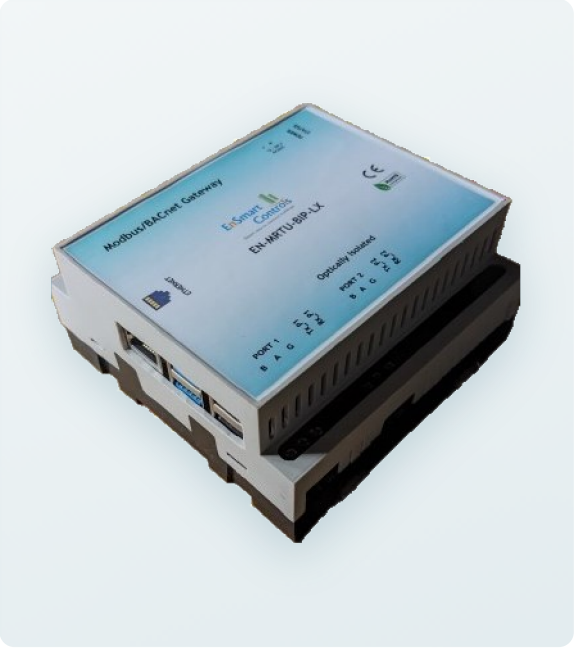
MODBUS / BACNET GATEWAY

EN-MRTU-BIP-LX

The EN-MRTU-BIP-LX is a DIN-rail mounted protocol gateway built on the same SmartNova hardware platform as the EN-CPU-V7 controller. It connects Modbus RTU, Modbus TCP and BACnet devices to building management, SCADA and cloud systems, with all gateway conversion functions included.

The standard model has 2 optically isolated RS485 ports. The EN-MRTU-BIP-LX-3P adds a third port and can also act as a Modbus RTU splitter, sharing data from COM1 to COM2 and COM3. Both models now include a BACnet MS/TP router.

Modbus RTU | Modbus TCP | BACnet/IP | BACnet MS/TP | MQTT | REST API



2 / 3	MS/TP	Splitter	0 to 50 °C	12–24 V
RS485 ports (LX / LX-3P)	BACnet router built in	COM1 → COM2 + COM3 (3P)	Operating temperature	AC/DC supply

FEATURES & BENEFITS

- Modbus RTU to Modbus TCP and BACnet/IP conversion
- Modbus TCP to BACnet/IP conversion
- Modbus and BACnet data to MQTT and REST API
- BACnet MS/TP router — MS/TP devices on RS485 to BACnet/IP
- 2 optically isolated RS485 ports; 3 ports on the -3P model
- Modbus RTU splitter on -3P: COM1 shared to COM2 and COM3
- Point mapping sheet with scaling, byte order, bit selection and invert
- RS485 from 300 to 250 000 bps, 5–8 data bits, 1–2 stop bits, None / Even / Odd parity
- Same 110 × 110 × 70 mm hardware as EN-CPU-V7, without FBD programming
- 0 °C to 50 °C operating range, 12–24 V AC/DC supply

APPLICATIONS

BMS Integration
Modbus meters, VFDs and chillers into a BACnet BMS

BACnet MS/TP Networks
Route MS/TP controllers onto BACnet/IP

SCADA & EMS
Modbus RTU devices published over Modbus TCP

Shared Field Devices
Split Modbus RTU data to two more ports (3P)

Typical sectors: Commercial buildings · IT parks · Pharmaceutical · Healthcare · Data centres · Industrial · Retail

TECHNICAL DATA

HARDWARE SPECIFICATIONS	
Platform	SmartNova
Processor	ARM A53, 1.5 GHz, 32-bit
Memory (RAM)	2 GB
Storage	16 GB flash

INTERFACES	
RS485	2 (LX) / 3 (LX-3P), isolated
Ethernet	RJ45, 10/100/1000 Mbps
USB	4 ports
HDMI	1 port

RS485 SERIAL SETTINGS	
Interface	2-wire (A+, B–) with GND
Baud rate	300 to 250 000 bps
Frame	5–8 data bits · 1–2 stop bits · None / Even / Odd parity

GATEWAY FUNCTIONS	
Modbus	Modbus RTU ↔ Modbus TCP
BACnet	Modbus RTU / TCP → BACnet/IP
MS/TP router	BACnet MS/TP ↔ BACnet/IP
IoT	MQTT, REST API
Splitter (3P)	COM1 → COM2 + COM3

POWER	
Supply voltage	12–24 V AC/DC
Power consumption	30 W

ENVIRONMENT	
Operating temperature	0 °C to 50 °C
Storage temperature	0 °C to 70 °C
Storage humidity	5–95 % RH, non-condensing

MECHANICAL	
Dimensions (L × W × H)	110 × 110 × 70 mm
Mounting	35 mm DIN rail
Enclosure	ABS

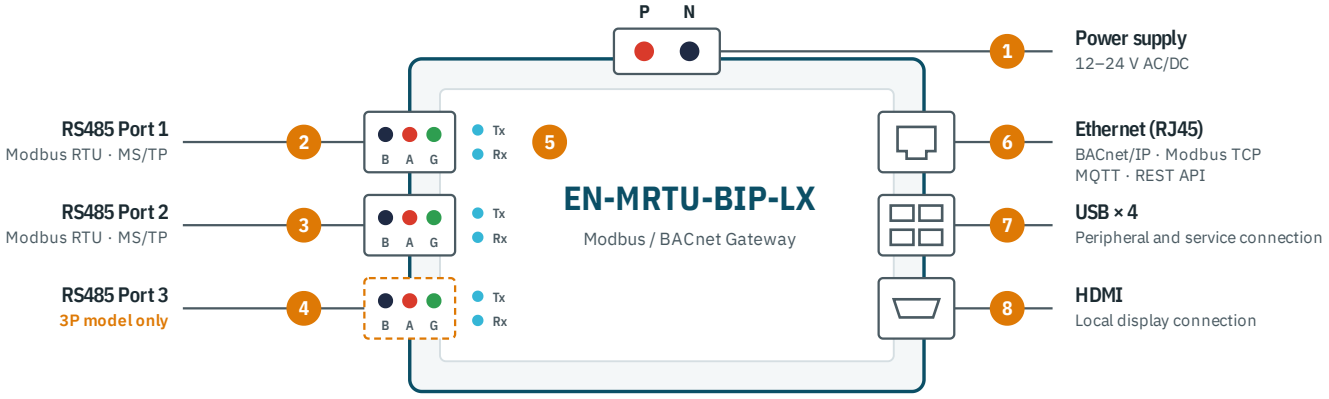
STANDARDS & CERTIFICATIONS	
Standards	ISO 16484, ASHRAE 135
Certifications	CE, RoHS

SOFTWARE	
Configuration	Point-mapping sheet (see page 5)
Loading method	To be confirmed
FBD programming	Not included

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
EN-MRTU-BIP-LX	Modbus / BACnet gateway, 2 × RS485, Ethernet, BACnet MS/TP router, 12–24 V AC/DC
EN-MRTU-BIP-LX-3P	As above with 3 × RS485 and Modbus RTU splitter (COM1 → COM2 + COM3)
EN-CPU-V7	SmartNova DDC Controller — same platform with FBD programming

INTERFACES & TERMINALS



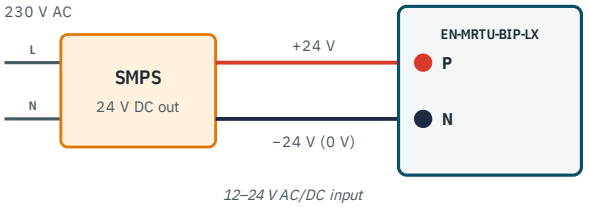
Functional overview — terminal positions on the unit may differ.

NO.	INTERFACE	TERMINAL / LABEL	SIGNAL	DESCRIPTION
1	**Power supply**	**P, N**	12–24 V AC/DC	Gateway supply input — P: + supply, N: – supply
2	**RS485 Port 1 (COM1)**	**B (–), A (+), GND**	Modbus RTU / BACnet MS/TP	Serial field bus; source port for splitter mode on -3P
3	**RS485 Port 2 (COM2)**	**B (–), A (+), GND**	Modbus RTU / BACnet MS/TP	Serial field bus; splitter output on -3P
4	**RS485 Port 3 (COM3)**	**B (–), A (+), GND**	Modbus RTU / BACnet MS/TP	EN-MRTU-BIP-LX-3P only; splitter output
5	**Port indicators**	**Tx_P / Rx_P per port**	LED	Transmit and receive activity on each RS485 port
6	**Ethernet**	**RJ45, 10/100/1000 Mbps**	BACnet/IP, Modbus TCP, MQTT, REST API	Network connection to BMS, SCADA and cloud platforms
7	**USB**	**4 × USB**	USB	Peripheral and service connection
8	**HDMI**	**1 × HDMI**	Video output	Local display connection

RS485 BUS WIRING

- Use shielded twisted-pair cable for all RS485 wiring.
- Wire devices in a daisy-chain (line) topology; avoid star and spur connections.
- Fit 120 Ω termination at both ends of long bus segments.
- Connect GND to the signal ground of every device on the bus.
- Set the same baud rate, data bits, stop bits and parity on every device of a port.
- Segment length up to 1200 m per TIA/EIA-485, reduced at higher baud rates.

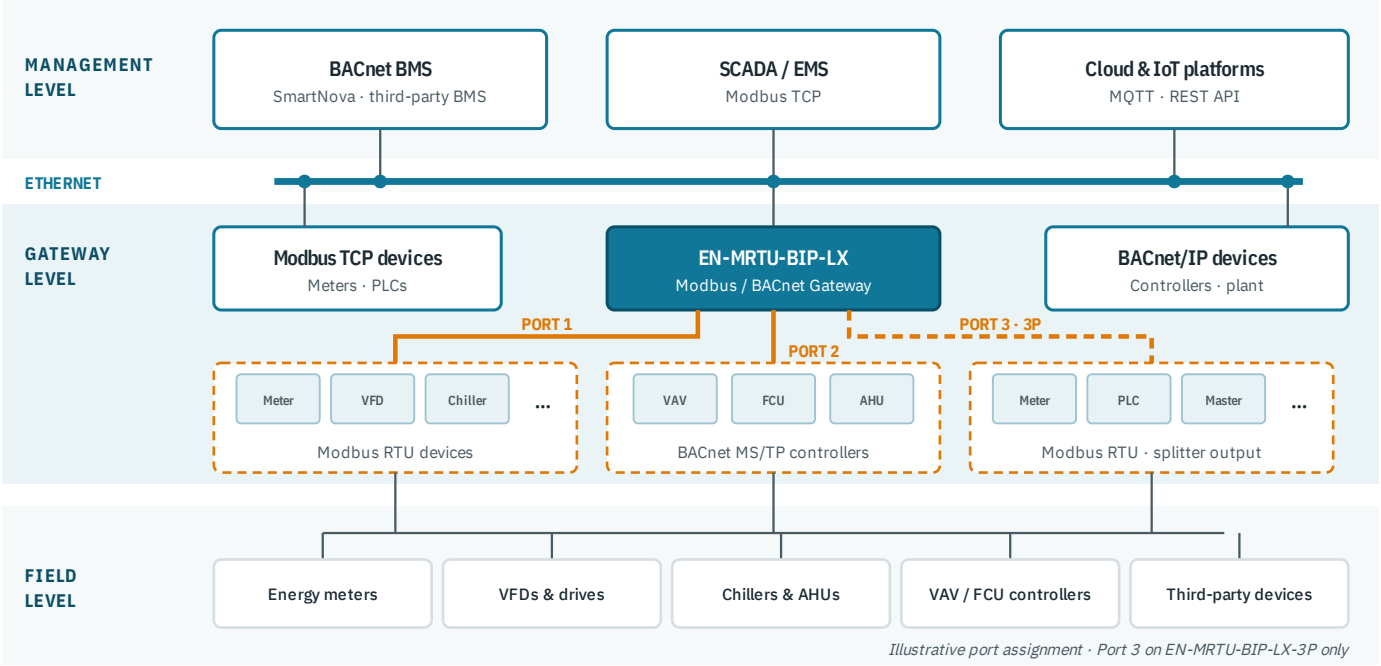
POWER SUPPLY WIRING



12–24 V AC/DC input

- Supply from a 12–24 V AC/DC source, such as a 230 V AC to 24 V DC SMPS.
- Connect + supply to terminal P and – supply to terminal N.
- Size the supply for the gateway plus any other connected loads.

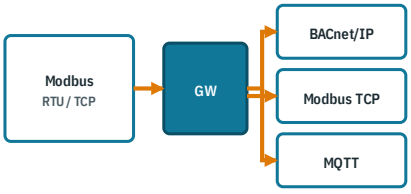
SYSTEM ARCHITECTURE



Illustrative port assignment · Port 3 on EN-MRTU-BIP-LX-3P only

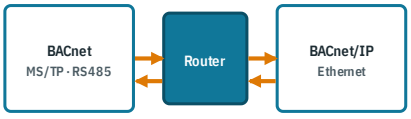
OPERATING MODES

PROTOCOL GATEWAY



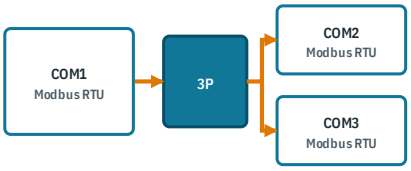
Modbus RTU / TCP to BACnet/IP, Modbus TCP, MQTT

BACNET MS/TP ROUTER



MS/TP devices routed onto BACnet/IP

MODBUS RTU SPLITTER



EN-MRTU-BIP-LX-3P: COM1 to COM2 and COM3

PROTOCOL CONVERSION

FROM		TO	TYPICAL USE
Modbus RTU	→	**Modbus TCP**	RS485 field devices to Modbus TCP SCADA / EMS
Modbus RTU	→	**BACnet/IP**	Modbus devices as BACnet objects for any BACnet BMS
Modbus TCP	→	**BACnet/IP**	Modbus TCP equipment into a BACnet network
BACnet MS/TP	→	**BACnet/IP**	MS/TP controllers routed onto the IP network
Modbus RTU / TCP	→	**MQTT**	Modbus data to cloud and IoT platforms
BACnet/IP	→	**MQTT**	BACnet data to cloud and IoT platforms
Modbus RTU COM1	→	**COM2 + COM3**	Modbus RTU splitter — EN-MRTU-BIP-LX-3P only

CONFIGURATION & POINT MAPPING

Points are mapped in the EnSmart gateway configuration sheet — one row per data point. Each row tells the gateway where to read the Modbus value and how to publish it as a BACnet object.

1 Device
fid · dev_name · esnmart_module

2 Connection
ip_address · ip_port · slave_id

3 Modbus point
modbus_type · modbus_address · bit_position

4 BACnet object
bacnet_type · object_id · array_index · datapoint_name

5 Scale & format
data_type · endian · invert · offset · gain

CONFIGURATION FIELDS

FIELD	MEANING	VALUES / DEFAULT
fid	Row number of the mapping	1, 2, 3 …
dev_name	Device name (energy meter, gas meter …)	Text
esnmart_module	EnSmart IO module name, if one is used	Otherwise same as dev_name
ip_address	Where the device is reached	127.0.0.1 for RS485 devices · device IP for Modbus TCP
ip_port	Gateway port for the device	COM1 = 503 · COM2 = 504 (default)
slave_id	Modbus slave ID of the device	Per device
modbus_type	Modbus data type	input_sts · coil_sts · hold_read · hold_write · input_read
modbus_address	Extended Modbus address, 1-based	See address format
bit_position	Bit to read as a binary value	0 for status points; 0, 1, 2, 3 … from registers
bacnet_type	BACnet object type, lower case	ai · bi · ao · bo · av · bv
object_id	BACnet object identifier	AI0, AI1 … / BI0 … per type
array_index	Index within each BACnet type	0, 1, 2 … per type
datapoint_name	BACnet object name	Text
data_type	Value format	binary · float · uint16 · uint32
endian	Byte order	LE (default) · BE
invert	Invert a binary value (0 ↔ 1)	False (default) · True
offset	Value added to the received value	0 (default)
gain	Multiplication / division factor	1 (default)
array_name · modbus_index	Internal references	Any common reference · 0
plc_address · documentation	Internal references	A (default)

MODBUS → BACNET TYPE

MODBUS_TYPE	BACNET_TYPE
hold_read / input_read	ai or av
hold_write	av or ao
coil_sts	bv or bo
input_sts	bi

MODBUS ADDRESS FORMAT

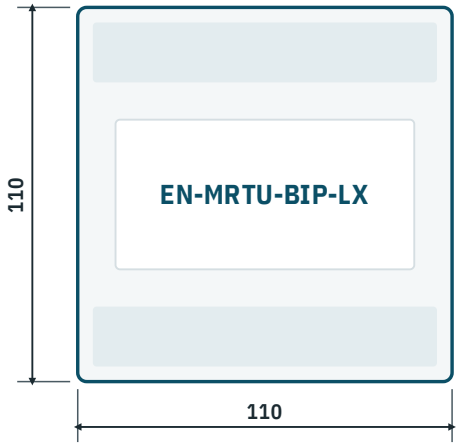
REGISTER TYPE	START ADDRESS
Coil status	1
Input status	100001
Input register	300001
Holding register	400001

DATA TYPE & BYTE ORDER

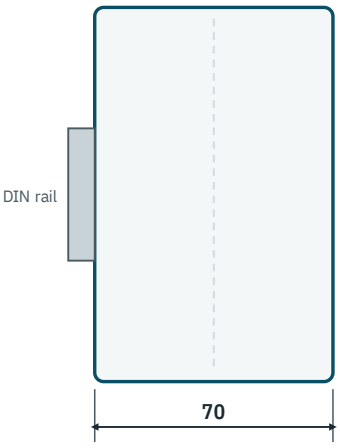
DATA_TYPE	BACNET VALUE	ENDIAN
binary	enumerated	—
float	real	LE
reverse float	real	BE
uint16	unsigned 16-bit	LE / BE
uint32	unsigned 32-bit	LE / BE

- Enter bacnet_type in lower case (ai, av, bi, bo …); object_id uses upper case (AI0, BV3 …).
- Number object_id and array_index from 0 separately for each BACnet type.
- COM3 port number on the -3P model and the method for loading the sheet into the gateway.

DIMENSIONS



FRONT VIEW



SIDE VIEW

Overall dimensions

110 × 110 × 70

L × W × H (mm)

Mounting

DIN rail

Enclosure

ABS

All dimensions in mm.
Simplified outline.

INSTALLATION

- Mount on 35 mm DIN rail inside a control panel or enclosure.
- Leave space around the unit for ventilation and cable access.
- Isolate the power supply before wiring or servicing.
- Route RS485 and Ethernet cables away from power wiring.
- Keep each RS485 port as its own daisy-chained segment.

COMMISSIONING

1. Mount the gateway and connect the 12–24 V AC/DC supply.
2. Connect the Ethernet port to the site network.
3. Wire Modbus RTU or BACnet MS/TP devices to RS485 ports 1–2 (1–3 on -3P).
4. Fill in the point-mapping sheet (page 5) and load it into the gateway.
5. Check communication on the Tx / Rx indicators and at the BMS or SCADA.

SYSTEM REQUIREMENTS

- Ethernet network connection to the BMS, SCADA or cloud platform
- EnSmart gateway configuration sheet for point mapping
- 12–24 V AC/DC power supply
- 35 mm DIN rail mounting inside a control panel

SAFETY INFORMATION

- ▲ Installation, wiring and maintenance must be carried out by qualified personnel in line with local electrical regulations.
- ▲ Disconnect all power before connecting or removing terminal wiring.
- ▲ Install inside a closed control panel, protected from dust, water and direct sunlight.
- ▲ Operate only within the supply voltage and environmental limits stated in this datasheet.
- ▲ Observe ESD precautions when handling the unit.
- ▲ Dispose of the product as electronic waste in accordance with local e-waste regulations.

SERVICES & SUPPORT

Technical support	Installation & setup	Maintenance	Application support	Hardware support	Warranty

EnSmart™ Smart way to connect buildings

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