

# IEC 62056-21:2002 Serial

## IEC62056-21:2002 Serial communication protocol

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### Supported device types and versions

The protocol implements serial communication with devices according to international standard IEC62056-21, protocol mode C, or protocol mode D (passive readout).

### Communication line configuration

- Communication line categories: [Serial](#), [SerialOverUDP Device Redundant](#), [RFC2217 Client](#), [MOXA IP Serial Library](#), **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 the setting of a specific device or modem (in protocol mode D the transfer rate is 2400 baud according to the standard).
- The implicit parameters comply with the 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	The YES value activates SW emulation of transfer parameters of 7 data bits, even parity when the transfer parameters of 8 data bits, none parity, are set (i.e. emulation 7E1 when 8N1 is set).	YES /NO	NO

### Communication station configuration

- Communication protocol "**IEC62056-21:2002 Serial**".
- The station address (device) is optional. If the parameter is empty, the device must answer. If there are more devices on one line (e.g. RS485 bus), the device address must be set. The device address consists of a maximum of 32 characters that are formed from figures (0 - 9), capital letters (A - Z), small letters (a - z), or space ( ). The zeroes in front of a 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	The phone number for connection via modem with this station (only lines of MODEM category).		
Dial Timeout	The maximum waiting time on connection via modem (only lines of MODEM category).	sec	60

Dial Retry Count	The maximum number of attempts 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	The time delay between sending the request and reading the answer. <b>Note:</b> a device sends a 3-character manufacturer's identification in the identification message. The standard defines that if the 3-rd character is a lower case letter, (e.g. in identifications <i>ELm</i> or <i>UNi</i> ), the minimum reaction time for such a 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	The time delay between reading the answer till it is completed. See the note for the <a href="#">Wait First Timeout</a> parameter.	ms	200
Max Wait Retry	A retry count of reading response until its completion.	1 .. 100	20
Retry Timeout	The delay between the request retries if the error communication occurs.	ms	1000 ms
Retry Count	A retry count of request in case of a communication error.	1 .. 20	3
Disconnect Timeout	Timeout for waiting for an answer to modem hangup operation (only lines of MODEM category).	sec	15
Passive Mode	Activation of a passive mode, which corresponds to IEC62056-21, protocol mode D (no requests are sent, data arrives spontaneously)	YES /NO	NO
Baudrate Changeover (Z)	Value of 'Z' parameter - Baud rate identification (for baud rate changeover) of <i>Acknowledgement/option select message</i> request of protocol's C mode.  AUTO option finds out automatically the value 'Z' from the acknowledging answer and uses it.	300 Baud 600 Baud 1200 Baud 2400 Baud 4800 Baud 9600 Baud 19200 Baud 38400 Baud 57600 Baud 115200 Baud 0 Baud AUTO	2400 Baud
Data Readout	The parameter enables the reading of the current values ("data readout").	YES /NO	YES
Manuf. Spec. Table Readout Nr. 1 (Y)	The parameter enables reading of the "manufacturer-specific table" values, 1-st block. Choice '-' means the values are not read, choice '6' to '9' means the selected "manufacturer-specific table" will be read.	- 6 7 8 9	-
Manuf. Spec. Table Readout Nr. 2 (Y)	The parameter enables reading of the "manufacturer-specific table" values, 2-nd block. Choice '-' means the values are not read, choice '6' to '9' means the selected "manufacturer-specific table" will be read.	- 6 7 8 9	-
Manuf. Spec. Table Readout Nr. 3 (Y)	The parameter enables reading of the "manufacturer-specific table" values, 3-rd block. Choice '-' means the values are not read, choice '6' to '9' means the selected "manufacturer-specific table" will be read.	- 6 7 8 9	-
Load Profile	The parameter enables the reading of the historical data from the profile.	YES /NO	YES
Profile	Profile name - OBIS code of load profile used during the reading of historical data from profile.		P.01
Profile Time Mask	Date and time masks used to read historical data from the profile. Meaning of the "z" flag - see the description of the <a href="#">Session Recognition Flag</a> parameter. The letter "z" is used to set the time and is replaced by a value of 0, 1, or 2 according to the <a href="#">Session Recognition Flag</a> parameter.		zyymmddh hmi
Profile History Depth	Time depth of historical profile readings.	hour	24
Time Round	Time rounding of data from a profile.	min	15
Profile Read Step	The time range of data that is queried from the profile in one request. It is entered as a multiple of the "Time Round" parameter.	x Time Round	2

Profile Read Level	Access level used to read historical data from profile.	0-9	5
Profile Read Mode	<p>Method of reading from the profile:</p> <ul style="list-style-type: none"> <li>• <i>VDEW read command (R5)</i> : READ command will be used (the R5 default level can be changed by the <a href="#">Profile Read Level</a> parameter).</li> <li>• <i>VDEW block read command (R6)</i> : BLOCK READ command will be used (the default level should be changed to R6 by <a href="#">Profile Read Level</a> parameter).</li> <li>• <i>P1 + VDEW read command (R5)</i> : first, a Level 1 password will be set (see the <a href="#">Password - level 1</a> parameter), and then the READ command will be used</li> <li>• <i>P1 + VDEW block read command (R6)</i>: first, a Level 1 password will be set (see the <a href="#">Password - level 1</a> parameter), and then the BLOCK READ command will be used</li> </ul> <p>BLOCK READ divides the data into several blocks with the size of <a href="#">Profile Read Block Length</a> rows. Block reading makes sense on lines with higher error rates.</p>	-	VDEW read command (R5)
Profile Read Block Length	Block size (number of rows) if BLOCK READ from the profile is used - if <a href="#">Profile Read Mode</a> is <i>VDEW block read command (R6)</i> or <i>P1 + VDEW block read command (R6)</i>	row	4
Profile Read Formatted Execution	This parameter enables specifying a special sequence that may be required by some electrometers. So far the only known sequence is <b>F101()</b> (The whole sequence sent to electrometers is <code>&lt;SOH&gt;E2&lt;STX&gt;F101()&lt;ETX&gt;&lt;SOH&gt;</code> ).	-	
Password - level 1	The password necessary for changing the configuration of the device (level 1) used to set the date and time.		"00000000"
Session Recognition Flag	<p>A flag that indicates the type of date/time used by the device. Electrometers LZQJ manufactured by EMH Elektrizitätszähler indicates the type of date/time by this flag (0=Normal Time, 1=Summer Time, 2=UTC Time). This flag is used by <a href="#">Time Mask</a> and <a href="#">Date Mask</a> parameters to set the time and by <a href="#">Profile Time Mask</a> parameter to read historical data from the profile.</p> <p><b>Note:</b> Both <i>Normal Time</i> and <i>Summer Time</i> values will cause the flag to be set depending on the time currently set or read.</p>	Normal Time Summer Time UTC Time	Normal time
Time Register	<p>Register used to set the time.</p> <p>The parameter is important only if synchronization is enabled on the "Time parameters" tab in the configuration of the station.</p>		0.9.1
Time Mask	<p>Mask used to set the time.</p> <p>The letter "z" is used for time conversion according to the <a href="#">Session Recognition Flag</a> parameter.</p> <p>The parameter is important only if synchronization is enabled on the "Time parameters" tab in the configuration of the station.</p> <p>Note: Some meters are disturbed by summer/winter time ("z") flag and require mask <i>hhmiss</i></p>		zhmiss
Date Register	<p>Register used to set the date.</p> <p>The parameter is important only if synchronization is enabled on the "Time parameters" tab in the configuration of the station.</p>		0.9.2
Date Mask	<p>Mask used to set the date.</p> <p>The letter "z" is used for dátumu conversion according to the <a href="#">Session Recognition Flag</a> parameter.</p> <p>The parameter is important only if synchronization is enabled on the "Time parameters" tab in the configuration of the station.</p> <p>Note: Some meters are disturbed by the summer/winter time ("z") flag and require mask <i>ddmmyy</i> or require a year-month-day order (<i>zyymmdd</i> or <i>yymmdd</i>)</p>		zddmmyy
Time Date Mode	<p>Special settings used when setting the date and time. These may be required by some electricity meters.</p> <ul style="list-style-type: none"> <li>• <i>Normal</i>: no special settings</li> <li>• <i>(00000000)</i>: this string is added after the written date/time. Example: if <a href="#">Date Mask</a> is <i>zddmmyy</i>, the date 31 Dec 2019 is written as <i>(0311219)(00000000)</i></li> </ul>	Normal (00000 000)	Normal
AT Command 1	A special initial string of modem 1 (only for MODEM lines).		AT&FE0V 1Q0B0X3L 0M0
AT Command 2	<p>A special initial string of modem 2 (only for MODEM lines).</p> <p>Explanation of recommended settings:</p> <p><b>S37=5</b> 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 individually.</p> <p><b>&amp;D2</b> DTR drop to hangup - for matching with the parameter of modem line (line configuration, tab "Modem - parameters", check the option "Use DTR for Hangup").</p> <p><b>S0=0</b> Disable auto-answer. Auto-answer will not be used.</p> <p><b>S30=2</b> 20 sec inactivity timeout - automatic hangup after idle timeout expired. Necessary for assuring connection termination after the communication with the last device is over.</p>		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

Ignore Number of Periods	The parameter is used to ignore the "Number of Periods" value that a particular electricity meter (Schrack LZQJ) sent in the data reading for the Demand Register (class_id = 5). He sent this between the OBIS code and the value itself, which led to an unsuccessful attempt by the D2000 KOM process to interpret the value as an optional timestamp and subsequently to discard the entire data line read. Example of such a data line: 1.4.0(007)(0224*kW) Note: sending "Number of Periods" does not comply with IEC62056-21.	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 the reading of historical data from profile (Unicontrols device only). The retrieved index is not processed further and serves only as debugging information for Unicontrols.	YES /NO	NO
Ignore BCC Error	Ignore packet checksum. The packet will be processed even if the checksum does not match.	YES /NO	NO

## I/O tag configuration

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

## I/O tag address

I/O tag address corresponds to standard *IEC 62056-61:2002 Object Identification System* (OBIS) in terms of "Annex A - Code presentation". The I/O tag with an address starting with *%IGNORE* will be ignored.

Abbreviated format of the address is supported: **C.D[E][\*F]** as well as full format **A.B.C.D[E][\*F]**  
(from 31.5.2021 also format containing colon and hyphen separators instead of a full stop, e.g. **A-B:C.D.E**)

in which:

- **A** - Value group A (number in range 0..15). The 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). The 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'). The 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). The 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 the 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). The 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 UNIPED 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). The 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](http://www.vdew.net).

## Changes and modifications

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## Document revisions

- Ver. 1.0 - April 24th, 2009 - document creation.
- Ver. 1.1 - July 27th, 2022 - support for Mode D (parameter *Passive Mode*)



Related pages:

[Communication protocols](#)