IEC 62056-21:2002 Serial

IEC62056-21:2002 Serial communication protocol

Supported device types and versions

The protocol communicates in series with devices according to international standard IEC62056-21, protocol mode C.

Communication line configuration

- Communication line categories: Serial, SerialOverUDP Device Redundant, **MODEM**.
- To set the transmission parameters, use the **even parity**, **7 data bits** and 1 stop bit in all line categories!
- A transfer rate according to setting of specific device or modem.
- The implicit parameters comply with MODEM line (tab "Modem - parameters"), the specific parameters can be configured by station protocol parameters for modem initialization.

Communication line protocol parameters

Configuration dialog box, tab **Protocol parameters -** select the protocol "IEC62056-21:2002 Serial".

Table 1

Parameter	Meaning	Unit	Default value
Area Code	The common call prefix for phone modem connection (only lines of MODEM category).		
Software 7E1	YES option switches SW emulation of transfer parameters of 7 data bits, even parity when the transfer parameters of 8 data bits are set, none parity (i.e. emulation 7E1 when 8N1 is set).	YES /NO	NO

Communication station configuration

- Communication protocol "**IEC62056-21:2002 Serial**".
- Station address (device) is optional. If the parameter is empty, device must answer. If there is more devices on one line (e.g. bus RS485) the device address must be set. Device address consists of maximum 32 characters that are formed from figures (0 - 9), capital letters (A - Z), small letters (a - z) or space ( ). The zero in front of valid figure are ignored (i.e. address 10203 = 010203 = 000010203).

Station protocol parameters

Configuration dialog box - tab **Protocol parameters**.
These parameters influence some optional protocol parameters. Following station protocol parameters can be set:

Table 2

Parameter	Meaning	Unit	Default value
Modem Telephone Number	Phone number for connection via modem with this station (only lines of MODEM category).		
Dial Timeout	Maximal waiting time on connection via modem (only lines of MODEM category).	sec	60
Dial Retry Count	Maximum number of attempt to connect via modem (only lines of MODEM category).	1..20	1
Dial Retry Timeout	Delay before attempting to dial after an unsuccessful connection attempt (only lines of MODEM category).	sec	30
Wait First Timeout	Time delay between sending the request and reading the answer. **Note:** a device sends a 3-character manufacturer's identification in the identification message. Standard defines that if the 3-rd character is a lower case letter, (e.g. in identifications *ELm* or *UNi*), minimum reaction time for such device is 20 ms instead of 200 ms. If the 3-rd character is an upper case letter, this does not preclude supporting a 20 ms reaction time.	ms	200

Wait Timeout	Time delay between reading the answer till it is completed. See the note of parameter Wait First Timeout.	ms	200
Max Wait Retry	Retry count of reading response till its completion.	1 .. 100	20
Retry Timeout	Delay between the request retry if the error communication occurs.	ms	1000 ms
Retry Count	Retry count of request as far as the error communication.	1 .. 20	3
Disconnect Timeout	Timeout for waiting for answer to modem hangup operation (only lines of MODEM category).	sec	15
Ack Delay	Delay after transmitting acknowledgement of received data (ACK).	ms	100
Baudrate Changeover (Z)	Value of parameter 'Z' - Baud rate identification (for baud rate changeover) of request Acknowledgement/option select message of protocol C mode. Option AUTO finds out automatic the value 'Z' from acknowledgement of answer and uses it.	300 Baud 600 Baud 1200 Baud 2400 Baud 4800 Baud 9600 Baud 19200 Baud 38400 Baud 57600 Baud 115200 Baud AUTO	2400 Baud
Data Readout	Permission to read the current values ("data readout").	YES /NO	YES
Manuf. Spec. Table Readout Nr.1 (Y)	Permission to read the "manufacturer specific table" values, 1-st block. Choice '-' means the values are not read, choice '6' to '9' means selected "manufacturer specific table" will be read.	- 6 7 8 9	-
Manuf. Spec. Table Readout Nr.2 (Y)	Permission to read the "manufacturer specific table" values, 2-nd block. Choice '-' means the values are not read, choice '6' to '9' means selected "manufacturer specific table" will be read.	- 6 7 8 9	-
Manuf. Spec. Table Readout Nr.3 (Y)	Permission to read the "manufacturer specific table" values, 3-rd block. Choice '-' means the values are not read, choice '6' to '9' means selected "manufacturer specific table" will be read.	- 6 7 8 9	-
Load Profile	Permission to load the historical data from profile.	YES /NO	YES
Profile	Profile name - OBIS code of load profile used during loading of historical data from profile.		P.01
Profile Time Mask	Date and time mask used to read historical data from profile. The letter " z" is used to set the time and is replaced by a value of 0, 1 or 2 according to the parameter Session Recognition Flag.		zyymmddh hmi
Profile History Depth	Time depth of historical profile readings.	hour	24
Time Round	Time round of data from profile.	min	15
Profile Read Step	Time range of data which is queried from profile in one request. It is entered as a multiple of the parameter "Time Round".	x Time Round	2
Profile Read Level	Access level used to read historical data from profile.	0-9	5
Password - level 1	Password necessary for changing configuration of device (level 1) used to set the date and time.		"00000000"
Session Recognition Flag	Flag that indicates type of date/time used by the device. Electrometers LZQJ manufactured by EMH Elektrizitätszähler indicate type of date/time by this flag (0=Normal Time, 1=Summer Time, 2=UTC Time). This flag is used by parameters Time Mask and Date Mask to set the time and by parameter Profile Time Mask to read historical data from profile. **Note:** Both *Normal Time* and *Summer Time* values will cause the flag to be set depending on the time currently set or read.	Normal Time Summe r Time UTC Time	Normal time
Time Register	Register used to set the time. The parameter is important only if the synchronization is enabled on the tab "Time parameters" in the configuration of station.		0.9.1
Time Mask	Mask used to set the time. The letter " z" is used for time conversion according to the parameter Session Recognition Flag. The parameter is important only if the synchronization is enabled on the tab "Time parameters" in the configuration of station.		zhhmiss
Date Register	Register used to set the date. The parameter is important only if the synchronization is enabled on the tab "Time parameters" in the configuration of station.		0.9.2
Date Mask	Mask used to set the date. The letter " z" is used for dátumu conversion according to the parameter Session Recognition Flag. The parameter is important only if the synchronization is enabled on the tab "Time parameters" in the configuration of station.		zddmmyy
AT Command 1	A special initial string of modem 1 (only for MODEM lines).		AT&FE0V1 Q0B0X3L0 M0

AT Command 2	A special initial string of modem 2 (only for MODEM lines). Explanation of recommended settings: **S37=5** 1200bps DTE-DTE speed - limits the speed for modems. Many devices use modems with limited transfer speeds and this setting can speed-up the connection establishment process. Higher transfer speeds must be negotiated individualy. **&D2** DTR drop to hangup - for matching with tha parameter of modem line (line configuration, tab "Modem - parameters", check the option "Use DTR for Hangup"). **S0=0** Disable auto-answer. Auto-answer will not be used. **S30=2** 20 sec inactivity timeout - automatic hangup after idle timeout expired. Necessary for assuring connection termination after the communication with the last device is over.		ATS37=5&D2S0=0S7=60S30=2
Full Debug	Full tracing of communication, loaded values of I/O tags and other debug information are shown.	YES /NO	NO
Unicontrols Devices	It activates data processing according to software implementation of protocol from Unicontrols.	YES /NO	NO
Unicontrols Read Index	Activates reading of profile index (map of records stored in memory) within reading of historical data from profile (Unicontrols device only). Retrieved index is not processed further and serves only as debugging information for Unicontrols.	YES /NO	NO

I/O tag configuration

Possible types of I/O tag values: **Ai**, **Ci**, **Di**, **TxtI**, **TiA**, **TiR**.

I/O tag address

I/O tag address correspond to standard IEC 62056-61:2002 Object Identification system (OBIS) in terms of "Annex A - Code presentation".

Abbreviated format of address is supported: **C.D[.E][*F]** as well as full format **A.B.C.D[.E][*F]**

in which:

- **A** - Value group A (number in range 0..15). Number defines media (energy type) to which the metering is related. Nonmedia related information is handled as abstract data.
  - 0 - Abstract objects
  - 1 - Electricity related objects
  - 4 - Heat cost allocator related objects
  - 5 - Cooling related objects
  - 6 - Heat related objects
  - 7 - Gas related objects
  - 8 - Cold water related objects
  - 9 - Hot water related objects
  - All other - reserved
- **B** - Value group B (number in range 0..255). Number defines the channel number (for devices with multiple inputs, data concentrators etc).
  - 0 - No channel specified
  - 1…64 - Channel 1-64
  - 65…127 - Utility specific codes
  - 128…199 - Manufacturer specific codes
  - 200…255 - Reserved
- **C** - Value group C (number in range 0..255 or characters 'C', 'F', 'L' or 'P'). Number defines the abstract or physical data items related to the information source concerned, for example current, voltage, power, volume, temperature and for range 0…89 it depends on value group A:
  - 0…89 -Context specific identifiers (depending on Value group A). For electricity related objects (A = 1):
    - 0 - General purpose objects
    - 1 - Sum(Li) Active power+ (QI+QIV)
    - 2 - Sum(Li) Active power- (QII+QIII)
    - 3 - Sum(Li) Reactive power+ (QI+QII)
    - 4 - Sum(Li) Reactive power– (QIII+QIV)
    - 5 - Sum(Li) Reactive power QI
    - 6 - Sum(Li) Reactive power QII
    - 7 - Sum(Li) Reactive power QIII
    - 8 - Sum(Li) Reactive power QIV
    - 9 - Sum(Li) Apparent power+ (QI+QIV)
    - 10 - Sum(Li) Apparent power– (QII+QIII)
    - 11 - Current : any phase
    - 12 - Voltage : any phase
    - 13 - Sum(Li) Power factor-
    - 14 - Supply frequency
    - 15 - Sum(Li) Active power (abs(QI+QIV)+abs(QII+QIII))
    - 16 - Sum(Li) Active power (abs(QI+QIV)-abs(QII+QIII))
    - 17 - Sum(Li) Active power QI
    - 18 - Sum(Li) Active power QII
    - 19 - Sum(Li) Active power QIII
    - 20 - Sum(Li) Active power QIV
    - 21 - L1 Active power+
    - 22 - L1 Active power–
    - 23 - L1 Reactive power+

        - 24-30 L1 etc.. (see 4-10)
        - 31 - L1 Current
        - 32 - L1 Voltage
        - 33 - L1 Power factor
        - 34 - L1 Supply frequency
        - 35-40 L1 Active power... etc. (see 15-20)
        - 41 - L2 Active power+
        - 42 - L2 Active power–
        - 43 - L2 Reactive power+
        - 44-60 - L2 etc. (see 24-40)
        - 61 - L3 Active power+
        - 62 - L3 Active power–
        - 63 - L3 Reactive power+
        - 64-80 - L3 etc. (see 24-40)
        - 81 - Angles
        - 82 - Unitless quantity (pulses or pieces)
        - 83 - Transformer and line loss quantities
        - 84 - Sum(Li) power factor–
        - 85 - L1 Power factor–
        - 86 - L2 Power factor–
        - 87 - L3 Power factor–
        - 88 - Sum(Li) Ampere-squared hours (QI+QII+QIII+QIV)
        - 89 - Sum(Li) Volt-squared hours (QI+QII+QIII+QIV)
        - 91 - L0 current (neutral)
        - 92 - L0 voltage (neutral)
        - 93 - Consortia specific identifiers
        - 94 - Country specific identifiers
        - 96 - Electricity-related service entries
        - 97 - Electricity-related error messages
        - 98 - Electricity list
        - 99 - Electricity data profile
        - 100…127 - Reserved
        - 128...199, 240 - Manufacturer specific codes
        - All other - Reserved
    - 93 - Consortia specific identifiers
    - 94 - Country specific identifiers
    - 96 - General service entries (can be entered as character 'C')
    - 97 - General error messages (can be entered as character 'F')
    - 98 - General list objects (can be entered as character 'L')
    - 99 - Abstract data profiles (can be entered as character 'P')
    - 127 - Inactive objects
    - 128…199, 240 - Manufacturer specific codes
    - 200…255 - Reserved
- **D** - Value group D (number in range 0..255). Number defines types of data depending on Value group A and C, after processing by various specific algorithms. For A=1 and C<>0,93…94,95…99:
    - 0 - Billing period average (since last reset)
    - 1 - Cumulative minimum 1
    - 2 - Cumulative maximum 1
    - 3 - Minimum 1
    - 4 - Current average 1
    - 5 - Last average 1
    - 6 - Maximum 1
    - 7 - Instantaneous value
    - 8 - Time integral 1
    - 9 - Time integral 2
    - 10 - Time integral 3
    - 11 - Cumulative minimum 2
    - 12 - Cumulative maximum 2
    - 13 - Minimum 2
    - 14 - Current average 2
    - 15 - Last average 2
    - 16 - Maximum 2
    - 17 - Time integral 7
    - 18 - Time integral 8
    - 19 - Time integral 9
    - 20 - Time integral 10
    - 21 - Cumulative minimum 3
    - 22 - Cumulative maximum 3
    - 23 - Minimum 3
    - 24 - Current average 3
    - 25 - Last average 3
    - 26 - Maximum 3
    - 27 - Current average 5
    - 28 - Current average 6
    - 29 - Time integral 5
    - 30 - Time integral 6
    - 31 - Under limit threshold
    - 32 - Under limit occurrence counter
    - 33 - Under limit duration

    - 34 - Under limit magnitude
    - 35 - Over limit threshold
    - 36 - Over limit occurrence counter
    - 37 - Over limit duration
    - 38 - Over limit magnitude
    - 39 - Missing threshold
    - 40 - Missing occurrence counter
    - 41 - Missing duration
    - 42 - Missing magnitude
    - 55 - Test average
    - 58 - Time integral 4
    - 128...254 - Manufacturer specific codes
    - All other - Reserved
- **E** - Value group E (number in range 0..255). Number defines further processing or classification of quantities identified by value groups A,C,D. Various standard-defined classifications depending on Value groups:
    - Identification of tariff rates - Electricity related objects (A = 1)
    - Identification of harmonics - Electricity related objects (A = 1), measurement of harmonics of voltage (C = 12, 32, 52, 72, 92), current (C = 11, 31, 51, 71, 91) or active power (C = 15, 35, 55, 75), D = 7 or D = 24
    - Identification of phase angles - Electricity related objects (A = 1); angle measurement (C = 81; D = 7)
    - Identification of transformer and line loss quantities - Electricity related objects (A = 1); transformer and line loss quantities (C = 83)
    - Identification of UNIPEDE voltage dips - Electricity related objects (A = 1), Voltage dips measurement (C = 12, 32, 52, 72, D = 32)
- **F** - Value group F (number in range 0..255). Number defines the storage of data, identified by value groups A…E, according to different billing periods. Where this is not relevant, this value group can be used for further classification. If it is not used, it is set to 255.

Example of addresses:

0.0.0	Meter address
0.0.1	Identity number
0.9.1	Time
0.9.2	Date
1.2.1	Cumulative P+ Tariff 1
1.2.2	Cumulative P+ Tariff 2
1.6.1	Maximum P+ Tariff 1
1.8.1	Energy P+ Tariff 1
3.6.1	Maximum Q+ Tariff 1
3.6.1*01	01.Pre-value Maximum Q+ Tariff 1

Literature

- International Standard IEC 62056-21, Direct Data Local Exchange, First edition 2002-05.
- International Standard IEC 62056-61, Object Identification System (OBIS), Second edition 2006-11.
- Energie-Info, OBIS-Kennzahlen-System, Stand: 03. November 2006, www.vdew.net.

Changes and modifications

-

Document revisions

- Ver. 1.0 - April 24th, 2009 - document creation.

Related pages:

Communication protocols