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EMI 2 – P1

- EMIZB-151

Technical manual

Revised 29.08.2025

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RoHS CE

1 Cautionary notes

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2 Features

The Zigbee interface of the device allows the following information and functionality to be accessed wirelessly:

- Data from connected P1 meter
- Supply voltage measurement
- Zigbee network diagnostics (RSSI, Frame Error Rate, other low level data)

2.1 Device Responsiveness

As a Zigbee sleeping end device, it is only possible to communicate with the device, when it is actively polling for data. The behaviour of this polling and thus the responsiveness of the device, can be configured through the poll control cluster. This device is configured with a standard long poll interval of 7.5 seconds, which means it should be possible to send a message to the device and get a response, at all times.
For the first 2 minutes after a power cycle the device will be in fast polling mode. This behaviour is fixed, but the fast-poll interval can be adjusted in the Poll Control cluster. The device can be set in fast polling mode, by responding to the Check In performed on the Poll Control cluster.

2.2 Power supply

The power supply voltage can be read from the power configuration cluster. The attribute “MainsVoltage” is measuring the voltage in units of 100mV.

2.3 Keep-alive

The device will check for connectivity with the PAN coordinator every 15 minutes. If the coordinator has a time server, the device will send a ReadAttribute request to read the time attribute. If no time cluster is available, the device will send an IEEE address request instead. If the connection to the PAN coordinator is deemed lost, the device will periodically scan all channels, to locate the network if it has relocated.
As a Zigbee end device, this device is dependent on its Zigbee network parent. Therefore, the connection to this parent is closely monitored during operation. This means that under normal conditions a situation with a lost parent will be remedied after three failed communication attempts.

2.3.1 Rejoin

If the device continuously is unable to find any suitable parent, it will start operating in offline mode. In this mode, it will periodically attempt to find and rejoin the network again. For the first 15 minutes, it will try at least every 3 minutes, after which it will drop to attempt every 15 minuttes.

2.4 Behavior after a power cycle or reset

The behavior of the device after a power on depends on whether it has already been enrolled into a Zigbee network

2.4.1 Not joined into a network

When the device has not previously joined a network (or has been reset to factory default), it will start up and search for a network with join permit open. The device will scan each ZigBee channel starting from 11 to 26. The yellow LED will flash once every second until it joins a device. After 15 minutes the device will pause the scan and enter a backoff mode. Another 15 minutes later the scan will recommence. This pattern repeats until the device successfully joins a network.

2.4.2 Joined in a network

Once the device has joined the network, it will stay there until a factory reset is performed or it receives a Zigbee message instructing it to leave.
As an enddevice, it will attempt to find a suitable parent and rejoin, using the same procedure as described above in the Rejoin section.

The device will explore the network for the following standard Zigbee services:

- OTA server
- Time server
- Poll control

If unsuccessful, the device will search again periodically, with an increasing interval.

2.5 MMI, EZ-mode and Factory Reset

The MMI button has the following functions:

Function	User action
Display device status with yellow LED: 1 blink OK	Quick push and release

2 blinks Low battery (Not applicable) 3 blinks Network trouble	
EZ-mode initiator. Perform the following actions: • Blink LED once every 3 seconds • Broadcast MgtPermitJoinReq to allow new devices to join the network • Broadcast IdentifyQuery and listen for IdentifyQueryResponse messages from potential targets If a target is identified, the device will perform a discovery for the following client clusters: • Power Configuration • Simple Metering • Electrical Measurement If a match is found, a binding is created to the target device	Push and hold button for 5 seconds until yellow LED blinks once
EZ-mode target. Perform the following actions: • Blink LED twice every 3 seconds • Broadcast MgtPermitJoinReq to allow new devices to join the network. • Respond to IdentifyQuery messages	Push and hold button for 10 seconds until yellow LED blinks twice
Perform factory reset. All persisted data will be erased, and the device will start to search for a network to join	Push and hold button for 15 seconds until yellow LED blinks continuously

2.6 Data Mapping

The data received from the P1 meter is mapped into ZigBee attributes. This mapping is described here.

2.6.1 Header Information

The P1 specification specifies that the data readout will start with the following string:

/XXX5YYYYYY

Cluster	Attribute	Part
Meter Identification	MeterCompanyName	XXX
Meter Identification	MeterModel	YYYYYY (up to 16 chars)

If the standard format is not adhered to, the whole string is used for the MeterModel attribute.

2.6.2 OBIS codes

The following table describes the attributes, which are directly updated based on the received OBIS code data.

"x" defines the channel of the sub meter [1:4].

Cluster	Attribute	Meter device	Source
Metering	CurrentSummationDelivered	Primary	1-0:1.8.0*255 or 1-0:1.8.1*255 + 1-0:1.8.2*255
		Sub meters	Value part of: 0-x:24.2.1*255
Metering	CurrentSummationReceived	Primary	1-0:2.8.0*255 or 1-0:2.8.1*255 + 1-0:2.8.2*255
Metering	Multiplier	Primary	Decimal point in: 1-0:1.8.0*255 1-0:1.8.1*255 1-0:1.8.2*255 1-0:2.8.0*255 1-0:2.8.1*255 1-0:2.8.2*255 1-0:1.7.0*255 - 1-0:2.7.0*255
		Sub meters	Decimal point in: 0-x:24.2.1*255
Metering	Divisor	Primary	Decimal point in:

			1-0:1.8.0*255 1-0:1.8.1*255 1-0:1.8.2*255 1-0:2.8.0*255 1-0:2.8.1*255 1-0:2.8.2*255 1-0:1.7.0*255 - 1-0:2.7.0*255
		Sub meters	Decimal point in: 0-x:24.2.1*255
Metering	InstantaneousDemand	Primary	1-0:1.7.0*255 - 1-0:2.7.0*255
Metering	MeterSerialNumber	Primary	0-0:96.1.1*255
		Sub meters	0-x:96.1.0*255
Metering	ReadingSnapShotTime	Sub meters	Time part of: 0-x:24.2.1*255
Metering	UnitOfMeasure	Sub meters	Unit part of: 0-x:24.2.1*255
Metering	MeteringDeviceType	Sub meters	0-x:24.1.0*255
Electrical Measurement	TotalActivePower	Primary	1-0:1.7.0*255 - 1-0:2.7.0*255
Electrical Measurement	PowerMultiplier	Primary	Decimal point in: 1-0:1.7.0*255 - 1-0:2.7.0*255
Electrical Measurement	PowerDivisor	Primary	
Electrical Measurement	RMSVoltage	Primary	1-0:32.7.0*255
Electrical Measurement	RMSVoltagePhB	Primary	1-0:52.7.0*255
Electrical Measurement	RMSVoltagePhC	Primary	1-0:72.7.0*255
Electrical Measurement	ACVoltageMultiplier	Primary	Decimal point in: 1-0:32.7.0*255 1-0:52.7.0*255 1-0:72.7.0*255
Electrical Measurement	ACVoltageDivisor	Primary	
Electrical Measurement	RMSCurrent	Primary	1-0:31.7.0*255

Electrical Measurement	RMSCurrentPhB	Primary	1-0:51.7.0*255
Electrical Measurement	RMSCurrentPhC	Primary	1-0:71.7.0*255
Electrical Measurement	ACCurrentMultiplier	Primary	Decimal point in: 1-0:31.7.0*255 1-0:51.7.0*255 1-0:71.7.0*255
Electrical Measurement	ACCurrentDivisor	Primary	
Electrical Measurement	ActivePower	Primary	1-0:21.7.0*255 - 1-0:22.7.0*255
Electrical Measurement	ActivePowerPhB	Primary	1-0:41.7.0*255 - 1-0:62.7.0*255
Electrical Measurement	ActivePowerPhC	Primary	1-0:61.7.0*255 - 1-0:62.7.0*255
Electrical Measurement	ACPowerMultiplier	Primary	Decimal point in: 1-0:21.7.0*255 - 1-0:22.7.0*255 1-0:41.7.0*255 - 1-0:42.7.0*255 1-0:61.7.0*255 - 1-0:62.7.0*255
Electrical Measurement	ACPowerDivisor	Primary	
Electrical Measurement	MeasurementType	Primary	Updated based on which other attributes are populated with data.

3 Endpoints

The device implements the following Zigbee endpoints:

3.1 Meter Interface

- End point number 0x02
- End point for primary meter
- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0053 (Meter Interface)

3.2 Sub Meter Interfaces

- End point numbers 0x40, 0x41, 0x42 and 0x43
- End point for sub meters (OBIS code channel 1-4)
- Application profile Id 0x0104 (Home Automation)
- Application device Id 0x0053 (Meter Interface)

3.3 Onics Utility

- End point number 0x01
- Application profile Id 0xC0C9 (Onics (Formerly Develco Products) manufacturer specific profile)
- Application device Id 0x0001
- Manufacturer code is 0x1015

3.4 Manufacturer Name

“frient A/S” or “Develco Products A/S” – depending on the product version.

4 EP 0x02 – Metering Clusters

4.1 Basic Server – Cluster id 0x0000

4.1.1 Attributes

Id#	Name	Data Type	Spec	Comment
0x0000	ZCLVersion	Uint8	Standard	
0x0004	ManufacturerName	Char String	Standard	
0x0005	ModelIdentifier	Char String	Standard	
0x0006	DateCode	Char String	Standard	
0x0007	PowerSource	Enum8	Standard	
0xFFFD	ClusterRevision	Uint16	Standard	
0x8000	PrimarySwVersion	Octet String	MFG specific (0x1015)	Represents the 3 version numbers x.x.x. E.g. values 0x020301 is version 2.3.1
0x8010	PrimaryBootloaderSwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8020	PrimaryHwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8050	PrimarySwVersion3rdParty	Octet String	MFG specific (0x1015)	Same format as above
0x8053	SecureEngineFwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8100	LedControl	Bitmap8	MFG specific (0x1015)	Bitmask to control the LED behavior BIT0: Indicate faults

4.2 Power Configuration Server - Cluster id 0x0001

4.2.1 Attributes

Id#	Name	Type	Spec
0x0000	MainsVoltage	UInt16	Standard
0x0001	MainsFrequency	Uint8	Standard
0xFFFD	ClusterRevision	UInt16	Standard

4.3 Identify Server/Client – Cluster id 0x0003

4.3.1.1 Attributes

Id#	Name	Type	Spec
0x0000	IdentifyTime	Uint16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.3.1.2 Server Commands Received

Id#	Name	Spec
0x00	Identify	Standard
0x01	Identify Query	Standard

4.3.1.3 Server Commands Generated

Id#	Name	Spec
0x00	Identify Query Response	Standard

4.3.1.4 Client Commands Received

Id#	Name	Spec
0x00	Identify Query Response	Standard

4.3.1.5 Client Commands Generated

Id#	Name	Spec
0x00	Identify	Standard
0x01	Identify Query	Standard

4.4 Time Client – Cluster id 0x000A

This cluster is used for internal time keeping and for the keep-alive mechanism.

4.4.1 Attributes

Id#	Name	type	Spec
0xFFFD	ClusterRevision	Uint16	Standard

4.5 OTA Upgrade Client – Cluster id 0x0019

After joining a network or after a reset, the device will check for a firmware update using the QueryNextImage command. OTA firmware files are encrypted and only official images from Onics (Formerly Develco Products) will be accepted by the device.
The device will send QueryNextImage every 6 hours.

4.5.1 Attributes

Id#	Name	Type	Spec
0x0000	UpgradeServerID	IEEE Address	Standard
0x0001	FileOffset	Uint32	Standard
0x0002	CurrentFileVersion	Uint32	Standard
0x0004	DownloadedFileVersion	Uint32	Standard
0x0006	ImageUpgradeStatus	Enum8	Standard
0x0007	Manufacturer ID	Uint16	Standard
0x0008	Image Type ID	Uint16	Standard
0x0009	MinimumBlockRequestDelay	Uint16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.5.2 Commands received

Id#	Name	Spec
0x00	ImageNotify	Standard
0x02	QueryNextImageResponse	Standard
0x05	ImageBlockResponse	Standard

0x07	UpgradeEndResponse	Standard

4.5.3 Commands generated

Id#	Name	Spec
0x01	Query Next Image request	Standard
0x03	Image Block Request	Standard
0x06	Upgrade End Request	Standard

4.6 Poll Control – Cluster id 0x0020

After joining a network, the device will automatically look for a Poll Control cluster on the coordinator. If this is successful, it will automatically create a binding to this cluster, and start sending CheckIn commands.

4.6.1 Attributes

Id#	Name	Type	Spec
0x0000	CheckInInterval	Uint32	Standard
0x0001	LongPollInterval	Uint32	Standard
0x0002	ShortPollInterval	Uint16	Standard
0x0004	FastPollTimeout	Uint16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.6.2 Commands received

Id#	Name	Spec
0x00	CheckInResponse	Standard
0x01	FastPollStop	Standard
0x02	SetLongPolllInterval	Standard
0x03	SetShortPollInterval	Standard

4.6.3 Commands generated

Id#	Name	Spec
0x00	CheckIn	Standard

4.7 Metering – Cluster id 0x0702

Only attributes where meaningful data is received from the meter has valid values. All other attributes will show the appropriate empty or InvalidValue value when read.

4.7.1 Attributes

Id#	Name	Type	Spec
0x0000	CurrentSummationDelivered	Uint48	Standard
0x0001	CurrentSummationReceived	Uint48	Standard
0x0002	CurrentMaxDemandDelivered	Uint48	Standard
0x0004	CurrentMaxDemandReceived	Uint48	Standard
0x0007	ReadingSnapShotTime	UTCTime	Standard
0x0008	CurrentMaxDemandDeliveredTime	UTCTime	Standard
0x0009	CurrentMaxDemandReceivedTime	UTCTime	Standard
0x000F	ProfileIntervalPeriod	Enum8	Standard
0x0200	Status	Bitmap8	Standard
0x0300	UnitOfMeasure	Enum8	Standard
0x0301	Multiplier	Uint24	Standard
0x0302	Divisor	Uint24	Standard
0x0303	SummationFormatting	Bitmap8	Standard
0x0304	DemandFormating	Bitmap8	Standard
0x0306	MeteringDeviceType	Bitmap8	Standard
0x0308	MeterSerialNumber	OctetString	Standard
0x0400	InstantaneousDemand	Int24	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.7.2 Commands received

Id#	Name	Spec
0x00	GetProfile	Standard

4.7.3 Commands generated

Id#	Name	Spec
0x00	GetProfileResponse	Standard

4.8 Tunneling – Cluster id 0x0704

It is possible to listen-in on the data received from the meter. This is achieved by opening a tunnel, using the Tunneling cluster. If a tunnel is opened with ManufacturerCope = 0x1015 (Onics (Formerly Develco Products)), ProtocolId = 215 and no flow control, the device will forward all received data to the requestee.

4.8.1 Attributes

Id#	Name	Type	Spec
0x0000	CloseTunnelTimeout	Uint16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.8.2 Commands received

Id#	Name	Spec
0x00	RequestTunnel	Standard
0x01	CloseTunnel	Standard
0x02	TransferData	Standard
0x03	TransferDataError	Standard

4.8.3 Commands generated

Id#	Name	Spec
0x00	RequestTunnelResponse	Standard

0x01	TransferData	Standard
0x02	TransferDataError	Standard
0x06	TunnelClosureNotification	Standard

4.9 Meter Identification – Cluster id 0x0B01

Only attributes where meaningful data is received from the meter has valid values. All other attributes will show the appropriate empty or InvalidValue value when read.

4.9.1 Attributes

Id#	Name	Type	Spec
0x0000	MeterCompanyName	CharString	Standard
0x0001	MeterTypeId	UInt16	Standard
0x0004	DataQualityId	UInt16	Standard
0x0006	MeterModel	OctetString	Standard
0x000C	POD	CharString	Standard
0x000D	AvailablePower	Int24	Standard
0x000E	PowerThreshold	Int24	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.10 Electrical Measurement – Cluster id 0x0B04

Only attributes where meaningful data is received from the meter has valid values. All other attributes will show the appropriate empty or InvalidValue value when read.

4.10.1Attributes

Id#	Name	Type	Spec
0x0000	MeasurementType	Bitmap32	Standard
0x0304	TotalActivePower	Int32	Standard
0x0402	PowerMultiplier	Uint32	Standard
0x0403	PowerDivisor	Uint32	Standard
0x0505	RMSVoltage	Uint16	Standard
0x0508	RMSCurrent	Uint16	Standard
0x050B	ActivePower	Int16	Standard

0x0600	ACVoltageMultiplier	Uint16	Standard
0x0601	ACVoltageDivisor	Uint16	Standard
0x0602	ACCurrentMultiplier	Uint16	Standard
0x0603	ACCurrentDivisor	Uint16	Standard
0x0604	ACPowerMultiplier	Uint16	Standard
0x0605	ACPowerDivisor	Uint16	Standard
0x0905	RMSVoltagePhB	Uint16	Standard
0x0908	RMSCurrentPhB	Uint16	Standard
0x090B	ActivePowerPhB	Int16	Standard
0x0A05	RMSVoltagePhC	Uint16	Standard
0x0A08	RMSCurrentPhC	Uint16	Standard
0x0A0B	ActivePowerPhC	Int16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

4.11 Diagnostics Server – Cluster id 0x0b05

4.11.1 Attributes

Id#	Name	Type	Spec
0x0000	NumberOfResets	Uint16	Standard
0x0100	MacRxBcast	Uint32	Standard
0x0101	MacTxBcast	Uint32	Standard
0x0102	MacRxUcast	Uint32	Standard
0x0103	MacTxUcast	Uint32	Standard
0x0104	MacTxUcastRetry	Uint16	Standard
0x0105	MacTxUcastFail	Uint16	Standard
0x0106	APSRxBcast	Uint16	Standard
0x0107	APSTxBcast	Uint16	Standard
0x0108	APSRxUcast	Uint16	Standard
0x0109	APSTxUcastSuccess	Uint16	Standard
0x010A	APSTxUcastRetry	Uint16	Standard
0x010B	APSTxUcastFail	Uint16	Standard

0x010C	RouteDiscInitiated	Uint16	Standard
0x010D	NeighborAdded	Uint16	Standard
0x010E	NeighborRemoved	Uint16	Standard
0x010F	NeighborStale	Uint16	Standard
0x0110	JoinIndication	Uint16	Standard
0x0111	ChildMoved	Uint16	Standard
0x0112	NWKFCFailure	Uint16	Standard
0x0113	APSFCFailure	Uint16	Standard
0x0114	APSUnauthorizedKey	Uint16	Standard
0x0115	NWKDecryptFailures	Uint16	Standard
0x0116	APSDecryptFailures	Uint16	Standard
0x0117	PacketBufferAllocateFailures	Uint16	Standard
0x0118	RelayedUcast	Uint16	Standard
0x0119	PhytoMACqueuelimitreached	Uint16	Standard
0x011A	PacketValidatedropcount	Uint16	Standard
0x011B	AverageMACRetryPerAPSMessageSent	Uint16	Standard
0x011C	LastMessageLQI	Uint8	Standard
0x011D	LastMessageRSSI	Int8	Standard
0xFFFD	ClusterRevision	Uint16	Standard

5 EP 0x40, 0x41, 0x42 and 0x43

5.1 Basic Server – Cluster id 0x0000

5.1.1 Attributes

Id#	Name	Data Type	Spec	Comment
0x0000	ZCLVersion	Uint8	Standard	
0x0004	ManufacturerName	Char String	Standard	
0x0005	ModelIdentifier	Char String	Standard	
0x0006	DateCode	Char String	Standard	
0x0007	PowerSource	Enum8	Standard	
0xFFFD	ClusterRevision	Uint16	Standard	
0x8000	PrimarySwVersion	Octet String	MFG specific (0x1015)	Represents the 3 version numbers x.x.x. E.g. values 0x020301 is version 2.3.1
0x8010	PrimaryBootloaderSwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8020	PrimaryHwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8050	PrimarySwVersion3rdParty	Octet String	MFG specific (0x1015)	Same format as above
0x8053	SecureEngineFwVersion	Octet String	MFG specific (0x1015)	Same format as above
0x8100	LedControl	Bitmap 8	MFG specific (0x1015)	Bitmask to control the LED behavior BIT0: Indicate faults

5.2 Identify Server/Client – Cluster id 0x0003

5.2.1 Attributes

Id#	Name	Type	Spec
0x0000	IdentifyTime	Uint16	Standard
0xFFFD	ClusterRevision	Uint16	Standard

5.2.2 Server Commands Received

Id#	Name	Spec
0x00	Identify	Standard
0x01	Identify Query	Standard

5.2.3 Server Commands Generated

Id#	Name	Spec
0x00	Identify Query Response	Standard

5.2.4 Client Commands Received

Id#	Name	Spec
0x00	Identify Query Response	Standard

5.2.5 Client Commands Generated

Id#	Name	Spec
0x00	Identify	Standard
0x01	Identify Query	Standard

5.3 Metering – Cluster id 0x0702

Only attributes where meaningful data is received from the meter has valid values. All other attributes will show the appropriate empty or InvalidValue value when read.

5.3.1 Attributes

Id#	Name	Type	Spec	Description
0x0000	CurrentSummationDelivered	Uint48	Standard	
0x0007	ReadingSnapShotTime	UTCTime	Standard	
0x0200	Status	Bitmap8	Standard	
0x0300	UnitOfMeasure	Enum8	Standard	
0x0301	Multiplier	Uint24	Standard	
0x0302	Divisor	Uint24	Standard	
0x0303	SummationFormatting	Bitmap8	Standard	
0x0306	MeteringDeviceType	Bitmap8	Standard	
0x0308	MeterSerialNumber	OctetString	Standard	
0xFFFD	ClusterRevision	Uint16	Standard	
0x0302	InterfaceMode	Enum16	MFG specific (0x1015)	Describes if the sub meter is active and transmits data. Possible values: • 0x0104: P1 port active • 0xFFFE: Unknown • 0xFFFF: Disabled

5.4 Meter Identification – Cluster id 0x0B01

Only attributes where meaningful data is received from the meter has valid values. All other attributes will show the appropriate empty or InvalidValue value when read.

5.4.1 Attributes

Id#	Name	Type	Spec
0x0000	MeterCompanyName	CharString	Standard
0x0001	MeterTypeId	UInt16	Standard
0x0004	DataQualityId	UInt16	Standard
0x000C	POD	CharString	Standard

0x000D	AvailablePower	Int24	Standard
0x000E	PowerThreshold	Int24	Standard
0xFFFD	ClusterRevision	Uint16	Standard

6 EP 0x01 – Onics Utility Clusters

6.1 Network Diagnostics Server - Cluster id 0x0005

Id#	Name	Type	Spec	Description
0x0000	NetworkLinkAddress	IEEE Address	MFG specific	The IEEE address of the network parent of the device
0x0001	NetworkLinkRSSI	Uint8	MFG specific	The RSSI of packets received from the parent device
0x0003	NetworkLinkFER	Uint8	MFG specific	The frame error rate (FER) of outgoing packets

7 Contact Information

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