COMMUNICATION PROTOCOL

BACNET MANUAL
M4M Network analyzers

ABB

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1 General

M4M network analyzers offer includes versions with BACnet communication protocol (M4M 20 BACnet and M4M 30 BACnet)

1.1 BACnet

BACnet is data communication protocol for Building Automation and Control networks designed for building automation networks. It is defined by ANSI/ASHRAE-135 standard document. The protocol defines standard for data exchange between devices present in building automation networks, including HVAC, lighting control, access control. BACnet is object-oriented, client-server protocol.

ANSI/ASHRAE-135 defines list of standard object types and services that allow accessing, modification and interactions with objects as well as discovering the network devices and their capabilities. Also data-link/physical layers are defined by the standard.

ANSI/ASHRAE-135 defines series of standard device profiles. M4M BACnet implements BACnet Application specific profile (B-ASC). This profile defines the device as controller with limited resources that supports limited programmability and is able to provide complete information about any of its BACnet objects and can respond to communication control messages..

1.1.1 BACnet/IP data link layer

M4M BACnet implements BACnet/IP data link layer defined in ANSI/ASHRAE-135 annex J.

1.1.2 Frame layout and data encoding

Each BACnet frame consists of Network-protocol-data-unit (NPDU) and Application-protocol-data-unit (APDU). All data contained inside APDU is exchanged using BACnet tagging that allows encoding of BACnet object and property identifiers, single properties, arrays and lists.

1.1.3 Frame size and segmentation

ANSI/ASHRAE-135 requires each device to provide information of maximum accepted message length. It also defines list of standardized frame lengths that result from different data link layers. Each BACnet device object shall implement property of max-APDU-accepted that defines.

M4M BACnet accepts messages of maximum length 480 octets.

The standard allows sending messages above accepted length and defines segmentation rules that should be followed when transmitting segmented messages. Segmentation support is not required by standard for each device and can be supported for receive, transmission or in both directions. Each BACnet device

object is required to implement property that defines whether segmentation is supported and in which directions.

M4M BACnet does not support segmentation, neither receive nor transmission.

When length of response frame to received request exceeds capabilities of particular device, it shall send reject response with segmentation-not-supported error code. Then the request sent by client device shall be divided to several.

2 Supported features

2.1 Services

ANSI/ASHRAE-135 contains series of services that define how BACnet devices with different capabilities interact with each other and exchange information over network.

All services defined by BACnet standard have client-side and server-side implementation, called 'initiate' and 'execute' accordingly. Specific device profiles require implementation of particular services within 'initiate', 'execute' or both of them. Table 2 contains summary information of services implemented by M4M BACnet meters.

Service	Initiate	Execute
Read-property		X
Read-property-multiple		X
Write-property		X
Write-property-multiple		X
Device-communication-control		X
Who-Has		X
I-Have	X	
Who-Is		X
I-Am	X	

Services divide into two categories: confirmed and unconfirmed. In case of confirmed services BACnet server devices are required to send any kind of response, accept, reject or error, while unconfirmed services does not have such requirement.

2.1.1 Data sharing services

Services related to data sharing allow accessing majority of objects' properties. BACnet standard defines requires each BACnet device to implement at least read-property service, that allows reading single properties of single objects. The standard defines optional service read-property-multiple that allows reading multiple properties of all objects, one property of multiple objects and multiple properties of multiple objects. Write-property and write-property-multiple are defined accordingly to write values to object's properties.

 These services allow accessing both BACnet-defined and non-standard properties and objects, as long as they fulfill basic requirements that are applicable to all types of objects.

2.1.2 Dynamic device/object binding

Services of dynamic device binding and dynamic object binding allow client devices to discover BACnet devices that are available over BACnet network and resolve devices' attributes.

M4M BACnet implements all services required according to its BACnet profile, i.e. Who-Has, I-Have, Who-Is, I-Am.

When client-side device sends Who-Is or Who-Has request device that resolves as requested one shall respond with initiating I-Am or I-Have message respectively. Request for discovering device or object can be called with given object-identifier or object-name.

2.1.3 Device communication control

This service allows disabling some functionalities communication of particular device for finite time or upon enabling. This service can be optionally password-protected.

M4M BACnet supports disabling communication for finite time duration only without password.

2.1.4 Registering as foreign device

M4M BACnet offers capability of registering as a foreign device when configured.

BACnet devices require exchanging broadcast datagrams between each-other for full operation of the network. Due to security reasons broadcast messages are usually blocked by networking routers and gateways. Thus ANSI/ASHRAE-135 defines foreign device that is outside of its physical BACnet network or logical subnet, and is capable of communicating with the remaining network. In order to do that BACnet network has to be equipped with BACnet Broadcast Management Device (BBMD) which is gateway between BACnet subnets and foreign devices.

When configured, the device sends subscription request directly to the BBMD which stores list of all registered foreign devices. Then BBMD is capable of forwarding all broadcast messages to foreign devices.

The subscription of foreign device is time-finite with period defined by device itself and has to be renewed before expiration in order to maintain uninterrupted communication with the device.

M4M BACnet is capable of registering as a foreign device when proper configuration is provided. In order to do that BBMD mode shall be enabled and proper parameters for BBMD IP address, BBMD UDP port and BBMD TTL shall be set.

3 Objects

BACnet standard defines object-oriented approach to access all information that shall be exchanged over BACnet network. Each object is identified by its object-identifier that consists of object-type and object instance. Object-identifier must be unique for each object within one BACnet device. BACnet standard defines some standard object types, vendors are allowed to create proprietary object types with custom implementation as long as they meet basic requirements that are applicable to objects of all types.

Each object shall contain basic properties: object-identifier, object-type, object-name and property-list. For each of standard types the standard defines properties that are required or optional. Additionally some of the defined properties might be required to be writable.

Each of regular device shall contain exactly one instance of device object-type. Device object instance number and object-name shall be unique over BACnet network.

M4M contains only objects of standard-defined types.

3.1 Properties

BACnet has definition for available property types. Primitive data types include

Collection of properties can be presented as BACnet arrays or BACnet lists.

BACnet array is one-indexed collection of elements having the same data type that allows accessing elements of the array by reading each individual of them or accessing whole array. Reading array with given index equal to zero returns size of the array. The array can be empty, i.e. its size can be equal to zero.

BACnet list is one-based collection of elements having the same data type. BACnet list can be accessed using special-purpose service read-range.

3.2 List of BACnet objects

BACnet Objects supported by M4M BACnet meters are presented in tables below.

3.2.1 Device Object

Device object represents the meter and its configuration over BACnet network.

Proeprty name	Access	Example value	Additional info
object-identifier	W	(device,228)	
object-name	W	M4M 30SBA	Max length 63
object-type	R	device	
system-status	R	operational	
vendor-name	R	ABB, Inc.	
vendor-identifier	R	127	
model-name	R	M4M 30SBA	
firmware-revision	R	P1.3.1	
application-software-version	R	P1.2.0	
location	W	—	Max length 63
description	W	—	Max length 249
protocol-version	R	1	
protocol-revision	R	14	
protocol-services-supported	R	—	
protocol-object-types-supported	R	—	
object-list	R	—	
max-apdu-length-accepted	R	480	
segmentation-supported	R	no-segmentation	
apdu-timeout	W	0	0-255 rounded to full sec.
number-of-apdu-retries	W	3	0-10
device-address-binding	R	—	
database-revision	R	—	
profile-name	R	B-ASC	

3.2.2 Analog value objects

Analog value object provide meter values and information.

3.2.3 Realtime measurements

Instance number	Object name
201	Voltage L1
202	Voltage L2
203	Voltage L3
204	Voltage L1-L2
205	Voltage L2-L3
206	Voltage L1-L3
210	Current 3 Phase
211	Current L1
212	Current L2
213	Current L3
214	Current Neutral

3.2.4 Energies

Instance number	Object name
100	Active energy import total
101	Active energy import tariff 1
102	Active energy import tariff 2
103	Active energy import tariff 3
104	Active energy import tariff 4
105	Active energy import tariff 5
106	Active energy import tariff 6
107	Active energy export total
114	Active energy net total
130	Reactive energy import total
137	Reactive energy export total
144	Reactive energy net total
160	Apparent energy import total
167	Apparent energy export total
174	Apparent energy net total

3.2.5 Power

Instance number	Object name
220	Active power total
221	Active power L1
222	Active power L2
223	Active power L3
230	Reactive power total
231	Reactive power L1
232	Reactive power L2
233	Reactive power L3
240	Apparent power total
241	Apparent power L1
242	Apparent power L2
243	Apparent power L3

3.2.6   Power quality

Instance number	Object name
301	THD voltage L1
302	THD voltage L2
303	THD voltage L3
311	THD voltage L1-L2
312	THD voltage L2-L3
313	THD voltage L1-L3
321	THD current L1
322	THD current L2
323	THD current L3
324	THD current neutral
331	Unbalance line voltage
332	Unbalance phase voltage
333	Unbalace current
341	Frequency
346	Power factor total
347	Power factor L1
348	Power factor L2
349	Power factor L3

3.2.7   Phase angle

Instance number	Object name
400	Phase angle power total
401	Phase angle power L1
402	Phase angle power L2
403	Phase angle power L3
404	Phase angle current L1
405	Phase angle current L2
406	Phase angle current L3
407	Phase angle voltage L1
408	Phase angle voltage L2
409	Phase angle voltage L3

3.2.8 Average/Max/Min

Instance number	Object name
501	AVERAGE_VOLTAGE_L1
502	AVERAGE_VOLTAGE_L2
503	AVERAGE_VOLTAGE_L3
504	AVERAGE_VOLTAGE_L1_L2
505	AVERAGE_VOLTAGE_L2_L3
506	AVERAGE_VOLTAGE_L1_L3
511	AVERAGE_CURRENT_L1
512	AVERAGE_CURRENT_L2
513	AVERAGE_CURRENT_L3
514	AVERAGE_CURRENT_NEUTRAL
520	AVERAGE_ACTIVE_POWER_TOTAL
521	AVERAGE_ACTIVE_POWER_L1
522	AVERAGE_ACTIVE_POWER_L2
523	AVERAGE_ACTIVE_POWER_L3
530	AVERAGE_REACTIVE_POWER_TOTAL
531	AVERAGE_REACTIVE_POWER_L1
532	AVERAGE_REACTIVE_POWER_L2
533	AVERAGE_REACTIVE_POWER_L3
540	AVERAGE_APPARENT_POWER_TOTAL
541	AVERAGE_APPARENT_POWER_L1
542	AVERAGE_APPARENT_POWER_L2
543	AVERAGE_APPARENT_POWER_L3
601	MIN_VOLTAGE_L1
602	MIN_VOLTAGE_L2
603	MIN_VOLTAGE_L3
604	MIN_VOLTAGE_L1_L2
605	MIN_VOLTAGE_L2_L3
606	MIN_VOLTAGE_L1_L3
611	MIN_CURRENT_L1
612	MIN_CURRENT_L2
613	MIN_CURRENT_L3
614	MIN_CURRENT_NEUTRAL
620	MIN_ACTIVE_POWER_TOTAL
621	MIN_ACTIVE_POWER_L1
622	MIN_ACTIVE_POWER_L2
623	MIN_ACTIVE_POWER_L3
630	MIN_REACTIVE_POWER_TOTAL
631	MIN_REACTIVE_POWER_L1
632	MIN_REACTIVE_POWER_L2
633	MIN_REACTIVE_POWER_L3
640	MIN_APPARENT_POWER_TOTAL

641	MIN_APPARENT_POWER_L1
642	MIN_APPARENT_POWER_L2
643	MIN_APPARENT_POWER_L3
701	MAX_VOLTAGE_L1
702	MAX_VOLTAGE_L2
703	MAX_VOLTAGE_L3
704	MAX_VOLTAGE_L1_L2
705	MAX_VOLTAGE_L2_L3
706	MAX_VOLTAGE_L1_L3
711	MAX_CURRENT_L1
712	MAX_CURRENT_L2
713	MAX_CURRENT_L3
714	MAX_CURRENT_NEUTRAL
720	MAX_ACTIVE_POWER_TOTAL
721	MAX_ACTIVE_POWER_L1
722	MAX_ACTIVE_POWER_L2
723	MAX_ACTIVE_POWER_L3
730	MAX_REACTIVE_POWER_TOTAL
731	MAX_REACTIVE_POWER_L1
732	MAX_REACTIVE_POWER_L2
733	MAX_REACTIVE_POWER_L3
740	MAX_APPARENT_POWER_TOTAL
741	MAX_APPARENT_POWER_L1
742	MAX_APPARENT_POWER_L2
743	MAX_APPARENT_POWER_L3

3.2.9 Harmonics

Instance number	Object name	Additional info
1102	2 Harmonics voltage L1	Available only on M4M 30 range
1103	3 Harmonics voltage L1	Available only on M4M 30 range
1104	4 Harmonics voltage L1	Available only on M4M 30 range
1105	5 Harmonics voltage L1	Available only on M4M 30 range
1106	6 Harmonics voltage L1	Available only on M4M 30 range
1107	7 Harmonics voltage L1	Available only on M4M 30 range
1108	8 Harmonics voltage L1	Available only on M4M 30 range
1109	9 Harmonics voltage L1	Available only on M4M 30 range
1110	10 Harmonics voltage L1	Available only on M4M 30 range
1111	11 Harmonics voltage L1	Available only on M4M 30 range
1112	12 Harmonics voltage L1	Available only on M4M 30 range
1113	13 Harmonics voltage L1	Available only on M4M 30 range
1114	14 Harmonics voltage L1	Available only on M4M 30 range
1115	15 Harmonics voltage L1	Available only on M4M 30 range
1116	16 Harmonics voltage L1	Available only on M4M 30 range
1117	17 Harmonics voltage L1	Available only on M4M 30 range
1118	18 Harmonics voltage L1	Available only on M4M 30 range
1119	19 Harmonics voltage L1	Available only on M4M 30 range
1120	20 Harmonics voltage L1	Available only on M4M 30 range
1121	21 Harmonics voltage L1	Available only on M4M 30 range
1122	22 Harmonics voltage L1	Available only on M4M 30 range
1123	23 Harmonics voltage L1	Available only on M4M 30 range
1124	24 Harmonics voltage L1	Available only on M4M 30 range
1125	25 Harmonics voltage L1	Available only on M4M 30 range
1126	26 Harmonics voltage L1	Available only on M4M 30 range
1127	27 Harmonics voltage L1	Available only on M4M 30 range
1128	28 Harmonics voltage L1	Available only on M4M 30 range
1129	29 Harmonics voltage L1	Available only on M4M 30 range
1130	30 Harmonics voltage L1	Available only on M4M 30 range
1131	31 Harmonics voltage L1	Available only on M4M 30 range
1132	32 Harmonics voltage L1	Available only on M4M 30 range
1133	33 Harmonics voltage L1	Available only on M4M 30 range
1134	34 Harmonics voltage L1	Available only on M4M 30 range
1135	35 Harmonics voltage L1	Available only on M4M 30 range
1136	36 Harmonics voltage L1	Available only on M4M 30 range
1137	37 Harmonics voltage L1	Available only on M4M 30 range
1138	38 Harmonics voltage L1	Available only on M4M 30 range
1139	39 Harmonics voltage L1	Available only on M4M 30 range
1140	40 Harmonics voltage L1	Available only on M4M 30 range
1202	2 Harmonics voltage L2	Available only on M4M 30 range
1203	3 Harmonics voltage L2	Available only on M4M 30 range

1204	4 Harmonics voltage L2	Available only on M4M 30 range
1205	5 Harmonics voltage L2	Available only on M4M 30 range
1206	6 Harmonics voltage L2	Available only on M4M 30 range
1207	7 Harmonics voltage L2	Available only on M4M 30 range
1208	8 Harmonics voltage L2	Available only on M4M 30 range
1209	9 Harmonics voltage L2	Available only on M4M 30 range
1210	10 Harmonics voltage L2	Available only on M4M 30 range
1211	11 Harmonics voltage L2	Available only on M4M 30 range
1212	12 Harmonics voltage L2	Available only on M4M 30 range
1213	13 Harmonics voltage L2	Available only on M4M 30 range
1214	14 Harmonics voltage L2	Available only on M4M 30 range
1215	15 Harmonics voltage L2	Available only on M4M 30 range
1216	16 Harmonics voltage L2	Available only on M4M 30 range
1217	17 Harmonics voltage L2	Available only on M4M 30 range
1218	18 Harmonics voltage L2	Available only on M4M 30 range
1219	19 Harmonics voltage L2	Available only on M4M 30 range
1220	20 Harmonics voltage L2	Available only on M4M 30 range
1221	21 Harmonics voltage L2	Available only on M4M 30 range
1222	22 Harmonics voltage L2	Available only on M4M 30 range
1223	23 Harmonics voltage L2	Available only on M4M 30 range
1224	24 Harmonics voltage L2	Available only on M4M 30 range
1225	25 Harmonics voltage L2	Available only on M4M 30 range
1226	26 Harmonics voltage L2	Available only on M4M 30 range
1227	27 Harmonics voltage L2	Available only on M4M 30 range
1228	28 Harmonics voltage L2	Available only on M4M 30 range
1229	29 Harmonics voltage L2	Available only on M4M 30 range
1230	30 Harmonics voltage L2	Available only on M4M 30 range
1231	31 Harmonics voltage L2	Available only on M4M 30 range
1232	32 Harmonics voltage L2	Available only on M4M 30 range
1233	33 Harmonics voltage L2	Available only on M4M 30 range
1234	34 Harmonics voltage L2	Available only on M4M 30 range
1235	35 Harmonics voltage L2	Available only on M4M 30 range
1236	36 Harmonics voltage L2	Available only on M4M 30 range
1237	37 Harmonics voltage L2	Available only on M4M 30 range
1238	38 Harmonics voltage L2	Available only on M4M 30 range
1239	39 Harmonics voltage L2	Available only on M4M 30 range
1240	40 Harmonics voltage L2	Available only on M4M 30 range
1302	2 Harmonics voltage L3	Available only on M4M 30 range
1303	3 Harmonics voltage L3	Available only on M4M 30 range
1304	4 Harmonics voltage L3	Available only on M4M 30 range
1305	5 Harmonics voltage L3	Available only on M4M 30 range
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1307	7 Harmonics voltage L3	Available only on M4M 30 range
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1310	10 Harmonics voltage L3	Available only on M4M 30 range
1311	11 Harmonics voltage L3	Available only on M4M 30 range
1312	12 Harmonics voltage L3	Available only on M4M 30 range
1313	13 Harmonics voltage L3	Available only on M4M 30 range
1314	14 Harmonics voltage L3	Available only on M4M 30 range
1315	15 Harmonics voltage L3	Available only on M4M 30 range
1316	16 Harmonics voltage L3	Available only on M4M 30 range
1317	17 Harmonics voltage L3	Available only on M4M 30 range
1318	18 Harmonics voltage L3	Available only on M4M 30 range
1319	19 Harmonics voltage L3	Available only on M4M 30 range
1320	20 Harmonics voltage L3	Available only on M4M 30 range
1321	21 Harmonics voltage L3	Available only on M4M 30 range
1322	22 Harmonics voltage L3	Available only on M4M 30 range
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1538	38 Harmonics voltage L2-L3	Available only on M4M 30 range
1539	39 Harmonics voltage L2-L3	Available only on M4M 30 range
1540	40 Harmonics voltage L2-L3	Available only on M4M 30 range
1602	2 Harmonics voltage L1-L3	Available only on M4M 30 range
1603	3 Harmonics voltage L1-L3	Available only on M4M 30 range
1604	4 Harmonics voltage L1-L3	Available only on M4M 30 range
1605	5 Harmonics voltage L1-L3	Available only on M4M 30 range
1606	6 Harmonics voltage L1-L3	Available only on M4M 30 range
1607	7 Harmonics voltage L1-L3	Available only on M4M 30 range
1608	8 Harmonics voltage L1-L3	Available only on M4M 30 range
1609	9 Harmonics voltage L1-L3	Available only on M4M 30 range
1610	10 Harmonics voltage L1-L3	Available only on M4M 30 range
1611	11 Harmonics voltage L1-L3	Available only on M4M 30 range
1612	12 Harmonics voltage L1-L3	Available only on M4M 30 range
1613	13 Harmonics voltage L1-L3	Available only on M4M 30 range
1614	14 Harmonics voltage L1-L3	Available only on M4M 30 range
1615	15 Harmonics voltage L1-L3	Available only on M4M 30 range
1616	16 Harmonics voltage L1-L3	Available only on M4M 30 range
1617	17 Harmonics voltage L1-L3	Available only on M4M 30 range
1618	18 Harmonics voltage L1-L3	Available only on M4M 30 range
1619	19 Harmonics voltage L1-L3	Available only on M4M 30 range
1620	20 Harmonics voltage L1-L3	Available only on M4M 30 range
1621	21 Harmonics voltage L1-L3	Available only on M4M 30 range
1622	22 Harmonics voltage L1-L3	Available only on M4M 30 range
1623	23 Harmonics voltage L1-L3	Available only on M4M 30 range
1624	24 Harmonics voltage L1-L3	Available only on M4M 30 range
1625	25 Harmonics voltage L1-L3	Available only on M4M 30 range
1626	26 Harmonics voltage L1-L3	Available only on M4M 30 range
1627	27 Harmonics voltage L1-L3	Available only on M4M 30 range

1628	28 Harmonics voltage L1-L3	Available only on M4M 30 range
1629	29 Harmonics voltage L1-L3	Available only on M4M 30 range
1630	30 Harmonics voltage L1-L3	Available only on M4M 30 range
1631	31 Harmonics voltage L1-L3	Available only on M4M 30 range
1632	32 Harmonics voltage L1-L3	Available only on M4M 30 range
1633	33 Harmonics voltage L1-L3	Available only on M4M 30 range
1634	34 Harmonics voltage L1-L3	Available only on M4M 30 range
1635	35 Harmonics voltage L1-L3	Available only on M4M 30 range
1636	36 Harmonics voltage L1-L3	Available only on M4M 30 range
1637	37 Harmonics voltage L1-L3	Available only on M4M 30 range
1638	38 Harmonics voltage L1-L3	Available only on M4M 30 range
1639	39 Harmonics voltage L1-L3	Available only on M4M 30 range
1640	40 Harmonics voltage L1-L3	Available only on M4M 30 range
1702	2 Harmonics current L1	Available only on M4M 30 range
1703	3 Harmonics current L1	Available only on M4M 30 range
1704	4 Harmonics current L1	Available only on M4M 30 range
1705	5 Harmonics current L1	Available only on M4M 30 range
1706	6 Harmonics current L1	Available only on M4M 30 range
1707	7 Harmonics current L1	Available only on M4M 30 range
1708	8 Harmonics current L1	Available only on M4M 30 range
1709	9 Harmonics current L1	Available only on M4M 30 range
1710	10 Harmonics current L1	Available only on M4M 30 range
1711	11 Harmonics current L1	Available only on M4M 30 range
1712	12 Harmonics current L1	Available only on M4M 30 range
1713	13 Harmonics current L1	Available only on M4M 30 range
1714	14 Harmonics current L1	Available only on M4M 30 range
1715	15 Harmonics current L1	Available only on M4M 30 range
1716	16 Harmonics current L1	Available only on M4M 30 range
1717	17 Harmonics current L1	Available only on M4M 30 range
1718	18 Harmonics current L1	Available only on M4M 30 range
1719	19 Harmonics current L1	Available only on M4M 30 range
1720	20 Harmonics current L1	Available only on M4M 30 range
1721	21 Harmonics current L1	Available only on M4M 30 range
1722	22 Harmonics current L1	Available only on M4M 30 range
1723	23 Harmonics current L1	Available only on M4M 30 range
1724	24 Harmonics current L1	Available only on M4M 30 range
1725	25 Harmonics current L1	Available only on M4M 30 range
1726	26 Harmonics current L1	Available only on M4M 30 range
1727	27 Harmonics current L1	Available only on M4M 30 range
1728	28 Harmonics current L1	Available only on M4M 30 range
1729	29 Harmonics current L1	Available only on M4M 30 range
1730	30 Harmonics current L1	Available only on M4M 30 range
1731	31 Harmonics current L1	Available only on M4M 30 range
1732	32 Harmonics current L1	Available only on M4M 30 range
1733	33 Harmonics current L1	Available only on M4M 30 range

1734	34 Harmonics current L1	Available only on M4M 30 range
1735	35 Harmonics current L1	Available only on M4M 30 range
1736	36 Harmonics current L1	Available only on M4M 30 range
1737	37 Harmonics current L1	Available only on M4M 30 range
1738	38 Harmonics current L1	Available only on M4M 30 range
1739	39 Harmonics current L1	Available only on M4M 30 range
1740	40 Harmonics current L1	Available only on M4M 30 range
1802	2 Harmonics current L2	Available only on M4M 30 range
1803	3 Harmonics current L2	Available only on M4M 30 range
1804	4 Harmonics current L2	Available only on M4M 30 range
1805	5 Harmonics current L2	Available only on M4M 30 range
1806	6 Harmonics current L2	Available only on M4M 30 range
1807	7 Harmonics current L2	Available only on M4M 30 range
1808	8 Harmonics current L2	Available only on M4M 30 range
1809	9 Harmonics current L2	Available only on M4M 30 range
1810	10 Harmonics current L2	Available only on M4M 30 range
1811	11 Harmonics current L2	Available only on M4M 30 range
1812	12 Harmonics current L2	Available only on M4M 30 range
1813	13 Harmonics current L2	Available only on M4M 30 range
1814	14 Harmonics current L2	Available only on M4M 30 range
1815	15 Harmonics current L2	Available only on M4M 30 range
1816	16 Harmonics current L2	Available only on M4M 30 range
1817	17 Harmonics current L2	Available only on M4M 30 range
1818	18 Harmonics current L2	Available only on M4M 30 range
1819	19 Harmonics current L2	Available only on M4M 30 range
1820	20 Harmonics current L2	Available only on M4M 30 range
1821	21 Harmonics current L2	Available only on M4M 30 range
1822	22 Harmonics current L2	Available only on M4M 30 range
1823	23 Harmonics current L2	Available only on M4M 30 range
1824	24 Harmonics current L2	Available only on M4M 30 range
1825	25 Harmonics current L2	Available only on M4M 30 range
1826	26 Harmonics current L2	Available only on M4M 30 range
1827	27 Harmonics current L2	Available only on M4M 30 range
1828	28 Harmonics current L2	Available only on M4M 30 range
1829	29 Harmonics current L2	Available only on M4M 30 range
1830	30 Harmonics current L2	Available only on M4M 30 range
1831	31 Harmonics current L2	Available only on M4M 30 range
1832	32 Harmonics current L2	Available only on M4M 30 range
1833	33 Harmonics current L2	Available only on M4M 30 range
1834	34 Harmonics current L2	Available only on M4M 30 range
1835	35 Harmonics current L2	Available only on M4M 30 range
1836	36 Harmonics current L2	Available only on M4M 30 range
1837	37 Harmonics current L2	Available only on M4M 30 range
1838	38 Harmonics current L2	Available only on M4M 30 range
1839	39 Harmonics current L2	Available only on M4M 30 range

1840	40 Harmonics current L2	Available only on M4M 30 range
1902	2 Harmonics current L3	Available only on M4M 30 range
1903	3 Harmonics current L3	Available only on M4M 30 range
1904	4 Harmonics current L3	Available only on M4M 30 range
1905	5 Harmonics current L3	Available only on M4M 30 range
1906	6 Harmonics current L3	Available only on M4M 30 range
1907	7 Harmonics current L3	Available only on M4M 30 range
1908	8 Harmonics current L3	Available only on M4M 30 range
1909	9 Harmonics current L3	Available only on M4M 30 range
1910	10 Harmonics current L3	Available only on M4M 30 range
1911	11 Harmonics current L3	Available only on M4M 30 range
1912	12 Harmonics current L3	Available only on M4M 30 range
1913	13 Harmonics current L3	Available only on M4M 30 range
1914	14 Harmonics current L3	Available only on M4M 30 range
1915	15 Harmonics current L3	Available only on M4M 30 range
1916	16 Harmonics current L3	Available only on M4M 30 range
1917	17 Harmonics current L3	Available only on M4M 30 range
1918	18 Harmonics current L3	Available only on M4M 30 range
1919	19 Harmonics current L3	Available only on M4M 30 range
1920	20 Harmonics current L3	Available only on M4M 30 range
1921	21 Harmonics current L3	Available only on M4M 30 range
1922	22 Harmonics current L3	Available only on M4M 30 range
1923	23 Harmonics current L3	Available only on M4M 30 range
1924	24 Harmonics current L3	Available only on M4M 30 range
1925	25 Harmonics current L3	Available only on M4M 30 range
1926	26 Harmonics current L3	Available only on M4M 30 range
1927	27 Harmonics current L3	Available only on M4M 30 range
1928	28 Harmonics current L3	Available only on M4M 30 range
1929	29 Harmonics current L3	Available only on M4M 30 range
1930	30 Harmonics current L3	Available only on M4M 30 range
1931	31 Harmonics current L3	Available only on M4M 30 range
1932	32 Harmonics current L3	Available only on M4M 30 range
1933	33 Harmonics current L3	Available only on M4M 30 range
1934	34 Harmonics current L3	Available only on M4M 30 range
1935	35 Harmonics current L3	Available only on M4M 30 range
1936	36 Harmonics current L3	Available only on M4M 30 range
1937	37 Harmonics current L3	Available only on M4M 30 range
1938	38 Harmonics current L3	Available only on M4M 30 range
1939	39 Harmonics current L3	Available only on M4M 30 range
1940	40 Harmonics current L3	Available only on M4M 30 range

3.2.10 Integer value objects

Integer value objects provide possibility of basic configuration of particular parameters related to operation of the M4M BACnet meter.

Instance number	Object name	Additional info
3301	Active tariff	Writable only when tariff source is selected to communication, for details please refer to details of tariff configuration Available only on M4M 30 range
3400	Trafo CT Ratio L1 L2 L3 Primary	Writable, for details please refer to installation configuration
3401	Trafo CT Ratio L1 L2 L3 Secondary	Writable, for details please refer to installation configuration
3402	Trafo VT Ratio Primary	Writable, for details please refer to installation configuration
3403	Trafo VT Ratio Secondary	Writable, for details please refer to installation configuration
3404	Trafo CT Neutral Ratio Primary	Writable, for details please refer to installation configuration Available only on M4M 30 range
3405	Trafo CT Neutral Ratio Secondary	Writable, for details please refer to installation configuration Available only on M4M 30 range

3.2.11 Multi-state value objects

Multi-state value object provide possibility of basic configuration of particular parameters related to operation of the M4M BACnet meter.

Instance number	Object name	Additional info
3501	Wiring scheme	Writable, for details please refer to installation configuration

3.2.12 Characteristing value objects

Characteristing value object allows reading of particular properties of the M4M BACnet meter.

Instance number	Object name
3410	Serial Number