

Electric Energy Transducer



Installation Manual

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1 INTRODUCTION

We thank you for choosing an Akse instrument

We invite you to carefully read this instructions manual for the best use of the instruments.

1.1 COPYRIGHT

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1.2 WARRANTY

This product is covered by a warranty against material and manufacturing defects for a period of 36 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

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.

1.3 RETURN AND REPAIR FORMALITIES

Akse accepts the return of instruments for repair **only** when authorized in advance. For instrument purchased directly, the repair authorization must be requested to Akse directly by using the enclosed RMA form. We recommend otherwise to contact your local distributor for assistance on the return/repair formalities. In both the cases, the following information must be supplied:

- Company full data
- Contact name for further communication
- Product description
- Serial number
- Description of the returned accessories
- Invoice / Shipping document number and date
- Detailed description of the fault and of the operating condition when the fault occurred

The Akse repair lab will send the authorization number to the customer directly or to the distributor as per applicable case. The RMA authorization number shall be clearly marked on the packaging and on the return transport document.

WARNING: *Failure to indicate the RMA number on the external packaging will entitle our warehouse to refuse the delivery upon arrival and to return the parcel at sender's charge.*

The material must be shipped:

- within 15 working days from the receipt of the return authorization number
- free destination i.e. all transport expenses at sender's charge.
- to the following address: **Akse S.r.l.**
Via Aldo Moro, 39 - 42100 Reggio Emilia (RE) - Italy
Atn. Repair laboratory
- the units covered by warranty must be returned in their **original packaging**.

1.3.1 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 defective but found to be perfectly working by our laboratories, will be charged a fixed fee (40.00 Euro + VAT where applicable) to account for checking and testing time irrespective of the warranty terms.

1.3.2 Return Material Authorization (RMA form)

Request for the authorization number for the return of goods

Date:	
Company:	
Contact name:	
TEL:	FAX:
Product description:	
Serial number:	
Description of the returned accessories (if any):	
Original purchase Invoice (or Shipping document) number and date. NB: The proof of purchase must be provided by the customer. Failure to complete this area will automatically void all warranty.	
Detailed description of the malfunction and of the operating conditions when the fault occurred	
<input type="checkbox"/> Tick off for a quotation	
Should a product be found by our laboratories to be perfectly working, a fixed amount of 40 Euro (+VAT if applicable) will be charged to account for checking and testing time irrespective of the warranty tems.	

Space reserved to AKSE

R.M.A. No.

The RMA number shall be clearly indicated on the external packaging and on the shipping document:. Failure to observe this requirement will entitle the AKSE warehouse to refuse the delivery.

2 Safety

This instrument was manufactured and tested in compliance with IEC 61010 class 2 standards for operating voltages up to 250 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.

2.1 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.

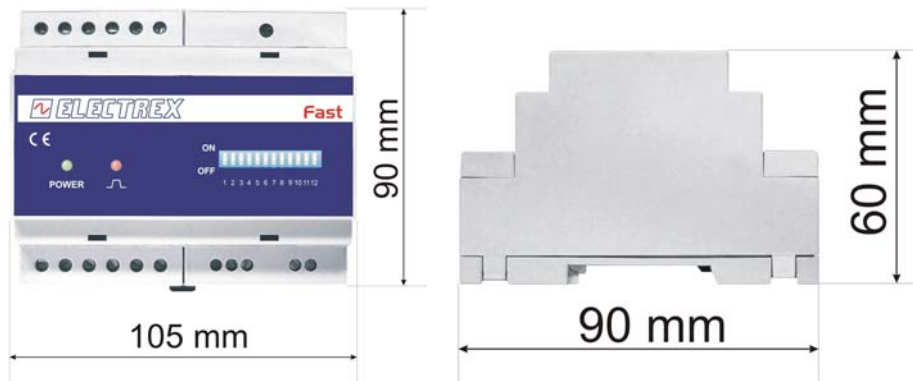


- The instrument is equipped with PTC current limiting device but a suitable external protection fuse should be foreseen by the contractor.
- The outputs and the options operate at low voltage level; they cannot be powered by any unspecified external voltage.
- The application of currents not compatible with the current inputs levels will damage to the instrument.

3 MOUNTING

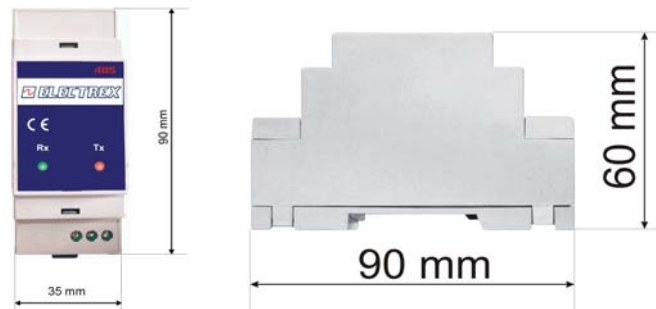
3.1 Instruments size (mm)

6 DIN rail modules



3.2 Optional modules size (mm)

2 DIN rail modules.

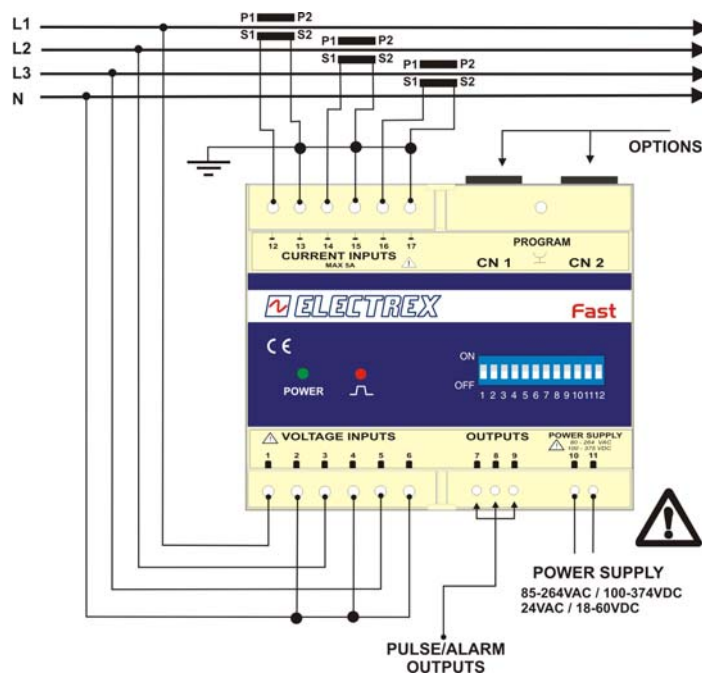


3.3 Fixing and blocking

The instrument (as well as the optional modules) are fixed to the DIN rail by means of the spring clip located on the rear side of the unit.



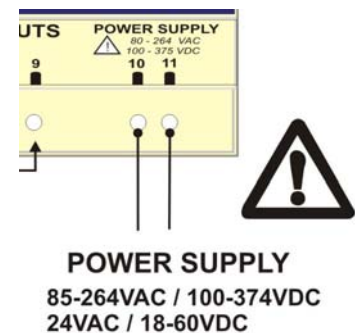
4 WIRING DIAGRAMS



4.1 Power supply

The instrument is fitted with a separate power supply with extended operating range. The power supply terminals are numbered (10) and (11).

Use cables with max cross-section of 4 mm².



4.2 Measurement connections

4.2.1 Voltage connection

Use cables with max cross-section of 4 mm² and connect them to the terminals marked VOLTAGE INPUT on the instrument according to the applicable diagrams that follow.

4.2.2 Current connection

It is necessary to use external CTs with a primary rating adequate to the load to be metered and with a 5A secondary rating. The number of CTs to be used (1, 2 or 3) depends upon the type of network.

Connect the CT output(s) to the terminals marked CURRENT INPUT of the instrument according to the applicable diagrams that follow.

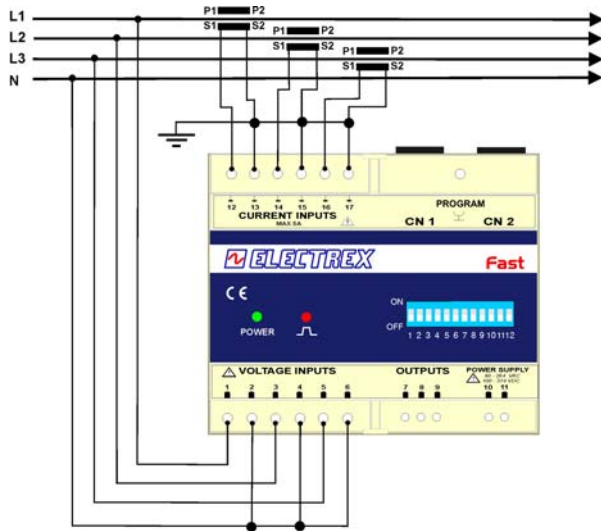
Use cables with cross-section adequate to the VA rating of the CT and to the distance to be covered. The max cross-section for the terminals is 4 mm².

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.

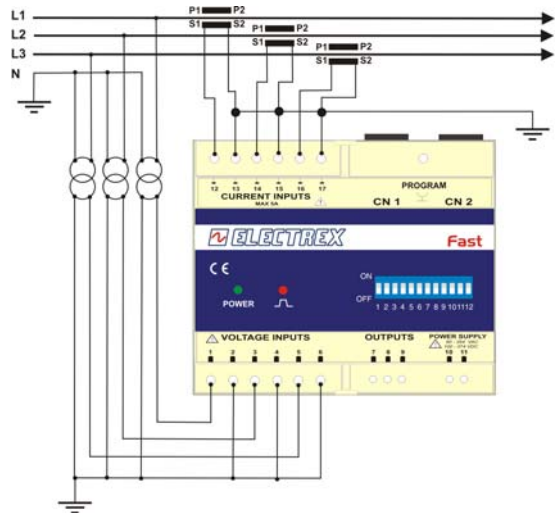
Warning: THE PHASE RELATIONSHIP AMONG VOLTAGE AND CURRENT SIGNALS MUST BE CAREFULLY RESPECTED. ALL DISREGARD OF THIS RULE OR OF THE WIRING DIAGRAM LEADS TO SEVERE MEASUREMENT ERRORS.

4.3 Dip Switch e Modbus programmable connections

4.3.1 4W Star connection (4 wire)



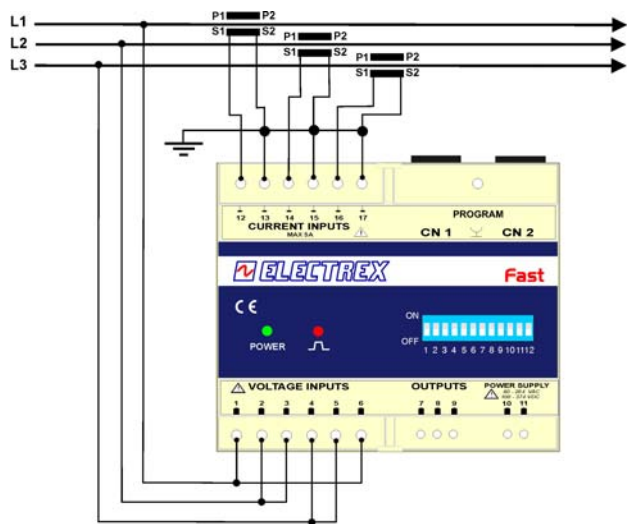
Low voltage 3 CTs
Configuration 3Ph/4W



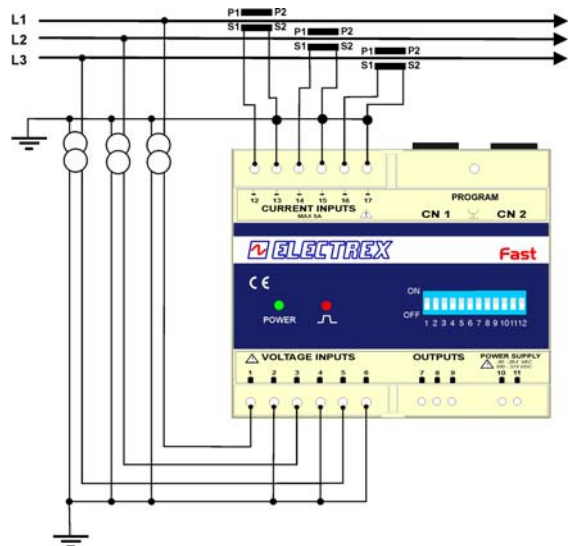
High voltage 3 PTs 3 CTs
Configuration 3Ph/4W

4.3.2 C W Delta connection (3 wire)

Connection with 3 CTs

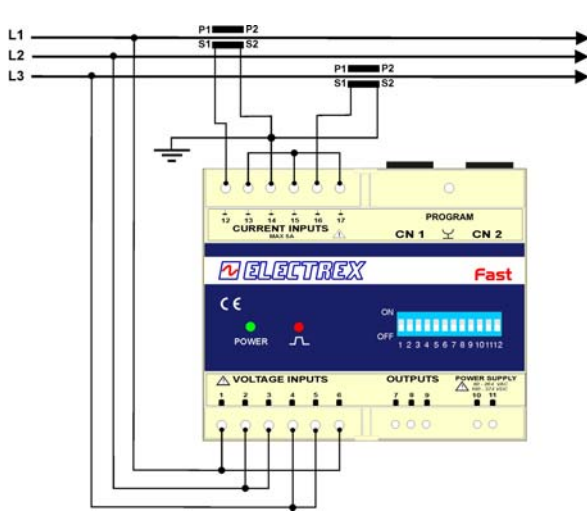


Low Voltage
Configuration 3P/3W

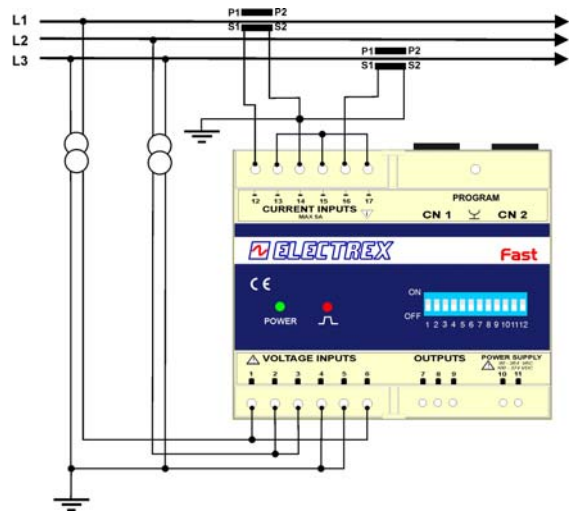


High Voltage
Configuration 3P/3W

4.3.2.1 Connection with 2 CTs on L1 and L3

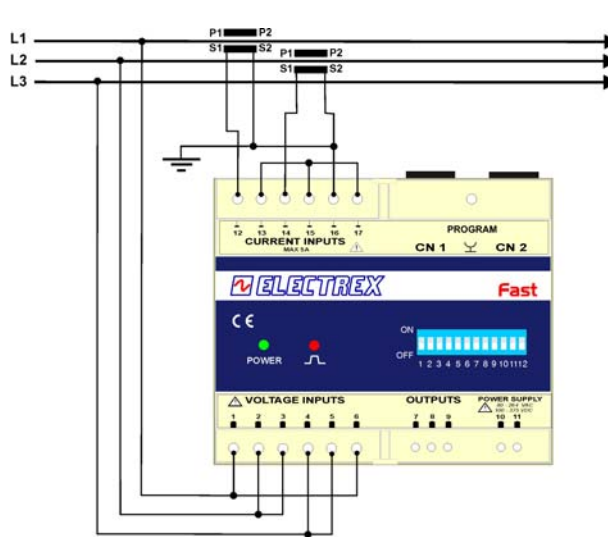


Low Voltage 2 CTs
Configuration 3Ph/3W

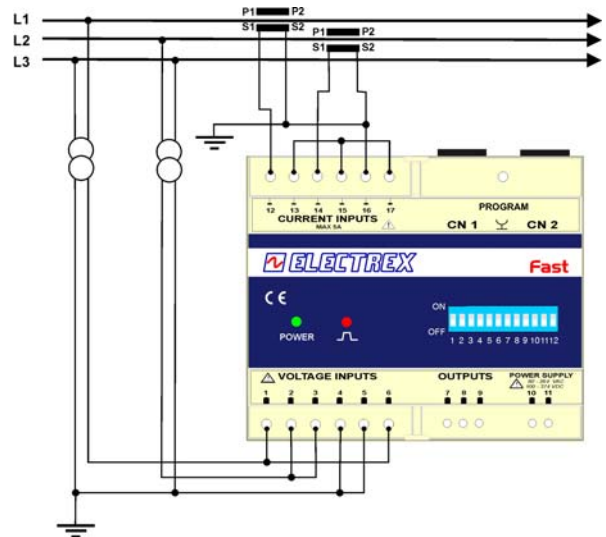


High Voltage 2 PTs 2 CTs
Configuration 3Ph/3W

4.3.2.2 Connection with 2 CTs on L1 and L2



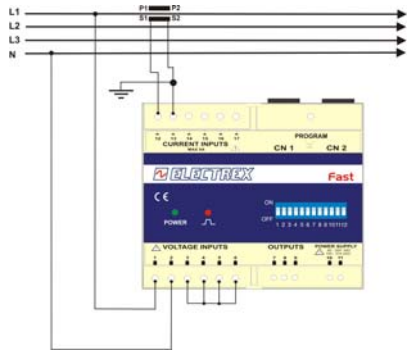
Low Voltage 2 CTs
Configuration 3Ph/3W



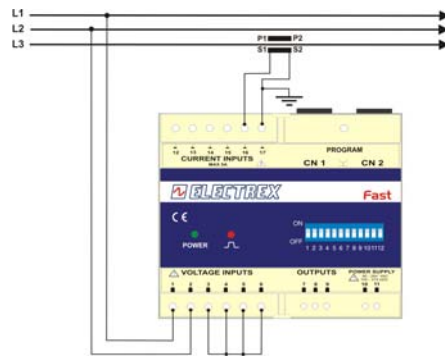
High Voltage 2 PTs 2 CTs
Configuration 3Ph/3W

4.4 Modbus programmable connections

4.4.1 4W Star connection (4 wire)



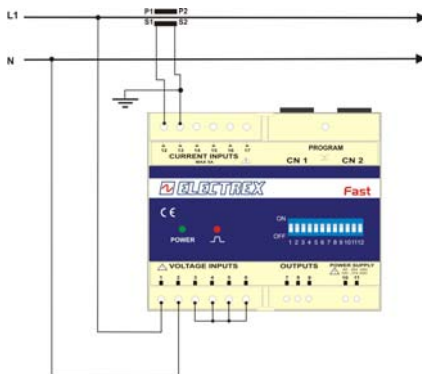
Low Voltage 1 CT (symmetrical and balanced load)
Configuration 3P/4W-Bal



4.4.2 3W Delta connection (3 wire)

Low Voltage 1CT (symmetrical and balanced load)
Configuration 3Ph/3W -Bal

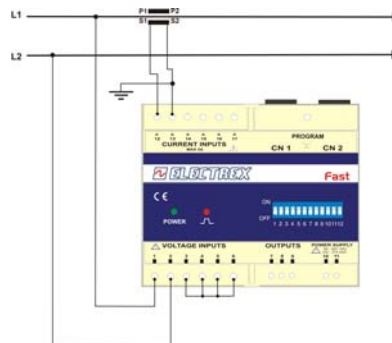
4.4.3 2 Wire connection (single phase)



Low Voltage (phase-neutral) 1 CT
Configuration 1Ph/2W

4.4.4 2 Wire connection (bi-phase)

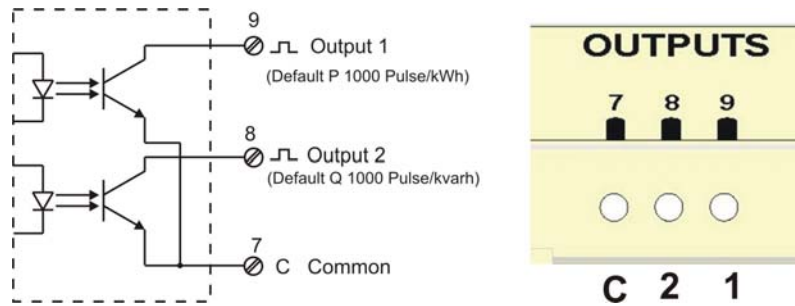
Low Voltage (phase-phase) 1 CT
Configuration 2Ph/2W



4.5 Outputs connection

The instrument is equipped with two opto-isolated transistor outputs rated 27 Vdc, 27 mA (DIN 43864 standards).

The outputs working mode is set by default to operate as pulse output proportional to the Active energy (output 1) and to the Reactive energy (output 2). They support an output rate of 1.000 pulses per kWh (or kvarh) referred to the instrument input range without any CT and PT multiplier.



In order to calculate the energy value of each pulse the following formula must be considered.

$$K_p = \frac{K_{CT} \times K_{PT}}{\text{Pulse / kWh}}$$

Where: K_p = energy of each pulse; K_{CT} = CT ratio ; K_{PT} = PT ratio ;
 Pulse/kWh = Pulse rate

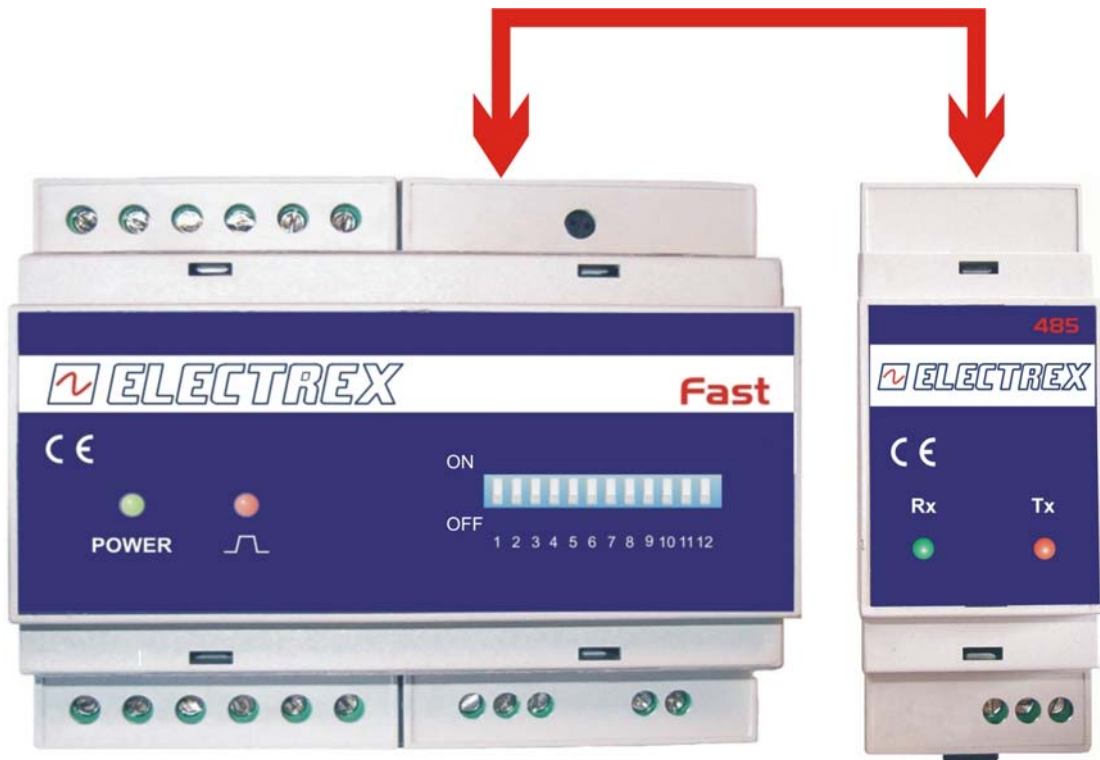
Example: CT = 100/5; PT = 20.000/100 $K_p = \frac{20 \times 200}{1000} = 4 \text{ kWh / pulse}$ or kWh = Pulse count/4

Other pulse rate settings may be however programmed as described in the instrument set up section. The operating mode of the digital outputs may also be changed to work as alarm output or as remote output device controlled by the Modbus protocol as described in the instrument set up section.

4.6 Optional modules connection

The optional modules shall be placed beside of the instrument and shall be connected to the same by means of the cable supplied with.

The optional modules are self-supplied; the instrument recognises the type of option(s) connected and the applicable programming menu will automatically appear when necessary.



CN1 connector: suitable for the RS485 or RS232 optional modules

CN2 connector: suitable for the 4-20 mA optional module or for the Hardware up-date key

4.6.1 RS485 Option

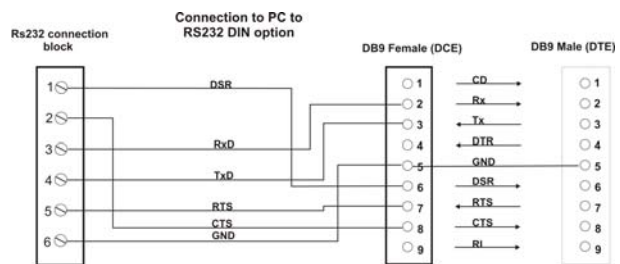


RS485 pin out	
1	A +
2	B -
3	Shield

4.6.2 RS232 Option



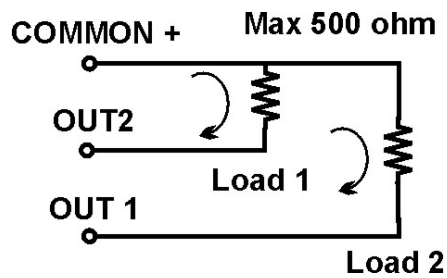
RS232 pin out	
1	DSR (Handshake to DTE)
2	CTS (Handshake to DTE)
3	RD (Data to DTE)
4	TD (Data from DTE)
5	RTS (Handshake from DTE)
6	GND



4.6.3 Dual 4-20 mA analog output option



4-20 mA pin out	
1	CH1 Channel 1
2	CH2 Channel 2
3	Source Common +



NB. The outputs are self powered; do not use external power supply.

5 Transducer set up

The transducer can be set up either by software, with Modbus protocol, using one RS232 or RS485 port connected to the transducer, or through dip switch on the front of the same transducer.

5.1 Configuration through Dip Switch.

The dip switches are located under the front panel and are visible through a transparent windows on the front label.

To make any modification the front panel has to be removed.

Dip switches configuration							
DIP No.	Function	Value					
1	Parity Enable	OFF*	<i>(No parity)</i>				
		ON	<i>Parity enabled</i>				
2	Parity Mode	OFF*	<i>Even Parity</i>				
		ON	<i>Odd Parity</i>				
3	Transmission speed	3	4	Speed (bps)			
		OFF*	OFF*	9600			
		OFF	ON	4800			
4		ON	OFF	19200			
		ON	ON	38400			
5	Address set up enable by dip switches	OFF*	<i>From software (Modbus function 0x42 s) (Default address 27)</i>				
		ON	<i>Hardware (by dip switches)</i>				
6	Modbus address	6	7	8	9	10	Address
7		OFF	OFF	OFF	OFF	OFF	1
8		OFF	OFF	OFF	OFF	ON	2
9	
10		ON	ON	ON	ON	ON	32
11	Network configuration	OFF*	<i>4 wires (Star)</i>				
		ON	<i>3 wires(Delta)</i>				
12	Import/Export mode	OFF*	<i>Import (2Q)</i>				
		ON	<i>Import/Export (4Q)</i>				

*The default dip switches position is always OFF.

5.2 Set up by Modbus protocol

Connect the transducer to a PC where the Energy Brain software from Akse is installed (the software is also available in Configurator version) through one optional RS232 or RS485 port.

Enter the configuration menu and set up all the parameters using the interactive windows.

The transducer can also be set up using a commercial program certified for Modbus protocol and able to write Holding Registers. (For more details see chapter 10 of the extended instruction manual available in Internet www.electrex.it).

The following functions can be set up by software:

Transmission: adds some more functions to the dip switches.

Words/Bytes swap flags allows to swap from Big Endian (default) to Little Endian data format.

Tx delay time insert a delay time to the transducer answer.

Network: parameters to define the mains distribution system configuration.

Network type 2, 3, 4 wires, only import or import/export.

CT Primary CT Secondary.

PT Primary PT Secondary.

AVG/MD powers integration time Counters hold time.

Analogue outputs: On the available 2 outputs the following set up are possible:

Quantity index output parameter selection.

Mode 4-20 or 0-20 mA

Scale begin value.

Scale end value .

Digital outputs: On the available 2 outputs the following set up are possible:

Configuration Pulse output, alarms or output direct command from Modbus

Watchdog timer in minutes.

Alarms: Active only with digital output set to alarm.

Quantity index alarm parameter selection.

Mode Min or Max alarm.

Threshold .

Hysteresis.

Latency. Time required to validate the on or off of the alarm..

*A broader instructions manual including the Modbus protocol mapping
may be downloaded from our web page www.electrex.it.*



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AKSE SRL
Via Aldo Moro, 39
42100 Reggio Emilia (RE) ITALY
Tel : +39 0522 924244
Fax : +39 0522 924245
E-Mail : info@akse.it
Internet : www.akse.it