GREYSTONE
ENERGY SYSTEMS INC

QIRF-II
Freon Gas Transmitter

BACnet
Protocol Implementation Conformance (PIC) Statement

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ANNEX A - PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (NORMATIVE)

QIRF-II BACnet Protocol Implementation Conformance Statement

Date: 2023-03-08
Vendor Name: Quatrosense Environmental Ltd
Product Name: QIRF-II Gas Transmitter
Product Model Number: QIRF-MAC:-xxx
Application Software Version: QIRF-A--MCU-X-XX
Firmware Revision: QIRF--B-MCU-X-XX
BACnet Protocol Revision: Version 1, Revision 7

Product Description:
QIRF-II is a digital sensor in one Gas Transmitter that communicates via BACnet protocol MS/TP. QIRF-II is an end device in term of BACnet protocol. Available with NDIR infrared sensor to detect Freon gases.

BACnet Standardized Device Profile (Annex L):

☐ **BACnet Operator Workstation (B-OWS)**
☐ **BACnet Advanced Operator Workstation (B-AWS)**
☐ **BACnet Operator Display (B-OD)**
☐ **BACnet Building Controller (B-BC)**
☐ **BACnet Advanced Application Controller (B-AAC)**
☐ **BACnet Application Specific Controller (B-ASC)**
■ **BACnet Smart Sensor (B-SS)**
☐ **BACnet Smart Actuator (B-SA)**

List all BACnet Interoperability Building Blocks Supported (Annex K):
BIBB-Data sharing-ReadProperty-B (DB-RP-B)
BIBB-Data sharing-ReadPropertyMultiple-B (DB-RPM-B)
BIBB-Data sharing-WriteProperty-B (DB-WP-B)
BIBB-Device Management-Device Communication Control-B (DM-DCC-B)
BIBB-Device Management-TimeSynchronization-B (DM-TS-B)
BIBB-Device Management-UTCTimeSynchronization-B (DM-UTC-B)

Segmentation Capability:

☐ Able to transmit segmented messages Window Size _____
☐ Able to receive segmented messages Window Size _____

Standard Object Types Supported:
Device Object
Analog Input Object
Binary Value Object
Binary Output Object

Data Link Layer Options:

☐ BACnet IP, (Annex J)
☐ BACnet IP, (Annex J), Foreign Device
☐ ISO 8802-3, Ethernet (Clause 7)
☐ ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
☐ ATA 878.1, EIA-485 ARCNET (Clause 8), baud rate(s) _____
■ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
■ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):_____
☐ Point-To-Point, modem, (Clause 10), baud rate(s): _____
☐ LonTalk, (Clause 11), medium: _____
☐ BACnet/ZigBee (ANNEX O)
☐ Other: _____

Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ■ No

Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)

Does the BBMD support registrations by Foreign Devices? ☐ Yes ■ No

Does the BBMD support network address translation? ☐ Yes ■ No

Network Security Options:

■ Non-secure Device - is capable of operating without BACnet Network Security
☐ Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
- ☐ Multiple Application-Specific Keys:
- ☐ Supports encryption (NS-ED BIBB)
- ☐ Key Server (NS-KS BIBB)

Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

■ ANSI X3.4	☐ IBM™/Microsoft™ DBCS	☐ ISO 8859-1
☐ ISO 10646 (UCS-2)	☐ ISO 10646 (UCS-4)	☐ JIS X 0208

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:

_____

ANNEX K – BACnet INTEROPERABILITY BULDING BLOCK (BIBBs) (NORMATIVE)

K.1.2 BIBB – Data Sharing – ReadProperty – B (DS-RP-B)

The B device is a provider of data to device A

BACnet Service	Initiate	Execute
ReadProperty		X

K.1.4 BIBB – Data Sharing – ReadPropertyMultiple – B (DS-RPM-B)

The B device is a provider of data to device A and returns multiple values at one time.

BACnet Service	Initiate	Execute
ReadPropertyMuliple		X

K.1.8 BIBB – Data Sharing – WriteProperty – B (DS-WP-B)

The B device is a provider of data to device A.

BACnet Service	Initiate	Execute
WriteProperty		X

K.5.2 BIBB – Device Management – Dynamic Device Binding – B (DM-DDB-B)

The B device provides information about its device attributes and responds to requests to identify itself.

BACnet Service	Initiate	Execute
Who-Is		X
I-Am	X	

K.5.4 BIBB – Device Management – Dynamic Object Binding – B (DM-DOB-B)

The B device provides address information about its objects upon requests.

BACnet Service	Initiate	Execute
Who-Has		X
I-Have	X	

K.5.6 BIBB – Device Management – DeviceCommunicationControl – B (DM-DCC-B)

The B device responds to communication control exercised by the A device.

BACnet Service	Initiate	Execute
DeviceCommunicationControl		X

K.5.12 BIBB – Device Management – TimeSynchronization – B (DM-TS-B)

The B device interprets time synchronization messages from the A device.

BACnet Service	Initiate	Execute
TimeSynchronization		X

K.5.13 BIBB – Device Management – UTCTimeSynchronization – B (DM-UTC-B)

The B device interprets time synchronization messages from the A device.

BACnet Service	Initiate	Execute
UTCTimeSynchronization		X

Property List of Objects

Property	Default Value	Access	Conformance Code
object-identifier	device, 4005	Read	Required
object-name	"QIRF-MAC: (address)"	Read	Required
object-type	Device	Read	Required
system-status	operational	Read	Required
vendor-name	"QEL (Quatrosense Environmental Ltd)"	Read	Required
vendor-identifier	464	Read	Required
model-name	"QIRF-MAC: (address)"	Read	Required
firmware-revision	"QIRF-B-MCU-x-xx"	Read	Required
application-software-version	"QIRF-A-MCU-x-xx"	Read	Required
Location	"Canada"	Read/Write	Optional
description	"QIRF R134a 1000PPM"	Read/Write	Optional
protocol-version	1	Read	Required
protocol-revision	7	Read	Required
protocol-services-supported	ReadProperty, ReadPropertyMultiple WriteProperty, DeviceCommunicationControl ReinitializeDevice, TimeSynchronization Who-has, Who-is, UTCTimeSynchronization	Read	Required
protocol-object-types-supported	device, analog-input, binary-output, binary-value	Read	Required
object-list	Device, 4005 Analog Input 0 (QIRF-II Gas Concentration) Analog Input 1 (QIRF-II STEL) Analog Input 2 (QIRF-II TWA) Analog Input 3 (QIRF-II Daily Peak) Analog Input 4 (QIRF-II MCU Temperature) Analog Input 5 (reserved) Analog Input 6 (reserved) Analog Input 7 (reserved) Analog Input 8 (reserved) Analog Input 9 (reserved) Binary Value 0-7 (QIRF-IIAlarm1 to Alarm8) Binary Value 8-15 (reserved) Binary Output 0-2 (Relay1 to Relay3) Binary Output 3-5 (Buzzer1 to Buzzer3)	Read	Required
max-APDU-length-accepted	480	Read	Required
segmentation-supported	NO-SEGMENTATION	Read	Required
apdu-timeout	3000 (ms)	Read	Required
number-of-apdu-retries	3	Read	Required
device-address-binding	()	Read	Required
database-revision	1	Read	Required
max-master	127	Read/Write	Required
max-info-frames	1	Read/Write	Required
Local_Time	Time	Read	Optional
Local_Date	Date	Read	Optional
UTC_Offset	Integer	Read	Optional
Daylight_Savings_Status	Boolean	Read	Optional

Device: *Note: all string size should be less than 20 characters.

Analog Input 0:

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 0	Read	Required
object-name	"QIRF-II Concentration"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"Instantaneous Reading"	Read/Write	Optional

Analog Input 1:

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 1	Read	Required
object-name	"QIRF-II STEL"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"Short Term Exposure Limit"	Read/Write	Optional

Analog Input 2:

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 2	Read	Required
object-name	"QIRF-II TWA"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	false	Read	Required
units	Parts-per-million	Read	Required
description	"Time Weighted Average"	Read/Write	Optional

Analog Input 3:

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 3	Read	Required
object-name	"QIRF-II Daily Peak"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"24 Hours Peak Reading"	Read/Write	Optional

Analog Input 4:

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 4	Read	Required
object-name	"QIRF-II MCU Temperature"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	false	Read	Required
units	Degrees-Celsius	Read	Required
description	"QIRF-II Microcontroller Temperature"	Read/Write	Optional

Analog Input 5: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 0	Read	Required
object-name	"reserved1"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"Instantaneous Reading"	Read/Write	Optional

Analog Input 6: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 1	Read	Required
object-name	"reserved2"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"Short Term Exposure Limit"	Read/Write	Optional

Analog Input 7: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 2	Read	Required
object-name	"reserved3"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	false	Read	Required
units	Parts-per-million	Read	Required
description	"Time Weighted Average"	Read/Write	Optional

Analog Input 8: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 3	Read	Required
object-name	"reserved4"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	Xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
units	Parts-per-million	Read	Required
description	"24 Hours Peak Reading"	Read/Write	Optional

Analog Input 9: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	analog-input, 4	Read	Required
object-name	"reserved5"	Read	Required
object-type	analog-input(0)	Read	Required
present-value	xxxx	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	false	Read	Required
units	Degrees-Celsius	Read	Required
description	"Q6R Microcontroller Temperature"	Read/Write	Optional

Binary Value 0 to Binary Value 7:

Property	Default Value	Access	Conformance Code
object-identifier	binary-value, 0 - 7	Read	Required
object-name	"QIRF-II Alarm1 to Alarm8 Status"	Read	Required
object-type	binary-value(5)	Read	Required
present-value	active / inactive	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
description	"BV(x): Alarm1 Status"	Read/Write	Optional
priority-array	QIRF-II priority is 12	Read	Optional
relinquish-default	inactive	Read	Optional

Binary Value 8 to Binary Value 15: (reserved)

Property	Default Value	Access	Conformance Code
object-identifier	binary-value, 8 – 15	Read	Required
object-name	"reserved"	Read	Required
object-type	binary-value(5)	Read	Required
present-value	active / inactive	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
description	"BV(8+x): Alarm(x) Status"	Read/Write	Optional
priority-array	QIRF-II priority is 12	Read	Optional
relinquish-default	Inactive	Read	Optional

Binary Output 0 to Binary Output 2:

Property	Default Value	Access	Conformance Code
object-identifier	binary-output, 0 - 2	Read	Required
object-name	"Relay1 to Relay3 Status"	Read	Required
object-type	binary-output(4)	Read	Required
present-value	active / inactive	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
Priority	normal	Read	Required
Description	"BO(x): Relay(x) Output"	Read/Write	Optional
priority-array	QIRF-II priority is 12	Read	Required
relinquish-default	inactive	Read	Required

Binary Output 3 to Binary 5:

Property	Default Value	Access	Conformance Code
object-identifier	binary-output, 3 - 5	Read	Required
object-name	"Buzzer1 to Buzzer3 Status"	Read	Required
object-type	binary-output(4)	Read	Required
present-value	active / inactive	Read	Required
status-flag	health / overridden	Read	Required
event-state	normal(0)	Read	Required
out-of-service	False	Read	Required
priority	normal	Read	Required
description	"BO(3+x): Buzzer(x) Output"	Read/Write	Optional
priority-array	QIRF-II priority is 12	Read	Required
relinquish-default	Inactive	Read	Required