

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, $\cos\varphi$, φ , φU , φV , $\tan\varphi$

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 and 5 A

Voltage inputs: 100 to 480 V (ph-ph) or 100 / $\sqrt{3}$ to 480 / $\sqrt{3}$ 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: single-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: single-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

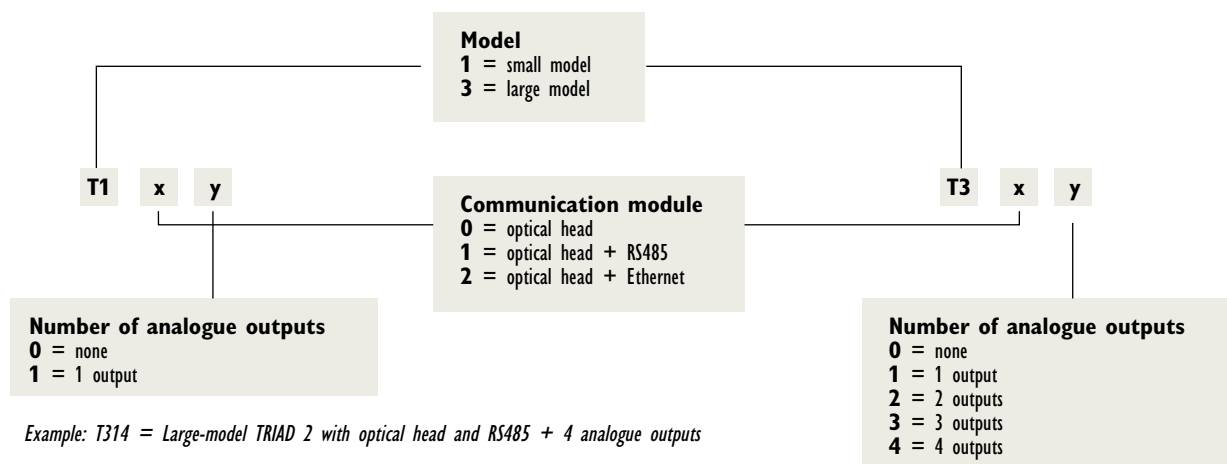
Weight	320g (T1xy) / 700g (T3xy)
Mounting	DIN rail 43700 or plate mounting
Connection	Terminals with mobile stirrup clamp with screw for 4 single-wire 6 mm ² conductors or 2 multi-wire 4 mm ² conductors



TRIAD 2 Range

► 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.



Network	Function	T1xy model	T3xy model
Single-phase	V	•	•
	I	•	•
	F	•	•
	P	•	•
	Q	•	•
	S	•	•
	FP	•	•
	Tan ϕ	•	•
	Cos ϕ	•	•
	ϕ	•	•
Balanced 3-phase, 3 wires	U12, U23, U31	•	•
	I1, I2, I3	•	•
	F	•	•
	Pt	•	•
	Qt	•	•
	St	•	•
	FPt	•	•
	Tan ϕ	•	•
	Cos ϕ	•	•
	ϕ	•	•
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	•	•
	Tan ϕ	•	•
	Cos (ϕ 1, ϕ 2, ϕ 3, ϕ t)	•	•
Unbalanced 3-phase, 3/4 wires	ϕ 1, ϕ 2, ϕ 3, ϕ t	•	•
	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	•	•
	Tan ϕ	•	•
Unbalanced 3-phase, 3/4 wires	Cos (ϕ 1, ϕ 2, ϕ 3, ϕ t)	•	•
	ϕ 1, ϕ 2, ϕ 3, ϕ t	•	•
	ϕ (U12/U23, U23/U31, U31/U12)	•	•
	ϕ (V1/V2, V2/V3, V3/V1)	•	•

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	650 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	25,000 A	
Acceptable overload	50 I _n / 1 s	
Consumption	< 0.15 VA	
Auxiliary power supply		
High level	80 / 265 Vac (50/60 Hz) — 80 / 265 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
	± 1mA, ± 5mA, ± 20mA	± 1 V, ± 10 V
Acceptable resistive load	15 V / I _o ⁽¹⁾	≥ 1 kΩ
Acceptable capacitive load	0.1 μF	0.1 μF
Overrun	1.2 I _o ⁽¹⁾	1.2 U _o ⁽¹⁾
Peak-peak residual wave	± 0.2% of I _o ⁽¹⁾	± 0.2% of U _o ⁽¹⁾
Programmable response time	50 ms — 100 ms — 200 ms — 500 ms — 1 s	
Transfer curve	Linear, 2 slopes or quadratic	

⁽¹⁾ I_o = output current, U_o = 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 classs over measurement range (as per IEC 60688)				
	RT = 50 ms	RT = 100 ms	RT = 200 ms	RT = 500 ms	RT = 1 s
V, U, I, F, P, Q, S, FP, Tan ϕ , Cos ϕ , ϕ , ϕU , ϕV	$\pm 1\%$	$\pm 0.5\%$	$\pm 0.2\%$	$\pm 0.15\%$	$\pm 0.1\%$

* RT: Response time for F = 50 Hz

** Phase angle between voltages



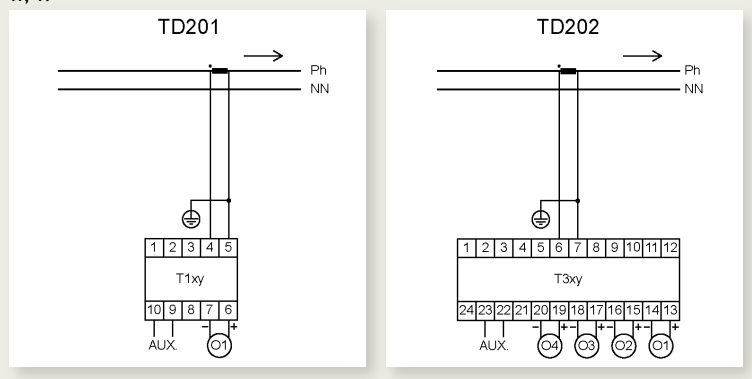
TRIAD 2 Range

► Electrical connections Single-phase network

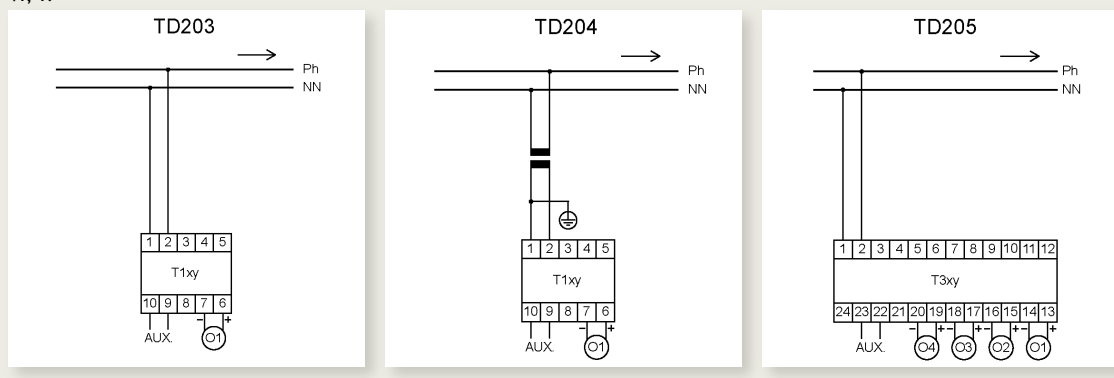
Programmable digital transducers

► Measurement and instrumentation

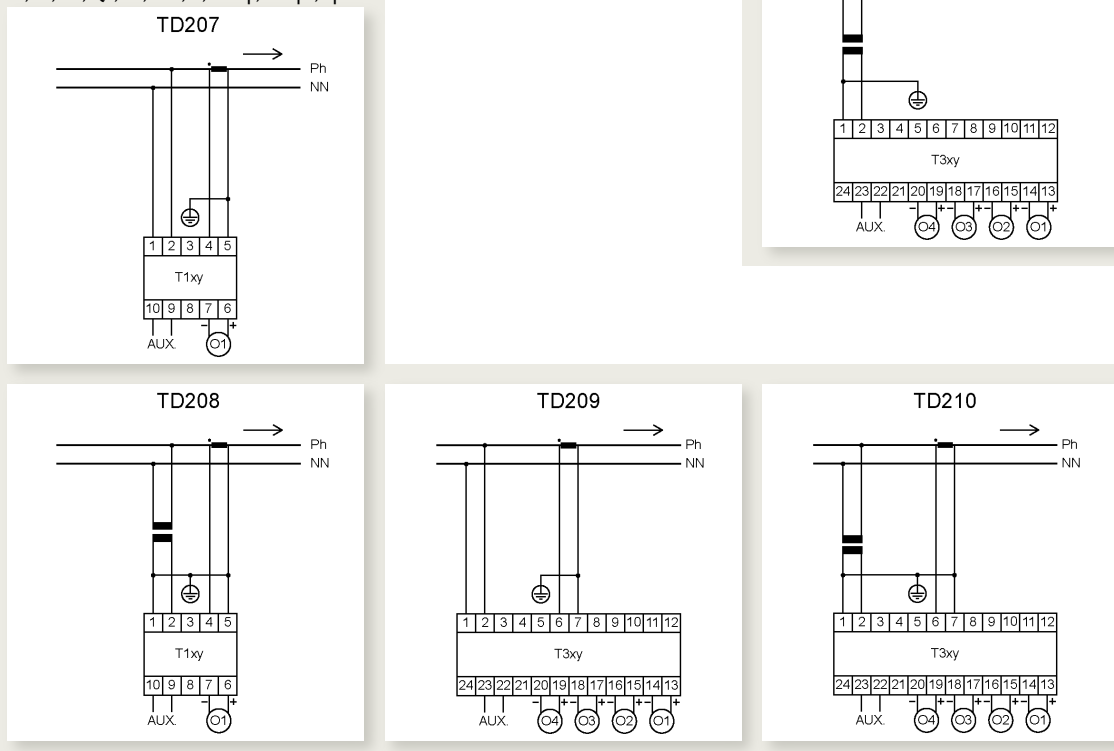
I1, F:



V1, F:

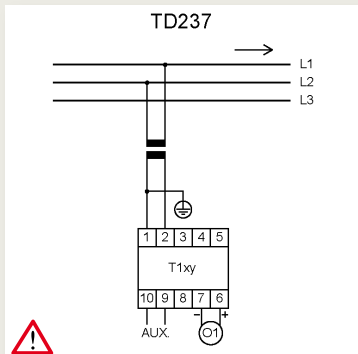
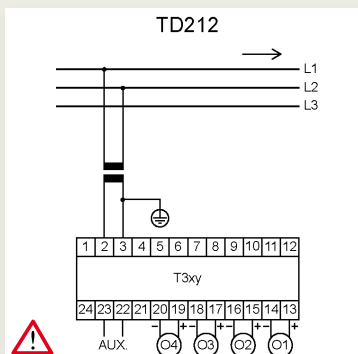
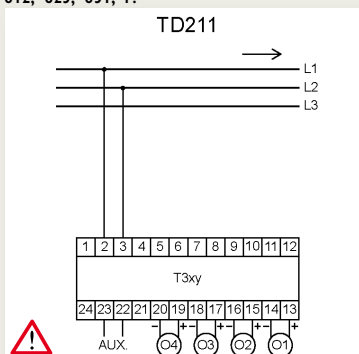


V1, I1, P1, Q1, S1, FP1, F, TANφ, Cosφ1, φ1:

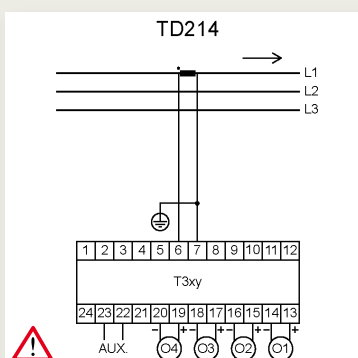
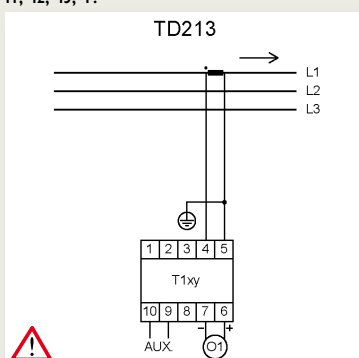


Balanced 3-phase, 3-wire network

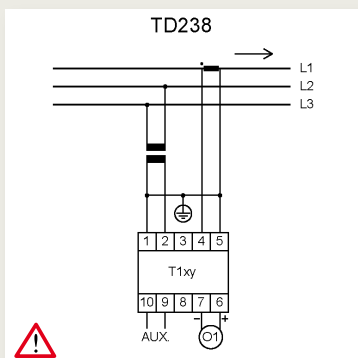
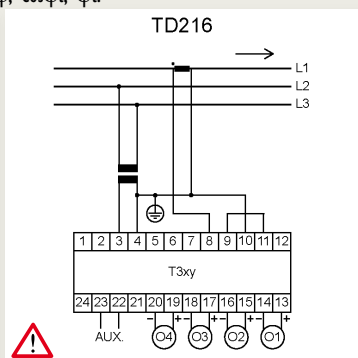
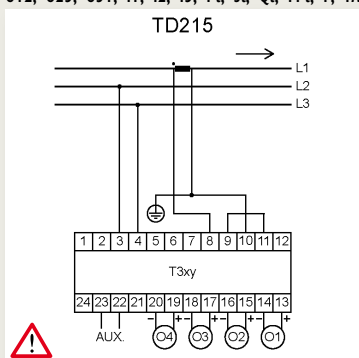
U12, U23, U31, F:



I1, I2, I3, F:



U12, U23, U31, I1, I2, I3, Pt, St, Qt, FPt, F, TANφ, Cosφpt, qpt:



Phase rotation authorized

1
ENERGY
PERFORMANCE

2
NETWORK
QUALITY

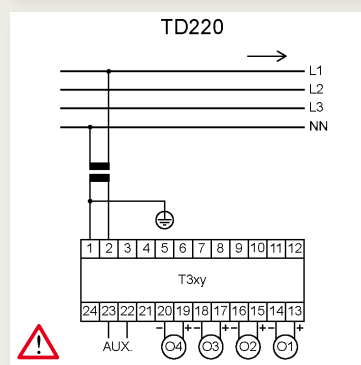
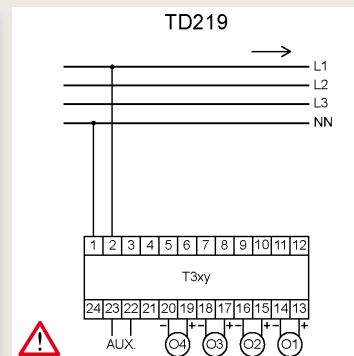
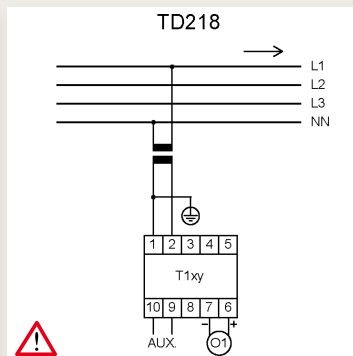
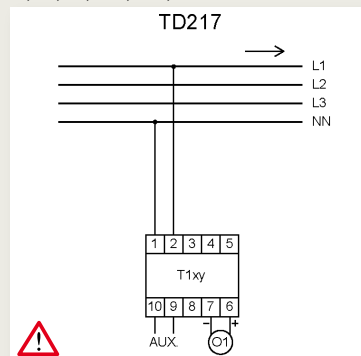
3
MEASUREMENT AND
INSTRUMENTATION



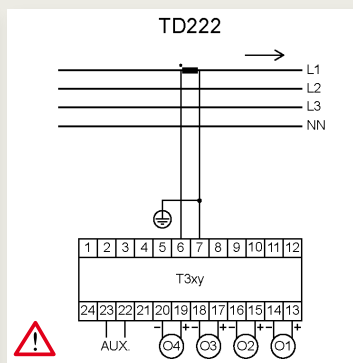
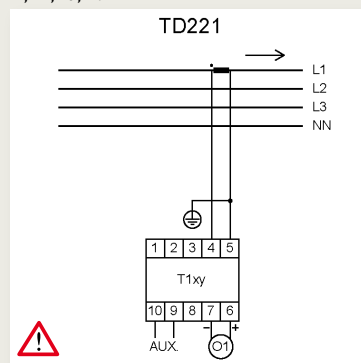
TRIAD 2 Range

Balanced 3-phase, 4-wire network

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



I1, I2, I3, F:

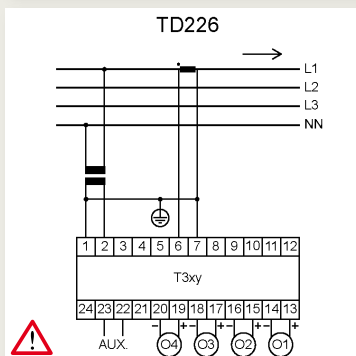
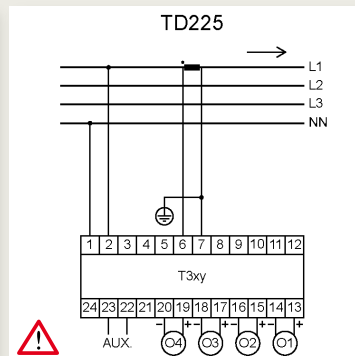
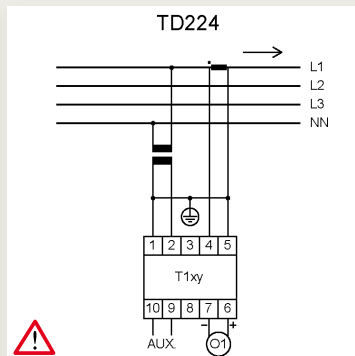
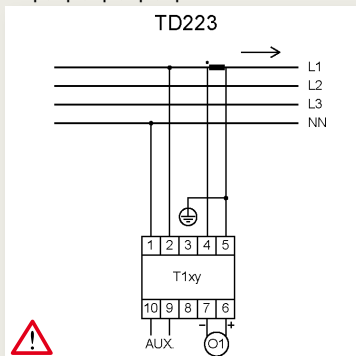


Phase rotation authorized

Programmable digital transducers

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

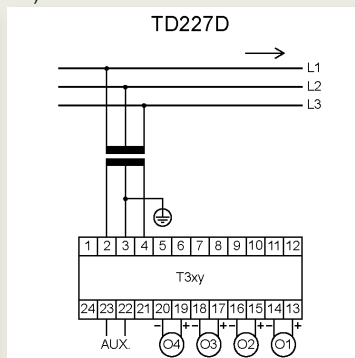
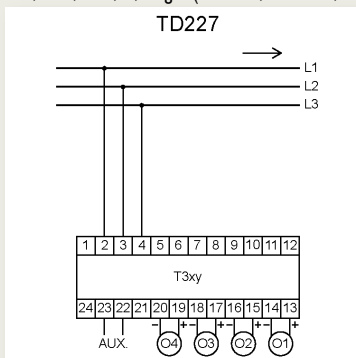
V1, V2, V3, U12, U23, U31, I1, I2, I3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TAN φ , Cos φ 1, Cos φ 2, Cos φ 3, Cos φ t, φ 1, φ 2, φ 3, φ t:



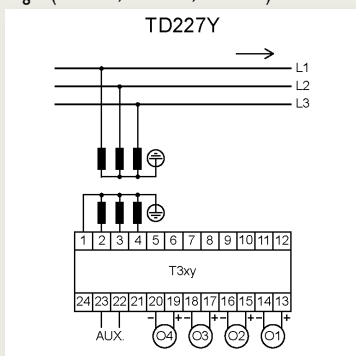
! Phase rotation authorized

Unbalanced 3-phase, 3-wire network

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



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





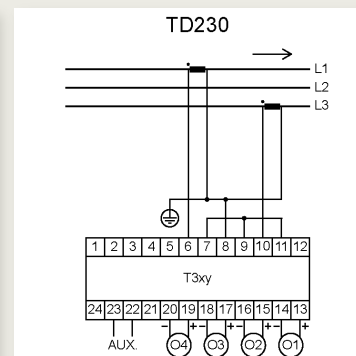
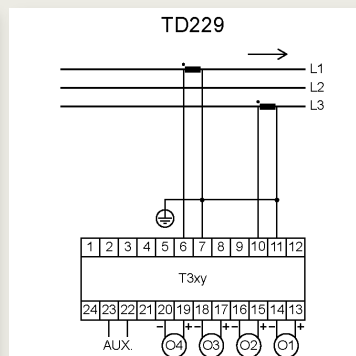
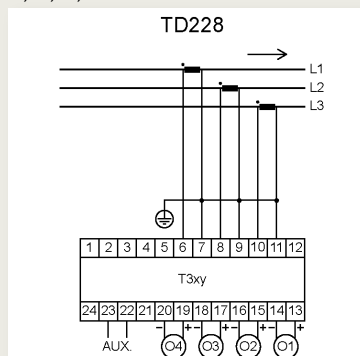
TRIAD 2 Range

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

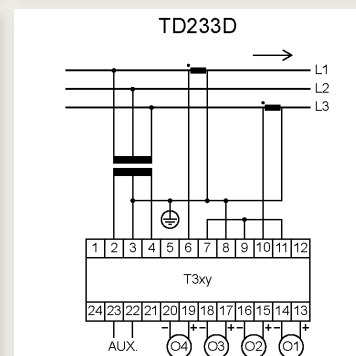
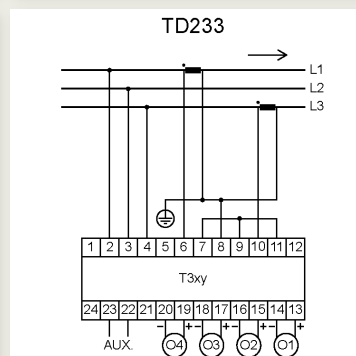
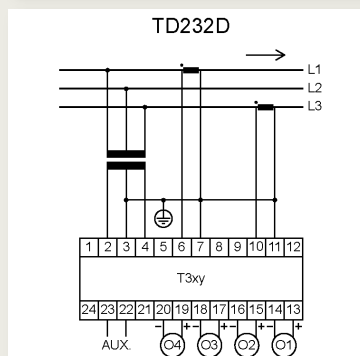
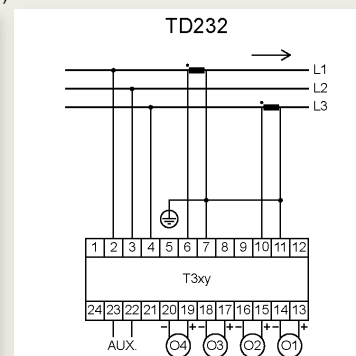
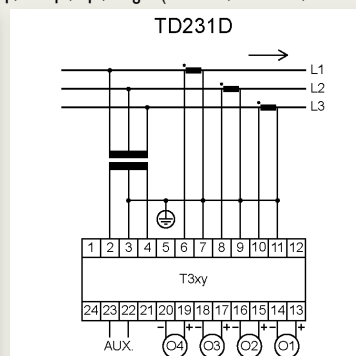
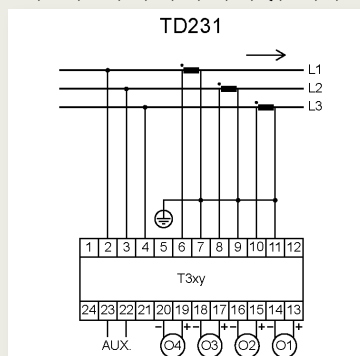
Programmable digital transducers



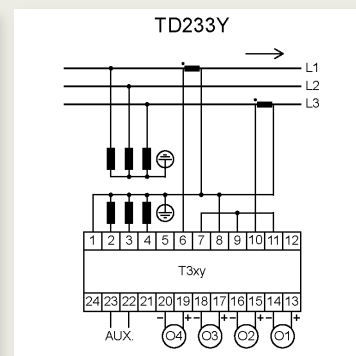
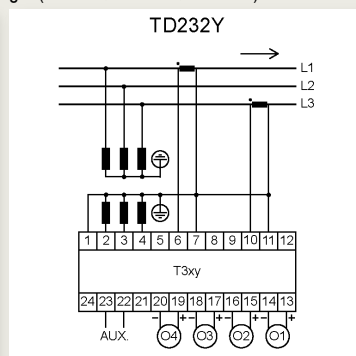
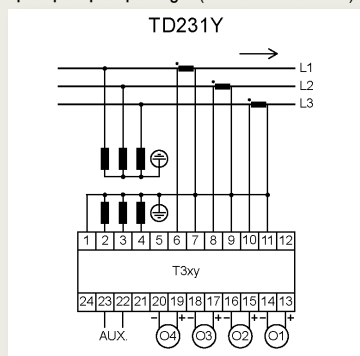
I1, I2, I3, F:



U12, U23, U31, I1, I2, I3, Pt, St, Qt, FPt, F, TANφ, Cosφpt, φpt, Angle (U12/U23, U23/U31, U31/U12):

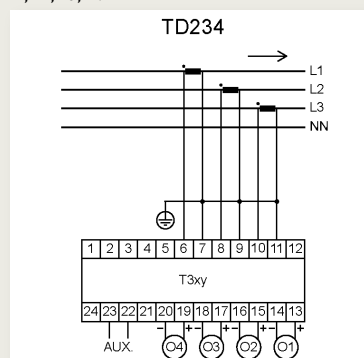


V1, V2, V3, U12, U23, U31, I1, I2, I3, P1, P2, P3, Pt, S1, S2, S3, St, Q1, Q2, Q3, Qt, FP1, FP2, FP3, FPt, F, TANφ, Cosφ1, Cosφ2, Cosφ3, Cosφpt, φ1, φ2, φ3, φpt, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):

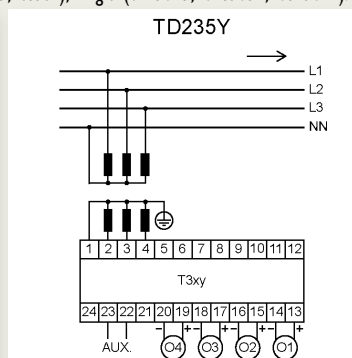
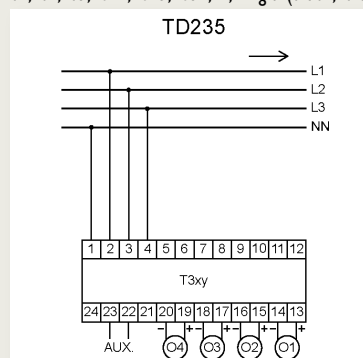


Unbalanced 3-phase, 4-wire network

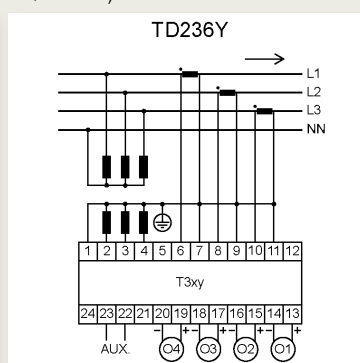
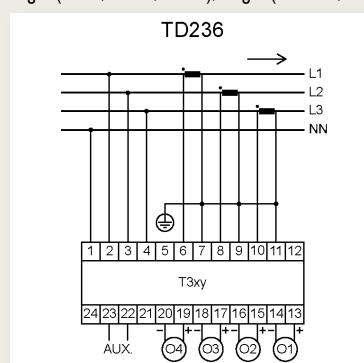
I1, I2, I3, F:



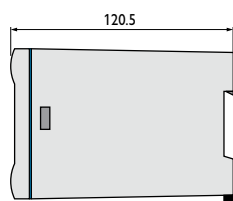
V1, V2, V3, U12, U23, U31, F, Angle (V1/V2, V2/V3, V3/V1), Angle (U12/U23, U23/U31, U31/U12):



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

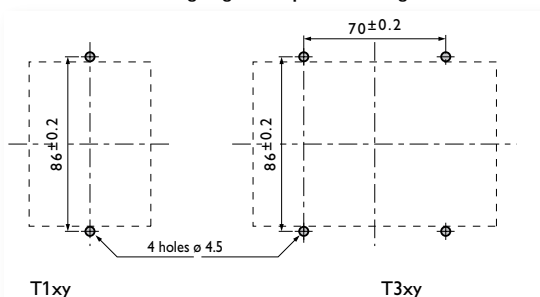


► Dimensions (in mm)

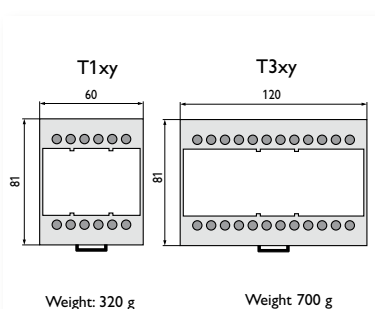


All models

Panel drilling diagram for plate mounting

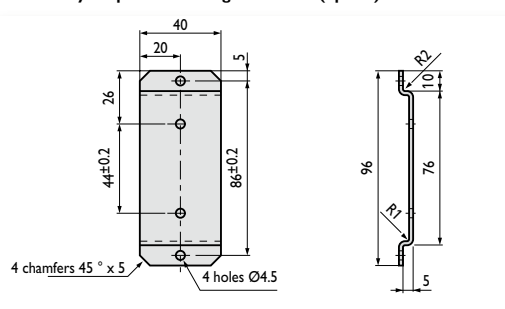


Accessory for plate mounting with screw (option)



Weight: 320 g

Weight: 700 g





TRIAD 2 Range

TRIAD 2 programmable via TRIADJUST 2

Measurement and instrumentation Programmable digital transducers

TO ORDER

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

Link	Output	Supply	Without tropicalization	With tropicalization
			Number of input 1	Number of input 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)

Link	Output	Supply	Without tropicalization				With tropicalization			
			Number of input(s)				Number of output(s)			
			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

T1 : small model — 1 analogue output
T3 : large model — 1 to 4 analogue output(s)

2 Communication

0 : Without
1 : RS485
2 : Ethernet

3 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)

4 Frequency

0 : 50 Hz
1 : 60 Hz

5 Supply

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

6 Tropicalization

0 : Without
1 : With

7 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

8 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

9 Connection configuration

Indicate the diagram numbe. E.g. TD204

10 Voltage input

Indicate direct voltage to be measured or the VT ratio

11 Current input

Indicate direct current to be measured or the CT ratio

12 Analogue output

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

To simplify the procedure when ordering you can send us the form on page xxx.

Factory-programmed TRIAD 2: order form

1 - Model / Hz

☐ T1 or ☐ T3
☐ 50 Hz or ☐ 60 Hz

2 - Network

☐ Single-phase ☐ 3-wire unbalanced three-phase
☐ 3-wire balanced three-phase ☐ 4-wire unbalanced three-phase
☐ 4-wire balanced three-phase

3 - Options / Connection

☐ Ethernet or ☐ RS485
☐ Tropicalization

Connection diagram: TD

4 - Power supply

☐ 80 to 265 Vac (50/60 Hz) / 80 to 265 Vdc or ☐ 19 to 58 Vdc

5 - Inputs

Current

With current transformer or Direct
 Primary Secondary
 / A A

Voltage

With voltage transformer or Direct
 Primary Secondary
 / V V
☐ Phase-phase ☐ Phase-neutral ($\sqrt{3}$)

Available quantities

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 COSφ1 COSφ2 COSφ3 COSφt φ1 φ2 φ3 φt
 φU12/23 φU23/31 φU31/12 φV1/2 φV2/3 φV3/1

Output 1

Quantity and measurement range (x)

Indicate quantity to be measured
 Min breaking point Max Unit ⁽¹⁾

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min Breaking point Max mA V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%: 1 s	0.8 s	0.8 s
☐ 0.15%: 0.5 s	0.4 s	0.4 s
☐ 0.2%: 0.2 s	0.16 s	0.16 s
☐ 0.5%: 100 ms	80 ms	80 ms
☐ 1%: 50 ms	40 ms	40 ms

Output 2

Quantity and measurement range (x)

Indicate quantity to be measured
 Min breaking point Max Unit ⁽¹⁾

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min Breaking point Max mA V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%: 1 s	0.8 s	0.8 s
☐ 0.15%: 0.5 s	0.4 s	0.4 s
☐ 0.2%: 0.2 s	0.16 s	0.16 s
☐ 0.5%: 100 ms	80 ms	80 ms
☐ 1%: 50 ms	40 ms	40 ms

Output 3

Quantity and measurement range (x)

Indicate quantity to be measured
 Min breaking point Max Unit ⁽¹⁾

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min Breaking point Max mA V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%: 1 s	0.8 s	0.8 s
☐ 0.15%: 0.5 s	0.4 s	0.4 s
☐ 0.2%: 0.2 s	0.16 s	0.16 s
☐ 0.5%: 100 ms	80 ms	80 ms
☐ 1%: 50 ms	40 ms	40 ms

Output 4

Quantity and measurement range (x)

Indicate quantity to be measured
 Min breaking point Max Unit ⁽¹⁾

Transfer curve

☐ Linear
☐ 2 slopes
☐ Quadratic

Output signal (y)

Min Breaking point Max mA V

Accuracy class

	50 Hz	60 Hz
☐ 0.1%: 1 s	0.8 s	0.8 s
☐ 0.15%: 0.5 s	0.4 s	0.4 s
☐ 0.2%: 0.2 s	0.16 s	0.16 s
☐ 0.5%: 100 ms	80 ms	80 ms
☐ 1%: 50 ms	40 ms	40 ms

⁽¹⁾ Please indicate the unit of the measurement range, e.g. V, kW or MW



TRIADJUST 2 software

Designed for quick configuration and display of all the parameters of your TRIAD 2 transducers

Programmable digital transducers

Measurement and instrumentation

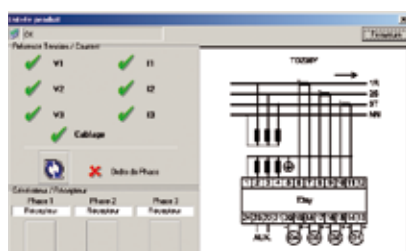
PRODUCT ADVANTAGES

- CONFIGURATION** via **OPTICAL HEAD**, **ETHERNET** or **RS485**
- ACCESS** to **ALL** the **TRIAD 2 PARAMETERS**
- DIAGNOSIS** of the **INSTALLATION**
- LABEL PRINTING** on **ALL TYPES OF LASER PRINTERS**



Configuration

- Inputs / Outputs
- Communication
- Connection diagram
- Response time



Diagnosis

- Voltage inputs
- Current inputs
- Cabling
- Phase order
- Analogue outputs
- Fresnel



Display

- Instantaneous quantities (in digital or analogue form)

Recording

- In real time in exported file

Description

The **TRIADJUST 2** software allows quick, unlimited programming of all your TRIAD 2's parameters.

Using a PC and the optical lead supplied in each kit, connect your product's auxiliary power supply to dialogue with total security. Depending on your TRIAD 2's configuration, remote communication is possible via RS485 or Ethernet.

In the Windows™ environment, initialize or simply modify the quantities measured, the measurement ranges and the analogue outputs on the transducers installed.

TRIADJUST 2 also offers other functions such as **DIAGNOSIS** of your network, instantaneous **DISPLAY** of the electrical quantities and **REAL-TIME RECORDING** of the measurements in an exported file.

You can also print labels indicating the configurations and connections of your products.

Minimum configuration

Platform: PC

Operating system: Windows 2000 or XP

Processor: Pentium-compatible

RAM: 128 MB

Hard disk: 40 GB

Drive: CD-ROM

Communication port:

Local: USB 1.1 minimum

Remote: RS485 and/or Ethernet

KIT TRIADJUST 2



The **TRIADJUST 2 configuration kit** comprises:

- The TRIADJUST 2 software
- An optical / USB lead
- 30 sheets of blank labels
- A 230 x 185 x 45 mm carrying case

TRIADJUST 2 “PREMIER”



This module is a **complete tool** designed for distributors or any user needing to program a large number of transducers

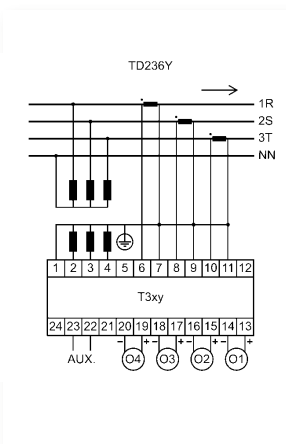
The TRIADJUST 2 “PREMIER” configuration workstation comprises:

- The TRIADJUST 2 software
- An optical / USB lead
- A benchtop power-supply base
- 210 sheets of blank labels
- A 500 x 400 x 270 mm carrying case

Labels common to both kits

A sheet contains two labels, one for the configuration of the inputs/outputs and the other for the programmed connection diagram. The labels can be printed on all types of laser printers.

T314	
Inputs:	50-60 Hz
10 000 V/3	100 V/3
1 000 A	5A
AO 1: V1	0,20 200 ms 750 Ω
	0V...5 773,5V
	4 mA...20 mA
AO 2: I1	0,20 200 ms 750 Ω
	0A...1 000 A
	4 mA...20 mA
AO 3: Pt	0,20 200 ms 750 Ω
	0W...17,32 MW
	4 mA...20 mA
AO 4: F1	0,20 200 ms 750 Ω
	45 Hz...55 Hz
	4 mA...20 mA
Made in France	
Reference client / Own reference customer	



TO ORDER

Model	Reference
TRIADJUST 2 kit	P01380410
TRIADJUST 2 “PREMIER” workstation	P01380420
Accessories	
Set of 30 sheets of blank labels	P01380400
Optical/USB lead	P01330403

Associated product

TRIAD 2 programmable
with TRIADJUST 2

► page 190

