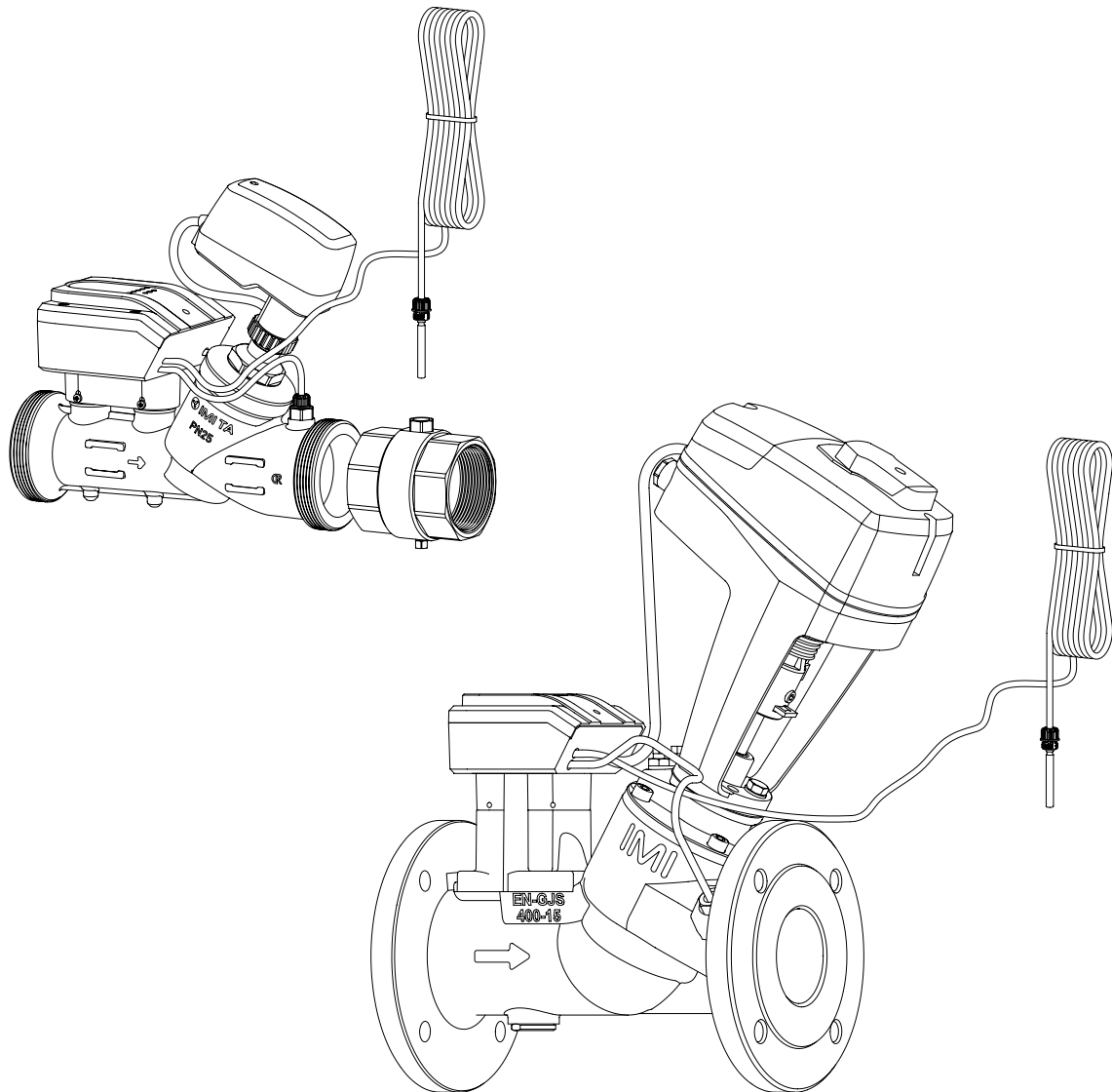


TA-Smart BACnet MS/TP

Protocol Implementation Conformance Statement – PICS



General information

Date:	18/11/2021
Vendor Name:	IMI Hydronic Engineering
Vendor ID:	926
Product Name:	TA-Smart DN32 to 80
Product Model Number:	322231-XXXXX
Application Software Version:	1.0
BACnet Protocol Revision:	16
Product Description:	Digitally configurable connected 2-way control valve with integrated ultrasonic flow measurement
BACnet Standard Device Profile:	BACnet Application Specific Controller (B-ASC)
BACnet Interoperability Building Blocks (BIBBs) supported:	<ul style="list-style-type: none">• Data Sharing - ReadProperty-B (DS-RP-B)• Data Sharing - ReadPropertyMultiple-B (DS-RPM-B)• Data Sharing - WriteProperty-B (DS-WP-B)• Data Sharing - WritePropertyMultiple-B (DS-WPM-B)• Device Management - DynamicDeviceBinding-B (DM-DDB-B)• Device Management - DynamicObjectBinding-B (DM-DOB-B)• Device Management - DeviceCommunicationControl-B (DM-DCC-B)†• Device Management - TimeSynchronization (DM-TS-B)*• Device Management - UTCTimeSynchronization (DM-UTC-B)*
Segmentation Capability:	Configurable (Tx, Rx, Both**, None)
Data Link Layer Options:	MS/TP master
Baud rates:	Auto, 9600**, 19200, 38400, 56700, 76800, 115200
Device Address Binding:	Supported
Networking Options:	None
Character Sets Supported:	ISO 10646 (UTF-8)

†) No password required

*) Valid range for years is 2000 – 2099

***) Default value

BACnet object description

Device object

Object type / address	Name	Access	Value	Description
Device	Object ID	RW	0 ... 4194303	Value computed from the S/N by default
Device	Object name	RW	1 to 32 char	By default: "TA-Smart X YYYYYYYY" (X being the DN Size and YYYYYYYY being the 8 character serial number)
Device	Serial-number	R	YYYYYYYY	8 characters
Device	Max-master	RW	1 ... 127	Maximum value for the "poll for master"
Device	Location	RW	32 char max	Empty by default
Device	Object description	RW	32 char max	Empty by default

Object list (pages 3-7)

Obj type	Object name	Access	Unit	Value range	Default	Description
AI:0	ValveNominalFlow_unit1	R	FlowUnit1	[0.0, 3.4e+38]	n.a.	Nominal flow of the valve expressed in the units selected in registers FlowUnit1 and FlowUnit2 respectively. This is the maximum value of flow that can be assigned to the valve.
AI:1	ValveNominalFlow_unit2	R	FlowUnit2	[0.0, 3.4e+38]	n.a.	
AI:2	ValveMinAdjustableFlow_unit1	R	FlowUnit1	[0.0, 3.4e+38]	n.a.	Min adjustable flow of the valve expressed in the units selected in registers FlowUnit1 and FlowUnit2 respectively. This is the minimum value of flow that can be assigned to the valve.
AI:3	ValveMinAdjustableFlow_unit2	R	FlowUnit2	[0.0, 3.4e+38]	n.a.	
AI:4	ValveNominalPower_unit1	R	PowerUnit1	[0.0, 3.4e+38]	n.a.	Nominal power of the valve expressed in the units selected in registers PowerUnit1 and PowerUnit2 respectively. This is the maximum value of power that can be assigned to the valve.
AI:5	ValveNominalPower_unit2	R	PowerUnit2	[0.0, 3.4e+38]	n.a.	
AI:6	ValveMinAdjustablePower_unit1	R	PowerUnit1	[0.0, 3.4e+38]	n.a.	Min adjustable power of the valve expressed in the units selected in registers PowerUnit1 and PowerUnit2 respectively. This is the minimum value of power that can be assigned to the valve.
AI:7	ValveMinAdjustablePower_unit2	R	PowerUnit2	[0.0, 3.4e+38]	n.a.	
AI:8	ValveNominalStroke_mm	R	mm	[0.0, 3.4e+38]	n.a.	Nominal stroke of the valve expressed in millimeters and inches respectively.
AI:9	ValveNominalStroke_inch	R	inch	[0.0, 3.4e+38]	n.a.	
AI:10	ValveMinAdjustableStroke_mm	R	mm	[0.0, 3.4e+38]	n.a.	Min adjustable stroke of the valve expressed in millimeters and inches respectively. This is the minimum value of limited stroke that can be assigned to the valve.
AI:11	ValveMinAdjustableStroke_inch	R	inch	[0.0, 3.4e+38]	n.a.	
AI:12	AnalogSetPointValue	R	VDC or mA	[0.0, 10.0] for VDC; [0.0, 20.0] for mA	n.a.	Analog input value in VDC or mA used as setpoint for controlling the valve if register ControlSource is set to Analog. Value is VDC or mA depending on register AnalogSignalType
AI:13	FlowSetPoint_unit1	R	FlowUnit1	[0.0, ValveNominalFlow_unit1]	n.a.	Flow setpoint
AI:14	FlowSetPoint_unit2	R	FlowUnit2	[0.0, ValveNominalFlow_unit2]	n.a.	
AI:15	PowerSetPoint_unit1	R	PowerUnit1	[0.0, ValveNominalPower_unit1]	n.a.	Power setpoint
AI:16	PowerSetPoint_unit2	R	PowerUnit2	[0.0, ValveNominalPower_unit2]	n.a.	
AI:17	PositionSetPoint_mm	R	mm	[0.0, ValveNominalStroke_mm]	n.a.	Position setpoint
AI:18	PositionSetPoint_inch	R	inch	[0.0, ValveNominalStroke_inch]	n.a.	
AI:19	RelativeMeasuredFlow	R	%	[0.0, 100.0]	n.a.	Measured flow expressed in percentage of the currently applicable maximum flow depending on register CurrentRegime
AI:20	MeasuredFlow_unit1	R	FlowUnit1	[0.0, 3.4e+38]	n.a.	Measured flow
AI:21	MeasuredFlow_unit2	R	FlowUnit2	[0.0, 3.4e+38]	n.a.	
AI:22	MeasuredSupplyTemp_degC	R	°C	[-40.0, 140.0]	n.a.	Measured supply temperature
AI:23	MeasuredSupplyTemp_degF	R	°F	[-40.0, 284.0]	n.a.	
AI:24	MeasuredReturnTemp_degC	R	°C	[-40.0, 140.0]	n.a.	Measured return temperature
AI:25	MeasuredReturnTemp_degF	R	°F	[-40.0, 284.0]	n.a.	
AI:26	MeasuredDeltaT_K	R	K	[0.0, 3.4e+38]	n.a.	Measured Delta T
AI:27	MeasuredDeltaT_degF	R	°F	[0.0, 3.4e+38]	n.a.	
AI:28	RelativeMeasuredPower	R	%	[0.0, 100.0]	n.a.	Measured power expressed in percentage of the currently applicable maximum power depending on register CurrentRegime
AI:29	MeasuredPower_unit1	R	PowerUnit1	[0.0, 3.4e+38]	n.a.	Measured power
AI:30	MeasuredPower_unit2	R	PowerUnit2	[0.0, 3.4e+38]	n.a.	
AI:31	EnergyCounterRegime1_unit1	R	EnergyUnit1	[0.0, 3.4e+38]	n.a.	Energy counter in regime 1
AI:32	EnergyCounterRegime1_unit2	R	EnergyUnit2	[0.0, 3.4e+38]	n.a.	
AI:33	EnergyCounterRegime2_unit1	R	EnergyUnit1	[0.0, 3.4e+38]	n.a.	Energy counter in regime 2
AI:34	EnergyCounterRegime2_unit2	R	EnergyUnit2	[0.0, 3.4e+38]	n.a.	
AI:35	RelativeMeasuredPosition	R	%	[0.0, 100.0]	n.a.	Measured position expressed in percentage of the currently applicable maximum position depending on register CurrentRegime

Obj type	Object name	Access	Unit	Value range	Default	Description
AI:36	MeasuredPosition_mm	R	mm	[0.0, 3.4e+38]	n.a.	Measured position
AI:37	MeasuredPosition_inch	R	inch	[0.0, 3.4e+38]	n.a.	
AV:0	ControlCharCoefficient	R/W	n.a.	[0.01, 0.99]	0.25	This coefficient (thermal efficiency) allows to adjust the curvature of the EQM and Inverted EQM characteristics. Default value is 0.25.
AV:1	R1SetbackPercentage	R/W	%	[0.0, 100.0]	100.0	Setback percentage applied to MaxFlowRegime1 when CurrentRegime is set to Regime1Setback
AV:2	R2SetbackPercentage	R/W	%	[0.0, 100.0]	100.0	Setback percentage applied to MaxFlowRegime2 when CurrentRegime is set to Regime2Setback
AV:3	MaxFlowRegime1_unit1	R/W	FlowUnit1	[ValveMinAdjustableFlow_unit1, ValveNominalFlow_unit1]	ValveNominalFlow_unit1	Max flow assigned to the valve when the valve is in regime 1
AV:4	MaxFlowRegime1_unit2	R/W	FlowUnit2	[ValveMinAdjustableFlow_unit2, ValveNominalFlow_unit2]	ValveNominalFlow_unit2	
AV:5	MaxFlowRegime2_unit1	R/W	FlowUnit1	[ValveMinAdjustableFlow_unit1, ValveNominalFlow_unit1]	ValveNominalFlow_unit1	Max flow assigned to the valve when the valve is in regime 2
AV:6	MaxFlowRegime2_unit2	R/W	FlowUnit2	[ValveMinAdjustableFlow_unit2, ValveNominalFlow_unit2]	ValveNominalFlow_unit2	
AV:7	MinFlowRegime1_unit1	R/W	FlowUnit1	[0.0, MaxFlowRegime1_unit1]	0.0	Min flow assigned to the valve when the valve is in regime 1
AV:8	MinFlowRegime1_unit2	R/W	FlowUnit2	[0.0, MaxFlowRegime1_unit2]	0.0	
AV:9	MinFlowRegime2_unit1	R/W	FlowUnit1	[0.0, MaxFlowRegime2_unit1]	0.0	Min flow assigned to the valve when the valve is in regime 2
AV:10	MinFlowRegime2_unit2	R/W	FlowUnit2	[0.0, MaxFlowRegime2_unit2]	0.0	
AV:11	MaxPowerRegime1_unit1	R/W	PowerUnit1	[ValveMinAdjustablePower_unit1, ValveNominalPower_unit1]	ValveNominalPower_unit1	Max power assigned to the valve when the valve is in regime 1
AV:12	MaxPowerRegime1_unit2	R/W	PowerUnit2	[ValveMinAdjustablePower_unit2, ValveNominalPower_unit2]	ValveNominalPower_unit2	
AV:13	MaxPowerRegime2_unit1	R/W	PowerUnit1	[ValveMinAdjustablePower_unit1, ValveNominalPower_unit1]	ValveNominalPower_unit1	Max power assigned to the valve when the valve is in regime 2
AV:14	MaxPowerRegime2_unit2	R/W	PowerUnit2	[ValveMinAdjustablePower_unit2, ValveNominalPower_unit2]	ValveNominalPower_unit2	
AV:15	MaxPositionRegime1_mm	R/W	mm	[ValveMinAdjustableStroke_mm, ValveNominalStroke_mm]	ValveNominalStroke_mm	Max position assigned to the valve when the valve is in regime 1
AV:16	MaxPositionRegime1_inch	R/W	inch	[ValveMinAdjustableStroke_inch, ValveNominalStroke_inch]	ValveNominalStroke_inch	
AV:17	MaxPositionRegime2_mm	R/W	mm	[ValveMinAdjustableStroke_mm, ValveNominalStroke_mm]	ValveNominalStroke_mm	Max position assigned to the valve when the valve is in regime 2
AV:18	MaxPositionRegime2_inch	R/W	inch	[ValveMinAdjustableStroke_inch, ValveNominalStroke_inch]	ValveNominalStroke_inch	
AV:19	MinPositionRegime1_mm	R/W	mm	[0.0, MaxPositionRegime1_mm]	0.0	Min position assigned to the valve when the valve is in regime 1
AV:20	MinPositionRegime1_inch	R/W	inch	[0.0, MaxPositionRegime1_inch]	0.0	
AV:21	MinPositionRegime2_mm	R/W	mm	[0.0, MaxPositionRegime2_mm]	0.0	Min position assigned to the valve when the valve is in regime 2
AV:22	MinPositionRegime2_inch	R/W	inch	[0.0, MaxPositionRegime2_inch]	0.0	
AV:23	RelativeSetpoint	R/W	%	[0.0, 100.0]	100.0	Relative setpoint in percentage of currently applicable max value. This setpoint applies if register ControlSource is set to Bus
AV:24	AdditiveConcentration	R/W	%	[0.0, 57.0]	0.0	Additive concentration in water in % weight. Additive is defined through register FluidType. Register is not writable if FluidType is Water

Obj type	Object name	Access	Unit	Value range	Default	Description
AV:25	OverrideValue_unit1	R/W		[0.0, 3.4e+38]		Value of the max flow, power or position that applies if register OverrideType is set to 1, 2, 4 or 6. The value is expressed according in selected Unit1 for flow and power and in mm for position
AV:26	OverrideValue_unit2	R/W		[0.0, 3.4e+38]		Value of the max flow, power or position that applies if register OverrideType is set to 1, 2, 4 or 6. The value is expressed according in selected Unit2 for flow and power and in inch for position
AV:55	LastErrors[1]	R	n.a.	[0, 2^32]	0	Newest error in error log. Positive for raised error, negative for cleared error. Description property is formatted as follows: +YYMMDD_HHMMSS_ShortErrorString or -YYMMDD_HHMMSS_ShortErrorString See object BSV:0 for the list of possible errors
AV:...	...					
AV:59	LastErrors[10]	R	n.a.	[0, 2^32]	0	Oldest error in error log. Positive for raised error, negative for cleared error. Description property is formatted as follows: +YYMMDD_HHMMSS_ShortErrorString or -YYMMDD_HHMMSS_ShortErrorString See object BSV:0 for the list of possible errors
AV:60	LastEvents[1]	R	n.a.	[0, 2^32]	0	Newest event in event log. Description property is formatted as follows: YYMMDD_HHMMSS_ShortEventString See table Events for the list of possible events
AV:...	...					
AV:69	LastEvents[10]	R	n.a.	[0, 2^32]	0	Oldest event in event log. Description property is formatted as follows: YYMMDD_HHMMSS_ShortEventString See table Events for the list of possible events
MSI:0	ValveFamily	R	n.a.	1: TA-Smart 2: TA-Smart-Dp	n.a.	Family to which the valve belongs
MSI:1	ValveVersion	R	n.a.	1: Standard	n.a.	Version of the valve
MSI:2	ValveSize	R	n.a.	3: DN20 - 3/4" 4: DN25 - 1" 5: DN32 - 1 1/4" 6: DN40 - 1 1/2" 7: DN50 - 2" 8: DN65 - 2 1/2" 9: DN80 - 3" 10: DN100 - 4" 11: DN125 - 5"	n.a.	Size of the valve
MSI:3	AnalogSignalType	R	n.a.	1: Voltage (VDC) 2: Current (mA)	1	Defines the type of analog input signal as set by jumper inside the SmartBox
MSV:0	FluidType	R/W	n.a.	1: Water 2: Monoethylene glycol 3: Monopropylene glycol	1	Type of the fluid. It can be either water or one of the listed additives diluted in water
MSV:1	FlowSide	R/W	n.a.	1: Supply side 2: Return side	1	Piping side on which the valve is installed (supply or return)
MSV:2	ControlMode	R/W	n.a.	1: Flow control 2: Power control 4: Position control	1	The control mode indicates which variable is being controlled by the valve
MSV:3	ControlCharacteristics	R/W	n.a.	1: Linear 2: Equal-percentage (EQM) 3: Inverted EQM	2	Signal characteristics applied to the setpoint value given in register RelativeSetpoint into a target value for the controlled variable. When control mode is set to flow control, the chosen characteristics should be selected as EQM and Linear in the other cases.
MSV:4	ControlSource	R/W	n.a.	1: Analog 2: Bus	1	Control source specifies whether the setpoint for controlling the valve is provided by the analog input (in which case bus is used just for monitoring) or by the bus
MSV:5	FlowUnit1	R/W	n.a.	1: m3/h 2: l/s 3: l/min 4: l/h 5: GPM	1	First selected flow unit

Obj type	Object name	Access	Unit	Value range	Default	Description
MSV:6	FlowUnit2	R/W	n.a.	1: m3/h 2: l/s 3: l/min 4: l/h 5: GPM	5	Second selected flow unit
MSV:7	PowerUnit1	R/W	n.a.	1: kW 2: W 3: Btu/h 4: kBtu/h 5: ton (refrig.)	1	First selected power unit
MSV:8	PowerUnit2	R/W	n.a.	1: kW 2: W 3: Btu/h 4: kBtu/h 5: ton (refrig.)	4	Second selected power unit
MSV:9	EnergyUnit1	R/W	n.a.	1: kWh 2: kJ 3: MJ 4: kBtu 5: MBtu 6: ton.h	1	First selected energy unit
MSV:10	EnergyUnit2	R/W	n.a.	1: kWh 2: kJ 3: MJ 4: kBtu 5: MBtu 6: ton.h	5	Second selected energy unit
MSV:11	RegimeSwitching	R	n.a.	1: None 2: Dual-range input signal 3: Bus 4: Temperature detection 5: Scheduling	1	Switching mode between regimes 1 and 2. To be changed by configuration with the HyTune app. When None, values input for regime 1 are used.
MSV:12	CurrentRegime	R/W	n.a.	1: Regime1 2: Regime2 3: Regime1Setback 4: Regime2Setback	1	Current change-over regime. Changing the current change-over regime via BACnet can be done only if register RegimeSwitching is set to 2.
MSV:13	OverrideType	R/W	n.a.	1: None 2: Flow 3: Power 5: Valve position 6: Stop 7: Simulated operation	1	Type of override defining which action is taken as an override to the configured control. The valve resets automatically to normal operation leaving the override after 3 hours.
BSV:0	CurrentErrorState	R	n.a.	Bit 0 (0x01): 0/1	0	Error 1: ErrorLowPower (ELowPower)
				Bit 1 (0x02): 0/1	0	Error 2: ErrorInputLineBroken (EInLnBreak)
				Bit 2 (0x04): 0/1	0	Error 3: WarningFlowNotReached (WFlowNotRchd)
				Bit 3 (0x08): 0/1	0	Error 4: WarningPowerNotReached (WPwrNotRchd)
				Bit 4 (0x10): 0/1	0	Error 5: ErrorLocalTempSensorDisconnected (ELclTmpSnsrDsctd)
				Bit 5 (0x20): 0/1	0	Error 6: ErrorRemoteTempSensorDisconnected (ERmtTmpSnsrDsctd)
				Bit 6 (0x40): 0/1	0	Error 7: ErrorLocalTempSensorShortCircuit (ELclTmpSnsrShrtC)
				Bit 7 (0x80): 0/1	0	Error 8: ErrorRemoteTempSensorShortCircuit (ERmtTmpSnsrShrtC)
				Bit 8 (0x100): 0/1	0	Error 9: ErrorLocalTempSensorBelowMin (ELclTmpSnsrBlw)
				Bit 9 (0x200): 0/1	0	Error 10: ErrorRemoteTempSensorBelowMin (ERmtTmpSnsrBlw)
				Bit 10 (0x400): 0/1	0	Error 11: ErrorLocalTempSensorAboveMax (ELclTmpSnsrAbv)
				Bit 11 (0x800): 0/1	0	Error 12: ErrorRemoteTempSensorAboveMax (ERmtTmpSnsrAbv)
				Bit 14 (0x4000): 0/1	0	Error 15: ErrorFlowMeasurement (EFlowMsrm)

Event table

Value	Short event string	Description
0x40000001	EvRstUsrDflt	Reset to user default
0x40000002	EvAdmnLogin	Login as Admin

Object processing

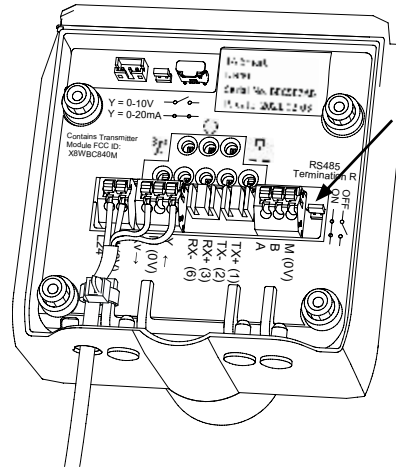
Object type	Optional properties	Writable properties
Analog Input	Min Pres Value	Present Value
	Max Pres Value	Out of Service
	Resolution	
Analog Value	Description	Present Value
	Min Pres Value	Out of Service
	Max Pres Value	
	Resolution	
BitString Value	Bit Text	Present Value
		Out of Service
Device	Location	Object Identifier
	Description	Object Name
	Serial Number	Location
		Description
		Segmentation Supported
		Max Segments Accepted
		UTC Offset
		Daylight Savings Status
		APDU Segment Timeout
		APDU Timeout
		Number of APDU Retries
		Max Master
		Max Info Frames
Multi-state Input	State Text	Present Value
		Out of Service
Multi-state Value	State Text	Present Value
		Out of Service

The properties Object name, Description and Location of the Device Object support up to 32 characters (all other character strings are read-only).
The device does not support the CreateObject and DeleteObject service.

RS-485 termination resistance

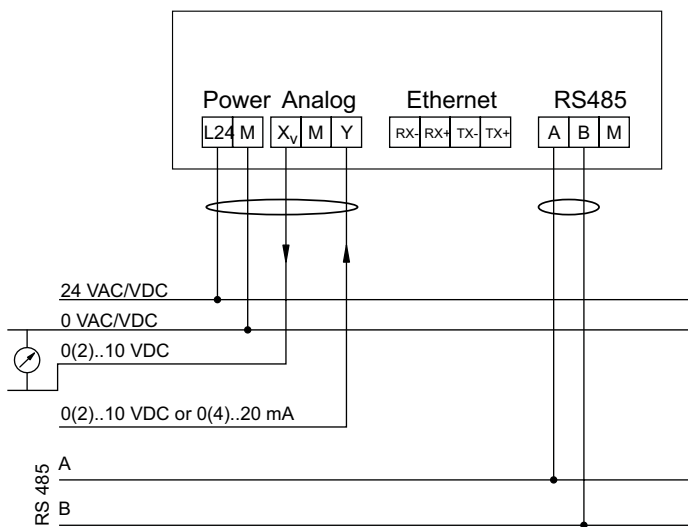
The jumper placed beside the RS-485 A, B and M wire connectors must be closed (set to ON) for activating the 120 Ohm RS-485 termination resistance.

The termination resistance must be activated if TA-Smart is at the end of a daisy chain or if it is not part of a daisy chain.



Wiring diagram

TA-Smart



Note:

1. A, B and M terminals are NOT isolated from all other terminals.
2. GND (M - 0V) is common to power supply, analog signals and RS 485.
3. In case of AC power supply, L24 and M should be connected to the same phase for each TA-Smart.
4. GND (0V) of RS 485 should be connected to 0 VAC/VDC on the controller side.
5. GND (0V) of analog input/output should be connected to 0 VAC/VDC on the controller side.