TECHNICAL DATA SHEET
DS0132 rev 46

Cylon® FBXi Series

DESCRIPTION

The FBXi Series is a range of freely programmable BACnet® Controllers with native BACnet/IP communications support. BTL listed (B-BC) with built in advanced cybersecurity technology and multi-protocol support, the FBXi series is ideally suited as integration platform for HVAC equipment and electrical systems including lighting control and metering applications.

With support for up to sixteen FLX (**F**ield **L**evel e**X**pansion) series extension modules equipped with UniPut technology and dedicated FusionAir Sensor port, the FBXi series provides power and flexibility for complex plant applications. Local override function through HOA switches is available on the -H variants.

For medium sized plants, the -8R8 variants feature built-in 8 UniPuts™ with Relay and 8 Universal Inputs

APPLICATION

The FBXi Series supports routing of BACnet MS/TP to BACnet/IP or communicates on Modbus TCP and Modbus RTU as clients.

It is designed for a wide range of energy management applications for intelligent control of:

- HVAC equipment such as Central Plant, Boilers, Chillers, Cooling Towers, Pump Systems, Air Handling Units (Constant Volume, Variable Air Volume and Multi-zone), and Rooftop Units,
- Electrical systems such as lighting control, variable frequency drives and metering.

The controller accommodates available pre-engineered strategies or can be tailored to custom applications using CXpro^{HD} programming software.

FLX I/O Expansion Module

(-H variants include Hand/Off/Auto Local Override Function)

FLX-4R4(-H) 4 UniPuts with Relay, 4 Universal Inputs
FLX-8R8(-H) 8 UniPuts with Relay, 8 Universal Inputs

FLX-16DI	16 Digital Inputs
FLX-PS24	Power Supply Module
FLX-RMC	Remote Module Connector

Connectivity for Complex Plants

BACnet/IP communications
with dual port Ethernet switch (star or daisy chain topology) and support for both DHCP and Static IP

Network Time Protocol (NTP) support

Multi-protocol communications support
for BACnet MS/TP, Modbus TCP, Modbus RTU, HTTPS for configuration

FusionAir Sensor Port
Enables IAQ applications using CO_2 and VOC sensors in FusionAir
Touch Free user mobile app

Dual IP ports
Supports the Spanning Tree network switch protocol (STP)

Control Capability for Complex Plants

Flexible onboard UniPut technology
allows expandable I/O configurations from 16 to 96 points through connected FLX modules

UniPut™
ABB's patented technology that can be configured as analog / digital outputs or analog inputs automatically by the downloaded strategy

FLX -H
Local HOA switches provide easy manual override capability for simple checkout and override

LED status on all I/O channels
provides indication of fault or override status

Compact form factor for Medium Complexity

-8R8 and 8R8-H versions with built in FLX control points for medium complexity plant applications

PRODUCT SELECTION CHART

		FBXi -X256	FBXi -X256	FBXi-8R8-X96	FBXi-8R8-H-X96
Service		Main Controller	Main Controller	Main Controller	Main Controller
I/O Point Qty	UniPuts with Relay(1)	0	0	8	8
	Universal Inputs	0	0	8	8
	Digital Inputs	0	0	0	0
Input Options	Voltage 0 … 10 V @ 40 kΩ			✓	✓
	Resistance 0 … 450 kΩ			✓	✓
	Temperature -40 °C … +110 °C (-40 °F … +230 °F)			✓	✓
	Current 0 … 20 mA @ 390 Ω			✓	✓
	Digital Volt-Free contact			✓	✓
	Digital 24 V AC detect			UniPuts only	UniPuts only
	Pulse counting			✓	✓
Output Options	Analog 0 … 10 V			✓	✓
	Digital 0 … 10 V			✓	✓
	Relay Contacts 24 V AC			✓	✓
HOA Switch & Pot.					✓
18 V Aux Power				✓	✓
BACnet MS/TP-to-IP Routing		✓	✓	✓	✓
Modbus TCP(2)		✓	✓	✓	✓
RS-485 Port 1(3)		BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU	BACnet MS/TP or Modbus RTU
RS-485 Port 2(3)		BACnet MS/TP, Modbus RTU or Sensor Bus	BACnet MS/TP, Modbus RTU or Sensor Bus	BACnet MS/TP, Modbus RTU or Sensor Bus	BACnet MS/TP, Modbus RTU or Sensor Bus
Local Sensor bus		✓	✓	✓	✓

Note (1) : UniPuts are software configurable for point types AI, DI, AO or DO-R.

Note (2) : FBXi supports a maximum of 640 Modbus point (FBXi-X256), 450 Modbus point (FBXi-8R8(-H)-X96), 320 Modbus points (FBXi-X48) which can be a combination of Modbus RTU or TCP.

Note (3) : The controller supports different protocols on the two RS485 ports at the same time. Each RS-485 Port supports one communication protocol at a time.

Note: FBXi acts only as a Modbus Client for Modbus TCP communications, and only as a Modbus Master for Modbus RTU communications.

Note: Routing of Modbus RTU to Modbus TCP via strategies in CXpro[HD]

SPECIFICATIONS

MECHANICAL

Size (excluding terminal plugs)	166 x 89.5 x 57 mm [6.54 x 3.5 x 2.24”]
Enclosure	Flame-Retardant ABS DIN 43880 type-2 compatible Enclosure IP 20
Mounting	DIN rail

CONNECTION

Note: Use Copper or Copper Clad Aluminum 70 °C (158 °F) conductors only.

Terminals	PCB mounted plug terminal connections
Conductor Area	Max: AWG 12 (3.31 mm^2) Min: AWG 22 (0.355 mm^2)

ENVIRONMENT

Note: This equipment is intended for field installation within an enclosure.

Ambient Temperature	-25 °C … 50 °C (-13 °F … 122 °F)
Ambient Humidity	0% … 90% RH non-condensing
Storage Temperature	-30 °C … +70 °C (-22 °F … 158 °F)
EMC Immunity	EN 61326-1: 2013
EMC Emission	EN 61326-1: 2013 EN 61000-3-2: 2014 EN 61000-3-3: 2013
Approvals	UL Listed (CDN & US) UL916 Energy Management Equipment – File No. E176435
Safety	CE Approved

ELECTRICAL

Supply Requirements		24 V AC/DC ±20 % 50/60 Hz	
Supply Rating	FBXi	Without onboard IO	With onboard IO
		20 VA (no FLX modules)	30 VA (no FLX modules)
	FBXi + 1 x FLX	32 VA	42 VA
	FBXi + 2 x FLX	44 VA	54 VA
	FBXi + 3 x FLX	56 VA	66 VA
	FBXi + 4 x FLX	68 VA	NA
FLX Power Connection		Proprietary FLX bus connector carries power and communications from FBXi unit to power to up to 3 FLX modules (with onboard IO) or 4 FLX modules (without onboard IO). Using FLX-PS24 units allows 4 additional FLX modules per FLX-PS24 unit, up to a maximum of 16 FLX modules.	
Auxiliary Power		18 V DC / 60 mA output	

PROCESSOR

Type	TI Sitara AM335X Dual-core ARM Cortex A8
Clock Speed	1 GHz
System Memory	4 GB eMMC Flash + 512 MB DDR3 DRAM
Real-Time Clock	Yes, backed for 7 days typical

COMMUNICATIONS

Ethernet ports	Dual Switched 10/100BASE-TX (RJ45) Addressing: IP address or Hostname / DHCP Client or Static IP Connection Topology: Daisy-chain, supports Spanning Tree Modbus TCP, BACnet/IP	
USB ports	2 x Type-A USB connectors USB 2.0 5 V DC 2.5W	
RS485 Port 1	Software selectable BACnet MS/TP or Modbus RTU. RS485 @ 9K6,19K2, 38K4(default), 57K6, 76K8 or 115k2 Baud. Max cable length 1.2 km @ default ¼ unit load device.	
Sensor/RS485 Port 2	Software selectable BACnet MS/TP, Modbus RTU or FusionAir sensor bus. RS485 @ 9K6,19K2, 38K4(default), 57K6, 76K8 or 115k2 Baud. Max cable length 1.2 km @ default ¼ unit load device. RS485 sensor bus with a maximum cable length 500 m. Supports ABB Cylon® room sensors.	
Modbus	Total points – Modbus RTU or TCP/IP:	
	FBXi-X256 :	640
	FBXi-8R8(-H) -X96:	450
	FBXi-X48 :	320
FLX bus	115.2K Baud Max bus length (including extension cables): 30 m / 100 ft. using 18 AWG conductors 15 m / 50 ft. using 22 AWG conductors	
FLX bus Connection	FLX bus connector carries inter-module communications and module power	
Supported FLX modules	FBXi-X256 :	16 modules
	FBXi-8R8(-H)-X96:	5 modules
	FBXi-X48 :	3 modules
Supported FLX hardware points	FBXi-X256 :	256 points
	FBXi-8R8(-H)-X96:	96 points
	FBXi-X48 :	48 points

INPUTS / OUTPUTS

Note: Shielded cable is recommended for all input connections.

UniPuts™ with Relay

When configured as **Input**:

Analog Input
- Range: 0 ... 10 V @ 40 kΩ
- Accuracy: ±0.5% full scale [50mV]

Resistance measurement
- Range: 0 ... 450 kΩ
- Accuracy: ±0.5% of measured resistance

Temperature measurement
- Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
- Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1))
  ±0.3 °C, -40 to 90 °C (-40°F to 194°F); ±0.4 °C > 90 °C (194°F)

Current input
- Range: 0 ... 20 mA @ 390 Ω

Note: Current Input requires user-supplied external 390 Ω resistance.

- Accuracy: depends on user supplied external resistor

Digital Volt-Free contact, 2 mA contact-wetting current

Digital 24 V AC detect

Pulse counting up to 20 Hz, 25 ms - 25 ms

When configured as **Output**:

Analog Output 0 ... 10 V @ 20 mA max load, 12-bit resolution

Digital Output 0 ... 10 V @ 20 mA max load

Relay Contacts with ability to switch up to 24 V AC
Maximum Load: 24 V AC, 2 (1) A resistive (inductive) for all relay contacts

Universal Inputs

Analog Input
- Range: 0 ... 10 V @ 130 kΩ
- Accuracy: ±0.5% full scale [50mV]

Resistance measurement
- Range: 0 ... 450 kΩ
- Accuracy: ±0.5% of measured resistance

Temperature measurement
- Range: -40 °C ... +110 °C (-40 °F ... +230 °F)
- Accuracy: 10k NTC sensors (e.g. 10k Type 2 (10K3A1) or 10k Type 3 (10K4A1))
  ±0.3°C, -40 to 90°C (-40°F to 194°F); ±0.4°C > 90°C (194°F)

Current input
- Range: 0 ... 20 mA @ 390 Ω
- Accuracy: ±0.5% full scale [100µA]

Digital Volt-Free contact, 2 mA contact-wetting current

Pulse counting up to 20 Hz, 25 ms – 25 ms

Notes:
1) All inputs and outputs are protected against short circuit, as well as over-voltage up to 24 V AC.
2) Inputs use on-board 16-bit analog to digital convertor.
3) 18 V DC supply, max 60 mA per FBXi unit, is available for powering sensors.

SOFTWARE FEATURES

Maximum number of Strategy Modules	FBXi-X256 :	5000
	FBXi-X48 :	2500
	FBXi-8R8(-H) -X96:	3500
Maximum number of Trendlog Modules	255	
Entries per Trendlog	1024	
Maximum BACnet Schedules	16	
Maximum number of Exposable BACnet Points	FBXi-X256 :	5000
	FBXi-X48 :	1200
	FBXi-8R8(-H) -X96:	2500

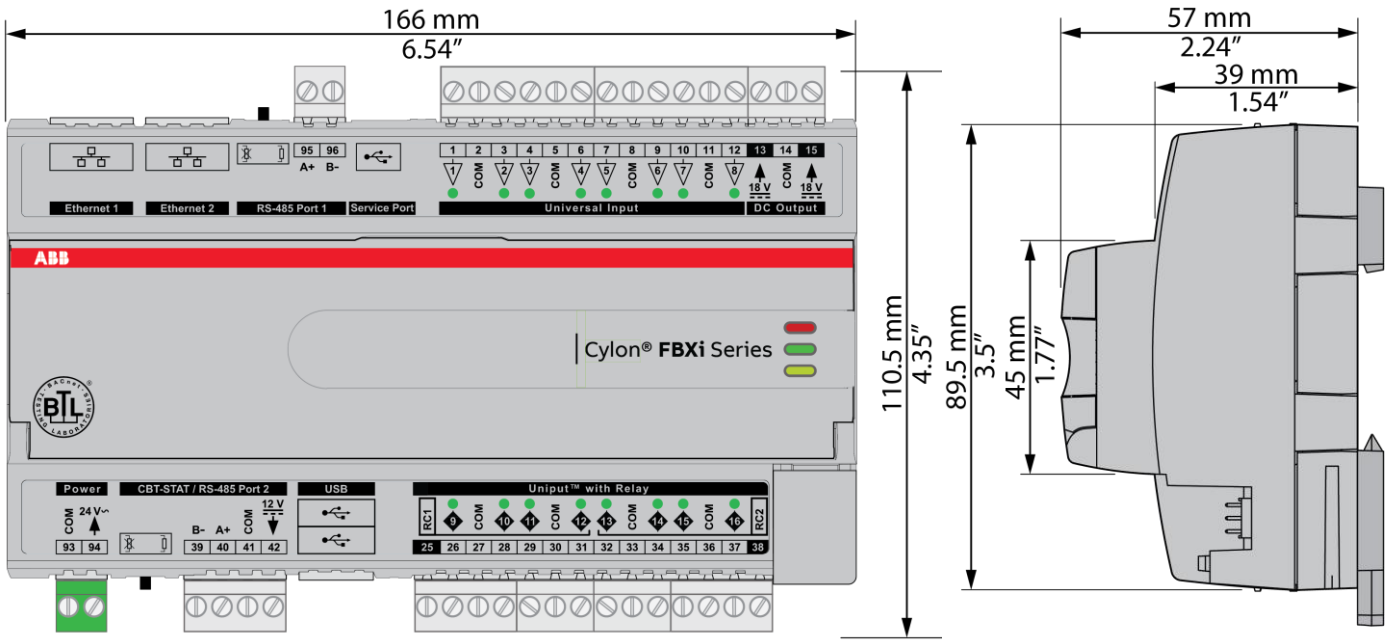
SECURITY

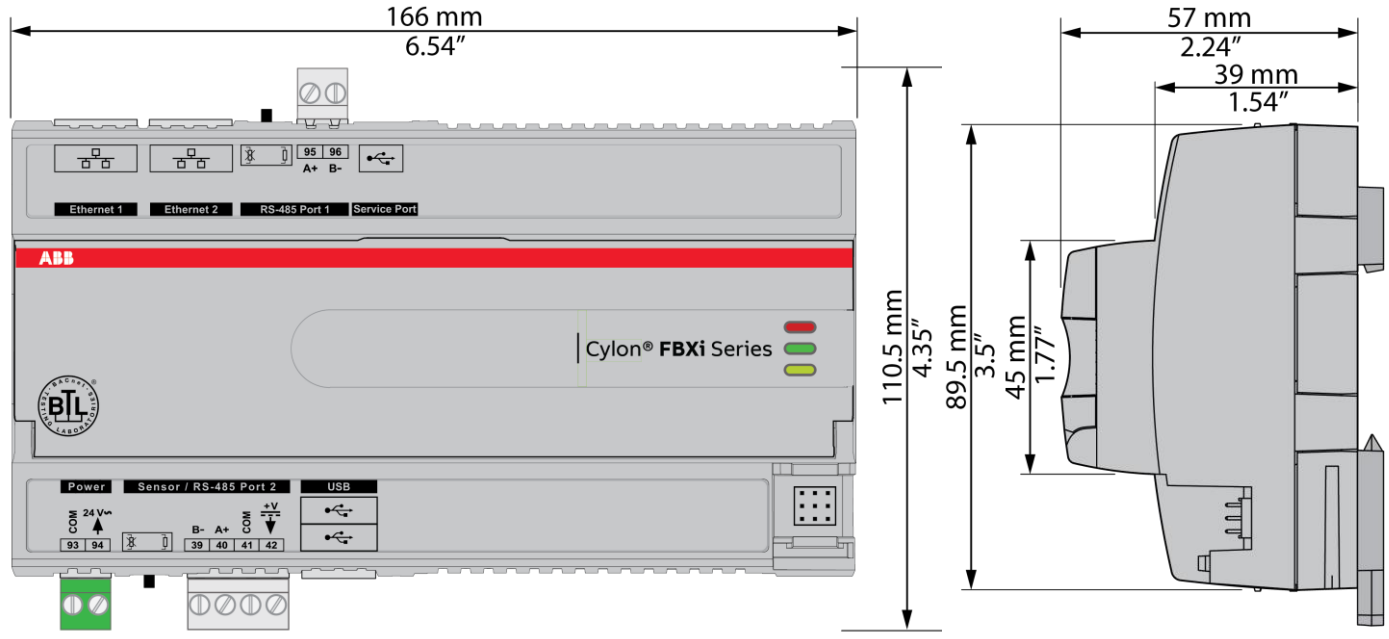
Data Security	Strategy and Set points backed up in Flash
Transport Layer Security	Support for TLS 1.3
Upgrade Security	Upgrade software bundles are signed

INTERFACE

Engineering Software	CXpro[HD]	
Touchscreen	eXplore	

DIMENSIONS

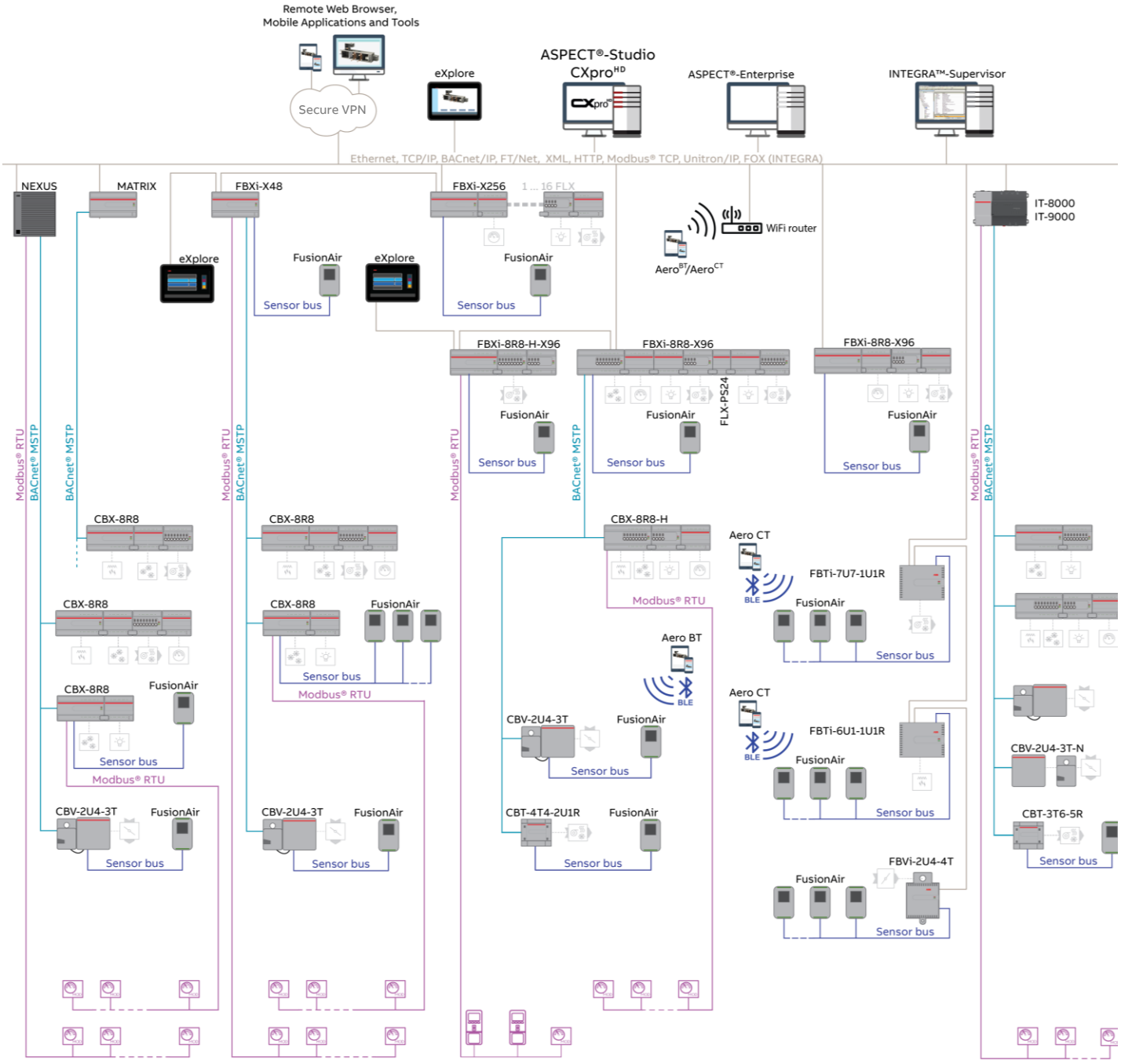




ORDERING INFORMATION

Order Code	Product Name	Description
ABB2CQG201014R1021	FBXi-X256	IP B-BC + 640 Total Modbus Points
ABB2CQG201018R1021	FBXi-X48	IP B-BC + 320 Total Modbus Points
ABB2CQG201029R1011	FBXi-8R8-H-X96	IP B-BC+HOA: 16 I/O + 450 Total Modbus Points
ABB2CQG201028R1011	FBXi-8R8-X96	IP B-BC: 16 I/O + 450 Total Modbus Points

SYSTEM ARCHITECTURE



FBXi / CBXi-8R8 / CBX-8R8

CBXi-8R8-H / CBX-8R8-H

CBV-2U4-3T

FLX-8R8 / FLX-4R4 / FLX-16DI

FLX-8R8 -H

FLX-4R4-H

FLX-PS24

CBT-4T4-2U1R

FBVi-2U4-4T

NEXUS Series

MATRIX-2 Series

INTEGRA Series

eXplore

FusionAir Smart Sensor

CBT-STAT

UCU Room Display

SOLUTIONS.ABB/HVAC-BUILDING-AUTOMATION

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