ATTO D4 70A
INSTALLATION INSTRUCTIONS

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WARRANTY

This product is covered by a warranty against material and manufacturing defects for a 24 months period from the manufacturing date.
The warranty does not cover the defects that are due to:
• Negligent and improper use
• Failures caused by atmospheric hazards
• Acts of vandalism
• Wear out of materials
• Firmware upgrades
Akse reserves the right, at its discretion, to repair or substitute the faulty products
The warranty is not applicable to the products that will result defective in consequence of a negligent and improper use or an operating procedure not contemplated in this manual.

RETURN AND REPAIR FORMALITIES

Akse accepts the return of instruments for repair only when authorized in advance. The transport costs are at customer charge.

RE-SHIPPING OF REPAIRED PRODUCT

The terms for re-shipment of repaired products are ex-works, i.e. the transport costs are at customer charge.
Products returned as detective but found to be perfectly working by our laboratories, will be charged a flat fee to account for checking and testing time irrespective of the warranty terms.

SAFETY

This instrument was manufactured and tested in compliance with CEI EN 61010-1 CAT III -300V, class 2, standards for operating voltages up to 300 VAC rms phase to neutral.
In order to maintain this condition and to ensure safe operation, the user must comply with the indications and markings contained in the following instructions:

- When the instrument is received, before starting its installation, check that it is intact and no damage occurred during transport.
- Before mounting, ensure that the instrument operating voltages and the mains voltage are compatible then proceed with the installation.
- The instrument power supply needs no earth connection.
- The instrument is not equipped with a power supply fuse; a suitable external protection fuse must be foreseen by the contractor.
- Maintenance and/or repair must be carried out only by qualified, authorized personnel
- If there is ever the suspicion that safe operation is no longer possible, the instrument must be taken out of service and precautions taken against its accidental use.
- Operation is no longer safe when:

1) There is clearly visible damage.
2) The instrument no longer functions.
3) After lengthy storage in unfavorable conditions.
4) After serious damage occurred during transport

The instruments must be installed in respect of all the local regulations.

OPERATOR SAFETY

Warning: Failure to observe the following instructions may lead to a serious danger of death.

- During normal operation dangerous voltages can occur on instrument terminals and on voltage and current transformers. Energized voltage and current transformers may generate lethal voltages. Follow carefully the standard safety precautions while carrying out any installation or service operation.
- The terminals of the instrument must not be accessible by the user after the installation. The user should only be allowed to access the instrument front panel where the display is located.
- Do not use the digital outputs for protection functions nor for power limitation functions. The instrument is suitable only for secondary protection functions.
- The instrument must be protected by a breaking device capable of interrupting both the power supply and the measurement terminals. It must be easily reachable by the operator and well identified as instrument cut-off device.
- The instrument and its connections must be carefully protected against short-circuit.

Precautions: Failure to respect the following instructions may irreversibly damage to the instrument.

- The outputs and the options operate at low voltage level; they cannot be powered by any unspecified external voltage.
- The application of currents not compatible with the current inputs levels will damage to the instrument.

Further documentation may be downloaded from our web site www.electrex.it.

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DECLARATION OF CONFORMITY

Akse hereby declares that its range of products complies with the following directives EMC 89/336/EEC 73/23CE 93/68 CE and complies with the following product's standard CEI CEI EN 61326 – IEC 61326   CEI EN 61010 – IEC 61010
The product has been tested in the typical wiring configuration and with peripherals conforming to the EMC directive and the LV directive.

The instrument is programmed with the following default values:

PAGE	MENU DISPLAYED	AVAILABLE PARAMETERS	DEFAULT
PASSWORD		0000 ... 9999	0000
RS485			
	RS485 Address	1 ... 247	27
	Rate	2400, 4800, 9600, 19200, 38400	38400
	Data Bit	7 or 8	8
	Parity	N = no parity, E =even parity, O = odd parity	N
	Stop Bit	1 or 2	2
NETWORK			
	Type *(note n.1)*	3PH-3W-2CT, 3PH-4W, 2PH-2W, 1PH-2W	1PH-2W
	Export	NO, YES	NO
	I FS	14 or 70A	70
AVG-MD TIME *(note n.2)*			
	POWERS	1...60 (minutes)	15
	CURRENTS	1...60 (minutes)	8
ALARM 1 / A *(note n.11)*			
	MODE *(note n.3)*	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE *(note n.4)*	MAX, MIN	MIN
	MEAS *(note n.5)*	Controlled measure. See table n.1 for register selection	200
	THRE *(note n.5)*	Threshold value	0
ALARM 1 / B			
	HYST	1...100 (%)	1
	DELAY	1...99 (seconds)	1
	AVG *(nota n.6)*	1...99 (seconds)	1
	OUT *(nota n.7)*	Normal, Hold, Pulse-L, Pulse-S	NORMAL
ALARM 2 / A *(note n.11)*			
	MODE *(note n.3)*	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE *(note n.4)*	MAX, MIN	MIN
	MEAS *(note n.5)*	Controlled measure. See table n.1 for register selection	200
	THRE *(note n.5)*	Threshold value	0
ALARM 2 / B			
	HYST	1...100 (%)	1
	DELAY	1...99 (seconds)	1
	AVG *(note n.6)*	1...99 (seconds)	1
	OUT *(note n.7)*	Normal, Hold, Pulse-L, Pulse-S	NORMAL
ALARM 3 / A *(note n.11)*			
	MODE *(note n.3)*	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE *(note n.4)*	MAX, MIN	MIN
	MEAS *(note n.5)*	Controlled measure. See table n.1 for register selection	200
	THRE *(note n.5)*	Threshold value	0
ALARM 3 / B			
	HYST	1...100 (%)	1
	DELAY	1...99 (seconds)	1
	AVG *(note n.6)*	1...99 (seconds)	1
	OUT *(note n.7)*	Normal, Hold, Pulse-L, Pulse-S	NORMAL
ALARM 4 / A *(note n.11)*			
	MODE *(note n.3)*	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE *(note n.4)*	MAX, MIN	MIN
	MEAS *(note n.5)*	Controlled measure. See table n.1 for register selection	200
	THRE *(note n.5)*	Threshold value	0
ALARM 4 / B			
	HYST	1...100 (%)	1
	DELAY	1...99 (seconds)	1
	AVG *(note n.6)*	1...99 (seconds)	1
	OUT *(note n.7)*	Normal, Hold, Pulse-L, Pulse-S	NORMAL
DIGITAL OUT 1 *(note n.8)*			
	MODE	PULSE, ALARM, REMOTE	PULSE
	POLARITY	NO, NC	NO
PULSE OUT 1			
	MEAS *(note n.9)*	P-IMP, QL-IMP, QC-IMP, S-IMP, P-EXP, QL-EXP, QC-EXP, S-EXP	P-IMP
	PRIMARY *(note n.10)*	YES, NO	YES
	WEIGHT	1...100000000 (Wh/100)	100000
	WIDTH	50ms...1S	500
DIGITAL OUT 2 *(note n.8)*			
	MODE	PULSE, ALARM, REMOTE	PULSE
	POLARITY	NO, NC	NO
PULSE OUT 2			
	MEAS *(nota n.9)*	P-IMP, QL-IMP, QC-IMP, S-IMP, P-EXP, QL-EXP, QC-EXP, S-EXP	QL-IMP
	PRIMARY *(nota n.10)*	YES, NO	YES
	WEIGHT	1...100000000 (Wh/100)	100000
	WIDTH	50ms...1S	500

MECHANICAL CHARACTERISTICS	
Enclosure	Self-extinguishing plastic material class V0
Protection degree	IP40 on front panel
Dimensions	70 x 90 x 58 mm (4 DIN modules)
VOLTAGE INPUT	
Direct	Up to 300 Vrms phase-neutral or 519 Vrms phase to phase
	Overload: 900 Vrms phase to phase for 1 sec
Power supply	230/240Vac +/- 10% 50/60Hz
Self consumption	< 3VA
MODELS	
PFA7451-02	ATTO D4 70A ECT RS485 230-240V TRANSDUCER / ANALYZER
PFA7451-12	ATTO D4 70A ECT RS485 230-240V 1DI 2DO TRANSDUCER / ANALYZER

TABLE NR. 1 - INPUT REGISTERS

Address	n° Register	Type *	Description	Symbol	Unit
200	2	F	Phase to Neutral Voltage, THD	THD U1N	[%]
202	2	F	Phase to Neutral Voltage, THD	THD U2N	[%]
204	2	F	Phase to Neutral Voltage, THD	THD U3N	[%]
206	2	F	Phase to Phase Voltage, THD	THD U12	[%]
208	2	F	Phase to Phase Voltage, THD	THD U23	[%]
210	2	F	Phase to Phase Voltage, THD	THD U31	[%]
212	2	F	Phase Current, THD	THD I1	[%]
214	2	F	Phase Current, THD	THD I2	[%]
216	2	F	Phase Current, THD	THD I3	[%]
218	2	F	Frequency of U1N	f	[Hz]
220	2	F	Phase to Neutral Voltage, RMS Amplitude	U1N	[V]
222	2	F	Phase to Neutral Voltage, RMS Amplitude	U2N	[V]
224	2	F	Phase to Neutral Voltage, RMS Amplitude	U3N	[V]
226	2	F	Phase to Phase Voltage, RMS Amplitude	U12	[V]
228	2	F	Phase to Phase Voltage, RMS Amplitude	U23	[V]
230	2	F	Phase to Phase Voltage, RMS Amplitude	U31	[V]
232	2	F	Phase Current, RMS Amplitude	I1	[A]
234	2	F	Phase Current, RMS Amplitude	I2	[A]
236	2	F	Phase Current, RMS Amplitude	I3	[A]
238	2	F	Neutral Current, RMS Amplitude	IN	[A]
240	2	F	Phase Active Power (+/-)	P1	[W]
242	2	F	Phase Active Power (+/-)	P2	[W]
244	2	F	Phase Active Power (+/-)	P3	[W]
246	2	F	Phase Reactive Power (+/-)	Q1	[var]
248	2	F	Phase Reactive Power (+/-)	Q2	[var]
250	2	F	Phase Reactive Power (+/-)	Q3	[var]
252	2	F	Phase Apparent Power	S1	[VA]
254	2	F	Phase Apparent Power	S2	[VA]
256	2	F	Phase Apparent Power	S3	[VA]
258	2	F	Phase Power Factor (+/-)	PF1	[-]
260	2	F	Phase Power Factor (+/-)	PF2	[-]
262	2	F	Phase Power Factor (+/-)	PF3	[-]
264	2	F	Phase to Neutral Voltage, Mean THD	THD UI	[%]
266	2	F	Phase to Phase Voltage, Mean THD	THD UD	[%]
268	2	F	Phase Current, Mean THD	THD I	[%]
270	2	F	Phase to Neutral Voltage, Mean RMS Amplitude	UI	[V]
272	2	F	Phase to Phase Voltage, Mean RMS Amplitude	UD	[V]
274	2	F	Three phase current, RMS Amplitude	I	[A]
276	2	F	Total active power (+/-)	PS	[W]
278	2	F	Total reactive power (+/-)	QS	[var]
280	2	F	Total apparent power	SS	[VA]
282	2	F	Total power factor (+/-)	PFS	[-]
284	2	F	Internal Temperature, °C	T	[°C]
286	2	F	Internal Temperature, °F	T	[°F]
288	2	F	Phase to Neutral Voltage, RMS Amplitude, MIN	U1N MIN	[A]
290	2	F	Phase to Neutral Voltage, RMS Amplitude, MIN	U2N MIN	[A]
292	2	F	Phase to Neutral Voltage, RMS Amplitude, MIN	U3N MIN	[A]
294	2	F	Phase to Neutral Voltage, RMS Amplitude, MAX	U1N MAX	[A]
296	2	F	Phase to Neutral Voltage, RMS Amplitude, MAX	U2N MAX	[A]
298	2	F	Phase to Neutral Voltage, RMS Amplitude, MAX	U3N MAX	[A]
300	2	F	Phase to Phase Voltage, RMS Amplitude, MIN	U12 MIN	[A]
302	2	F	Phase to Phase Voltage, RMS Amplitude, MIN	U23 MIN	[A]
304	2	F	Phase to Phase Voltage, RMS Amplitude, MIN	U31 MIN	[A]
306	2	F	Phase to Phase Voltage, RMS Amplitude, MAX	U12 MAX	[A]
308	2	F	Phase to Phase Voltage, RMS Amplitude, MAX	U23 MAX	[A]
310	2	F	Phase to Phase Voltage, RMS Amplitude, MAX	U31 MAX	[A]
312	2	F	Phase Current, RMS Amplitude, MAX	I1 MAX	[A]
314	2	F	Phase Current, RMS Amplitude, MAX	I2 MAX	[A]
316	2	F	Phase Current, RMS Amplitude, MAX	I3 MAX	[A]
318	2	F	Neutral Current, RMS Amplitude, MAX	IN MAX	[A]
320	2	F	Phase Active Power, Import, MAX	P1+ MAX	[A]
322	2	F	Phase Active Power, Import, MAX	P2+ MAX	[A]
324	2	F	Phase Active Power, Import, MAX	P3+ MAX	[A]
326	2	F	Phase Active Power, Export, MAX	P1- MAX	[A]
328	2	F	Phase Active Power, Export, MAX	P2- MAX	[A]
330	2	F	Phase Active Power, Export, MAX	P3- MAX	[A]
332	2	F	Phase Current, RMS Amplitude, AVG	I1 AVG	[A]
334	2	F	Phase Current, RMS Amplitude, AVG	I2 AVG	[A]
336	2	F	Phase Current, RMS Amplitude, AVG	I3 AVG	[A]
338	2	F	Phase Current, RMS Amplitude, MD	I1 MD	[A]
340	2	F	Phase Current, RMS Amplitude, MD	I2 MD	[A]
342	2	F	Phase Current, RMS Amplitude, MD	I3 MD	[A]
344	2	F	Total imported active power, AVG	P+ AVG	[W]
346	2	F	Total imported inductive power, AVG	Qind+ AVG	[var]
348	2	F	Total imported capacitive power, AVG	Qcap+ AVG	[var]
350	2	F	Total imported apparent power, AVG	S+ AVG	[VA]
352	2	F	Total exported active power, AVG	P- AVG	[W]
354	2	F	Total exported inductive power, AVG	Qind- AVG	[var]
356	2	F	Total exported capacitive power, AVG	Qcap- AVG	[var]
358	2	F	Total exported apparent power, AVG	S- AVG	[VA]
360	2	F	Total imported active power, MD	P+ MD	[W]
362	2	F	Total imported inductive power, MD	Qind+ MD	[var]
364	2	F	Total imported capacitive power, MD	Qcap+ MD	[var]
366	2	F	Total imported apparent power, MD	S+ MD	[VA]
368	2	F	Total exported active power, MD	P- MD	[W]
370	2	F	Total exported inductive power, MD	Qind- MD	[var]
372	2	F	Total exported capacitive power, MD	Qcap- MD	[var]
374	2	F	Total exported apparent power, MD	S- MD	[VA]
376	2	F	External Pulse Counter, With Weight, Total counter or Tariff T1	CNT1 S	
384	2	F	External Pulse Counter, With Weight, Partial Counter or Tariff T2	CNT1 P	
392	2	I	External Pulse Counter, Total counter or Tariff T1	CNT1 S	[-]
400	2	I	Lifetimer, Total counter	TIME S	[s]
402	2	I	External Pulse Counter, Partial Counter or Tariff T2	CNT1 P	[-]
410	2	I	Lifetimer, Partial Counter or Conditional Counter	TIME P	[s]
412	2	I	Total imported active energy, Total counter or Tariff T1	Ea S +	[kWh/10]
414	2	I	Total imported inductive energy, Total counter or Tariff T1	Er Ind S +	[kvarh/10]
416	2	I	Total imported capacitive energy, Total counter or Tariff T1	Er Cap S +	[kvarh/10]
418	2	I	Total imported apparent energy, Total counter or Tariff T1	Es S +	[kVAh/10]
420	2	I	Total exported active energy, Total counter or Tariff T1	Ea S -	[kWh/10]
422	2	I	Total exported inductive energy, Total counter or Tariff T1	Er Ind S -	[kvarh/10]
424	2	I	Total exported capacitive energy, Total counter or Tariff T1	Er Cap S -	[kvarh/10]
426	2	I	Total exported apparent energy, Total counter or Tariff T1	Es S -	[kVAh/10]
428	2	I	Total imported active energy, Partial Counter or Tariff T2	Ea P +	[kWh/10]
430	2	I	Total imported inductive energy, Partial Counter or Tariff T2	Er Ind P +	[kvarh/10]
432	2	I	Total imported capacitive energy, Partial Counter or Tariff T2	Er Cap P +	[kvarh/10]
434	2	I	Total imported apparent energy, Partial Counter or Tariff T2	Es P +	[kVAh/10]
436	2	I	Total exported active energy, Partial Counter or Tariff T2	Ea P -	[kWh/10]
438	2	I	Total exported inductive energy, Partial Counter or Tariff T2	Er Ind P -	[kvarh/10]
440	2	I	Total exported capacitive energy, Partial Counter or Tariff T2	Er Cap P -	[kvarh/10]
442	2	I	Total exported apparent energy, Partial Counter or Tariff T2	Es P -	[kVAh/10]
444	2	I	Phase imported active energy	Ea+ L1	[kWh/10]
446	2	I	Phase imported active energy	Ea+ L2	[kWh/10]
448	2	I	Phase imported active energy	Ea+ L3	[kWh/10]
450	2	I	Phase imported inductive energy	Er Ind + L1	[kvarh/10]
452	2	I	Phase imported inductive energy	Er Ind + L2	[kvarh/10]
454	2	I	Phase imported inductive energy	Er Ind + L3	[kvarh/10]
456	2	I	Phase imported capacitive energy	Er Cap + L1	[kvarh/10]
458	2	I	Phase imported capacitive energy	Er Cap + L2	[kvarh/10]
460	2	I	Phase imported capacitive energy	Er Cap + L3	[kvarh/10]
462	2	I	Phase imported apparent energy	Es + L1	[kvarh/10]
464	2	I	Phase imported apparent energy	Es + L2	[kvarh/10]
466	2	I	Phase imported apparent energy	Es + L3	[kvarh/10]
468	2	I	Phase exported active energy	Ea- L1	[kWh/10]
470	2	I	Phase exported active energy	Ea- L2	[kWh/10]
472	2	I	Phase exported active energy	Ea- L3	[kWh/10]
474	2	I	Phase exported inductive energy	Er Ind - L1	[kvarh/10]
476	2	I	Phase exported inductive energy	Er Ind - L2	[kvarh/10]
478	2	I	Phase exported inductive energy	Er Ind - L3	[kvarh/10]
480	2	I	Phase exported capacitive energy	Er Cap - L1	[kvarh/10]
482	2	I	Phase exported capacitive energy	Er Cap - L2	[kvarh/10]
484	2	I	Phase exported capacitive energy	Er Cap - L3	[kvarh/10]
486	2	I	Phase exported apparent energy	Es - L1	[kvarh/10]
488	2	I	Phase exported apparent energy	Es - L2	[kvarh/10]
490	2	I	Phase exported apparent energy	Es - L3	[kvarh/10]
492	1	B	Digital Inputs Status	DI	[-]
494	1	B	Alarms Status (simple)	ALS	[-]
495	1	B	Alarms Status (combined)	ALC	[-]
496	4	I	Total imported active energy, Total counter or Tariff T1	Ea S +	[Wh/10]
500	4	I	Total imported inductive energy, Total counter or Tariff T1	Er Ind S +	[varh/10]
504	4	I	Total imported capacitive energy, Total counter or Tariff T1	Er Cap S +	[varh/10]
508	4	I	Total imported apparent energy, Total counter or Tariff T1	Es S +	[VAh/10]
512	4	I	Total exported active energy, Total counter or Tariff T1	Ea S -	[Wh/10]
516	4	I	Total exported inductive energy, Total counter or Tariff T1	Er Ind S -	[varh/10]
520	4	I	Total exported capacitive energy, Total counter or Tariff T1	Er Cap S -	[varh/10]
524	4	I	Total exported apparent energy, Total counter or Tariff T1	Es S -	[VAh/10]
528	4	I	Total imported active energy, Partial Counter or Tariff T2	Ea P +	[Wh/10]
532	4	I	Total imported inductive energy, Partial Counter or Tariff T2	Er Ind P +	[varh/10]
536	4	I	Total imported capacitive energy, Partial Counter or Tariff T2	Er Cap P +	[varh/10]
540	4	I	Total imported apparent energy, Partial Counter or Tariff T2	Es P +	[VAh/10]
544	4	I	Total exported active energy, Partial Counter or Tariff T2	Ea P -	[Wh/10]
548	4	I	Total exported inductive energy, Partial Counter or Tariff T2	Er Ind P -	[varh/10]
552	4	I	Total exported capacitive energy, Partial Counter or Tariff T2	Er Cap P -	[varh/10]
556	4	I	Total exported apparent energy, Partial Counter or Tariff T2	Es P -	[VAh/10]
560	4	I	Phase imported active energy	Ea+ L1	[Wh/10]
564	4	I	Phase imported active energy	Ea+ L2	[Wh/10]
568	4	I	Phase imported active energy	Ea+ L3	[Wh/10]
572	4	I	Phase imported inductive energy	Er Ind + L1	[varh/10]
576	4	I	Phase imported inductive energy	Er Ind + L2	[varh/10]
580	4	I	Phase imported inductive energy	Er Ind + L3	[varh/10]

Note n.1

3PH-3W-2CT	2 phases 3 wires, triangle
3PH-4W	3 phases 4 wires, Star
2PH-2W	2 phases 2 wires, biphase
1PH-2W	1 phase 2 wires, monophase

Note n.2

POWERS	Integration time of the average value (AVG) and peak value (MD) for power (from 1 to 60 minutes)
CURRENTS	Integration time of the average value (AVG) and peak value (MD) for current (from 1 to 60 minutes)

Note n.3

Normal	Classic Alarm with reference to a fixed threshold or to maximum and minimum delay and applicable hysteresis. "AVG" parameter is not used.
1-OF-3	Consider also the 2 following registers of the selected one in "MEAS". Works on a fixed max or min threshold with delay and applicable hysteresis. If one of the three register exceed the threshold the alarm goes on. "AVG" parameter is not used.
3-OF-3	Consider also the 2 following registers of the selected one in "MEAS". Works on a fixed max or min threshold with delay and applicable hysteresis. When all the three register exceed the threshold the alarm goes on. "AVG" parameter is not used.
DERIV	"THRE" parameter becomes a % value, "AVG" parameter is used. The instant value applied to the alarm on "MEAS" is compared with its value mediated obtained on the basis of the time set on "AVG". When the instantaneous value combined alarm differs in more (setting "Max") or less (setting "MIN") from the average value (" AVG ") of the percentage set on "THRE" the alarm goes on. With delay and applicable hysteresis.
UNBAL	Consider also the 2 following registers of the selected one in "MEAS". "THRE" parameter becomes a % value. Alarm goes on when one of the three register is different from the percentage set on "THRE" comply with the higher value of the three read register if "MAX" is set on "TYPE", or comply with the lower value of the three register if "MIN" is set on "TYPE" With delay and applicable hysteresis.

Note n.4

MAX	Alarm setting in excess compared with the established conditions. With the exception of "UNBAL".
MIN	Alarm setting in decrease compared with the established conditions. With the exception of "UNBAL"

Note n.5

MEAS	Indicates which register (and thus measure) the alarm is related. See table n.1 input register.
THRE	Alarm threshold in absolute value, with the exception made for "DERIV" and "UNBAL" in which the value inserted becomes a percentage.

Note n.6

AVG	Parameter to be used only in "DERIV" mode. Is the duration of the refe-rence (in seconds) used to create a reference value for the istantaneous readings.

Note n.7	
NORMAL	Physical output of the alarm excited during the duration of the alarm. It restores automatically
HOLD	Output remains excited until manual reset made via Modbus
PULSE-L	Output generate a 500ms impulse when the alarm goes on.
PULSE-S	Output generate a 100ms impulse when the alarm goes on.

Note n.8	
PULSE	Enables exit function as impulsive
ALARM	Enables exit function as alarm
REMOTE	Enables function output via protocol Modbus
NO	Normally open
NC	Normally closed

Note n.9	
P-IMP	Imported Active Power (Energy)
QL-IMP	Imported Reactive Inductive Power (Energy)
QC-IMP	Imported Reactive Capacitive Power (Energy)
S-IMP	Imported Apparent Power (Energy)
P-EXP	Exported Active Power (Energy)
QL-EXP	Exported Reactive Inductive Power (Energy)
QC-EXP	Exported Reactive Capacitive Power (Energy)
S-EXP	Exported Apparent Power (Energy)

Note n.10	
YES	Referred to CT primary
NO	Referred to CT secondary

Note n.11	
ALLARME 1	Alarm related to the physical output: DIGITAL OUT 1 (DO1, terminal 8)
ALLARME 2	Alarm related to the physical output: DIGITAL OUT 2 (DO2, terminal 9)
ALLARME 3	Only MODBUS alarm
ALLARME 4	Only MODBUS alarm

ALARM SET UP EXAMPLE

To ensure that the exit "DIGITAL OUT 1" remain excited for the alarm duration (latching) when average active power (MEAS 344) exceeds the value of 100 kW, hysteresis, 5% and latency of 5 seconds set the parameters such as table:

ALARM 1 / A	MODE (*note n.2*)	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE (*note n.3*)	MAX, MIN	MAX
	MEAS (*note n.4*)	Controlled measure. See table n.1 for register selection	344
	THRE (*note n.4*)	Threshold value	100000
ALARM 1 / B	HYST	1...100 (%)	5
	DELAY	1...99 (seconds)	5
	AVG (*note n.5*)	1...99 (seconds)	1
	OUT (*note n.6*)	Normal, Hold, Pulse-L, Pulse-S	NORMAL
DIGITAL OUT 1	MODE	PULSE, ALARM, REMOTE	ALARM
	POLARITY	NO, NC	NO

To ensure that the exit "DIGITAL OUT 2" remain excited for the alarm duration (latching) when average active power (MEAS 344) goes down the value of 90 kW, hysteresis, 5% and latency of 5 seconds set the parameters such as table:

ALARM 2 / A	MODE (*note n.2*)	Normal, 1-OF-3, 3-OF-3, DERIV, UNBAL	NORMAL
	TYPE (*note n.3*)	MAX, MIN	MIN
	MEAS (*note n.4*)	Controlled measure. See table n.1 for register selection	344
	THRE (*note n.4*)	Threshold value	90000
ALARM 2 / B	HYST	1...100 (%)	5
	DELAY	1...99 (seconds)	5
	AVG (*note n.5*)	1...99 (seconds)	1
	OUT (*note n.6*)	Normal, Hold, Pulse-L, Pulse-S	NORMAL
DIGITAL OUT 2	MODE	PULSE, ALARM, REMOTE	ALARM
	POLARITY	NO, NC	NO

VOLTAGE AND CURRENT CONNECTION
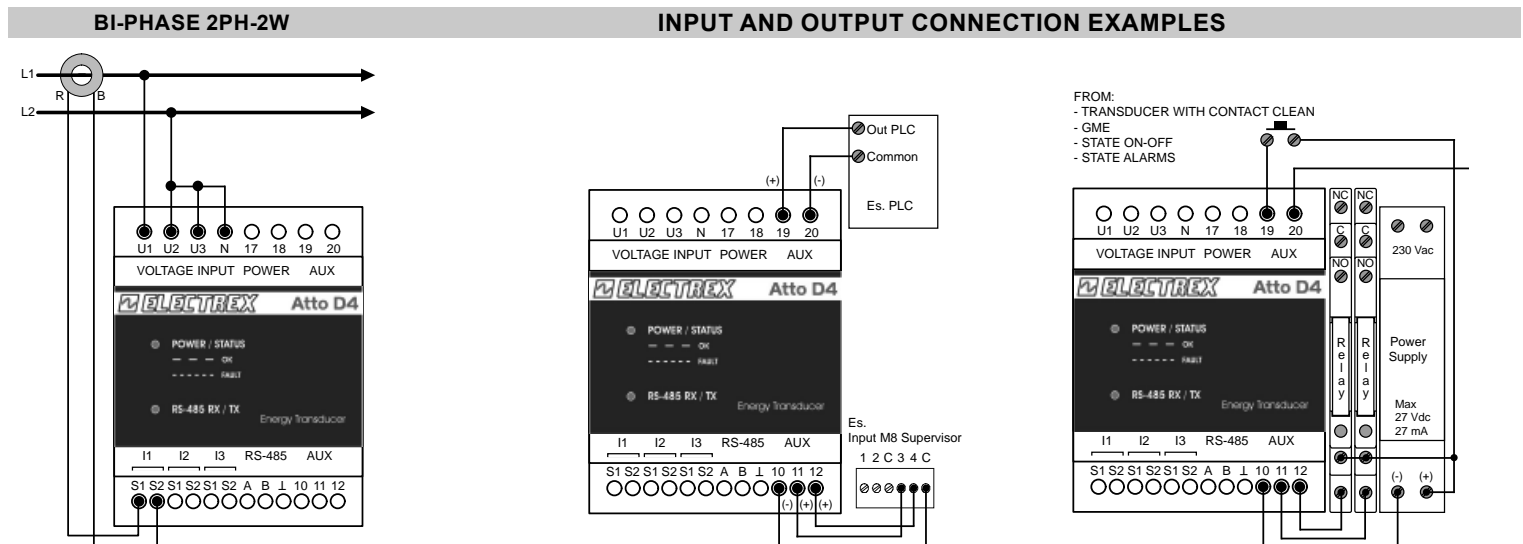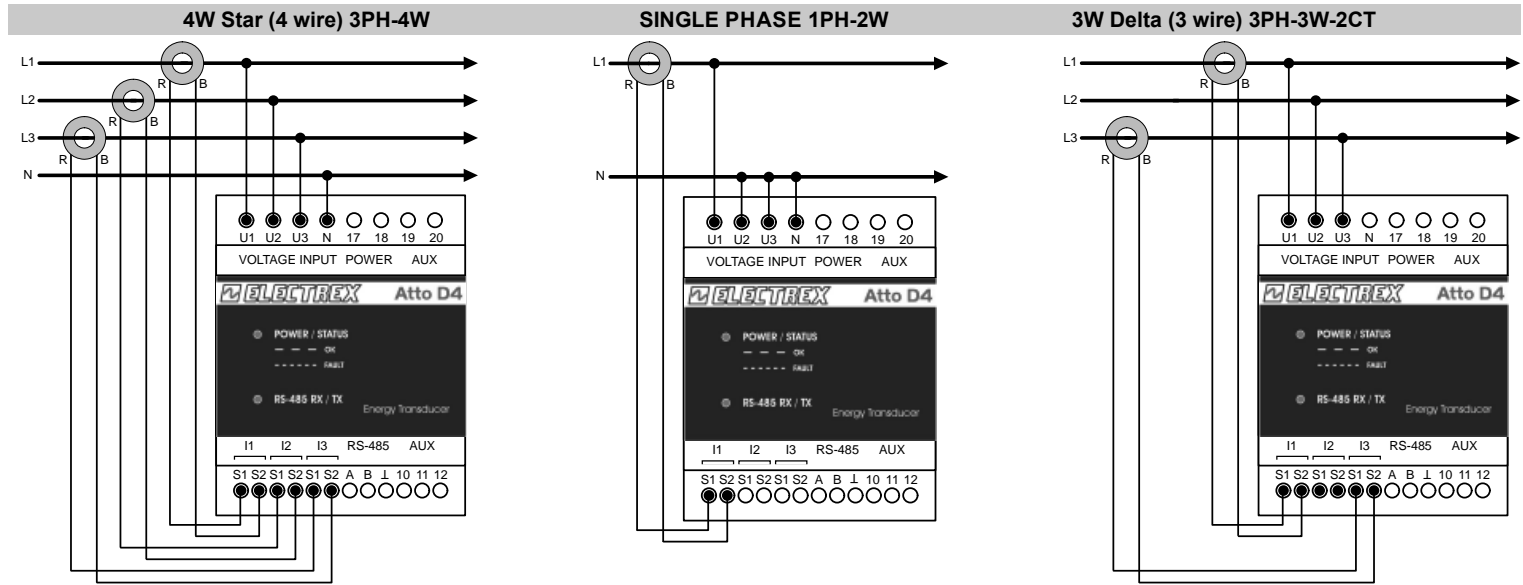
Voltage connection
Use cables with max cross-section of 2,5 mm² if flexible 4 mm² if rigid and connect them to the terminals marked voltage input on the instrument according to the applicable diagrams that follow.

Current connection
Use only the CT's provided with the instrument. Connect the CT output(s) to the terminals marked I1, I2, I3 (CURRENT INPUT) of the instrument according to the applicable diagrams that follow.
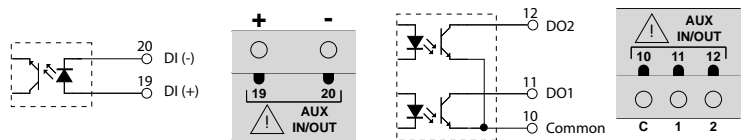
N.B. The CT secondary must always be in short circuit when not connected to the instrument in order to avoid damages and risks for the operator.

Warning: The phase relationship among voltage and current signals and the R-B orientation of the CT must be carefully respected. All disregard of this rule or of the wiring diagram leads to severe measurement errors. Do not lengthen the CT cables.

4W Star (4 wire) 3PH-4W

SINGLE PHASE 1PH-2W

3W Delta (3 wire) 3PH-3W-2CT

BI-PHASE 2PH-2W

INPUT AND OUTPUT CONNECTION EXAMPLES

DIGITAL INPUTS AND OUTPUTS CONNECTION
(Applicable only to type PFA7451-12)

Digital Inputs	
Supply voltage (external):	from 10 to 30 Vdc
Current consumption:	from 2 to 10mA
Max. count frequency	10 or 100Hz
N.B. For gas meters a galvanic separation is needed per ATEX standards	

Digital outputs (optocoupled NPN transistor type per DIN 43864)	
Maximum applicable voltage:	27 Vdc
Maximum switchable current:	27 mA

POWER SUPPLY AND SERIAL LINE CONNECTION

The instrument is fitted with a separate power supply. The power supply terminals are numbered (17) and (18). Use cables with max cross-section of 2,5 mm² if flexible, 4 mm² if rigid.

Serial RS485 port
A B ⊥