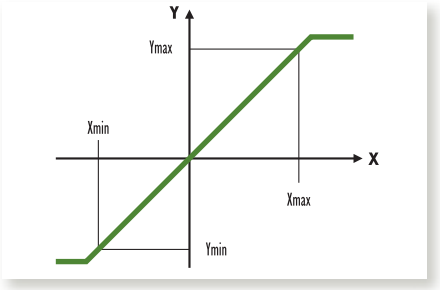
Please note:
Transducers purchased with either RS485 or Ethernet communication ports must be factory-programmed. Off-the-shelf units are not available. It is still possible to re-program factory programmed units using the "TRIADJUST2" software package and optical communication adaptor.

WHICH TRANSFER CURVES SHOULD YOU CHOOSE?

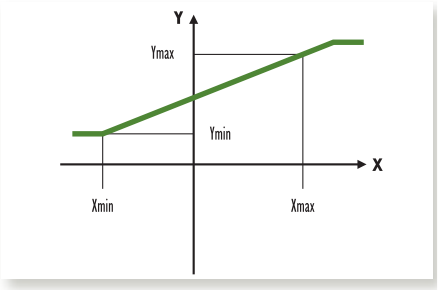
Linear



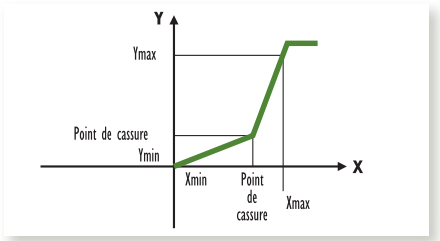
Linear without offset



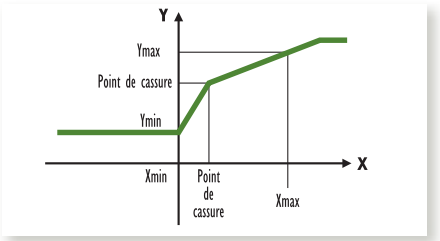
Linear with offset



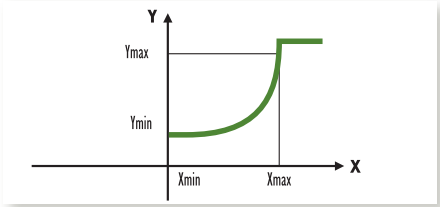
Linear with 2 extended slopes



Linear with 2 slopes



Quadratic



FOCUS

Accuracy class and IEC 688 standard

The IEC 688 standard defines the accuracy class as the limits of the intrinsic error expressed as a percentage of the output interval.
Example:
For a measurement range of 0 - 1,000 kW, an output interval of 16 mA (output 4-20 mA) and an accuracy class of 0.2, the intrinsic error is:

$$\frac{0.2}{100} \times 16 \text{ mA} = \pm 0.032 \text{ mA}$$

representing a measurement uncertainty of ±2 kW over the complete measurement range 0 - 1,000 kW.