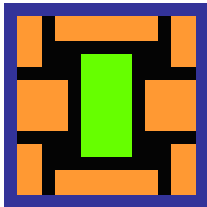


ICx IEC Substation Gateway



Datasheet

Document Version: 4

Solutions for SCADA communications and
protocol translation

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ICx IEC Substation Gateways: Rugged Substation Gateway

ICxIEC Series of Embedded Substation Computers are Fanless with highly ruggedized with an embedded operating system. It also includes extensions such as additional LAN / Serial Ports. ICxGateway Platform is feature specific and is suitable for data gateway, concentrator and data server applications. The Gateway architecture shortens the integration time with multiple networking interfaces and fulfills the complete Grid Communication requirements.

KEY Gateway Features

Implementation:

- ⇒ Protocol Converter
- ⇒ Data Concentrator
- ⇒ Pass-through Configuration (Transparent Device)
- ⇒ Protocol Analyzer / Monitoring

Redundancy:

- ⇒ Device Redundancy: ICx gateway devices can be configured for redundancy allowing seamless switchover from one device to another without effecting the communication.
- ⇒ Link Redundancy: Over a single ICx gateway, communication links (Serial / Ethernet) can be configured for redundancy, eliminating single point of failure.

Interfaces

- ⇒ Full compatibility with Industrial standard Interface.
- ⇒ Supported media types are:
 - Serial Interface (RS 232, RS 422, RS 485): 30 Devices per Port
 - Direct Support for Serial to Ethernet Terminal Devices Converters.
 - Ethernet/LAN (TCP/IP): 100 Devices per LAN Port
 - Fiber Interface through Add-on Module
 - Clients: Upto 5 Master / Clients per protocol supported.

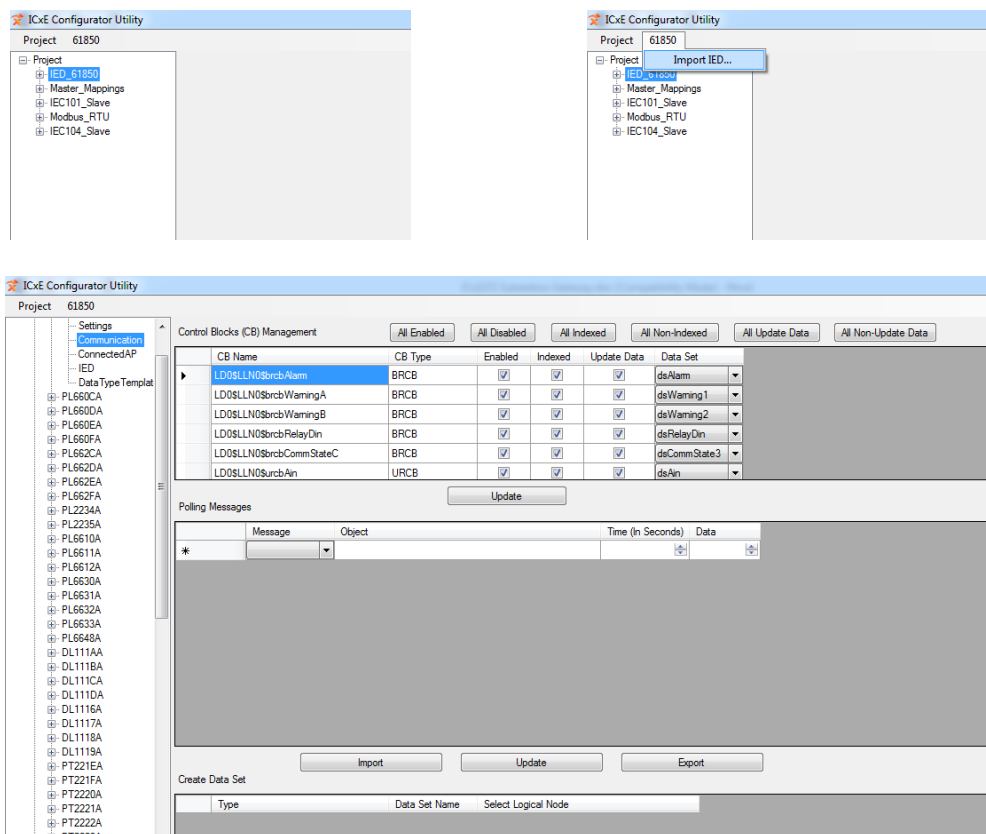
Database & Diagnosis

- ⇒ 60,000 I/O Tags & 120,000 Tags (in case for ICx4784)
- ⇒ Integration with MS Excel for Protocol data points and parameters definitions.
- ⇒ Versioning (commented) of database allows full control.
- ⇒ Error reporting and protocol analysis enable easy maintenance of the system.

The ICx Gateway supports the following Protocols:

- ⇒ IEC 60870-5-101 Master/Slave
- ⇒ IEC 60870-5-103 Master/Slave
- ⇒ IEC 60870-5-104 Client/Server
- ⇒ IEC 61850 Client/Server
- ⇒ ICCP Client / Server / Bi Directional
- ⇒ SINAUT Master
- ⇒ DNP3 Serial Master/Slave & DNP3 Network Master/Slave
- ⇒ MODBUS RTU Serial Master/Slave & TCP Master/Slave
- ⇒ Ethernet I/P
- ⇒ BACnet Master / Slave
- ⇒ DLMS Master/Slave
- ⇒ OPC UA, DA & AE Client / Server
- ⇒ CDC Slave

The ICx Gateway Configuration Tool



ICxÉ Configurator Utility

Project 61850

Project

- IED_61850
 - Settings
 - Communication
 - ConnectedAP
 - IED
 - Data Type Template
- PL660CA
- PL660DA
- PL660EA
- PL660FA
- PL662CA
- PL662DA
- PL662EA
- PL662FA
- PL2234A
- PL2235A
- PL6610A
- PL6611A
- PL6612A
- PL6630A
- PL6631A
- PL6632A
- PL6633A
- DL111AA
- DL111BA
- DL111CA
- DL111DA

IP 192.168.1.72

IP-SUBNET 255.255.255.0

IP-GATEWAY 0.0.0.0

OSI-TSEL 0001

OSI-SEL 0001

OSI-PSEL 00000001

OSI-AP-Title 1.3.9999.33

OSI-AP-Invoke 1

OSI-AE-Qualifier 23

OSI-AE-Invoke 1

Update

ICxÉ Configurator Utility

Project 61850

Project

- IED_61850
 - Master_Mappings
 - Digital Inputs
 - Analog Inputs
 - Digital Outputs
 - IEC101_Slave
 - Modbus_RTU
 - IEC104_Slave

101 Settings | 101 Settings2 | 101 Setting3 | 101 Settings4 | 101 Settings5 | 104 Settings1 | 104 Settings2 | 104 Settings3 | 104 Settings4 | 104 Settings5

101 Setting

Device Name Master101

Scada Device Address 1

Com Port 1

Baud Rate 9600

Data Bits 8

Stop Bits 1

Parity None

Intra Message Delay 200

Inter Message Delay 100

Number Of Retries 3

Response Timeout (in milliseconds) 10000

Cyclic Interval (in seconds) 1000

Data Link Address 1

ASDU Address Size 2

Information Object 3

Cause Of Transmission 2

ASDU Address 1

Originator Address 0

Update Remove Setting

ICxÉ Configurator Utility

Project 61850

Project

- IED_61850
 - Master_Mappings
 - Digital Inputs
 - Analog Inputs
 - Digital Outputs
 - IEC101_Slave
 - Modbus_RTU
 - IEC104_Slave

101 Settings | 101 Settings2 | 101 Setting3 | 101 Settings4 | 101 Settings5 | 104 Settings1 | 104 Settings2 | 104 Settings3 | 104 Settings4 | 104 Settings5

104 Setting1

Device Name Master104

Type 104 S

IP Address 192.168.1.246

TCP/IP Port 2404

ASDU Address Size 2

Information Object 3

Cause Of Transmission 2

ASDU Address 1

Originator Address 0

T1(Timeout in milliseconds) 15000

T2(Timeout in milliseconds) 10000

T3(Timeout in milliseconds) 20000

Send 8

Recieve 12

Cyclic Interval (in seconds) 1000

ICxE Configurator Utility

Project: 61850

Project Tree:

- Project
 - IED_61850
 - Master_Mappings
 - Digital Inputs
 - Digital Outputs
 - IEC101_Slave
 - Modbus_RTU
 - IEC104_Slave

Mapping	61850M Status	D1 IEC101 Address	D1101 Function Code	D1 IEC104 Address	D1104 Function Code	Remarks/Description
1	CL2239ASCL2239ACRSLGGIO218IndStVal	1	Single Point With Time Tag	1	Single Point With Time Tag	SPEECH CHANNEL-1 FAIL
2	CL2239ASCL2239ACRSLGGIO228IndStVal	2	Single Point With Time Tag	2	Single Point With Time Tag	PLCC PROT.N.CHANNEL-1 FAIL
3	CL2239ASCL2239ACRSLGGIO238IndStVal	3	Single Point With Time Tag	3	Single Point With Time Tag	SPEECH CHANNEL-2 FAIL
4	CL2239ASCL2239ACRSLGGIO248IndStVal	4	Single Point With Time Tag	4	Single Point With Time Tag	PLCC PROT.N.CHANNEL-2 FAIL
5	CL2239ASCL2239ACRSLGGIO258IndStVal	5	Single Point With Time Tag	5	Single Point With Time Tag	GENERAL LOCKOUT SF6
6	CL2239ASCL2239ACRSLGGIO268IndStVal	6	Single Point With Time Tag	6	Single Point With Time Tag	LOSS OF SF6 (R-PH)
7	CL2239ASCL2239ACRSLGGIO278IndStVal	7	Single Point With Time Tag	7	Single Point With Time Tag	LOSS OF SF6 (Y-PH)
8	CL2239ASCL2239ACRSLGGIO288IndStVal	8	Single Point With Time Tag	8	Single Point With Time Tag	LOSS OF SF6 (B-PH)
9	CL2239ASCL2239ACRSLGGIO298IndStVal	9	Single Point With Time Tag	9	Single Point With Time Tag	CB SPRING CHARGED
10	CL2239ASCL2239ACRSLGGIO308IndStVal	10	Single Point With Time Tag	10	Single Point With Time Tag	
11	CL2239ASCL2239ACRSLGGIO318IndStVal	11	Single Point With Time Tag	11	Single Point With Time Tag	
12	CL2239ASCL2239ACRSLGGIO328IndStVal	12	Single Point With Time Tag	12	Single Point With Time Tag	
13	CL2239ASCL2239ACRSLGGIO338IndStVal	13	Single Point With Time Tag	13	Single Point With Time Tag	
14	CL2239ASCL2239ACRSLGGIO348IndStVal	14	Single Point With Time Tag	14	Single Point With Time Tag	
15	CL2239ASCL2239ACRSLGGIO358IndStVal	15	Single Point With Time Tag	15	Single Point With Time Tag	
16	CL2239ASCL2239ACRSLGGIO368IndStVal	16	Single Point With Time Tag	16	Single Point With Time Tag	
17	CL2239ASCL2239ACRSLGGIO378IndStVal	17	Single Point With Time Tag	17	Single Point With Time Tag	
18	CL2239ASCL2239ACRSLGGIO388IndStVal	18	Single Point With Time Tag	18	Single Point With Time Tag	
19	CL2239ASCL2239ACRSLGGIO398IndStVal	19	Single Point With Time Tag	19	Single Point With Time Tag	
20	CL2239ASCL2239ACRSLGGIO408IndStVal	20	Single Point With Time Tag	20	Single Point With Time Tag	
21	CL2239ASCL2239ACRSLGGIO418IndStVal	21	Single Point With Time Tag	21	Single Point With Time Tag	
22	CL2239ASCL2239ACRSLGGIO428IndStVal	22	Single Point With Time Tag	22	Single Point With Time Tag	
23	CL2239ASCL2239ACRSLGGIO438IndStVal	23	Single Point With Time Tag	23	Single Point With Time Tag	
24	CL2239ASCL2239ACRSLGGIO448IndStVal	24	Single Point With Time Tag	24	Single Point With Time Tag	

Buttons: Update, Reload, Import Excel, Export Excel

ICxIEC Gateways Product Codes

Product Code	Serial Ports	LAN Ports	Certifications
ICx2272	1	1	BIS
ICx2272-2L	1	1 + 2	BIS
ICx2272-2S	1 + 2	1	BIS
ICx2372	4	2	BIS
ICx2372-2S	4 + 2	2	BIS
ICx2372-4S	4 + 4	2	BIS
ICx2372-1L	4	2 + 1	BIS
ICx2372-1W	4	2 + 1 WiFi	BIS
ICx4784	10	8	BIS, IEC 61850-3
ICx4784-1F	10	8 + 1 Port Fiber	BIS, IEC 61850-3
ICx4784-2F	10	8 + 2 Port Fiber	BIS, IEC 61850-3
ICx4784-8S	10 + 8	8	BIS, IEC 61850-3
ICx4784-16S	10 + 8 + 8	8	BIS, IEC 61850-3

Features ICx-2272

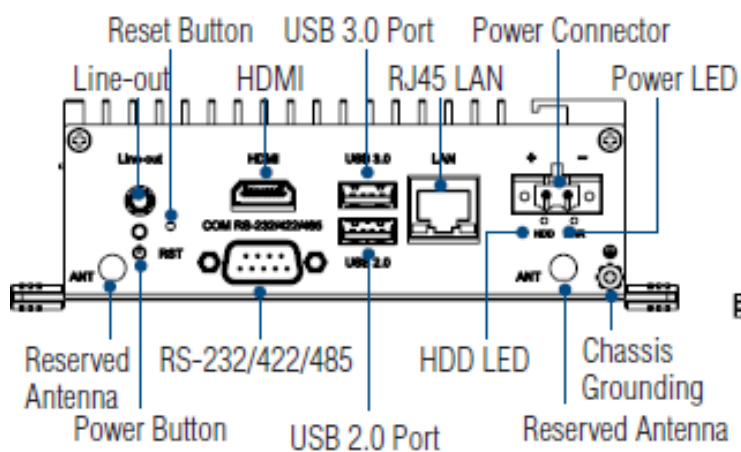
- Intel® Atom / Celeron Processor
- 2GB DDR3/ DDR3L Memory
- 1 x GbE LAN Port, 3 x USB 2.0/3.0, 1 x RS-232/485
- 1 x VGA or HDMI, Audio
- Compact with Fanless Design
- Diverse system I/O and Isolated Digital I/O by iDoor Technology
- Supports Fieldbus Protocol by iDoor Technology
- 3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology
- Chassis Grounding Protection
- Additional 2 LAN ports or 2 Isolated Rs485 ports using iDoor Technology

Specification Details for ICx-2272	
Certification	CE, FCC, UL, CCC, BSMI BIS Approved Product
Dimensions (W x D x H)	157 x 88 x 50 mm (6.2"x 3.5"x 2.0")
Enclosure	Aluminum Housing
Power Requirements Power Consumption	24VDC $\pm$ 20% 12W (Typical), 20W (Max)
Weight	0.8 kg (1.76 lbs) System Design Fanless design
System Hardware • Intel Celeron / ATOM Processor • Built-in 2GB DDR3L 1333 MHz • Intel® HD Graphics • LEDs for Power, HDD, LAN (Active, Status) • Storage 1 x full-size mSATA • Display 1 x HDMI, supports 1920 x 1080 @ 60Hz • 1 x 2 Pins, Terminal Block • WatchDog Timer Programmable 256 levels time interval, from 1 to 255 seconds for each tier	
I/O Interface • Serial Ports: ○ 1 ports RS-232/485, on board ○ Automatic RS-485 data flow control ○ Communication Speed ▪ RS-232: 50 ~ 115.2 kps, ▪ RS-422/485: 50 ~ 921600 bps • LAN: Intel i210 GbE, 802.10av, IEEE1588/802.1AS, 803.3az • USB Ports: 2 x USB 2.0 and 1 x USB 3.0 • Expansion: 1 iDoor Slot for (Serial & LAN Port Extensions)	

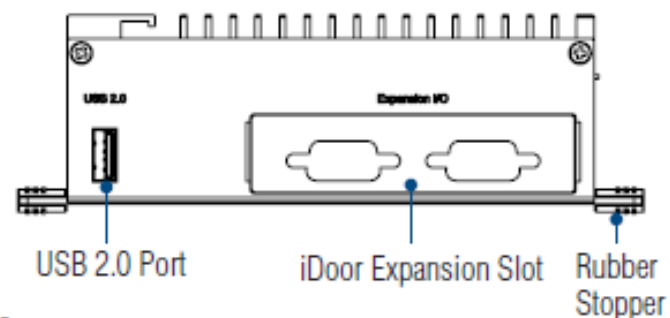
Environment

- **Operating Temperature:** -10 ~ 55°C (14~131) @ 5 ~ 85% RH with 0.7 m/s airflow
- **Operating Humidity:** 10 ~ 95% (non-condensing)
- **Shock Protection:** Operating, IEC 60068-2-27, 50G, half sine, 11 ms
- **Vibration Protection:** Operating, IEC 60068-2-64, 2 Grms, random, 5 ~ 500 Hz, 1hr/axis (mSATA)
- **Ingress Protection:** IP40

ICx-2272 View



Front I/O View



Rear I/O View

Features ICx-2372

- Intel® Atom / Celeron Processor
- 4GB DDR3/ DDR3L Memory
- 2 x GbE, 4 x USB, 4 x RS-232/422/485
- 1 x HDMI, Audio
- Compact with Fanless Design
- Diverse system I/O and Isolated Digital I/O by iDoor Technology
- Supports Fieldbus Protocol by iDoor Technology
- 3G/GPS/GPRS/Wi-Fi Communication by iDoor Technology
- Chassis Grounding Protection
- Additional 2 LAN ports or 2 Isolated Rs485 ports using iDoor Technology

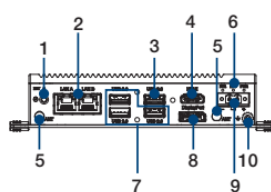
Specification Details for ICx-2372	
Certification	CE, FCC, UL, CCC, BSMI BIS Approved Product
Dimensions (W x D x H)	150 x 105 x 35mm (5.8" x 4.2" x 1.4")
Enclosure	Aluminum Housing
Power Requirements Power Consumption	10 - 36VDC 30W (Typical), 42W (Max)
Weight	1.0kg (2.2lbs)
System Hardware • Intel Celeron / ATOM Processor • Built-in 4GB DDR3L 1333 MHz • Intel® HD Graphics • LEDs for Power, HDD, LAN (Active, Status) • Storage 1 x full-size mSATA • Display ○ 1 x DisplayPort 1.2, supports 2560 x 1440p ○ 1 x HDMI v1.4, supports 1920 x 1080p @60Hz • Power Connector: 1 x 2 Pins, Terminal Block • Watch-Dog Timer Programmable 256 levels time interval, from 1 to 255 seconds for each tier	
I/O Interface • Serial Ports: 4 x RS232/422/485, DB9, 50 ~ 115.2kbps • LAN: 2 x RJ45, 10/100/1000 Mbps IEEE 802.3u 1000BASE-T Fast Ethernet • USB Ports: 1 x USB 3.0, 3 x USB 2.0 Compliant • Expansion: 1 iDoor Slot for (Serial & LAN Port Extensions) though Dual Stack Module	

Environment

- **Operating Temperature:** -20 ~ 60°C (-4 ~ 140°F) @ 5 ~ 85% RH with 0.7m/s airflow
- **Operating Humidity:** 10 ~ 95% (non-condensing)
- **Shock Protection:** Operating, IEC 60068-2-27, 50G, half sine, 11 ms
- **Vibration Protection:** Operating, IEC 60068-2-64, 2 Grms, random, 5 ~ 500 Hz, 1hr/axis (mSATA)
- **Ingress Protection:** IP40

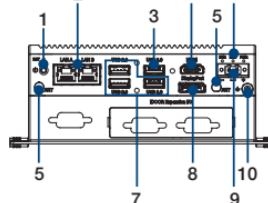
ICx-2372 View

Single Stack



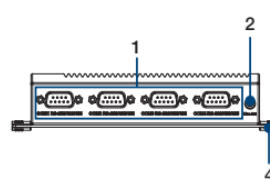
1. Power Button
2. RJ45 LAN
3. USB 3.0
4. HDMI
5. Reserved Antenna

Dual Stack



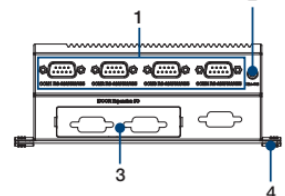
6. BTR, HDD & PWR LED Lights
7. USB 2.0
8. DisplayPort
9. Power Connector
10. Chassis Grounding

Single Stack



1. RS-232/422/485
2. Line Out

Dual Stack



3. iDoor Expansion Slot
4. Rubber Stopper

Front I/O View

Rear I/O View

Features ICx-4784

- Intel Haswell Core i7, i3, Celeron Processors
- Isolated 8 x LAN, 10 x Serial Port Communication Interfaces
- 220VAC/DC Redundant Power Supply
- 2 x IO Expansion Slots
- 2 x 2.5" SATA HDD, 1 x CFAST Socket for Storage
- VGA & DVI Display Interface
- Programmable LEDs
- Intelligent Connectivity Diagnosis Management
- Remote Management
- Trusted Platform Module
- Virtualization Technology for Directed I/O

Specification Details for ICx-4784	
Certification	CE, FCC, CCC, Electricity IV level for China, IEC-61850-3, IEEE-1613, UL, CB, LVD BIS Approved Product
Dimensions (W x D x H)	440 x 280 x 88 mm
Enclosure	SECC & Aluminum
Power Requirements	Power1: 100~240 VAC, 100~240 VDC
Power Consumption	Power2: 100~240 VAC, 100~240 VDC 24W (Typical)
Weight	6.0kg
System Hardware • Intel Haswell Core i7, i3, Celeron Processors • DDR3L 1.35V non-ECC 8G • Intel® HD Graphics • LEDs ○ LEDs for PWR1, PWR2, HDD, ○ Programmable LED, LAN (LINK, ACT), ○ COM (TX, RX), Slot1 & Slot2 • Storage ○ 2 x 2.5" SATA HDD (RAID0, RAID1) ○ 1 x CFAST socket • Display ○ 1 x DB15 VGA ○ 1 x DVI-D (Resolution: 1920 x 1080) • Watch-Dog Timer Programmable 256 levels time interval, from 1 to 255 seconds for each tier	

I/O Interface

- **Serial Ports:** 2 x RS-232 (DB9 connectors, Standard), 8 x RS-232/422/485, (Terminal Block), 2,500V isolation
- **LAN:** 8 x 10/100/1000 Base-T RJ45 ports, (Supports Teaming Function, PXE, LAN1 supports, AMT, all LAN ports support IEEE-1588)
- **USB Ports:** 6 x USB
- **Expansion:** 2 Domain I/O Expansion Slots, (Each slot supports 1 x PCIe/ PCI Interface)

Environment

- **Operating Temperature:** -20 ~ 60°C (-4 ~ 140°F) @ 5 ~ 85% RH with 0.7m/s airflow
- **Operating Humidity:** 10 ~ 95% (non-condensing)
- **Shock Protection:** Operating, IEC 60068-2-27, 50G, half sine, 11 ms
- **Vibration Protection:** Operating, IEC 60068-2-64, 2 Grms, random, 5 ~ 500 Hz, 1hr/axis (mSATA)
- **Ingress Protection:** IP40

ICx-4784 View

