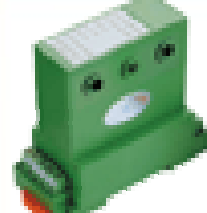




# CPI 3000



## Digital Electrical Transducers CE - A Series

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## Chapter 1. Brief Introduction

Categories: There are two categories of Series CE-A Digital electrical Multi-parameter Transducer. One is for 1 element circuit and another is for 3-phase circuit. The 3-phase type has two types of connection: 3-phase 3-wire and 3-phase 4-wire. Also there are three categories of Series CE-A Digital electrical Single Parameter Transducer. One is AC Current Transducer for 1 or 3 elements circuits. The second is DC current transducer for 1 or 3 elements circuits. The third one is AC/DC Voltage Transducer for 1 or 3 elements and 3-phase 3-wire or 3-phase 4-wire circuits.

Input: Voltage, Current

Digital output parameter: voltage, current, active and reactive power, power factor, frequency and energy

Digital output communication interface: RS-485 or RS-232C

Some of transducers are double isolated. It means that the output of the transducer is electrically isolated from its input. Some of transducers are treble isolated. It means that the input, output and power source of the transducer are isolated each from others.

Two kinds of power source: Steady voltage power source (the code of the type is 1~4) and wide voltage range power source (the code of the type is 5~9). The former is called the steady voltage input mode and the latter is called the wide voltage input mode.

There are two kinds of isolation voltage: 1000V (wide voltage input mode) and 2500V (steady voltage input mode).

Accuracy: 0.5%

Advantages: This series combines many advantages of small size, powerful function. The product provides strong isolation between input and output. Its ID address can be set and modified by software of monitoring system. It can measure up to 25A 3-phase current. It is the smallest one in size of the digital electrical transducer at present in China.

Main part numbers of 1 element Multi-parameter Transducer (S3 and N case style):

CE-AJ12-1---- 1 element connection, RS-485 interface, ASCII format, treble isolated.

CE-AJ12-2---- 1 element connection, RS-232C interface, ASCII format, treble isolated.

CE-AJ12B-1---- 1 element connection, RS-485 interface, ASCII format, treble isolated, with accumulative energy data power failure protection function.

CE-AJ12B-2---- 1 element connection, RS-232C interface, ASCII format, treble isolated, with accumulative energy data power failure protection function.

Main part numbers of 3-phase 3-wire (two watt meter method) Multi-parameter Transducer (S3 and N case style) are:

CE-AJ32-1----- 3-phase 3-wire (two watt meter method), RS-485 interface, ASCII format, treble isolated (only N case style).

CE-AJ32-2----- 3-phase 3-wire (two watt meter method), RS-232C interface, ASCII format, treble isolated (only N case style).

CE-AJ32B-1----- 3-phase 3-wire (two wattmeter method), RS-485 interface, ASCII format, treble isolated (N case style only), with accumulative energy data power failure protection

---

function.

CE-AJ32B-2----- 3-phase 3-wire (two wattmeter method), RS-232C interface, ASCII format, treble isolated (N case style only), with accumulative energy data power failure protection function.

Main part numbers of 3-phase 4-wire Multi-parameter Transducer (S3 and N case style):

CE-AJ42-1----- 3-phase 4-wire, RS-485 interface, ASCII format, treble isolated (only N case style).

CE-AJ42-1----- 3-phase 4-wire, RS-232C interface, ASCII format, treble isolated (only N case style).

CE-AJ42B-1----- 3-phase 4-wire, RS-485 interface, ASCII format, treble isolated (N case style only), with accumulative energy data power failure protection function.

CE-AJ42B-2----- 3-phase 4-wire, RS-232C interface, ASCII format, treble isolated (N case style only), with accumulative energy data power failure protection function.

Main part numbers of Single Parameter Transducer (S3 and N case style):

CE-AI12—1 element AC current treble isolated current transducer.

CE-AI32—3 elements AC current treble isolated current transducer.

CE-AZ11—1 element DC current double isolated current transducer.

CE-AV42 — 3-phase 4-wire AC (treble isolated) digital AC voltage transducer.

CE-AV32 — 3-phase 3-wire AC (treble isolated) digital AC voltage transducer.

CE-AV12 — 1 element (treble isolated) digital AC voltage transducer.

CE-AU11 — 1 element (double isolated) digital DC voltage transducer.

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## Chapter 2. Characteristics

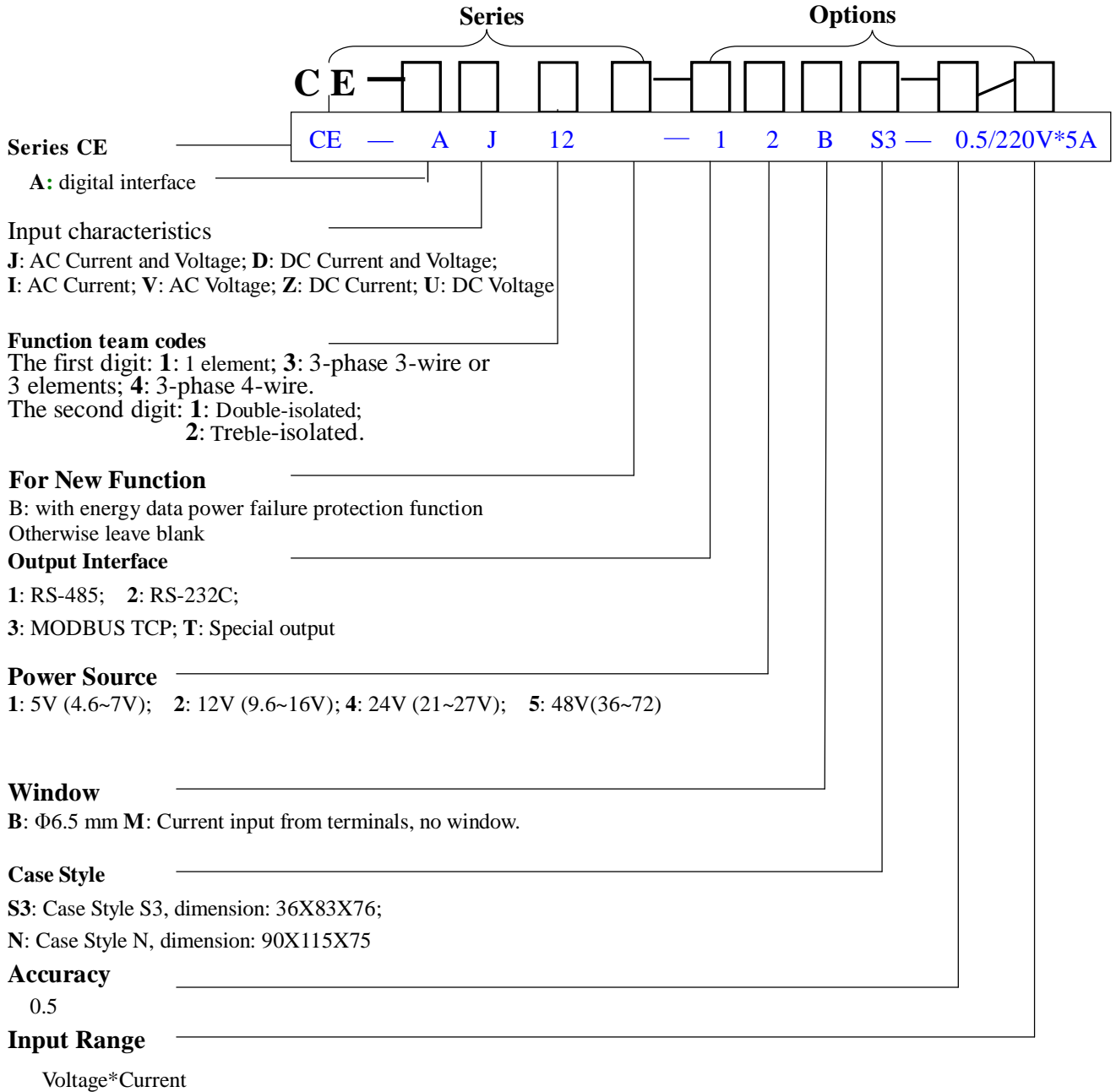
- | It combines collector and transmitter of electric data, can measure voltage, current, frequency, active power, reactive power, power factor as well as accumulative total energy simultaneously.
- | Full-digital AC sampling technology with high accuracy and stability.
- | Current, voltage input and RS-485 or RS-232C digital interface output, which can connect with computer and the network.
- | Output data format: ASCII format.
- | Fully-isolated processing with high anti-interfere ability
- | Multi-kinds of flexible installation method

## Chapter 3. Applications

It is applicable for electric power line, automatic monitoring system of equipment, industrial automatic control system, supervising system of rectifying circuit of telecommunication facilities, electrization railway, intelligentized residential district, intelligentized building, automatic power source and auto-recording system for business mansions, safety monitor system. It also can be used for the key device of electronic Kwh meter and pre-pay Kwh meter.

# Chapter 4. Product Tree

## 4.1 Part Number Selection Guide



### Typical Example 1:

**CE-AJ12-12BS3-0.5/110V\*5A:** 1 element Digital Electrical Transducer, treble isolated, output: RS-485 interface, power source: +12V, window: Φ6.5mm, Case style: S3, accuracy: 0.5%, input current: 0~5A, voltage: 0~110V.



**Typical Example 2:**

**CE-AJ42-11BN-0.5/380V\*5A:** 3-phase 4-wire, treble isolated, digital electrical transducer, output: RS-485, power source: 5V, window opening:  $\Phi 6.5\text{mm}$ , Case style: N, accuracy: 0.5%, measuring range: current: AC 0~5A, voltage: AC 0~380V. (Input, power source and output of transducer is isolated each from others.)

**4.2 Case Style and Dimensions**

Fig. 4.1, 4.2, 4.3 shows S3 case style. Their dimensions: 36×83×76 mm



Fig. 4.1: 1 element

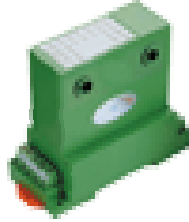


Fig. 4.2: 3-phase 3-wire

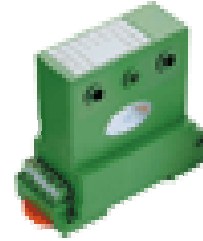


Fig. 4.3: 3-phase 4-wire

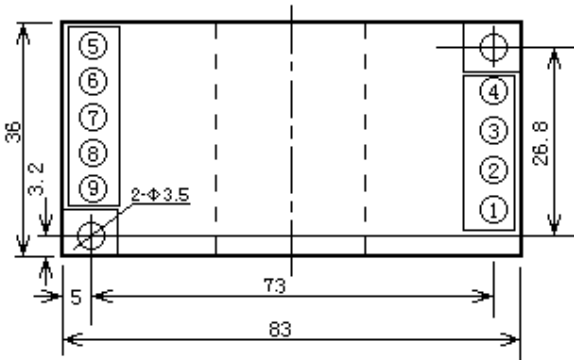


Fig. 4.4: S3 case style dimensions

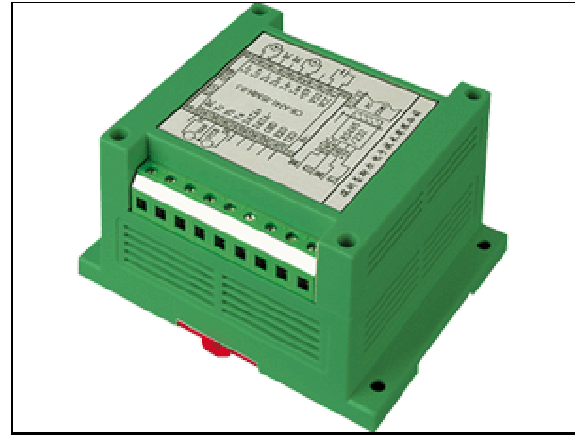


Fig.4.5: N case style  
N case style dimension: 90×115×75 mm  
Mounting size: 70×105 mm

---

## Chapter 5. 1 element Electrical Multi-parameter

### Digital Transducer

#### 5.1 Part Numbers of the Product:

CE-AJ12-1---- 1 element, RS-485 interface, treble isolated.

CE-AJ12-2---- 1 element, RS-232C interface, treble isolated.

CE-AJ12B-1----- 1 element, RS-485 interface, with accumulative energy data power failure protection function, treble isolated.

CE-AJ12B-2----- 1 element, RS-232C interface, with accumulative energy data power failure protection function, treble isolated.

#### 5.2 Specifications:

I Input (measuring range) ----- AC 45-65Hz, voltage: 110V, 220V, 380V and 500V. (Or specially supply to meet user's other special requirement), current: 1A, 5A, 15A, 25A (or specially supply to meet user's other special requirement)

I Data output-----RMS of voltage UA, RMS of current IA, frequency F, active power P, reactive power Q, power factor  $\cos\phi$ , active energy, and reactive energy.

CE-AJ12B provide accumulative energy data power failure protection function. They can save the accumulated active and reactive energy data when power is removed, and when power is reconnected to the transducer the transducer begins accumulating energy from where it left off when power was removed.

I Output interface-----

RS-485: two-wire connection, communication distance: 1200m,  $\pm 15$ KV ESD protection.

RS-232C: S3 case style connects to special RS485/RS-232C converter.

I Accuracy grade----- frequency 0.05 Hz. Voltage, current, power factor, active power, reactive power, active energy, reactive energy: 0.5%. (Accuracy and linearity are ignored when the voltage is below 5 %.)

I Baud rate----- 1200, 2400, 4800, 9600, 19.2K bps

I Refreshing period----- 250mS

I Isolation voltage----- 1000 V DC or 2500V DC

I System power consumption----- <200 mw (+12V)

I Power source----- +5V, +12V, +15V, +24V, +48V DC (please specify any one of the five options in you order)

I Operation temperature----- 0°C ~50°C

I Storage condition----- -20°C ~+80°C (RH: 5%~95% no dew)

#### 5.3 Case Style:

See fig 4.1 for 1 element S3 case style on page 5.

## 5.4 Connecting Diagram

See fig 5.1 for connection of 1 element S3 case style.

The terminal No. 7 can supply +5V power for RS485/RS-232C converter. Its max output current is 20mA

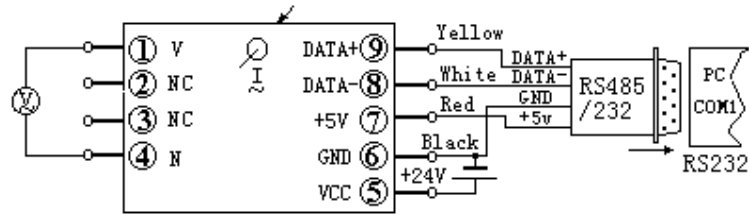


Fig. 5.1 for connection of 1 element S3 case style

## 5.5 Communication Protocol and Order Set

The format of order of series CE-A digital electrical transducer is ASCII format. Its output communication protocol is RS-232C or RS-485 interface protocol.

### 5.5.1 The order set

- l To read the transducer name: \$(Addr)M<CR>
  - l To read the configuration: \$(Addr)2<CR>
  - l To set the configuration: % (OldAddr) (New Addr) (Input Range) (Baud Rate) (Data Format) <CR>
  - l To read all data: # (Addr) A<CR>
  - l To read the data of accumulative total energy: # (Addr) W<CR>
  - l To clear the data of energy: & (Addr) (Order) <CR>
- ID address (Addr): 00~FF (hex indicated by two ASCII characters)  
 (It is supposed that the all following ID address is 01)  
 Data format: 1 bit of "0" for start bit, 8 bits for data, 1 bit of "1" for stop bit.
- l To amend frame number data (for CE-AJ12B only).

### 5.5.2 To read the transducer name

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)
<CR>:	Enter	1 byte	(0DH)

Response: !(Addr) (Transducer Name) <CR>

or: ? (Addr) <CR> (Respond to a wrong order received)

!?: Delimiter

Transducer Name: name of transducer

<CR>: Enter

Example: Order: \$01M<CR> (24H 30H 31H 4DH 0DH)

Response: !011212<CR> (21H 30H 31H 31H 32H 31H 32H 0DH)

!: respond to a correct order

01: Address

**5.5.3 To read the configuration**

To read the configuration of a transducer with specified address.

Order format: \$ (Addr) 2 <CR>

\$: Order symbol 1 byte (24H)  
 (Addr): Address 2 bytes (30H31H)  
 2: To read the configuration 1 byte (32H)  
 <CR>: Enter 1 byte (0DH)

Response: ! (Addr) (Input Range) (Baud Rate) (Data Format) <CR>

Or: ? (Addr) <CR> (Respond to a wrong order received)

Example: Order: \$012<CR> (24H 30H 31H 32H 0DH)

Response: ! 01000601 <CR>

! (21H) response to correct order  
 01 (30H 31H) address  
 00 (30H 30H) input range (reserved byte)  
 06 (30H 36H) communication Baud rate 9600bps  
 01 (30H 31H) no check sum  
 <CR> (0DH) enter

**5.5.4 To set configuration**

To set the configuration of specified transducer including address and baud rate

Order: % (OldAddr) (New Addr) (Input Range) (Baud rate) (Data Format) <CR>

% Order symbol 1 byte (25H)  
 (Old Addr) Old address 00~FFH 2 bytes (30H 31H)  
 (New Addr) New address 00~FFH 2 bytes (30H 32H)  
 (Input Range) Must be "00" 2 bytes (30H 30H)  
 (Baud Rate) Communication baud rate 03~07 2 bytes (33H--37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps
07	30H 37H	19200bps

(Data Format) must be "01" 2 bytes (30H 31H)

Response: ! (Addr) <CR>

Or: ? (Addr) <CR>

Example: order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

This order will change address of transducer from 01 to 02; the new baud rate for it is 19200bps.

**5.5.5 To read the all data**

---

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH) address is supposed to be 01  
 The responded all real-time data of transducer, the sequence of output is as follows:  
 Ua, Ia, P, Q, Cosφ, F

Response: > (Data Ua) (Data Ia) (Data P) (Data Q) (Data Cosφ) (Data F) <CR>

Data XX: This format consists of 1 digit of sign “+” or “-” and 5 digits of decimal system value of data codes and a decimal point. This value shows actual data in the form of a percentage of the maximum value of its measurable range.

Data F: The format consists of 5 digits of decimal system value of data and a decimal point. This value is a real value of the frequency measured.

Suppose: The maximum value of its measurable range of current is 5A, the output data is +0.6000, Then the real value is:  $I = 60\% \times 5A = 3.0000A$

Example: Suppose: the maximum value of its measurable range: current  $I_o = 5A$ , Voltage  $U_o = 100V$ , Frequency = 50Hz

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+1.0000+0.6000+0.6000+0.0000+1.0000 50.000<CR>

Then:  $U_a = +1.0000 \times U_o = +100\% \times 100V = 100.00V$   
 $I_a = +0.6000 \times I_o = +60\% \times 5A = 3.0000A$   
 $P = +0.6000 \times U_o \times I_o = +60\% \times 100V \times 5A = 300.00W$   
 $Q = +0.0000 \times U_o \times I_o = +0\% \times 100 \times 5 = 0Var$   
 $Cos\Phi = 1.0000$   
 $F = 50.000Hz$

### 5.5.6 To read the data of accumulative total energy

Order: # (Addr) W<CR>

Response: > (Order) (+) (Data Kwh) (+) (Data Kvarh) (CHK) <CR>

Or: ? (Addr) <CR> (Respond to a wrong order received)

#:	Order symbol (23H)	1 byte
W:	To read the energy order (57H)	1 byte
(Order):	Frame number from 00~FF	2 bytes
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte
(Data):	Hex ASCII data	6 bytes
(CHK):	Accumulate the check sum from >start (hex)	2 bytes

The intelligent transducer can output the accumulative total active and reactive energy. It starts to measure immediately after turned on. The data of accumulative total active energy is stored inside the RAM. The transducer will respond the data of energy immediately after it received the order to read that data.

The format of returned data is as follows:

> (Order) (+) (Data Kwh) (+) (data Kvarh) (CHK) <CR>

>:	Order symbol of response (3EH)	1 byte
(Order):	Frame number (from 00 to FFH)	2 bytes hex, ASCII, (see note 1)
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte hex data ASCII

---

(Data):	data of Kwh	6 bytes	hex data
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte	hex data ASCII
(Data):	data of Kvarh	6 bytes	hex data
(CHK):	Check sum	2 bytes	accumulating 17 bytes given before (CHK) then the sum is ANDED with OFFH to get the 2 bytes of hex data.

Note 1: Each responded one set of accumulative total active and reactive energy data means one data frame. When the transducer receives a correct order to clear the data of energy from computer, the transducer cleans the data in its RAM and adds 1 to the frame number. When the computer reads the energy again after cleaning, its frame number is one more than last time to read out (circulating 00 through FF). The data of energy is a new one, which is the total energy only since the last frame had been read out accumulated from zero. If the transducer did not receive the correct order of clear, the frame number will not change. The data of energy is the data of energy of last time read out adds that of since last time read to present (i.e. no clear).

The data of energy starts to accumulate from zero immediately after the transducer is turned on. The longest period to accumulate is 1553.4 hours when U and I of input reach the maximum value of measuring range. The data will overflow when this value is exceeded

$$\text{Calculation of energy: } \text{Energy} = \pm \text{DATAN} \times \frac{U0 \times I0}{1000 \times 3600} \text{ kwh}$$

Example: Order: #01W<CR>  
Response: >01-0003E8+00003A62<CR> (hex)

The frame number is: 01

Active energy: 3E8H (hex) or 1000(decimal)

Reactive energy: 3AH (hex) or 58 (decimal)

Check sum:

$$62 = (0x3E + 0x30 + 0x31 + 0x2D + 0x30 + 0x30 + 0x30 + 0x32 + 0x30 + 0x45 + 0x2B + 0x30 + 0x30 + 0x30 + 0x30 + 0x33 + 0x41) \text{ MOD } 0x100$$

### 5.5.7 To clear the data of energy

Order: & (Addr) (Order) <CR>

Response: ! (Addr) <CR> (21H 30H 31H 0DH)

Or: ? (Addr) <CR> (Respond to a wrong order received)

Example: Order: &0101<CR>

Response: !01<CR> (frame number is correct)

Or: ?01<CR> (Respond to a wrong order received with wrong frame number)

### 5.5.8 To amend frame number data (for CE-AJ12B only)

Order: \$ (Addr) 9 (FrameAdd) (Data) <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address of the transducer	2 bytes	(such as 30H, 31H)
9:	Control symbol to amend frame number	1 byte	(39H)

---

FrameAdd:	Byte address to be written	1 byte	(0DH)
Data:	Frame number data to be written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)
Response: !(Addr) (Data) <CR>			
!:	Order symbol	1 byte	(21H)
Addr:	Address of the transducer	2 bytes	(such as 30H, 31H)
Data:	Frame number data had been written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)

The objective byte to be amended: The Frame Number byte of the order To read the accumulative total energy.

The order: To read the accumulative total energy:

> (Order)(+)(DataKwh)(+)(DataKvarh)(+)(CHK)<CR>

The Frame Number byte (Order) is the byte to be amended.

### 5.5.9 Internal orders

A group of internal calibrating orders was set for the CE-AJ product: (Note: The second byte and the third byte of following 4 orders are address codes of transducer, the default address codes of all transducers were set to “01” before they were delivered.)

- l Calibrating order of zero adjusting for DC current: \$010<CR> (24H 30H 31H 30H 0DH)
- l Calibrating order of zero adjusting for DC voltage: \$011<CR> (24H 30H 31H 31H 0DH)
- l Calibrating order of zero adjusting for AC current: \$013<CR> (24H 30H 31H 33H 0DH)
- l Calibrating order of zero adjusting for AC voltage: \$014<CR> (24H 30H 31H 34H 0DH)

For above 4 orders, 7 bytes of data will be responded from 1 element products.

- l Reset order: @CEAFW <CR> (40H 43H 45H 41H 46H 57H 0DH)

The address codes of transducers will be reset to “01” and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after received the reset order. This order can not be used in the network; otherwise it will cause bus conflict.

- l Please contact with the supplier when user need to revise the maximum value of the range of voltage and current of the product. Our technicians will help you to revise by using other internal orders.

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## Chapter 6. 3-phase 3-wire Electrical Multi-parameter Digital Transducer

### 6.1 Part Numbers of the Product

CE-AJ32-1----- 3-phase 3-wire (two wattmeter method), RS-485 interface, treble isolated (N case style only).

CE-AJ32-2----- 3-phase 3-wire (two wattmeter method), RS-232C interface, treble isolated (N case style only).

CE-AJ32B-1---3-phase 3-wire (two wattmeter method), RS-485 interface, treble isolated, with accumulative energy data power failure protection function, treble isolated. (N case style only)

CE-AJ32B-2---3-phase 3-wire (two wattmeter method), RS-232C interface, treble isolated, with accumulative energy data power failure protection function, treble isolated. (N case style only)

### 6.2 Specifications:

l Input (measuring range) ----- AC 45-65Hz, voltage: 110V, 220V, 380V and 500V. (or specially supply to meet user's other special requirement), current: 1A, 5A, 15A, 25A (or specially supply to meet user's other special requirement)

l Data output-----RMS of voltage  $U_{ab}$  and  $U_{cb}$ , RMS of current  $I_A$  and  $I_C$ , frequency  $F$ , active power  $P$ , reactive power  $Q$ , power factor  $\cos\phi$ , active energy, and reactive energy.

l Output interface-----

RS-485: two-wire connection, communication distance: 1200m,  $\pm 15$ KV ESD protection.

RS-232C: S3 case style connects to special RS485/RS-232C converter.

CE-AJ32B-1 and CE-AJ32B-2 provide accumulative energy data power failure protection function. They can save the accumulated active and reactive energy data when power is removed, and when power is reconnected to the transducer the transducer begins accumulating energy from where it left off when power was removed.

l Accuracy grade----- Frequency 0.05 Hz. Voltage, current, power factor, active power, reactive power, active energy, reactive energy: 0.5% grade. (Accuracy and linearity are ignored when the voltage is below 5 %.)

l Baud rate----- 1200, 2400, 4800, 9600, 19.2K bps

l Refreshing period----- 250mS

l Isolation voltage----- 1000 V DC or 2500V DC

l System power consumption----- <200 mW (+12V)

l Power----- +5V, +12V, +15V, +24V, +48V DC (please specify any one of the five options in you order)

l Operation temperature----- 0°C~50°C

l Storage condition----- -20°C~+80°C (RH:5%~95% no dew)



### 6.3 Case Style

See fig.4.4 for N style on page 5.

Dimensions: 90×115×75 mm

### 6.4 Connecting Diagram

See fig. 6.2 and 6.3 for connection of 3-phase 3-wire N case style product

The terminal No. 3 can supply +5V power for RS485/RS-232C converter; its max current output is 20mA

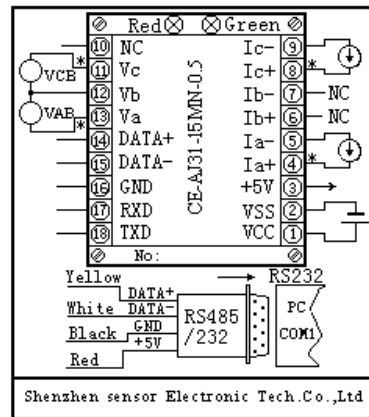


Fig. 6.2

RS-485 interface

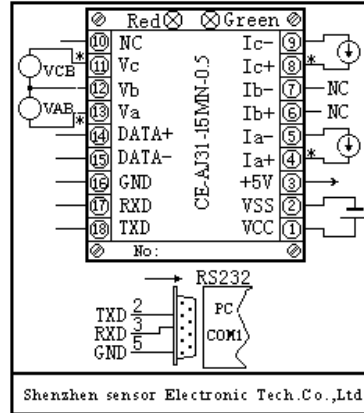


Fig. 6.3

RS-232C interface

### 6.5 Communication Protocol and Order Set

The format of order of series CE-A digital electrical transducer is ASCII format. Its output communication protocol is RS-232C or RS-485 interface protocol.

#### 6.5.1 The order set

- | To read the transducer name: \$(Addr)M<CR>
  - | To read the configuration: \$(Addr)2<CR>
  - | To set the configuration: % (OldAddr) (NewAddr) (InputRange) (Baud rate) (DataFormat) <CR>
  - | To read all data: # (Addr) A<CR>
  - | To read the data of accumulative total of energy: # (Addr) W<CR>
  - | To clear the data of energy: & (Addr) (Order) <CR>
- Address (Addr): 00~FF (hex indicated by two bit ASCIIcode)  
 Data format: 1 bit for start bit “0”, 8 bit for data bit, 1 bit for stop bit “1”  
 (It is supposed that the all following ID address is 01.)
- | To amend frame number data (for CE-AJ32B only).

#### 6.5.2 To read the transducer name

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)
<CR>:	Enter	1 byte	(0DH)

---

Response: !(Addr) (TransducerName) <CR>  
 Or: ? (Addr) <CR> (respond to a wrong order received)

!?: Delimiter  
 Transducer Name: name code of transducer  
 <CR>: Enter

Example: Order: \$01M<CR> (24H 30H 31H 4DH 0DH)  
 Response: !013212<CR? (21H 30H 31H 33H 32H 31H 32H 0DH)

!: Respond to a correct order  
 01: Address  
 3212: The name code of transducer CE-AJ32-12

### 6.5.3 To read the configuration

To read the data of configuration of transducer from a specified address

Order format: \$ (Addr) 2 <CR>

Order symbol: 1 byte (24H)  
 Address: 2 bytes (30H31H)  
 To read the configuration: 1 byte (32H)  
 Enter: 1 byte (0DH)

Response: !(Addr) (InputRange) (Baud rate) (DataFormat) <CR>  
 Or: ? (Addr) <CR> (Respond to a wrong order received)

Example: order: \$012<CR> (21H 30H 31H 32H 0DH)  
 Response: !01000601 <CR>

! Order is correct (21H)  
 01 address (30H 31H)  
 00 input range (reserved bit) (30H 30H)  
 06 communication Baud rate 9600bps (30H 36H)  
 01 no check sum (30H 31H)

### 6.5.4 To set configuration

To set configuration of a transducer including address and baud rate

Order: % (OldAddr) (NewAddr) (Input Range) (Baud rate) (DataFormat) <CR>

Order Symbol: 1 byte (25H)  
 Old address 00~FFH: 2 bytes (30H 31H)  
 New address 00~FFH: 2 bytes (30H 32H)  
 The range of input, "00" has to be set: 2 bytes (30H 30H)  
 The communication baud rate 03~07: 2 bytes (33H---37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps
07	30H 37H	19200bps

(Data Format) 01 has to be set 2 bytes (30H 31H)

Response: !(Addr) <CR>

---

Or: ? (Addr) <CR>

Example: Order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

This order will change address of the transducer from 01 to 02; the new baud rate is 19200bps.

### 6.5.5 To read all data

To read all real-time data of transducer, the sequence of data:

Uab, Iab, Ucb, Icb, P, Q, Cosφ, F

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH) —— address is supposed to be 01

Response: > (Data Uab) (Data Ia) (Data Ucb) (Data Ic) (Data P) (Data Q) (Data Cosφ) (Data F) <CR>

Data XX: This format consists of 1 place of sign “+” or “-” and 5 digits of decimal system value of data and a decimal point. This data shows the actual value in the form of a percentage of the maximum value of its measurable range.

Data F: The format consists of 5 digits of decimal system value of data and a decimal point. This value is a real value of the frequency measured.

Suppose: The maximum value of its measurable range of current is 5A, the output data is +0.6000, Then the real value is:  $I = 60\% \times 5A = 3.0000A$

Example: Suppose: the maximum value of its measurable range: Current  $I_o = 5A$ , Voltage  $U_o = 100V$ , Frequency  $F = 50Hz$

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+1.0000+0.6000+1.0000+0.6000+1.0000+0.6000+0.6000+0.0000+1.0000 50.000<CR>

Then:  $U_{ab} = +1.0000 \times U_o = +100\% \times 100V = 100.00V$

$I_{ab} = +0.6000 \times I_o = +60\% \times 5A = 3.0000A$

$U_{cb} = +1.0000 \times U_o = +100\% \times 100V = 100.00V$

$I_{cb} = +0.6000 \times I_o = +60\% \times 5A = 3.0000A$

$P = +0.6000 \times U_o \times I_o \times 2 = +60\% \times 100V \times 5A \times 2 = 600.00W$

$Q = +0.0000 \times U_o \times I_o \times 2 = +0\% \times 100 \times 5 \times 2 = 0Var$

$\text{Cos}\phi = +1.0000$

$F = 50.000Hz$

### 6.5.6 To read the accumulative total energy

Order: # (Addr) W<CR>

Response: > (Order) (+) (Data Kwh) (+) (Data Kvarh) (CHK) <CR>

Or: ? (Addr) <CR> (respond to a wrong order received)

#:	Order symbol (23H)	1 byte
W:	To read the energy order (57H)	1 byte
(Order):	Frame number (from 00 to FFH))	2 bytes
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte
(Data):	Hex ASCII	6 bytes
(CHK):	Check sum from >start (hex)	2 bytes

The intelligent transducer can output the accumulative total active and reactive

energy. It starts to measure immediately after turned on. The data of accumulative total active energy is stored inside the RAM. The transducer will respond the data of energy immediately after it received the order to read that data.

The format of responded data is as follows:

> (Order) (+) (Data Kwh) (+) (data Kvarh) (CHK) <CR>

>:	Response symbol (3EH)	1 byte	
(Order):	Frame number (from 00 to FFH)	2 bytes	hex data ASCII (see note 2)
(+):	Sign “+” or “-”	1 byte	hex data ASCII
(Data):	Data	6 bytes	hex data
(+):	Sign “+” or “-”	1 byte	hex data ASCII
(Data):	Data	6 bytes	hex data
(CHK):	Check sum	2 bytes	accumulating 17 bytes given before (CHK) then the sum is ANDed with 0FFH to get the 2 bytes of hex data

Note 2: Each responded one set of accumulative total active and reactive energy data means one data frame. When the transducer receives a correct order to clear the data of energy from computer, the transducer cleans the data in its RAM and adds 1 to the frame number. When the computer reads the energy again after cleaning, its frame number is one more than last time to read out (circulating 00 through FF). The data of energy is a new one, which is the total energy only since the last frame had been read out accumulated from zero. If the transducer did not receive the correct order of clear, the frame number will not change. The data of energy is the data of energy of last time read out adds that of since last time read to present (i.e. no clear).

The data of energy starts to accumulate from zero immediately after the transducer is turned on. The longest period to accumulate is 1553.4 hours when U and I of input reach the maximum value of measuring range. The data will overflow when this value is exceeded.

$$\text{Calculation of energy: } \quad U_0 \times I_0$$

$$\text{Energy} = \pm \text{DATAN} \times \frac{\quad}{1000 \times 3600} \text{ kwh}$$

Example: Order: #01W<CR>  
Response: >01-0003E8+00003A62<CR> (hex)

The frame number is: 01  
Active energy: 3E8H (hex) or 1000(decimal)  
Reactive energy: 3AH (hex) or 58 (decimal)  
Check sum:

$$62 = (0x3E + 0x30 + 0x31 + 0x2D + 0x30 + 0x30 + 0x30 + 0x32 + 0x30 + 0x45 + 0x2B + 0x30 + 0x30 + 0x30 + 0x30 + 0x33 + 0x41) \text{ MOD } 0x100$$

### 6.5.7 To clear the data of energy

Order: & (Addr) (Order) <CR>  
Response: ! (Addr) <CR> (21H 30H 31H 0DH)  
Or: ? (Addr) <CR> (respond to a wrong order received)

Example: Order: &0101<CR>  
Response: !01<CR> (frame number is correct)  
Or: ? (Addr) <CR> (respond to a wrong order received)

---

### 6.5.8 To amend frame number data (for CE-AJ32B only)

Order:	\$ (Addr) 9 (FrameAdd) (Data) <CR>		
\$:	Order symbol	1 byte	(24H)
(Addr):	Address of the transducer	2 bytes	(such as 30H, 31H)
9:	Control symbol to amend frame number	1 byte	(39H)
FrameAdd:	Byte address to be written	1 byte	(0DH)
Data:	Frame number data to be written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)
Response:	! (Addr) (Data) <CR>		
!:	Order symbol	1 byte	(21H)
Addr:	Address of the transducer	2 bytes	(such as 30H, 31H)
Data:	Frame number data had been written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)

The objective byte to be amended: The Frame Number byte of the order To read the accumulative total energy.

### 6.5.9 Internal orders

A group of internal calibrating orders was set for the CE-AJ product: (Note: The second byte and the third byte of following four orders are address codes of transducer, the default address codes of all transducers were set to “01” before they were delivered.)

- l Calibrating order of zero adjusting for current DC: \$010CR (24H 30H 31H 30H 0DH)
- l Calibrating order of zero adjusting for voltage DC: \$011CR (24H 30H 31H 31H 0DH)
- l Calibrating order of zero adjusting for current AC: \$013CR (24H 30H 31H 33H 0DH)
- l Calibrating order of zero adjusting for voltage AC: \$014CR (24H 30H 31H 34H 0DH)

For above 4 orders, 13 bytes of data will be responded from 3-phase 3-wire products.

- l Reset order: @CEAFW <CR> (40H 43H 45H 41H 46H 57H 0DH)

The address codes of transducers will be reset to “01” and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after receiving the reset order. This order cannot be used in the network; otherwise it will cause bus conflict.

- l Please contact with the supplier when user need to revise the range of voltage and current of the product. Our technicians will help you to revise by using other internal orders.

---

## Chapter 7. 3-phase 4-wire Electrical Multi-parameter Digital Transducer

### 7.1 Part Numbers of the Product

CE-AJ42-1----- 3-phase 4-wire, RS-485 interface, treble isolated (N case style only).

CE-AJ42-2----- 3-phase 4-wire, RS-232C interface, treble isolated (N case style only).

CE-AJ42B-1-----3-phase 4-wire, RS-485 interface, treble isolated, with accumulative energy data power failure protection function. (N case style only)

CE-AJ42B-2-----3-phase 4-wire, RS-232C interface, treble isolated, with accumulative energy data power failure protection function. (N case style only)

### 7.2 Specifications:

l Input (measuring range) ----- AC 45-65Hz, voltage: 110V, 220V, 380V and 500V. (or specially supply to meet user's other special requirement), current: 1A, 5A, 15A, 25A (or specially supply to meet user's other special requirement)

l Data output-----RMS of voltage  $U_a$ ,  $U_b$  and  $U_c$ ; RMS of current  $I_a$ ,  $I_b$  and  $I_c$ . Real value of frequency  $F$ . Other five parameters including Active power  $P$ , reactive power  $Q$ , power factor  $\cos\varphi$ , active energy and reactive energy are shown in the form of a percentage of the maximum value of its measurable range.

CE-AJ42B-1 and CE-AJ42B-2 provide accumulative energy data power failure protection function. They can save the accumulated active and reactive energy data when power is removed, and when power is reconnected to the transducer the transducer begins accumulating energy from where it left off when power was removed.

l Output interface-----

RS-485: two-wire connection, communication distance: 1200m,  $\pm 15$ KV ESD protection.

RS-232C: S3 case style connects to special RS485/RS-232C converter. N case style connects directly through its terminals.

l Accuracy grade----- Frequency: 0.05 Hz. Voltage, current, power factor, active power, reactive power, active energy, reactive energy: 0.5%. (Accuracy and linearity are ignored when the voltage is below 5 %.)

l Baud rate----- 1200, 2400, 4800, 9600, 19.2K bps

l Refreshing period----- 250mS

l Isolation voltage----- 1000 V DC or 2500V DC

l Power consumption----- <200 mW (+12V)

l Power----- +5V, +12V, +15V, +24V, +48V DC (please specify any one of the five options in you order)

l Operation temperature----- 0°C ~50°C

l Storage condition----- -20°C ~+80°C (RH:5%~95% no dew)

### 7.3 Case Style

See fig.4.4 for N case style on page 5.

Dimensions: 90×115×75 mm

### 7.4 Connecting Diagram

See fig. 7.2 and 7.3 for connections of 3-phase 4-wire N case style product

The terminal No. 3 can supply +5V power for RS485/RS-232C converter; its max output current is 20mA.

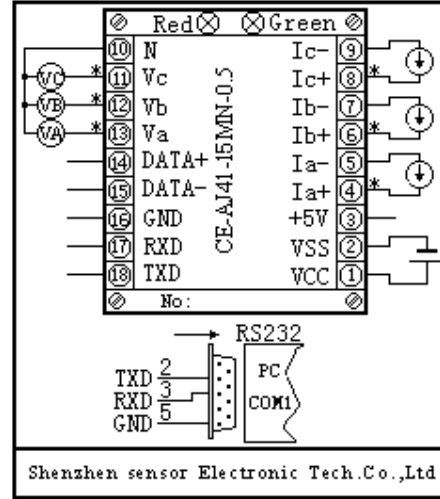
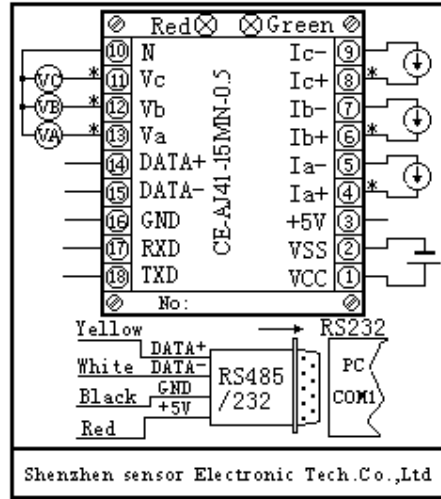


Fig.7.2 RS-485 interface

Fig. 7.3 RS-232C interface

Connections of 3-phase 4-wire N case style transducer

## 7.5 Communication Protocol and Order Set

The format of order of series CE-A digital electrical transducer is ASCII format. Its output communication protocol is RS-232C or RS-485 interface protocol.

### 7.5.1 The order set

- | To read the transducer name: \$(Addr)M<CR>
- | To read the configuration of transducer: \$(Addr)2<CR>
- | To set the configuration of transducer: % (OldAddr) (NewAddr) (InputRange) (Baud rate) (DataFormat) <CR>
- | To read all data: # (Addr) A<CR>
- | To read the accumulative total energy of energy: # (Addr) W<CR>
- | To clear the data of energy: & (Addr) (Order) <CR>

Address (Addr): 00~FF (hex indicated by two ASCII codes)

Data format: 1 code for start bit "0", 8 codes for data, 1 code for stop code "1"

- | To amend frame number data (for CE-AJ42B only).

### 7.5.2 To read the transducer name

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)

---

<CR>: Enter 1 byte (0DH)

Response:!(Addr)(TransducerName)<CR>

Or: ?(Addr)<CR>(respond to a wrong order received)

! ?: Delimiter

TransducerName: Name of transducer

<CR>: Enter

Example: Order: \$01M<CR>(24H 30H 31H 4DH 0DH)

Response: !014212<CR>(21H 30H 31H 34H 32H 31H 32H 0DH)

!: Order is correct

01: Address

4212: the name code of transducer CE-AJ42-12

### 7.5.3 To read the configuration

To read the configuration of transducer from a specified address

Order format: \$(Addr) 2 <CR>

Order format: \$: Order symbol 1 byte (24H)

(Addr): Address 2 bytes (30H31H)

2: To read the configuration 1 byte (32H)

<CR>: Enter 1 byte (0DH)

Response:!(Addr)(InputRange)(Baud rate)(DataFormat)<CR>

Or: ?(Addr)<CR>(Respond to a wrong order received)

Example: Order: \$012<CR>(21H 30H 31H 32H 0DH)

Response: !01000601 <CR>

! Order is correct (21H)

01 address (30H 31H)

00 input range (reserved codes) (30H 30H)

07 communication Baud rate 9600bps (30H 36H)

02 no check sum (30H 31H)

### 7.5.4 To set configuration

To set the configurations of the transducer including address and baud rate

Order: %(OldAddr)(NewAddr)(Input Range)(Baud rate)(DataFormat)<CR>

% Order Symbol 1 byte (25H)

(OldAddr) Old address (00~FFH) 2 bytes (30H 31H)

(NewAddr) New address (00~FFH) 2 bytes (30H 32H)

(InputRange) Must be 00 2 bytes (30H 30H)

(Baud rate) The communication baud rate (03~07) 2 bytes (33H---37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps



07	30H 37H	19200bps
----	---------	----------

(Data Format) Must be 01 2 bytes (30H 31H)

Response: ! (Addr) <CR>

Or: ? (Addr) <CR>

Example: order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

This order will change address of the transducer from 01 to 02; its new baud rate is 19200bps.

### 7.5.5 To read all data

To read all real-time data of transducer, the sequence of data:

Ua, Ia, Ub, Uc, Ic, P, Q, Cosφ, F

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH) address is supposed to be 01

Response: > (Data Ua) (Data Ia) (Data Ub) (Data Ib) (Data Uc) (Data Ic) (Data P) (Data Q) (Data Cosφ) (Data F) <CR>

Data XX: This format consists of 1 place of sign “+” or “-” and 5 digits of decimal system value of data and a decimal point. This value shows the actual data in the form of a percentage of the maximum value of its measurable range.

Data F: The format consists of 5 digits of decimal system value of data and a decimal point. This value is a real value of the frequency measured.

Suppose: The maximum value of its measurable range of current is 5A, the output data is +0.6000, Then the real value is:  $I = 60\% \times 5A = 3.0000A$

Example: Suppose: the maximum value of its measurable range: Current  $I_0 = 5A$ , Voltage  $U_0 = 100V$ , Frequency  $F = 50Hz$

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+1.0000+0.6000+1.0000+0.6000+1.0000+0.6000+0.6000+0.0000+1.0000 50.000<CR>

Then:  $U_a = +1.0000 \times U_0 = +100\% \times 100V = 100.00V$

$I_a = +0.6000 \times I_0 = +60\% \times 5A = 3.0000A$

$U_b = +1.0000 \times U_0 = +100\% \times 100V = 100.00V$

$I_b = +0.6000 \times I_0 = +60\% \times 5A = 3.0000A$

$U_c = +1.0000 \times U_0 = +100\% \times 100V = 100.00V$

$I_c = +0.6000 \times I_0 = +60\% \times 5A = 3.0000A$

$P = +0.6000 \times U_0 \times I_0 \times 2 = +60\% \times 1000V \times 5A \times 3 = +900.00W$

$Q = +0.0000 \times U_0 \times I_0 \times 2 = +0\% \times 100 \times 5 \times 3 = 0Var$

$Cos\phi = +1.0000$

$F = 50.000Hz$

### 7.5.6 To read the data of accumulative total energy

Order: # (Addr) W<CR>

Response: > (Order) (+) (Data Kwh) (+) (Data Kvarh) (CHK) <CR>

Or: ? (Addr) <CR> (respond to a wrong order received)

#: Order symbol (23H) 1 byte

W: To read the data of energy (57H) 1 byte

---

(Order):	Frame number (00~FF)	2 bytes
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte
(Data):	Hex ASCII	6 bytes
(CHK):	Check sum hex	2 bytes

The intelligent transducer can output the accumulative total active and reactive energy. It starts to measure immediately after turned on. The data of accumulative total active energy is stored inside the RAM. The transducer will respond the data of energy immediately after it received the order to read that data.

The format of returned data is as follows:

> (Order) (+) (Data Kwh) (+) (data Kvarh) (CHK) <CR>

>:	Response symbol (3EH)	1 byte	
(Order):	Frame number (from 00 to FFH)	2 bytes	hex ASCII (see note 3)
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte	hex ASCII
(Data):	Data	6 bytes	hex data
(+):	Sign “+” or “-” (2BH or 2DH)	1 byte	hex ASCII
(Data):	Data	6 bytes	hex data
(CHK):	Check sum	2 bytes	accumulating 17 bytes given before (CHK) then the sum is ANDed with 0FFH to get the 2 bytes of hex data

Note 3: Each responded one set of accumulative total active and reactive energy data means one data frame. When the transducer receives a correct order to clear the data of energy from computer, the transducer cleans the data in its RAM and adds 1 to the frame number. When the computer reads the energy again after cleaning, its frame number is one more than last time to read out (circulating 00 through FF). The data of energy is a new one, which is the total energy only since the last frame had been read out accumulated from zero. If the transducer did not receive the correct order of clear, the frame number will not change. The data of energy is the data of energy of last time read out adds that of since last time read to present (i.e. no clear).

The data of energy starts to accumulate from zero immediately after the transducer is turned on. The longest period to accumulate is 1553.4 hours when U and I of input reach the maximum value of measuring range. The data will overflow when this value is exceeded.

$$\text{Calculation of energy: } \quad U_0 \times I_0$$

$$\text{Energy} = \pm \text{DATAN} \times \frac{\quad}{1000 \times 3600} \quad \text{kwh}$$

Example:   Order:   #01W<CR>  
               Response: >01-0003E8+00003A62<CR> (hex)

The frame number is: 01

Active energy: 3E8H (hex) or 1000(decimal)

Reactive energy: 3AH (hex) or 58 (decimal)

Check sum

$$62 = (0x3E + 0x30 + 0x31 + 0x2D + 0x30 + 0x30 + 0x30 + 0x33 + 0x45 + 0x38 + 0x2B + 0x30 + 0x30 + 0x30 + 0x30 + 0x33 + 0x41) \text{ MOD } 0x100$$

### 7.5.7 To clear the data of energy

Order:       & (Addr) (Order) <CR>

Response:   ! (Addr) <CR> (21H 30H 31H 0DH)

---

Or: ? (Addr) <CR> (respond to a wrong order received)

Example: Order: &0101<CR>

Response: !01<CR> (frame number is correct)

Or: ?01<CR> (Respond to a wrong order received)

### 7.5.8 To amend frame number data (for CE-AJ42B only)

Order: \$ (Addr) 9 (FrameAdd) (Data) <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address of the transducer	2 bytes	(such as 30H, 31H)
9:	Control symbol to amend frame number	1 byte	(39H)
FrameAdd:	Byte address to be written	1 byte	(0DH)
Data:	Frame number data to be written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)
Response:	! (Addr) (Data) <CR>		
!:	Order symbol	1 byte	(21H)
Addr:	Address of the transducer	2 bytes	(such as 30H, 31H)
Data:	Frame number data had been written	1 byte	(00H — FFH)
<CR>:	Enter	1 byte	(0DH)

The objective byte to be amended: The Frame Number byte of the order To read the accumulative total energy.

### 7.5.9 Internal orders

A group of internal calibrating orders was set for the CE-AJ product: (Note: The second byte and the third byte of following four orders are address codes of transducer, the default address codes of all transducers were set to “01” before they were delivered.)

- l Calibrating order of zero adjusting for current DC: \$010CR (24H 30H 31H 30H 0DH)
- l Calibrating order of zero adjusting for voltage DC: \$011CR (24H 30H 31H 31H 0DH)
- l Calibrating order of zero adjusting for current AC: \$013CR (24H 30H 31H 33H 0DH)
- l Calibrating order of zero adjusting for voltage AC: \$014CR (24H 30H 31H 34H 0DH)

For above 4 orders, 13 bytes of data will be responded from 3-phase 4-wire products.

- l Reset order: @CEAFW <CR> (40H 43H 45H 41H 46H 57H 0DH)

The address codes of transducers will be reset to “01” and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after receiving the reset order. This order can not be used in the network; otherwise it will cause bus conflict.

- l Please contact with the supplier when user need to revise the range of voltage and current of the product. Our technicians will help you to revise by using other internal orders.

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## Chapter 8. 1(3) Element(s) AC Current Single Parameter

### Digital Transducer

#### 8.1 Part Numbers of the Product

The part numbers of treble isolated current transducer:

CE-AI12—1 element AC current digital transducer

CE-AI32—3 elements AC current digital transducer

#### 8.2 Specifications

- | Accuracy ----- 0.2%
- | Output Data----RMS of Current Ia, Ib, Ic (only Ia for AI12)
- | Output Interface ----- RS-485 : 2-wire connection, communication distance: 1200M,±15KV ESD protection.  
RS-232C: S3 case style connects to special RS485/RS-232C converter.
- | Input (measuring range)----- AC current: 1A, 5A, 15A, 25A (or specially supply to meet user's other special requirement)
- | Baudrate----- 1200, 2400, 4800, 9600, 19.2K bps.
- | Refreshing period----- 250mS
- | Isolation voltage----- 2500V DC
- | System power consumption----- <200 mW (+12V)
- | Power source----- +5V, +12V, +15V, +24V, +48V DC (please specify any one of the five options in you order)
- | Operation temperature----- 0°C ~+50°C
- | Storage condition----- -20°C ~+80°C (RH: 5%~95% no dew)

#### 8.3 Case style

Please see Fig. 3.1 S3 case for 3 elements products; Fig. 3.2 N case for AI12.

#### 8.4 Connections

Please see Fig. 8.1 S3 case for 3 elements products; Fig. 8.2 N case for AI12.

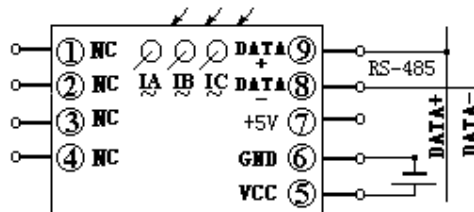


Fig. 8.1 S3 case connections for 3 elements product

(The terminal No. 7 of case style S3 can supply +5V power for RS485/RS-232C converter; its max current output is 20mA)

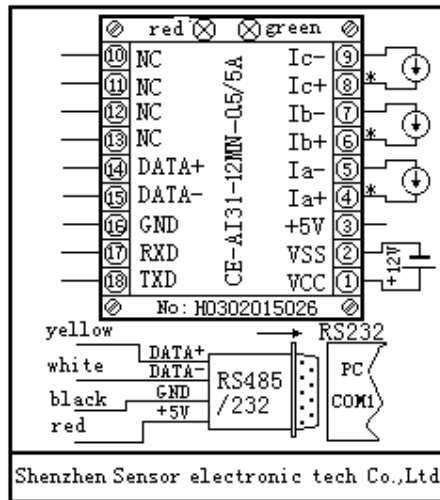


Fig. 8.2 N case connections for 1 element product

The terminal No. 3 can supply +5V power for RS485/RS-232C converter; its max output current is 20mA.

### 8.5 The Order Set

(It is supposed that the all following ID address is 01, and its baudrate is 9600 bps)

- I To read the transducer name: \$(Addr)M<CR>
- I To read the configuration: \$(Addr)2<CR>
- I To set the configuration:  
%(OldAddr)(NewAddr)(InpntRange)(BaudRate)(DataFormat)<CR>
- I To read all data: #(Addr)A<CR>

#### 8.5.1 To read the transducer name:

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)
<CR>:	Enter	1 byte	(0DH)

Response: ! (Addr) (Transducer Name) <CR>

or: ? (Addr) <CR> (Respond to a wrong order received)

!?: Delimiter  
 Transducer Name: name of transducer  
 <CR>: Enter

**Example:** Order: \$01M<CR> (24H 30H 31H 4DH 0DH)  
 Response: !01AI32<CR> (21H 30H 31H 41H 49H 33H 32H 0DH)  
 !: respond to a correct order

01: Address  
 AI32: the name code of the transducer CE-AI32

### 8.5.2 To read the configuration

To read the configuration of a transducer with specified address

Order format: \$ (Addr) 2 <CR>

\$: Order symbol 1 byte (24H)  
 (Addr): Address 2 bytes (30H31H)  
 2: To read the configuration 1 byte (32H)  
 <CR>: Enter 1 byte (0DH)

Response: ! (Addr) (Input Range) (Baud Rate) (Data Format) <CR>  
 Or: ? (Addr) <CR> (Respond to a wrong order received)

**Example:** Order: \$012<CR> (24H 30H 31H 32H 0DH)  
 Response: ! 01000601 <CR>

! (21H) response to correct order  
 01 (30H 31H) address  
 00 (30H 30H) input range (reserved byte)  
 06 (30H 36H) communication Baud rate 9600bps  
 01 (30H 31H) no check sum  
 <CR> (0DH) enter

### 8.5.3 To set configuration

To set the configuration of specified transducer including address and baud rate.

Order: % (OldAddr) (New Addr) (Input Range) (Baud rate) (Data Format) <CR>

% Order symbol 1 byte (25H)  
 (Old Addr) Old address 00~FFH 2 bytes (30H 31H)  
 (New Addr) New address 00~FFH 2 bytes (30H 32H)  
 (Input Range) Must be "00" 2 bytes (30H 30H)  
 (Baud Rate) Communication baud rate 03~07 2 bytes (30H33H—30H37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps
07	30H 37H	19200bps

(Data Format) must be "01" 2 bytes (30H 31H)

Response: ! (Addr) <CR>  
 Or: ? (Addr) <CR>

**Example:** order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

Response: ! 02<CR> (21H 30H 32H 0DH)

---

This order will change address of transducer from 01 to 02; the new baud rate for it is 19200 bps.

#### 8.5.4 To read the all data

To read the all data of a transducer with specified address. The output is Ia, Ib and Ic.

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH)

Response: > (Data Ia) (Data Ib) (Data Ic) <CR> (response of AI32)  
> (Data Ia) <CR> (response of AI12)

Data XX: This format consists of 1 digit of sign “+” or “-”, 5 digits of decimal system value of data codes and 1 decimal point. This value shows actual data in the form of a percentage of the maximum value of its measurable range. If the maximum value of measurable current range of an AI32 transducer is 5A, and the responded data is +0.6000, then the actual value of current is  $I=+0.6000 \times 5A=+3.0000A$

Example: Suppose: the maximum value of its measurable current range:  $I_o=5A$ ,

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+0.6000+0.6000+0.6000<CR>

Then:  $I_a=+0.6000 \times I_o=+0.6000 \times 5A=+3.0000A$

$I_b=+0.6000 \times I_o=+0.6000 \times 5A=+3.0000A$

$I_c=+0.6000 \times I_o=+0.6000 \times 5A=+3.0000A$

#### 8.5.5 Internal orders

A group of internal calibrating orders was set for the CE-AI products: (Note: The second byte and the third byte of following 2 orders are address codes of transducer, the default address codes of all transducers were set to “01” before they were delivered.)

l Calibrating order of zero adjusting for DC current: \$010<CR> (24H 30H 31H 30H 0DH)

l Calibrating order of zero adjusting for AC current: \$013<CR> (24H 30H 31H 33H 0DH)

For above 2 orders, 7 bytes of data will be returned from relevant transducer.

l Reset order: @ CEAFW<CR> (40H 43H 45H 41H 46H 57H 0DH)

The address codes of transducers will be reset to “01” and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after received the reset order. This order can not be used in the network; otherwise it will cause bus conflict.

l Please contact with the supplier when user need to revise the maximum value of the range of current of the product. Our technicians will help you to revise by using other internal orders.

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## Chapter 9. 1 Element DC Current Single Parameter

### Digital Transducer

#### 9.1 Part Numbers of the Product

The part numbers of digital DC current transducer:

CE-AZ11—1 element DC current Single Parameter transducer

#### 9.2 Specifications

- | Accuracy ----- 0.2%
- | Output Data---- current Ia
- | Output Interface ----- RS-485: 2-wire connection,
- | Communication distance: 1200M, ±15KV ESD protection.
- | RS-232C: S3 case style connects to special RS485/RS-232C converter.
- | Input (measuring range)----- DC current: 1A, 5A, 15A, 25A (or specially supply to meet user's other special requirement)
- | Baudrate -----1200, 2400, 4800, 9600, 19.2K bps
- | Refreshing period ----- 250 mS
- | Isolation voltage ----- 2500V DC
- | System power consumption ----- <200 mW(+12V)
- | Power source ----- +5V, +12V, +15V, +24V, +48V DC(please specify any one of the five options in you order)
- | Operation temperature ----- 0°C~+50°C
- | Storage condition----- -20°C~+80°C (RH: 5%~95% no dew)

#### 9.3 Case style

Please see Fig. 3.1 S3 no window case style on page 5.

#### 9.4 Connecting Diagram

Please see Fig. 9.1 S3 case connections

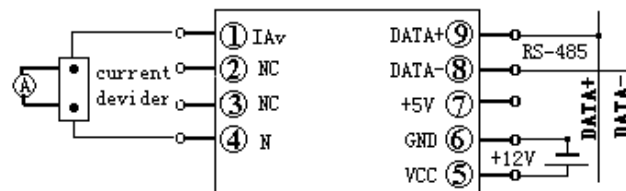


Fig. 9.1 S3 case connections

(The terminal No. 7 of case style S3 can supply +5V power for RS485/RS-232C converter; its max output current is 20mA)

#### 9.5 The Order Set

(It is supposed that the all following ID address is 01, and its baudrate is 9600 bps)

- | To read the transducer name: \$(Addr)M<CR>
- | To read the configuration: \$(Addr)2<CR>
- | To set the configuration:



---

%(OldAddr)(NewAddr)(InpntRange)(BaudRate)(DataFormat)<CR>

I To read all data: #(Addr)A<CR>

### 9.5.1 To read the transducer name:

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)
<CR>:	Enter	1 byte	(0DH)

Response: ! (Addr) (Transducer Name) <CR>

or: ? (Addr) <CR> (Respond to a wrong order received)

! ?: Delimiter

Transducer Name: name of transducer

<CR>: Enter

Example: Order: \$01M<CR> (24H 30H 31H 4DH 0DH)

Response: ! 01AZ11<CR? (21H 30H 31H 41H 5AH 31H 31H 0DH)

!: respond to a correct order

01: Address

AZ11: the name code of the transducer CE-AZ11

### 9.5.2 To read the configuration

Order format: \$ (Addr) 2 <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
2:	To read the configuration	1 byte	(32H)
<CR>:	Enter	1 byte	(0DH)

Response: ! (Addr) (Input Range) (Baud Rate) (Data Format) <CR>

Or: ? (Addr) <CR> (Respond to a wrong order received)

Example: Order: \$012<CR> (24H 30H 31H 32H 0DH)

Response: ! 01000601 <CR>

! (21H) response to correct order

01 (30H 31H) address

00 (30H 30H) input range (reserved bytes)

06 (30H 36H) communication Baud rate 9600bps

01 (30H 31H) no check sum

<CR> (0DH) enter

### 9.5.3 To set configuration

To set the configuration of specified transducer including address and baud rate.

Order: % (OldAddr) (New Addr) (Input Range) (Baud rate) (Data Format) <CR>

%	Order symbol	1 byte	(25H)
---	--------------	--------	-------

---

(Old Addr)	Old address 00~FFH	2 bytes	(30H 31H)
(New Addr)	New address 00~FFH	2 bytes	(30H 32H)
(Input Range)	Must be "00"	2 bytes	(30H 30H)
(Baud Rate)	Communication baud rate 03~07	2 bytes	(30H33H—30H37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps
07	30H 37H	19200bps

(Data Format) must be "01" 2 bytes (30H 31H)

Response: ! (NewAddr) <CR>

Or: ? (Addr) <CR>

Example: order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

Response: ! 02<CR> (21H 30H 32H 0DH)

This order will change address of transducer from 01 to 02; the new baud rate for it is 19200 bps.

#### 9.5.4 To read the all data

To read the all existent data of a transducer with specified address. The output is Ia.

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH)

Response: > (Data Ia) <CR> (response of AZ11)

Data XX: This format consists of 1 digit of sign "+" or "-", 5 digits of decimal system value of data codes and 1 decimal point. This value shows actual data in the form of a percentage of the maximum value of its measurable range. If the maximum value of measurable current range of an AZ11 transducer is 5A, and the responded data is +0.6000, then the actual value of current is  $I=+0.6000 \times 5A=+3.0000A$

Example: Suppose: the maximum value of its measurable current range:  $I_o=5A$ ,

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+0.6000<CR>

Then:  $I_a=+0.6000 \times I_o=+0.6000 \times 5A=+3.0000A$

#### 9.5.5 Internal orders

A group of internal calibrating orders was set for the CE-AI products: (Note: The second byte and the third byte of following 2 orders are address codes of transducer, the default address codes of all transducers were set to "01" before they were delivered.)

I Calibrating order of zero adjusting for DC current: \$010<CR> (24H 30H 31H 30H 0DH)

I Calibrating order of zero adjusting for AC current: \$013<CR> (24H 30H 31H 33H 0DH)

For above 2 orders, 7 bytes of data will be returned from relevant transducer.

- 
- I Reset order: @ CEA FW<CR> (40H 43H 45H 41H 46H 57H 0DH)

The address codes of transducers will be reset to “01” and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after received the reset order. This order can not be used in the network; otherwise it will cause bus conflict.

- I Please contact with the supplier when user need to revise the maximum value of the range of current of the product. Our technicians will help you to revise by using other internal orders.

## Chapter 10. AC / DC Voltage Single Parameter

### Digital Transducer

#### 10.1 Part Numbers of the Product

The part numbers of digital AC & DC voltage transducer:

CE-AV42 — 3-phase 4-wire AC (treble isolated) digital AC voltage transducer.

CE-AV32 — 3-phase 3-wire AC (treble isolated) digital AC voltage transducer.

CE-AV12 — 1 element (treble isolated) digital AC voltage transducer.

CE-AU11 — 1 element (double isolated) digital DC voltage transducer.

Notes: All specifications of AC and DC voltage transducers are the same except input voltage system. Under mentioned examples are all the AC transducers.

#### 10.2 Specifications

- I Accuracy ----- 0.2%
- I Output Data---- True RMS of Voltage Va, Vb, Vc (Only Vab, Vcb for AV32; only Va for AV12).
- I Output Interface ----- RS-485: 2-wire connection, communication distance: 1200M, ±15KV ESD protection.  
RS-232C: S3 case style connects to special RS485/RS-232C converter.
- I Input (measuring range) ----- Voltage: 110V, 220V, 380V, and 500V. (Or specially supply to meet user's other special requirement)
- I Baudrate----- 1200, 2400, 4800, 9600, 19.2K bps.
- I Refreshing period ----- 250 mS
- I Isolation voltage ----- 2500V DC
- I System power consumption ----- <200 mW(+12V)
- I Power source ----- +5V, +12V, +15V, +24V, +48V DC (please specify any one of the five options in you order)
- I Operation temperature----- 0°C~+50°C
- I Storage condition ----- -20°C~+80°C (RH: 5%~95% no dew)

#### 10.3 Case style

Please see Fig. 3.1 S3 no windows case style for 3 phase products; Fig. 3.2 N case for AU11 and AV12.

#### 10.4 Connecting Diagram

Please see Fig. 10.1 S3 case for 3 phase products; Fig. 10.2 N case for AU11 and AV12. (Only different input elements)

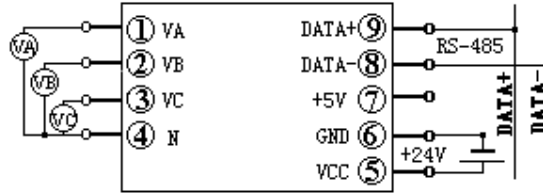


Fig. 10.1 S3 case connections for 3 phase product

(The terminal No. 7 of case style S3 can supply +5V power for RS485/RS-232C converter; its max output current is 20mA)

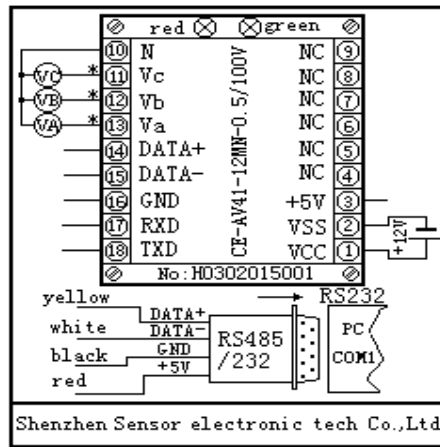


Fig. 10.2 N case connections for AU11 and AV12

The terminal No. 3 of N case style can supply +5V power for RS485/RS-232C converter; its max output current is 20mA.

## 10.5 The Order Set

(It is supposed that the all following ID address is 01, and its baudrate is 9600 bps)

- I To read the transducer name: \$(Addr)M<CR>
- I To read the configuration: \$(Addr)2<CR>
- I To set the configuration:  
%(OldAddr)(NewAddr)(InputRange)(BaudRate)(DataFormat)<CR>
- I To read all data: #(Addr)A<CR>

### 10.5.1 To read the transducer name

To read the transducer name from a specified address

Order format: \$ (Addr) M <CR>

\$:	Order symbol	1 byte	(24H)
(Addr):	Address	2 bytes	(30H31H)
M:	To read the transducer name	1 byte	(4DH)
<CR>:	Enter	1 byte	(0DH)

Response: ! (Addr) (Transducer Name) <CR>

---

or:       ? (Addr) <CR>       (Respond to a wrong order received)  
! ? :       Delimiter  
Transducer Name: name of transducer  
<CR>:       Enter  
Example: Order:       \$01M<CR> (24H 30H 31H 4DH 0DH)  
Response:       ! 01AV42<CR> (21H 30H 31H 41H 56H 34H 32H 0DH)  
! :       respond to a correct order  
01 :       Address  
AV42 :       the name code of the transducer CE-AV42

### 10.5.2 To read the configuration

To read the configuration of a transducer with specified address

Order format: \$ (Addr) 2 <CR>

\$:       Order symbol                   1 byte   (24H)  
(Addr):   Address                        2 bytes  (30H31H)  
2:       To read the configuration    1 byte   (32H)  
<CR>:    Enter                         1 byte   (0DH)

Response: ! (Addr) (Input Range) (Baud Rate) (Data Format) <CR>

Or:       ? (Addr) <CR>               (Respond to a wrong order received)

Example: Order: \$012<CR> (24H 30H 31H 32H 0DH)

Response: ! 01000601 <CR>

! (21H)       response to correct order  
01 (30H 31H)   address  
00 (30H 30H)   input range (reserved bytes)  
06 (30H 36H)   communication Baud rate 9600bps  
01 (30H 31H)   no check sum  
<CR> (0DH)     enter

### 10.5.3 To set configuration

To set the configuration of specified transducer including address and baud rate.

Order: % (OldAddr) (New Addr) (Input Range) (Baud rate) (Data Format) <CR>

%       Order symbol                   1 byte   (25H)  
(Old Addr)   Old address 00~FFH           2 bytes  (30H 31H)  
(New Addr)   New address 00~FFH         2 bytes  (30H 32H)  
(Input Range) Must be "00"           2 bytes  (30H 30H)  
(Baud Rate)   Communication baud rate 03~07 2 bytes (30H33H—30H37H)

No.	Baud rate code	Baud rate
03	30H 33H	1200bps
04	30H 34H	2400bps
05	30H 35H	4800bps
06	30H 36H	9600bps
07	30H 37H	19200bps

---

(Data Format) must be "01" 2 bytes (30H 31H)

Response: ! (NewAddr) <CR>

Or: ? (Addr) <CR>

Example: order: %0102000701 <CR> (25H 30H 31H 30H 32H 30H 30H 30H 37H 30H 31H 0DH)

Response: ! 02<CR> (21H 30H 32H 0DH)

This order will change address of transducer from 01 to 02; the new baud rate for it is 19200 bps.

#### 10.5.4 To read the all data

Order: # (Addr) A<CR> (23H 30H 31H 41H 0DH)

Response: >(Data Va) (Data Vb) (Data Vc)<CR> (response of AV42)  
>(Data Vab) (Data Vcb)<CR> (response of AV32)  
>(Data Va)<CR> (response of AV12)

Data XX: This format consists of 1 digit of sign "+" or "-", 5 digits of decimal system value of data codes and 1 decimal point. This value shows actual data in the form of a percentage of the maximum value of its measurable range. If the maximum value of measurable current range of an AV42 transducer is 100V, and the responded data is +0.6000, then the actual value of current is  $V=+0.6000 \times 100V=30.00V$ .

Example: Suppose: the maximum value of its measurable current range:  $V_0=100V$ ,

Order: #01A<CR> (23H 30H 31H 41H 0DH)

Response: >+0.6000+0.6000+0.6000<CR>

Then:  $V_a=+0.6000 \times V_0=+0.6000 \times 100V=+60.00V$

$V_b=+0.6000 \times V_0=+0.6000 \times 100V=+60.00V$

$V_c=+0.6000 \times V_0=+0.6000 \times 100V=+60.00V$

#### 10.5.5 Internal orders

A group of internal calibrating orders was set for the CE-AV products: (Note: The second byte and the third byte of following 2 orders are address codes of transducer, the default address codes of all transducers were set to "01" before they were delivered.)

I Calibrating order of zero adjusting for DC voltage: \$011<CR> (24H 30H 31H 31H 0DH)

I Calibrating order of zero adjusting for AC voltage: \$014<CR> (24H 30H 31H 34H 0DH)

For above 2 orders, 7 bytes of data will be returned from relevant transducer.

I Reset order: @ CEA FW<CR> (40H 43H 45H 41H 46H 57H 0DH)

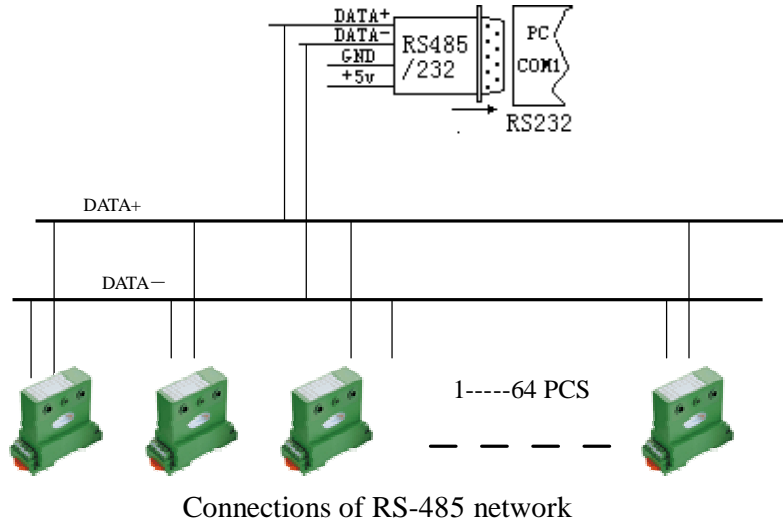
The address codes of transducers will be reset to "01" and the Baud rate will be reset to 9600 bps by the reset order no matter what the previous address codes and Baud rate of the transducer are. Four bytes of data will be returned from the transducer after received the reset order. This order can not be used in the network; otherwise it will cause bus conflict.

Please contact with the supplier when user need to revise the maximum value of the range of

voltage of the product. Our technicians will help you to revise by using other internal orders.

## Chapter 11. System Connecting

When series CE-A digital electrical transducers are applied in measuring and controlling system, the RS-485 system connecting diagram is as follows:



Series CE-A digital electrical transducer is able to communicate with all kinds of computers by appropriate connecting. The connecting method: connect pin “DATA+” of D485(RS-232/RS-485) converter of the computer with the pins “DATA+” of all transducers, connect the pin “DATA-” of that of computer with pins “DATA-” of all transducers, and put resistance terminators ( $120\Omega$ ) at the two ends [it is not necessary when the distance is closer ( $\leq 1200\text{m}$ )]. Then connect to the power source. The measurements can work with running application software of the sensor/transducer in the computer.

## Chapter 12. Application and Programming

Series CE-A digital electrical transducer can easily measure many kinds of useful electrical parameters of 3-phase 4-wire, 3-phase 3-wire and 1 element power lines. It can also be widely used in various industrial control and measuring systems. One sensor/transducer can replace many kinds of single parameter transducers i.e. current, voltage, frequency, power, power factor and energy transducers etc. It can reduce the cost of system and is easy to wiring at work site; especially its advanced isolation technology greatly improved the performance of system and helps to carry the reliability and stability of the system to a new and higher level. CE-A is able to connect to any industrial digital control system with the RS-485 bus communication technology and ASCII order set. So it is convenient to program and to extend the system and let you build up your own control system easily.

The default configuration of each CE-A transducer before delivery: transducer address is set to “01” (hex), and baud rate is 9600bps.

- Note:
1. Transducer address is programmable. It can be set from 0 through 255(00-FFH) optionally.
  2. Five programmable baud rates can be used: 1200bps, 2400bps, 4800bps, 9600bps and 19200 bps.

- 
3. The configuration data will be stored in EEPROM after the transducer address and baud rate were revised.

**12.1 Set the Baud Rate:** code of communication baud rate: 03---07

Baud rate code (hex)	Baud rate
03	1200bps
04	2400bps
05	4800bps
06	9600bps
07	19200bps

**12.2 Select the Measuring Range:**

You may select Series CE-A products with their measuring range of voltage (0~500V), current (1~25A). Usually 1.2 times of the maximum value of measuring range can be measured correctly.

The transducer could not be damaged when the inputs are less than 2 times of the maximum value of measuring range of voltage and 10 times of the maximum value of measuring range of current. Pay attention to connect the polarity of power correctly with right rated voltage.

**12.3 RS-485 Networks:**

Up to 64 transducers can be connected in an RS-485 bus; the maximum communication distance can reach 1200m. The transducer can be connected directly to digital industrial control system with RS-485 interface. If the system has only RS-232C interface available, RS-232C/RS-485 converter have to be used for data handshaking.

**12.4 Configuration:**

Each CE-A sensor/transducer must be configured before it is connected to a network. The baud rate of transducer must conform to that of the network; and no address collision (no overlapping the address of any other device in the network) could be allowed. To configure a transducer you need RS-485/RS-232C converter, computer with RS-232 interface and application software of intelligence transducer. The configuration can be completed easily by CE-A sensor/transducer application software. You should configure it by programming according to the order set of the transducer.

**Data acquisition:** After you connected the transducer correctly and properly. When the computer sends one of read orders, the transducer will return (respond) the measured data to the computer. The data inside the EEPROM of the CE-A sensor/transducer will be refreshed every 250ms (the values of voltage and current etc. are RMS during the 250ms). Data of energy is accumulated since powered-on and is cleared after received a clear order.

Output data is in the form of a percentage of the maximum value of its measurable range. Its format consists of 1 place of sign “+” or “-” and 5 digits of decimal system value of data and a decimal point. The data of frequency is a real value of the frequency measured. Its conversion formula is as follows:

The maximum value of measurable range of current of the transducer:  $I_0$   
 The maximum value of measurable range of voltage of the transducer:  $U_0$ ,



---

Then

Voltage  $U = u \times U_0$

V

Current  $I = i \times I_0$

A

Active power  $P = p \times U_0 \times I_0 \times 1$

W (for single phase products)

Active power  $P = p \times U_0 \times I_0 \times 2$

W (for 3-phase 3-wire two wattmeter method products)

Active power  $P = p \times U_0 \times I_0 \times 3$

W (for 3-phase 4-wire products)

Reactive power  $Q = q \times U_0 \times I_0 \times 1$

Var (for single phase products)

Reactive power  $Q = q \times U_0 \times I_0 \times 2$

Var (for 3-phase 3-wire two wattmeter method products)

Reactive power  $Q = q \times U_0 \times I_0 \times 3$

Var (for 3-phase 4-wire products)

Power factor  $\text{COS } \Phi = \eta$

Frequency = f

Hz

Energy = energy output data  $\times U_0 \times I_0 / (1000 \times 3600)$  Kwh

Note: u, i, p, q are output data from the transducer in the form of a percentage of the maximum value of measurable range of the transducer.

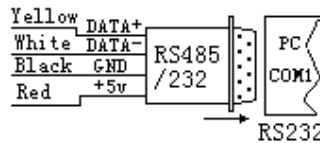
## Chapter 13. Instructions of CE-AJ485 (RS-485/RS-232C)

### Converter

CE-AJ485 converter developed by our company will help you to make data handshaking between RS-485 and RS-232C. It also helps you to use our CE-A digital electrical transducer to build up your various digital control-monitoring systems. Our cheaper price will reduce your cost.

CEAJ485 converter needs +5V power source. It is non-isolation RS-485/RS-232C converter.

The connection of CEAJ485 converter is shown as the following diagram. One side (RS-232C) of the converter can be inserted into the port COM1 or COM2 on PC, then to connect it with +5V power source and RS-485 bus. Conversion of receiving and sending is not delayed. The maximum communication distance is 1200m.



## Chapter 14. Ordering Instructions

### 14.1 Ordering Instructions

1. Ensure a complete correct part number and product descriptions are used according to abovementioned instructions. The ordering information must include the complete description including input and output parameters such as 1 element or 3-phase 3-wire or 3-phase 4-wire, measuring range, interface, power source, case style and interface converter etc.

Part number(s), quantity, delivery and shipping requirements must be included in your order. Provide complete company name, address, fax number, and email address. Be sure to provide the name of the contact person that we can contact with any questions.

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2. The complete order must be signed by both the seller and buyer.
  3. Payment is by irrevocably L/C at sight for large quantities or 50% in advance and the remaining to be paid before shipment for small quantity.

#### **14.2 Notice to User**

1. Please check the part number of the products carefully in accordance with packing list and product labels before apply them in your system.
2. Make sure to connect the input signals, outputs and power source correctly and properly.
3. Power source: accuracy 5% or greater, ripple  $V_{pp} \leq 0.4\%$ .
4. Conductive dust and gases corroding metal may damage the isolation. They are hazardous to the product. Don't operate in that environment.
5. Please screw the terminal tightly before you measure the output signal on the output terminals with the probes of instrument,
6. The transducers should not be used in environments with strong electromagnetic interference. Standard precautions such as shielding the input and/or output lines should be observed. All lines should be kept as short as possible. If several transducers are used together, keep a minimum of 10 mm space between each unit. A 35mm (width) track is to be used for DIN rail mounting with M3 screws for surface mounting.
7. The zero adjusting and the accuracy calibration for the products have been made before delivery. Please don't adjust it. Contact the company if field adjustments are required.
8. Please don't remove any labels on the products.

#### **14.3 Warranty Service**

1. SHENZHEN SENSOR ELECTRONIC TECHNOLOGY CO., LTD. warrants its products against all defects in workmanship and material. If you experience a problem with the product, our technicians are available to help you.
2. In case the product does not operate properly, please contact our Marketing Department or Technical Department by fax or by e-mail and explain the phenomenon of the problem, your operation environment and appoint a technician to contact.

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# CPI 3000

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