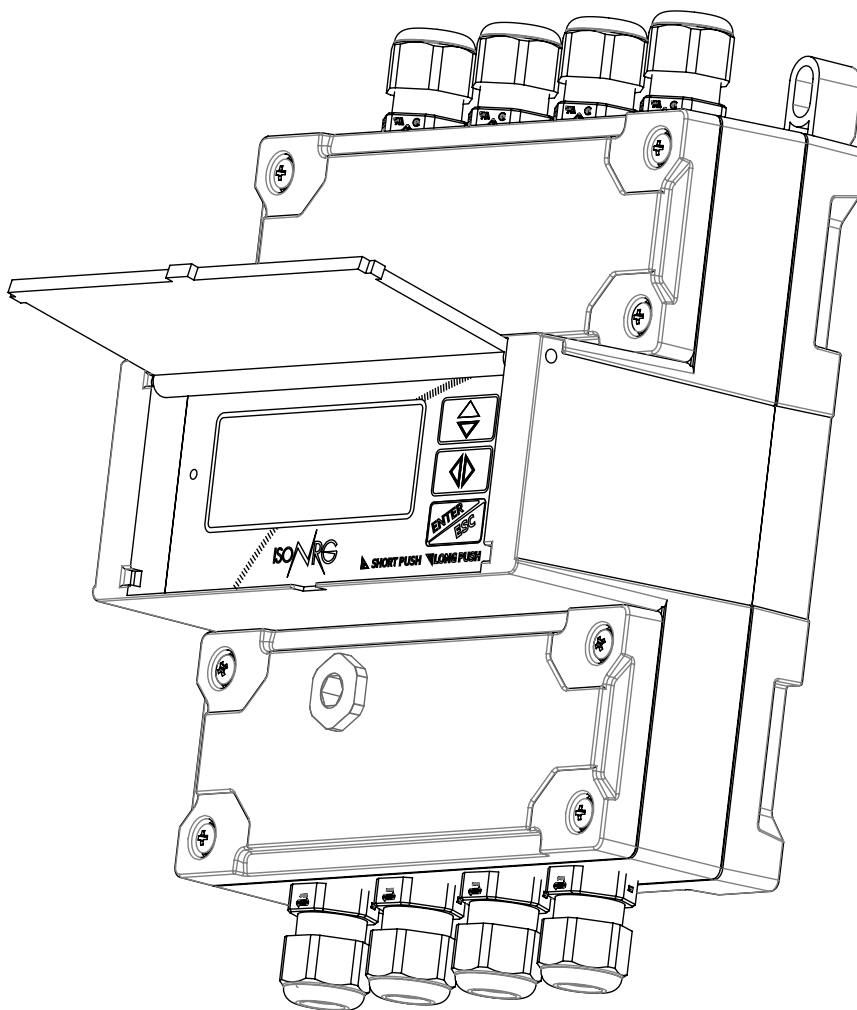




BACnet® MSTP & IP PROTOCOL



MV311



CE



ISOIL 
I N D U S T R I A



Release number: **MV311_BACnet_EN_IS_R2_1.04.0** -

The characters of file name in bold type indicate the software version which the manual refers to; it is visualized at the instrument start up, or by specific function on DIAGNOSTIC menu.

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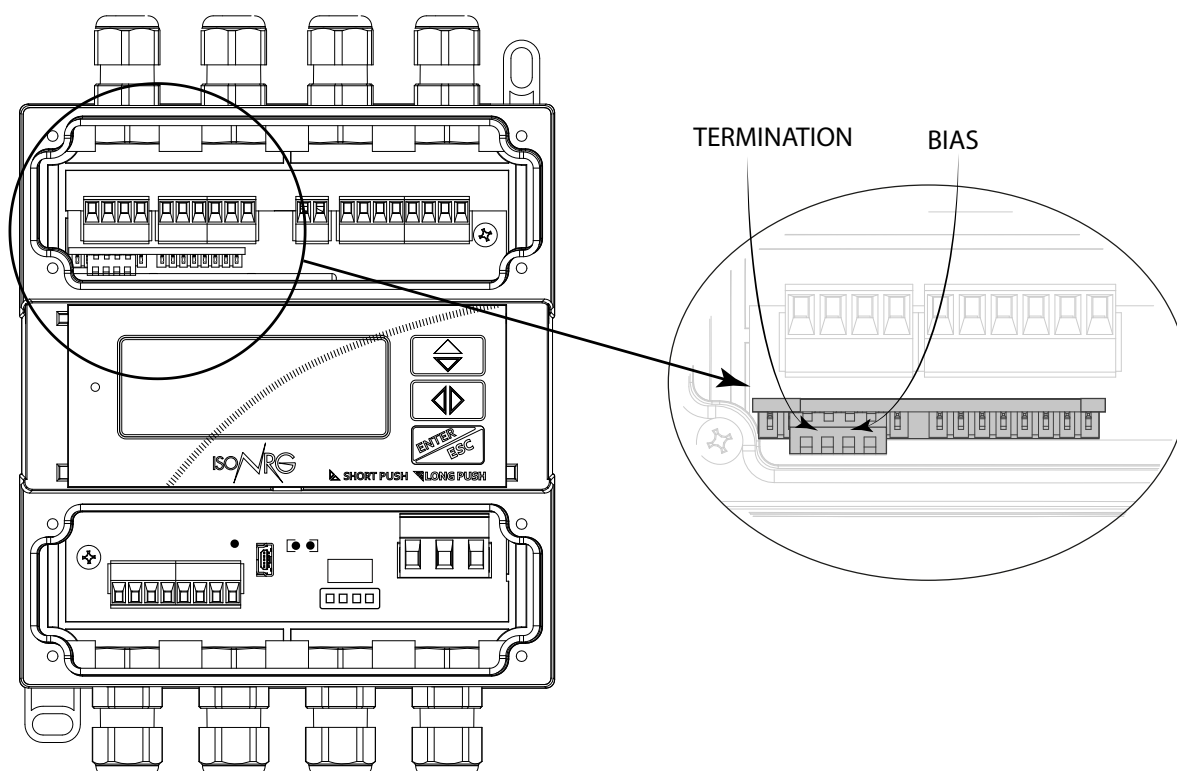
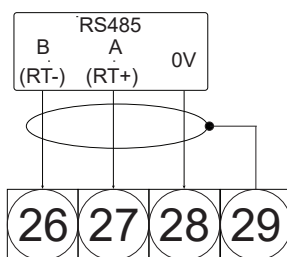
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TECHNICAL DATA

BACnet-MSTP

Device Object Name	MV 311
Bus termination	Dip switch
Bus bias	Dip switch
ISOIL ID number	589
Data Link Layer	According to MS/TP Master/Slave :
	Master Mode by the use of address range 0-127
	Slave Mode by the use of address range 128-254
Default Password for Device Management	"Pa55w0rd"
Communication speed	9600 bit/sec
	19200 bit/sec
	38400 bit/sec
	57600 bit/sec
	76800 bit/sec
	115200 bit/sec

ELECTRICAL CONNECTION

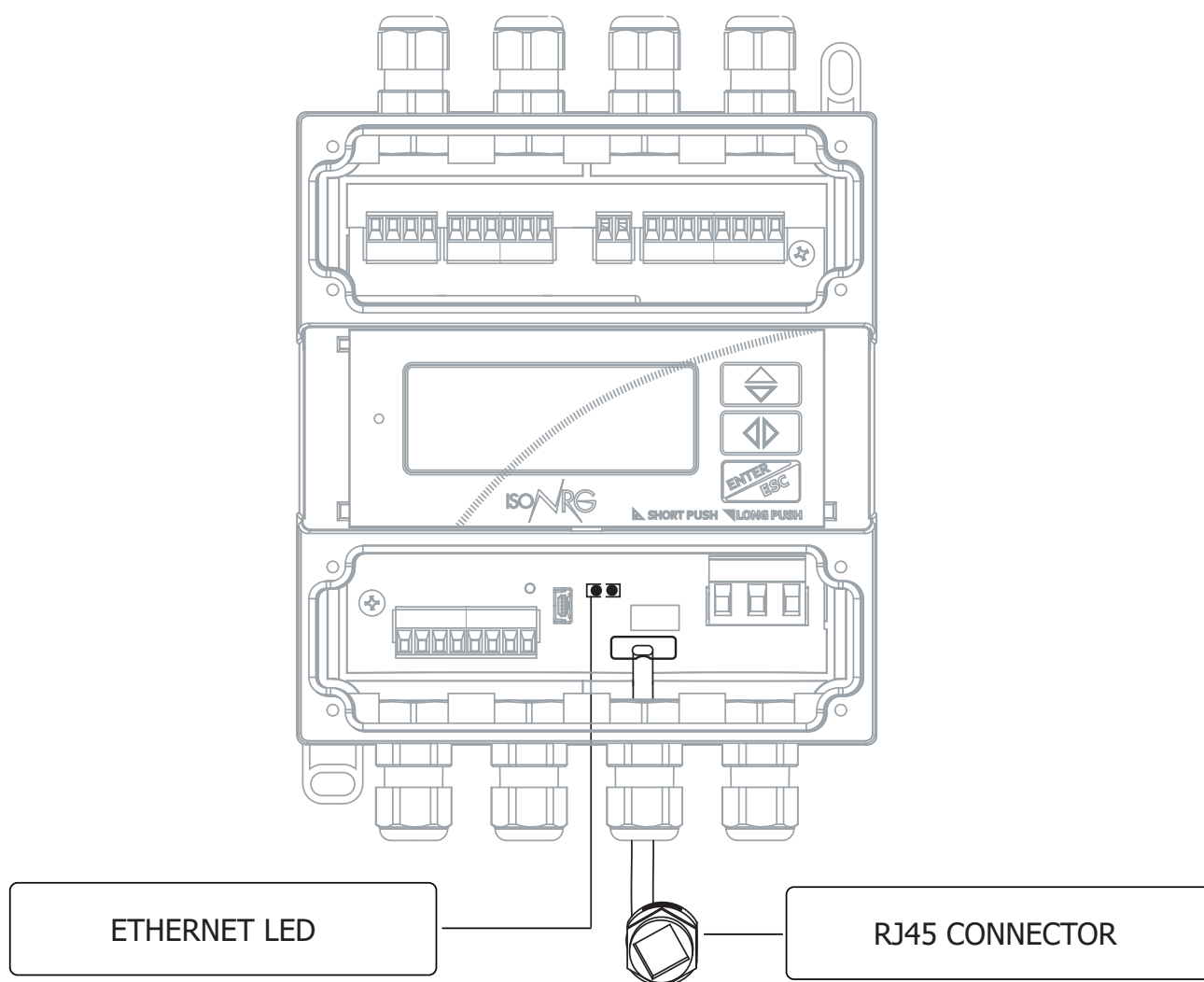


BACnet-IP

TECHNICAL DATA

Device Object Name	MV311
ISOIL ID number	589
Default Password for Device Management	"Pa55w0rd"
Data Link Layer	BACnet-IP (UDP)
Default Port	47808 (BAC0h)
Connector	RJ45
Communication Speed	10M
	100M

ELECTRICAL CONNECTION



LED ETHERNET

COLOR	STATE	MEANING
GREEN	OFF	Disconnected
	ON	Connected
	BLINK	Activity
YELLOW	OFF	10M (speed)
	ON	100M (speed)

Application

BACnet® is a widespread and established field bus protocol used within building automation. BACnet® is standardized according to ASHRAE 135 and is tested by BTL.

Functionality

The BACnet® module communicates with BACnet® MS/TP via RS-485 module as master or slave and with BACnet® IP via Ethernet.

The BACnet® module transfers a number of both actual data as well as accumulated data.

Reliability

Both RS-485 port module and Ethernet are galvanically separated from the meter's voltage potential thereby improving the security for smooth operations.

At the same time, the risk of influencing the meter due to influences of the RS-485 or Ethernet ports is reduced to a minimum.

BACnet® MS/TP Addressing

The module can be addressed as master in the MAC address range 0-127 and as slave when configured to use an MAC address in the range of 128-254.

The MAC address, the communication speed and other parameters of the BACnet® module is changeable via display or MCP.

BACnet® IP Addressing

The module can be addressed with standard Ethernet addresses

Status

A BACnet® MS/TP and IP icons with multiple states indicate the health of MS/TP, Ethernet and IP communications:

	BACnet-MSTP connected and detected; MV311 IDLE (no "token").
	BACnet-MSTP connected and detected; MV311 ACTIVE (have "token").
	BACnet-MSTP communication with MV311 in progress (White LED Blink if enabled).
	FIELDbus communication error detected, please check communication settings.
	Ethernet connected at 10M.
	Ethernet connected at 100M.
	alternate MODbus-TCP connected (at least 1 socket open).
	alternate MODbus-TCP; MV311 has been accessed via MODbus.
	alternate MODbus-TCP; Protocol Error.

CONFIGURATION



COMMUNICATION	
BACnet	IP
Modbus	TCP
M-Bus	ON
Dev. Address	1
Com.Speed	9600
Parity	NO 1SB
Ans. Delay	(ms)
ETH DHCP en.	ON
ETH dev IP addr.	010.138.09.
ETH network mask	255.255.25.
ETH gateway addr.	010.138.09.
ETH DNS address	010.138.09.
NTP time server	
Network password	
Net S.En.	ON+OFF
Bnet max mst	127
Bnet ONr	4194302
Bnet ObjName	MV311_Name
Bnet ObjDescr	MV311_desc.
Bnet ObjLoc	MV311_locat.
Bnet pw	Pa55w0rd
Bnet W.E.	OFF
Bnet Port	47808
MDB_32	AAAA-BBBB
Mbus ID	00985000
Mbus Dev.T.	AUTO

7.1	BACnet Communication Protocol
7.2	Modbus Communication Protocol
7.3	MeterBus Communication Protocol
7.4	Device Communication Address
7.5	Communication Speed
7.6	Communication Parity Bits
7.7	Communication Answer Delay
7.8	Ethernet DHCP enable
7.9	Ethernet device IP address
7.10	Ethernet network mask
7.11	Ethernet gateway address
7.12	Ethernet DNS address
7.13	NTP time server name / address
7.14	Network access password
7.15	Network security (SSL-TLS) enable
7.16	BACnet max master
7.17	BACnet Object Instance Number
7.18	BACnet Device Object Name
7.19	BACnet Device Object Description
7.20	BACnet Device Object Location
7.21	BACnet Device Managem. Password
7.22	BACnet Device Object Write Enable
7.23	BACnet Device Ethernet Port number (47808)
7.24	Modbus 32 bits registers order
7.25	MeterBus Identif. number (Secondary add.)
7.26	MeterBus Device Type (media)

7.1 BACnet Communication Protocol

OFF BACnet disabled

MSTP BACnet-MSTP* (over RS485) active.

IP BACnet-IP (over Ethernet) active.

* Enabling MSTP will disable other "uart based" protocols (like MODbus-RTU, M-Bus, ...).

7.4 Device Communication Address: (BACnet-MSTP ONLY)

Is the BACnet® unique "MAC" Address on MSTP network; 0-127 set the device as a Master; 128-254 set the device as Slave.

7.5 Communication Speed: (BACnet-MSTP ONLY)

Is the BACnet® MSTP communication speed.

7.8 Ethernet DHCP enable: (BACnet-IP ONLY)

Enable automatic ethernet addresses configuration from external DHCP.

Attention: Enabling DHCP make the ethernet address "not fixed" then the MV311 BACnet®-IP Server cannot be find using a "fixed" ethernet address.

7.9 Ethernet device IP address: (BACnet-IP ONLY)

Is the MV311 Ethernet unique address used when DHCP is disabled.

7.10 Ethernet network mask: (BACnet-IP ONLY)

Is the MV311 Ethernet network mask used when DHCP is disabled.

7.11 Ethernet gateway address: (not used by BACnet)

Is the MV311 Ethernet Gateway Address used when DHCP is disabled.

7.12 Ethernet DNS address: (not used by BACnet)

Is the MV311 Ethernet DNS Address used when DHCP is disabled.

7.16 BACnet max master: (BACnet-MSTP ONLY)

Is the Device – "Max_Master" property; can be set also via BACnet® MS/TP.

7.17 BACnet Object Instance Number:

Is the BACnet® unique Device – "Object_Identifier" property on the network; can be set also via BACnet®.

Device is shipped with this value set to 4194303 (3FFFFFFh) that means "not initialized"; configure the device before use. Once changed this value can't be set back to 4194303.

7.18 BACnet Device Object Name ² :

Is the Device – "Object_Name" property; can be set also via BACnet® ¹.

7.19 BACnet Device Object Description ²:

Is the Device – "Description" property; can be set also via BACnet® ¹.

7.20 BACnet Device Object Location ²:

Is the Device – "Location" property; can be set also via BACnet® ¹.

7.21 BACnet Device Managem. Password:

Is the Device Management Password for "DM-DCC-B" and "DM-RD-B" services; only reduced ASCII character set can be used.

7.22 BACnet Device Object Write Enable

Enable writing of Object Identifier, Name, Location and Description also via BACnet®:

OFF Writing via BACnet® disabled.

ALL Writing via BACnet® enabled.

DESC. Writing of just Name, Location and Description, via BACnet® enabled.

7.23 BACnet Device Ethernet Port number:

Is the Device Ethernet Port Number; default is 47808 (BAC0h).

NOTE: Restart the device after changing Ethernet Settings.

1 Depending on "BACnet Device Object Write Enable" settings

2 Only reduced ASCII character set can be used entering the text via Display or MCP; write it via BACnet® for full UTF-8 set.

BACNET® -PROTOCOL IMPLEMENTATION CONFORMANCE STATEMENT (PICS) - ANNEX A

Date: 15/01/2020
 Vendor Name: ISOIL Industria spa
 Product Name: MV311-ISONRG
 Product Model Number: MV311
 Application Software Version ³: 1.04.0000
 Firmware Revision ⁴: 1.0.3 (BACnet® MS/TP certified revision)
 1.1.3 (BACnet® IP revision)
 BACnet Protocol Revision: 1.15

Product Description:

The converter MV311-ISONRG is a highly accurate thermal energy measurement in water and water/glycol heating and cooling systems.

BACNET STANDARDIZED DEVICE PROFILE (ANNEX L):

☒ o BACnet Application Specific Controller (B-ASC)

LIST ALL BACNET INTEROPERABILITY BUILDING BLOCKS SUPPORTED (ANNEX K)

BIBB	Name	BACnet Service	Init.	Exec.
DS-RP-B	Data Sharing – Read Property-B	ReadProperty		x
DS-RPM-B	Data Sharing – Read Property Multiple-B	ReadPropertyMultiple		x
DS-WP-B	Data Sharing – Write Property-B	WriteProperty		x
DM-DDB-B ⁵	Device Management - Dynamic Device Binding-B	Who-Is		x
		I-Am	x	
DM-DOB-B ³	Device Management - Dynamic Object Binding-B	Who-Has		x
		I-Have	x	
DM-DCC-B	Device Management - Device Communication Control-B	Device Communication Control		x
DM-TS-B	Device Management – Time Synchronization-B	Time Synchronization		x
DM-UTC-B	Device Management – UTC Time Synchronization-B	UTCTime Synchronization		x
DM-RD-B	Device Management - Reinitialize Device-B	ReinitializeDevice		x

Table 1

☐ Segmentation Capability: NO

3 Referred to whole application; will be upgraded also for changes not related to BACnet implementation.

4 Referred to BACnet implementation ONLY; also reported on BTL Listing and conformance certificate.

5 Available only when configured as a MS/TP Master.

STANDARD OBJECT TYPES SUPPORTED

Type	ID	Name	R/W	Description	ASHRAE Units
Device	...	MV 311		MV 311 description	-
PositiveIntegerValue	0	TOT_HEAT_NRG_C	R	Tot. Heat. Thermal Energy [2]	[2] (R)
PositiveIntegerValue	1	PAR_HEAT_NRG_C	R	Par. Heat. Thermal Energy [2]	[2] (R)
PositiveIntegerValue	2	TOT_COOL_NRG_C	R	Tot. Cool. Thermal Energy [2]	[2] (R)
PositiveIntegerValue	3	PAR_COOL_NRG_C	R	Par. Cool. Thermal Energy [2]	[2] (R)
PositiveIntegerValue	4	TOT_VF_VOL_C	R	Tot. Volume Conveying Liquid [4]	[4] (R)
PositiveIntegerValue	5	PAR_VF_VOL_C	R	Par. Volume Conveying Liquid [4]	[4] (R)
PositiveIntegerValue	6	TOT_HW_VOL_C	R	Tot. Volume Hot Water [4]	[4] (R)
PositiveIntegerValue	7	PAR_HW_VOL_C	R	Par. Volume Hot Water [4]	[4] (R)
PositiveIntegerValue	8	TOT_CW_VOL_C	R	Tot. Volume Cold Water [4]	[4] (R)
PositiveIntegerValue	9	PAR_CW_VOL_C	R	Par. Volume Cold Water [4]	[4] (R)
PositiveIntegerValue	10	TOT_AUX_IN_C	R	Tot. Volume Aux Input [4,6,7]	[4,6,7] (R)
PositiveIntegerValue	11	PAR_AUX_IN_C	R	Par. Volume Aux Input [4,6,7]	[4,6,7] (R)
AnalogValue	0	TOT_HEAT_NRG_V	W	Tot. Heat. Thermal Energy [2]	[2] (R) ⁶
AnalogValue	1	PAR_HEAT_NRG_V	W	Par. Heat. Thermal Energy [2]	[2] (R) ⁶
AnalogValue	2	TOT_COOL_NRG_V	W	Tot. Cool. Thermal Energy [2]	[2] (R) ⁶
AnalogValue	3	PAR_COOL_NRG_V	W	Par. Cool. Thermal Energy [2]	[2] (R) ⁶
AnalogValue	4	TOT_VF_VOL_V	W	Tot. Volume Conveying Liquid [4]	[4] (R) ⁷
AnalogValue	5	PAR_VF_VOL_V	W	Par. Volume Conveying Liquid [4]	[4] (R) ⁷
AnalogValue	6	TOT_HW_VOL_V	W	Tot. Volume Hot Water [4]	[4] (R) ⁷
AnalogValue	7	PAR_HW_VOL_V	W	Par. Volume Hot Water [4]	[4] (R) ⁷
AnalogValue	8	TOT_CW_VOL_V	W	Tot. Volume Cold Water [4]	[4] (R) ⁷
AnalogValue	9	PAR_CW_VOL_V	W	Par. Volume Cold Water [4]	[4] (R) ⁷
AnalogValue	10	TOT_AUX_IN_V	W	Tot. Volume Aux Input [4,6,7]	[4,6,7] (R)
AnalogValue	11	PAR_AUX_IN_V	W	Par. Volume Aux Input [4,6,7]	[4,6,7] (R)
AnalogInput	0	TH_POWER	R	Thermal Power [1]	[1] (R)
AnalogInput	1	FLOW_RATE	R	V.F. Flow Rate [5]	[5] (R)
AnalogInput	2	T1_TEMP	R	T1 Flow Temperature [3]	[3] (R)
AnalogInput	3	T2_TEMP	R	T2 Return Temperature [3]	[3] (R)
AnalogInput	4	TD_TEMP	R	Delta Temperature [3]	[3] (R)
AnalogInput	5	BRD_TEMP	R	Board Temperature [3]	[3] (R)
AnalogInput	6	BATT_CHARGE	R	Battery Charge [%]	(98) percent
MultiStateValue	0	GLOBAL_ALARM	R	Global alarm	-
MultiStateValue	1	TH_PWR_ALARM	R	Thermal Power alarm	-
MultiStateValue	2	FL_RATE_ALARM	R	V.F. Flow rate alarm	-
MultiStateValue	3	T1_ALARM	R	Temperature T1 alarm	-
MultiStateValue	4	T2_ALARM	R	Temperature T2 alarm	-
MultiStateValue	5	TD_ALARM	R	Temperature Delta alarm	-
MultiStateValue	6	AIN_STATE	R	Analog input status	-
MultiStateValue	7	BATT_STATE	R	Battery status	-
MultiStateValue	8	P_TYPE_CTRL	R	Plant Type Control	-

6 Same unit for all energy counters

7 Same unit for all volume counters

Type	ID	Name	R/W	Description	ASHRAE Units
BitStringValue	0	MEA_ERROR	R	Measure error	-
BitStringValue	1	PLS_ERROR	R	Pulse error	-
BitStringValue	2	RTD_ERROR	R	RTD error	-
BitStringValue	3	SUPP_ERROR	R	Supply error	-
BinaryValue	0	P_TYPE_DET	R	Plant Type Detected	-
BinaryValue	1	P_TYPE_SEL	R-W ⁸	Plant Type Selected	-
BinaryValue	2	RST_SEL_CNT	W ⁹	Reset Selected Counters (Active=Reset)	-

Table 2

NOTE

Object Description change in accordance with the Units of Measure selected ; below how description can be :

NOTE	Unit of Measure	Text	ASHRAE Unit
[1] Power	Watt	W	(47) watt
	KiloWatt	kW	(48) kilowatts
	MegaWatt	MW	(49) megawatts
	GigaWatt	GW	(5120) ¹⁰ gigawatts

NOTE	Unit of Measure	Text	ASHRAE Unit
[2] Energy	Joule	J	(16) joule
	KiloJoule	kJ	(17) kilojoules
	WattHour	Wh	(18) watt-hours
	MegaJoule	MJ	(126) megajoules
	KiloWattHour	kWh	(19) kilowatt-hours
	GigaJoule	GJ	(5184) ¹⁰ gigajoules
	MegaWattHour	MWh	(146) megawatt-hours
	GigaWattHour	GWh	(5185) ¹⁰ gigawatt-hours

NOTE	Unit of Measure	Text	ASHRAE Unit
[3] Temperature	Degrees Celsius	°C	(62) degrees-Celsius
	Degrees Fahrenheit	°F	(64) degrees-Fahrenheit

8 Depends on local Device settings

9 Writing "1" (Active) cause reset ; Present_Value is always read as "0" (Inactive)

10 Custom Value

NOTE	Unit of Measure	Text	ASHRAE Unit
[4] "Volume" Metric	MilliLiter	ml	(197) milliliters
	Cubic Centimeter	Cm3	(4096) cubic-centimeters
	Liter	l	(82) liters
	Cubic Decimeter	dm3	(4097) ¹⁰ cubic-decimeters
	DecaLitre	dal	(4098) ¹⁰ decaliters
	HectoLitre	hl	(4099) ¹⁰ hectoliters
	Cubic Meter	m3	(80) cubic-meters
	MegaLitre	MI	(4100) ¹⁰ megaliters
[4] "Volume" Imperial / USC	Cubic Inch	in3	(4352) ¹⁰ cubic-inch
	US Gallon	Gal	(83) us-gallons
	UK Gallon	IGL	(81) imperial-gallons
	Cubic Foot	ft3	(79) cubic-feet
	Standard Barrel	bbl	(4353) ¹⁰ standard-barrels
	Oil Barrel	BBL	(4354) ¹⁰ oil-barrels
	Hundred Cubic Feet	hf3	(4355) ¹⁰ hundred-cubic-feet
	Kilo US Gallon	KGL	(4356) ¹⁰ us-kilo-gallons
	Kilo UK Gallon	IKG	(4357) ¹⁰ imperial-kilo-gallons
	Kilo Cubic Feet	kf3	(4358) ¹⁰ kilo-cubic-feet
	Ten Thousand Gallon	ttG	(4359) ¹⁰ ten-thousand-gallons
	Acre Foot	Aft	(4360) ¹⁰ acre-feet
	Mega US Gallon	MGL	(4361) ¹⁰ us-mega-gallons
	Mega UK Gallon	IMG	(4362) ¹⁰ imperial-mega-gallons

NOTE	Unit of Measure	Text	ASHRAE Unit
[5] "Flow" Metric	[4] \ SECOND	[4] \ S	(198) milliliters-per-second
			(4614) ¹⁰ cubic-centimeter-per-second
			(87) liters-per-second
			(4619) ¹⁰ cubic-decimeter-per-second
			(4623) ¹⁰ decaliters-per-seconds
			(4627) ¹⁰ hectoliters-per-seconds
			(85) cubic-meters-per-second
			(4631) ¹⁰ megaliters-per-seconds
	[4] \ MINUTE	[4] \ m	(4610) ¹⁰ milliliters-per-minute
			(4613) ¹⁰ cubic-centimeter-per-minute
			(88) liters-per-minute
			(4618) ¹⁰ cubic-decimeter-per-minute
			(4622) ¹⁰ decaliters-per-minute
			(4626) ¹⁰ hectoliters-per-minute
			(165) cubic-meters-per-minute
			(4630) ¹⁰ megaliters-per-minute
	[4] \ HOUR	[4] \ h	(4609) ¹⁰ milliliters-per-hour
			(4612) ¹⁰ cubic-centimeter-per-hour
			(136) liters-per-hour
			(4617) ¹⁰ cubic-decimeter-per-hour
			(4621) ¹⁰ decaliters-per-hour
			(4625) ¹⁰ hectoliters-per-hour
			(135) cubic-meters-per-hour
			(4629) ¹⁰ megaliters-per-hour
	[4] \ DAY	[4] \ d	(4608) ¹⁰ milliliters-per-day
			(4611) ¹⁰ cubic-centimeter-per-day
			(4615) ¹⁰ liters-per-day
			(4616) ¹⁰ cubic-decimeter-per-day
			(4620) ¹⁰ decaliters-per-day
			(4624) ¹⁰ hectoliters-per-day
			(249) cubic-meters-per-day
			(4628) ¹⁰ megaliters-per-day

10 Custom Value

NOTE	Unit of Measure	Text	ASHRAE Unit
[5] "Flow" Imperial / USC	[4] \ SECOND	[4] \ S	(4867) ¹⁰ cubic-inch-per-second
			(4869) ¹⁰ us-gallons-per-second
			(4872) ¹⁰ imperial-gallons-per-second
			(142) cubic-feet-per-second
			(4876) ¹⁰ standard-barrels-per-second
			(4880) ¹⁰ oil-barrels-per-second
			(4884) ¹⁰ hundred-cubic-feet-per-second
			(4888) ¹⁰ us-kilo-gallons-per-second
			(4892) ¹⁰ imperial-kilo-gallons-per-second
			(4896) ¹⁰ kilo-cubic-feet-per-second
			(4900) ¹⁰ ten-thousand-gallons-per-second
			(4904) ¹⁰ acre-feet-per-second
			(4908) ¹⁰ us-mega-gallons-per-second
			(4912) ¹⁰ imperial-mega-gallons-per-second
	[4] \ MINUTE	[4] \ m	(4866) ¹⁰ cubic-inch-per-minute
			(89) us-gallons-per-minute
			(86) imperial-gallons-per-minute
			(84) cubic-feet-per-minute
			(4875) ¹⁰ standard-barrels-per-minute
			(4879) ¹⁰ oil-barrels-per-minute
			(4883) ¹⁰ hundred-cubic-feet-per-minute
			(4887) ¹⁰ us-kilo-gallons-per-minute
			(4891) ¹⁰ imperial-kilo-gallons-per-minute
			(4895) ¹⁰ kilo-cubic-feet-per-minute
			(4899) ¹⁰ ten-thousand-gallons-per-minute
			(4903) ¹⁰ acre-feet-per-minute
			(4907) ¹⁰ us-mega-gallons-per-minute
			(4911) ¹⁰ imperial-mega-gallons-per-minute
	[4] \ HOUR	[4] \ h	(4865) ¹⁰ cubic-inch-per-hour
			(192) us-gallons-per-hour
			(4871) ¹⁰ imperial-gallons-per-hour
			(191) cubic-feet-per-hour
			(4874) ¹⁰ standard-barrels-per-hour
			(4878) ¹⁰ oil-barrels-per-hour
			(4882) ¹⁰ hundred-cubic-feet-per-hour
			(4886) ¹⁰ us-kilo-gallons-per-hour
			(4890) ¹⁰ imperial-kilo-gallons-per-hour
			(4894) ¹⁰ kilo-cubic-feet-per-hour
			(4898) ¹⁰ ten-thousand-gallons-per-hour
			(4902) ¹⁰ acre-feet-per-hour
			(4906) ¹⁰ us-mega-gallons-per-hour
			(4910) ¹⁰ imperial-mega-gallons-per-hour

10 Custom Value

NOTE	Unit of Measure	Text	ASHRAE Unit
[5] "Flow" Imperial / USC	[4] \ DAY	[4] \ d	(4864) ¹⁰ cubic-inch-per-day
			(4868) ¹⁰ us-gallons-per-day
			(4870) ¹⁰ imperial-gallons-per-day
			(248) cubic-feet-per-day
			(4873) ¹⁰ standard-barrels-per-day
			(4877) ¹⁰ oil-barrels-per-day
			(4881) ¹⁰ hundred-cubic-feet-per-day
			(4885) ¹⁰ us-kilo-gallons-per-day
			(4889) ¹⁰ imperial-kilo-gallons-per-day
			(4893) ¹⁰ kilo-cubic-feet-per-day
			(4897) ¹⁰ ten-thousand-gallons-per-day
			(4901) ¹⁰ acre-feet-per-day
			(4905) ¹⁰ us-mega-gallons-per-day
			(4909) ⁸ imperial-mega-gallons-per-day
[6] "Gas Volume"	StandardCubicMeters	Sm ³	(5376) ¹⁰ standard-cubic-meters
	NormalCubicMeters	Nm ³	(5377) ¹⁰ normal-cubic-meters
[7] "Electrical Energy"	WattHour	Wh	(18) watt-hours
	KiloWattHour	kWh	(19) kilowatt-hours
	MegaWattHour	MWh	(146) megawatt-hours
	GigaWattHour	GWh	(5185) ¹⁰ gigawatt-hours

STANDARD OBJECT TYPES SUPPORTED

Property Identifier	Property Datatype	R/W/O	Value
Object_Identifier	BACnetObjectIdentifier	R-W ¹¹	device, XXXXX
Object_Name	CharacterString	R-W ¹¹	MV 311
Object_Type	BACnetObjectType	R	device
System_Status	BACnetDeviceStatus	R	0, operational
Vendor_Name	CharacterString	R	ISOIL Industria spa
Vendor_Identifier	Unsigned16	R	589
Model_Name	CharacterString	R	MV311
Firmware_Revision	CharacterString	R	1.0.3 (BACnet® MS/TP certified) 1.1.3 (BACnet® IP)
Application_Software_Version	CharacterString	R	XX.XX.XXXX
Location	CharacterString	R-W ¹¹ (O)	MV 311 location
Description	CharacterString	R-W ¹¹ (O)	MV 311 description
Protocol_Version	Unsigned	R	1
Protocol_Revision	Unsigned	R	15
Protocol_Services_Supported	BACnetServicesSupported	R	...
Protocol_Object_Types_Supported	BACnetObjectTypesSupported	R	...
Object_List	BACnetARRAY[N]of BACnetObjectIdentifier	R	...
Max_Apdu_Length_Accepted	Unsigned	R	480
Segmentation_Support	BACnetSegmentation	R	3 => no
Local_Time	Time	W (O)	hh:mm:ss.cc
Local_Date	Date	W (O)	dd/mm/yyyy weekday
Utc_Offset	INTEGER	W (O)	+/- min ("+" -> E, "-" -> W)
Daylight_Saving_Status	BOOLEAN	W (O)	0 / 1
Apdu_Timeout	Unsigned	R	10000
Number_Of_Apdu_Retries	Unsigned	R	3
Max_Master	Unsigned(1..127)	W (O)	1-127 (BACnet-MSTP ONLY)
Max_Info_Frames	Unsigned	R (O)	2 (BACnet-MSTP ONLY)
Device_Address_Binding	List of BACnetAddressBinding	R	0 :

11 Depends on local Device settings.

Property Identifier	Property Datatype	R/W/O	Value
Database_Revision	Unsigned	R	RRRRR
Last_Restart_Reason	BACnetRestartReason	R (O)	See list below ...
Time_Of_Device_Restart	BACnetTimeStamp	R (O)	date, time
Serial_Number	CharacterString	R (O)	NNNNNNNN
Property_List	BACnetARRAY[N]of BACnetPropertyIdentifier	R	...
Status_Flags	BACnetStatusFlag	R (O)	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"

□ Table 3

Standard	BACnetRestartReason
	0, Unknown; 1, cold start; 2, warm start; 3, detected power lost; 4, detected power off; 5, hardware watchdog; 6, software watchdog

Custom	BACnetRestartReason
	65, low power mode 70, software update 80, system exception 85, nv memory fault 90, os error

"POSITIVE INTEGER VALUE" OBJECTS

Property Identifier	Property Datatype	R/W/O	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 11
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	Positive-integer-value
Present_Value	Unsigned	R	
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"
Event_State	BACnetEventState	R	0, normal
Reliability	BACnetReliability	R (O)	0, no-fault-detected 1, no-sensor 7, unreliable-other 64, not-installed ¹⁰ 102, simulation ¹⁰
Out_Of_Service	BOOLEAN	R	0, False
Units	BACnetEngineeringUnit	R	See "Units" on Table 2
Property_List	BACnetARRAY[N]of BACnetPropertyIdentifier	R	...
Decimal_Point_Position (4096) ¹⁰	Unsigned	R (O)	0 ... 8

Table 4**"ANALOG VALUE" OBJECTS**

Property Identifier	Property Datatype	R/W/O	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 11
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	analog-value
Present_Value	REAL	R	
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"
Event_State	BACnetEventState	R	0, normal
Reliability	BACnetReliability	R (O)	0, no-fault-detected 1, no-sensor 7, unreliable-other 64, not-installed ¹² 102, simulation ¹⁰
Out_Of_Service	BOOLEAN	R	0, False
Units	BACnetEngineeringUnit	R, W	See "Units" on Table 2
Property_List	BACnetARRAY[N]of BACnetPropertyIdentifier	R	...

Table 5**10 Custom Value**

"ANALOG INPUT" OBJECTS

Property Identifier	Property Datatype	R/W/O	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 6
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	analog-input
Present_Value	REAL	R	
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"
Event_State	BACnetEventState	R	0, normal
Reliability	BACnetReliability	R (O)	0, no-fault-detected 1, no-sensor 7, unreliable-other 64, not-installed ¹⁰ 102, simulation ¹⁰
Out_Of_Service	BOOLEAN	R	0, False
Units	BACnetEngineeringUnit	R	See "Units" on Table 2
Property_List	BACnetARRAY[N] of BACnetPropertyIdentifier	R	...

Table 6**"MULTI STATE VALUE" OBJECTS**

Property Identifier	Property Datatype	R/W/O	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 9
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	multi-state-value
Present_Value	Unsigned	R	See below ...
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"
Event_State	BACnetEventState	R	0, normal
Reliability	BACnetReliability	R (O)	0, no-fault-detected 64, not-installed ¹⁰
Out_Of_Service	BOOLEAN	R	0, False
Number_Of_States	Unsigned	R	See below ...
State_Text	BACnetARRAY[N] of CharacterString	R (O)	...
Property_List	BACnetARRAY[N] of BACnetPropertyIdentifier	R	...

Table 7**10 Custom Value**

Object	Number Of States	Present Value	Explanation
GLOBAL_ALARM	4	1	No Alarm
		2	Main Alarm
		3	Secondary Alarm
		4	Main and Secondary Alarm
TH_PWR_ALARM, FL_RATE_ALARM, TD_ALARM, T1_ALARM, T2_ALARM.	3	1	No Alarm
		2	Min Value Alarm
		3	Max Value Alarm
AIN_STATE	3	1	AIN_OK
		2	No Current (disconnected)
		3	Current Over Range
BATT_STATE	4	1	Battery OK (if enabled)
		2	Battery Low
		3	Battery Empty
		4	Battery Fault
P_TYPE_CTRL	3	1	Auto (by Power)
		2	Local (by IN4)
		3	Remote (by Com. Protocol)

"BITSTRING VALUE" OBJECTS

Property Identifier	Property Datatype	R/W	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 4
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	Bit-string-value
Present_Value	BIT STRING	R	See below ...
Bit_Text	BACnetARRAY[N] of CharacterString	R (O)	...
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	"F", "F", "F", "F".
Event_State	BACnetEventState	R	0, normal
Out_Of_Service	BOOLEAN	R	0, False
Property_List	BACnetARRAY[N] of BACnetPropertyIdentifier	R	...

Table 8

Object	Bit	explanation
MEA_ERROR	1	Power Measure Overflow
	2	Vector Fluid Overflow
	3	Temperature T1 Overflow
	4	Temperature T2 Overflow
	5	Temperature Delta Overflow
PLS_ERROR	1	Pulse In 1 Overflow
	2	Pulse In 2 Overflow
	3	Pulse In 3 Overflow
	4	Pulse In 4 Overflow
	5	Pulse Out 1 Overflow
	6	Pulse Out 2 Overflow
RTD_ERROR	1	Disconnected
	2	RTD1 Limit
	3	RTD2 Limit
	4	Shunt Error
	5	Ref Error
SUPP_ERROR	1	Internal Power Error
	2	Pulse In Power Error

"BINARY VALUE" OBJECTS

Property Identifier	Property Datatype	R/W	Value
Object_Identifier	BACnetObjectIdentifier	R	0 ... 2
Object_Name	CharacterString	R	See "Name" on Table 2
Object_Type	BACnetObjectType	R	binary- value
Present_Value	BACnetBinaryPV	R-W ¹²	
Description	CharacterString	R (O)	See "Description" on Table 2
Status_Flags	BACnetStatusFlag	R	InAlarm = "F" Fault = "T" or "F" Overridden = "F" OutOfService = "F"
Event_State	BACnetEventState	R	0, normal
Reliability	BACnetReliability	R (O)	0, no-fault-detected 70, plant-type-mismatch ¹³
Out_Of_Service	BOOLEAN	R	0, False
Inactive_Text	CharacterString	R (O)	See below
Active_Text	CharacterString	R (O)	See below
Priority_Array	BACnetPriorityArray	R (O) ¹⁴	...
Relinquish_Default	BACnetBinaryPV	R (O) ¹⁴	... ¹⁵
Property_List	BACnetARRAY[N]of BACnetPropertyIdentifier	R	...

Table 9

12 "P_TYPE_SEL" may be Writable, Depends on local Device settings.

13 Custom Value for "P_TYPE_DET" and "P_TYPE_SEL".

14 "Priority_Array" and "Relinquish_Default" properties are present only on objects with "Present_Value" Writable.

15 On "P_TYPE_SEL". Present_Value is automatically copied to Relinquish_Default to keep last settings

Object	R/W	Value	Text
P_TYPE_DET	R	Inactive	Heating
		Active	Cooling
P_TYPE_SEL	R-W ¹²	Inactive	Heating
		Active	Cooling
RST_SEL_CNT	W	Inactive	No Command
		Active	Reset Command

Data Link Layer Options:

- ☒ BACnet IP, (Annex J)
- ☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200
- ☒ MS/TP slave (Clause 9), baud rate(s): 9600, 19200, 38400, 57600, 76800, 115200

Device Address Binding: NO

Networking Options: None

Data Link Layer Options:

- ☒ ANSI X3.4 - ISO 10646 (UTF-8) ¹⁶

Gateway Options: Not a gateway

Network Security Options: None

11 Depends on local Device settings.

12 "P_TYPE_SEL" may be Writable, Depends on local Device settings.

16 With some limitation, see user manual.

HISTORY OF REVISIONS

Firmware Revision	Date	Protocol Revision	Summary of Changes
F.R.: 1.0.3 1.1.3	15/01/2020	1.15	Corrected documentation of AUX Input description and unit of measure
F.R.: 1.1.3	22/01/2019	1.15	Implemented BACnet® IP DataLink Protocol. Certified MSTP Protocol still have F.R.: 1.0.3
F.R.: 1.0.3	08/01/2018	1.15	"Priority_Array" and "Relinquish_Default" properties on Binary_Value Objects are present only on object instances with "Present_Value" Writable.
F.R.: 1.0.2	27/12/2017	1.15	Fixed followings errors •Reading single element or array size of Bit_Text property on BitString Value Object, return the error: PROPERTY, PROPERTY_IS_NOT_AN_ARRAY instead of the value. •Trying to writing a text property over its maximum size return the error; PROPERTY, VALUE_OUT_OF_RANGE instead of: RESURCES, VALUE_OUT_OF_RANGE. •Reinitialize_Device return the wrong PROPERTY Class for error OPTIONAL_FUNCTIONALITY_NOT_SUPPORTED instead of SERVICE class.
F.R.: 1.0.1	24/11/2017	1.15	Added, to "MEA_ERROR" BitStringValue Object, bits 3 to 5 : •Temperature T1 Overflow •Temperature T2 Overflow •Temperature Delta Overflow.
F.R.: 1.0.0	15/11/2017	1.15	-



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