UniStream®
Built-in

User Guide

US5-B5-B1, US5-B10-B1, US5-B5-TR22, US5-B10-TR22, US5-B5-T24, US5-B10-T24, US5-C5-B1, US5-C10-B1, US5-C5-TR22, US5-C10-TR22, US5-C5-T24, US5-C10-T24

US7-B5-B1, US7-B10-B1, US7-B5-TR22, US7-B10-TR22, US7-B5-T24, US7-B10-T24, US7-C5-B1, US7-C10-B1, US7-C5-TR22, US7-C10-TR22, US7-C5-T24, US7-C10-T24

US10-B5-B1, US10-B10-B1, US10-B5-TR22, US10-B10-TR22, US10-B5-T24, US10-B10-T24, US10-C5-B1, US10-C10-B1, US10-C5-TR22, US10-C10-TR22, US10-C5-T24, US10-C10-T24

US15-B10-B1, US15-C10-B1

This guide provides basic installation information for specific UniStream® models with built-in I/O. Technical specifications may be downloaded from the Unitronics website.

General Features

Unitronics' UniStream® Built-in series are PLC+HMI All-in-One programmable controllers that comprise a built-in CPU, an HMI panel, and built-in I/Os.

The series is available in two versions: UniStream Built-in and UniStream Built-in Pro.

Note that a model number that includes:

- **B5/C5** refers to UniStream Built-in
- **B10/C10** refers to UniStream Built-in Pro. These models offer additional features, detailed below.

HMI	▪ Resistive Color Touch-screens ▪ Rich graphic library for HMI design
Power Features	▪ Built-in Trends and Gauges, auto-tuned PID, data tables, data sampling, and Recipes ▪ UniApps™: Access & edit data, monitor, troubleshoot & debug and more – via HMI or remotely via VNC ▪ Security: Multi-level password protection ▪ Alarms: Built-in system, ANSI/ISA standards
I/O Options	▪ Built-in I/O configuration, varies according to model ▪ Local I/O via UAG-CX series I/O expansion adapters and standard UniStream Uni-I/O™ modules ▪ Remote I/O using UniStream Remote I/O or via EX-RC1 ▪ US15 only – Integrate I/O into your system by using UAG-BACK-IOADP, snap onto the panel for an all-in-one configuration.
COM Options	▪ Built-in ports: 1 Ethernet, 1 USB host, 1 Mini-B USB device port (USB-C in US15) ▪ Serial and CANbus ports may be added via UAC-CX modules
COM Protocols	▪ Fieldbus: CANopen, CAN Layer2, MODBUS, EtherNetIP and more. Implement any serial RS232/485, TCP/IP, or CANbus third-party protocols via Message Composer ▪ Advanced: SNMP Agent/Trap, e-mail, SMS, modems, GPRS/GSM, VNC Client, FTP Server/Client
Programming Software	All-in-One software for hardware configuration, communications, and HMI /PLC applications, available as a free download from Unitronics.

Comparison table

Feature	B5/C5	B10/C10 (Pro)
System Memory	3GB	6GB
Audio Jack	No	Yes
Video/RSTP Support	No	Yes
Web Server	No	Yes
SQL Client	No	Yes

Before You Begin

Before installing the device, the user must:

- Read and understand this document.
- Verify the Kit Contents.

Alert Symbols and General Restrictions

When any of the following symbols appear, read the associated information carefully.

Symbol	*Meaning*	*Description*
⚠	*Danger*	*The identified danger causes physical and property damage.*
⚠	*Warning*	*The identified danger could cause physical and property damage.*
Caution	*Caution*	*Use caution.*

- All examples and diagrams are intended to aid understanding, and do not guarantee operation. Unitronics accepts no responsibility for actual use of this product based on these examples.
- Please dispose of this product according to local and national standards and regulations.
- This product should be installed only by qualified personnel.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

⚠
- Failure to comply with appropriate safety guidelines can cause severe injury or property damage.
- Do not attempt to use this device with parameters that exceed permissible levels.
- Do not connect/disconnect the device when power is on.

Environmental Considerations

⚠
- Ventilation: 10mm space is required between the device top/bottom edges and the enclosure's walls
- Do not install in areas with: excessive or conductive dust, corrosive or flammable gas, moisture or rain, excessive heat, regular impact shocks or excessive vibration, in accordance with the standards and limitations given in the product's technical specification sheet.
- Do not place in water or let water leak onto the unit.
- Do not allow debris to fall inside the unit during installation.
- Install at maximum distance from high-voltage cables and power equipment.

UL Compliance

The following section is relevant to Unitronics' products that are listed with the UL.

The following models are UL listed for Hazardous Locations: US5-B5-B1, US5-B10-B1, US7-B5-B1 and US7-B10-B1

The following models are UL listed for Ordinary Location:

- USL followed by -, followed by 050 or 070 or 101, followed by B05
- US followed by 5 or 7 or 10, followed by -, followed by B5 or B10 or C5 or C10, followed by -, followed by B1 or TR22 or T24 or RA28 or TA30 or R38 or T42

Models from series US5, US7 and US10 that include "T10" or "T5" in the model name are suitable for mounting on the flat surface of Type 4X enclosure. For examples: US7-T10-B1, US7-T5-R38, US5-T10-RA22 and US5-T5-T42.

UL Ordinary Location

In order to meet the UL ordinary location standard, panel-mount this device on the flat surface of Type 1 or 4X enclosures

UL Ratings, Programmable Controllers for Use in Hazardous Locations, Class I, Division 2, Groups A, B, C and D

These Release Notes relate to all Unitronics products that bear the UL symbols used to mark products that have been approved for use in hazardous locations, Class I, Division 2, Groups A, B, C and D.

Caution This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D, or Non-hazardous locations only.

⚠
- Input and output wiring must be in accordance with Class I, Division 2 wiring methods and in accordance with the authority having jurisdiction.

⚠
- WARNING—Explosion Hazard—substitution of components may impair suitability for Class I, Division 2.
- WARNING – EXPLOSION HAZARD – Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- WARNING – Exposure to some chemicals may degrade the sealing properties of material used in Relays.

- This equipment must be installed using wiring methods as required for Class I, Division 2 as per the NEC and/or CEC.

Panel-Mounting

For programmable controllers that can be mounted also on panel, in order to meet the UL Haz Loc standard, panel-mount this device on the flat surface of Type 1 or Type 4X enclosures.

Communication and Removable Memory Storage

When products comprise either USB communication port, SD card slot, or both, neither the SD card slot nor the USB port are intended to be permanently connected, while the USB port is intended for programming only.

Removing / Replacing the battery

When a product has been installed with a battery, do not remove or replace the battery unless the power has been switched off, or the area is known to be non-hazardous.

Please note that it is recommended to back up all data retained in RAM, in order to avoid losing data when changing the battery while the power is switched off. Date and time information will also need to be reset after the procedure.

UL des zones ordinaires:

Pour respecter la norme UL des zones ordinaires, monter l'appareil sur une surface plane de type de protection 1 ou 4X

Certification UL des automates programmables, pour une utilisation en environnement à risques, Class I, Division 2, Groups A, B, C et D.

Cette note fait référence à tous les produits Unitronics portant le symbole UL - produits qui ont été certifiés pour une utilisation dans des endroits dangereux, Classe I, Division 2, Groupes A, B, C et D.

Attention

- Cet équipement est adapté pour une utilisation en Classe I, Division 2, Groupes A, B, C et D, ou dans Non-dangereux endroits seulement.
- Le câblage des entrées/sorties doit être en accord avec les méthodes de câblage selon la Classe I, Division 2 et en accord avec l'autorité compétente.
- AVERTISSEMENT: Risque d'Explosion – Le remplacement de certains composants rend caduque la certification du produit selon la Classe I, Division 2.
- AVERTISSEMENT - DANGER D'EXPLOSION - Ne connecter pas ou ne débranche pas l'équipement sans avoir préalablement coupé l'alimentation électrique ou la zone est reconnue pour être non dangereuse.
- AVERTISSEMENT - L'exposition à certains produits chimiques peut dégrader les propriétés des matériaux utilisés pour l'étanchéité dans les relais.
- Cet équipement doit être installé utilisant des méthodes de câblage suivant la norme Class I, Division 2 NEC et /ou CEC.

Montage de l'écran:

Pour les automates programmables qui peuvent aussi être monté sur l'écran, pour pouvoir être au standard UL, l'écran doit être monté dans un coffret avec une surface plane de type 1 ou de type 4X.

Communication et de stockage amovible de mémoire (carte mémoire)

Produits comprend un port USB de communication, soit un port carte SD ou les deux, ni le port SD, ni le port USB ne sont censés être utilisés en permanence, tandis que l'USB est destiné à la programmation uniquement.

Retrait / Remplacement de la batterie

Lorsqu'un produit a été installé avec une batterie, retirez et remplacez la batterie seulement si l'alimentation est éteinte ou si l'environnement n'est pas dangereux.

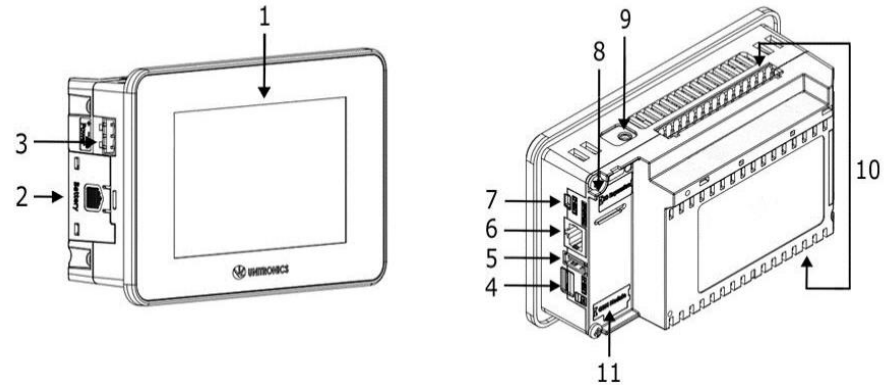
Veuillez noter qu'il est recommandé de sauvegarder toutes les données conservées dans la RAM, afin d'éviter de perdre des données lors du changement de la batterie lorsque l'alimentation est coupée. Les informations sur la date et l'heure devront également être réinitialisées après la procedure.

Kit Contents

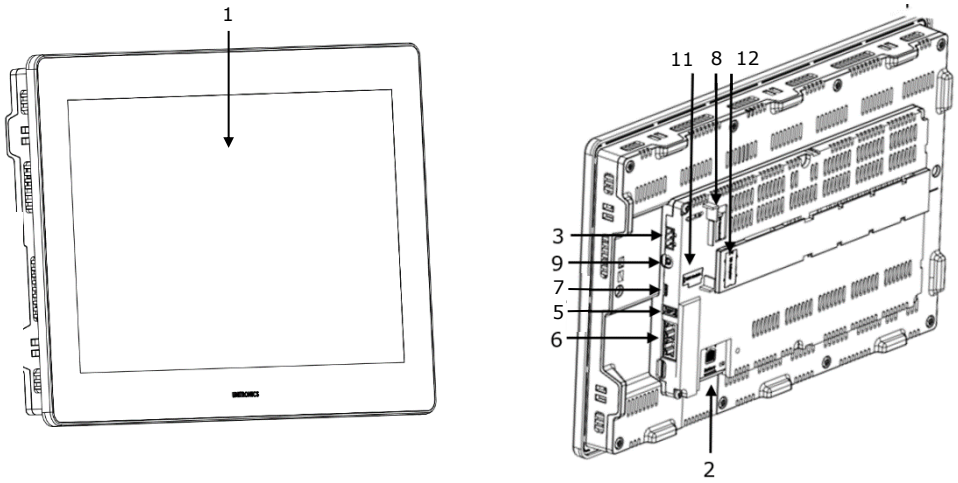
- 1 PLC+HMI controller
- 4,8,10 mounting brackets (US5/US7, US10, US15)
- 1 panel mounting seal
- 2 panel supports (US7/US10/US15 only)
- 1 power terminal block
- 2 I/O terminal blocks (provided only with models comprising built-in I/Os)
- 1 Battery

Product Diagram

US5/7/10



US15



Front and Rear View

1	Screen Protection	A plastic sheet attached to the screen for protection. Remove it during installation of the HMI Panel.
2	Battery Cover	The battery is supplied with the unit, but must be installed by the user.
3	Power Supply Input	Connection point for the controller power source. Connect the Terminal Block supplied with the kit to the end of the power cable.
4	microSD Slot	Supports standard microSD cards.
5	USB Host port	Provides the interface for external USB devices.
6	Ethernet port	Supports high-speed Ethernet communications.
7	USB Device	Use for application download and direct PC-UniStream communication.
8	I/O Expansion Jack	Connection point for an I/O Expansion Port. Ports are supplied as part of I/O Expansion Model Kits. Kits are available by separate order. Note that UniStream® Built-in is compatible only with adapters from the series UAG-CX.
9	Audio Jack	Pro models only. This 3.5mm Audio jack enables you to connect external audio equipment.
10	Built-in I/O	Model-dependent. Present in models with built-in I/O configurations.
11	Uni-COM™ CX Module Jack	Connection point for up to 3 stack-on modules. These are available by separate order.
12	UAG-BACK-IOADP Adapter Jack	Connection point for snap onto the panel for an all-in-one configuration. Adapter is available by Separate order.

Installation Space Considerations

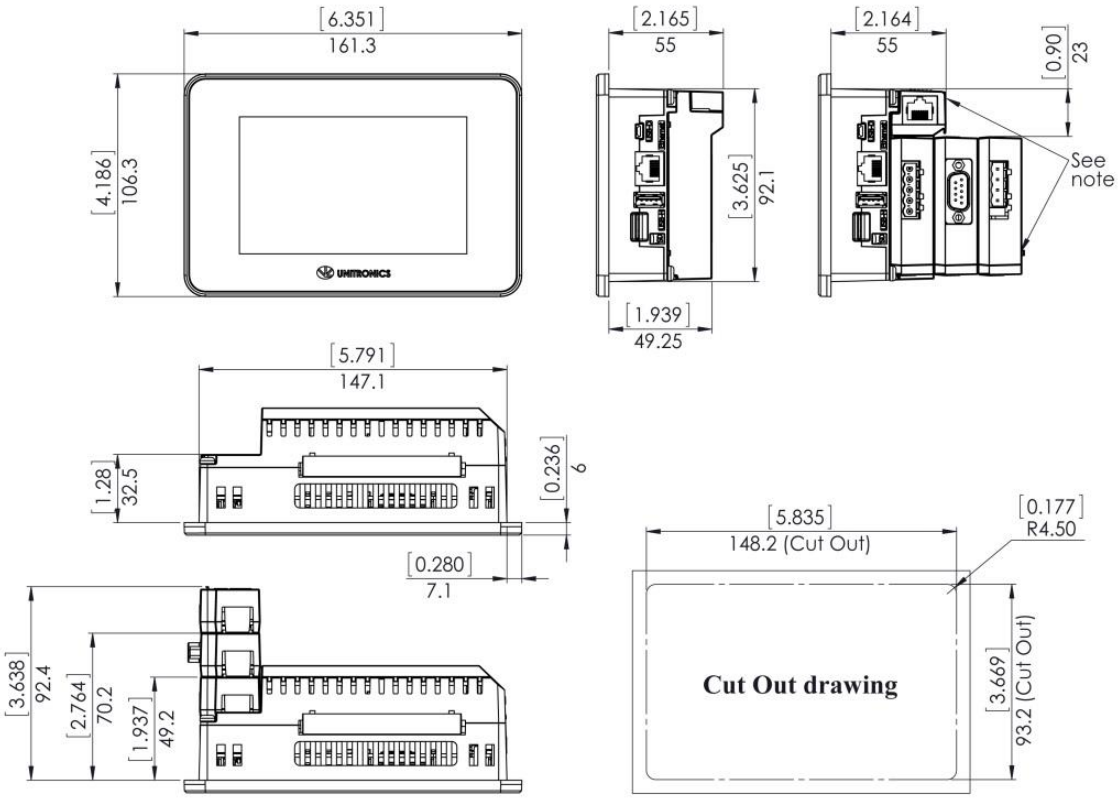
Allocate space for:

- the controller
- any modules that will be installed
- access to ports, jacks, and the microSD card slot

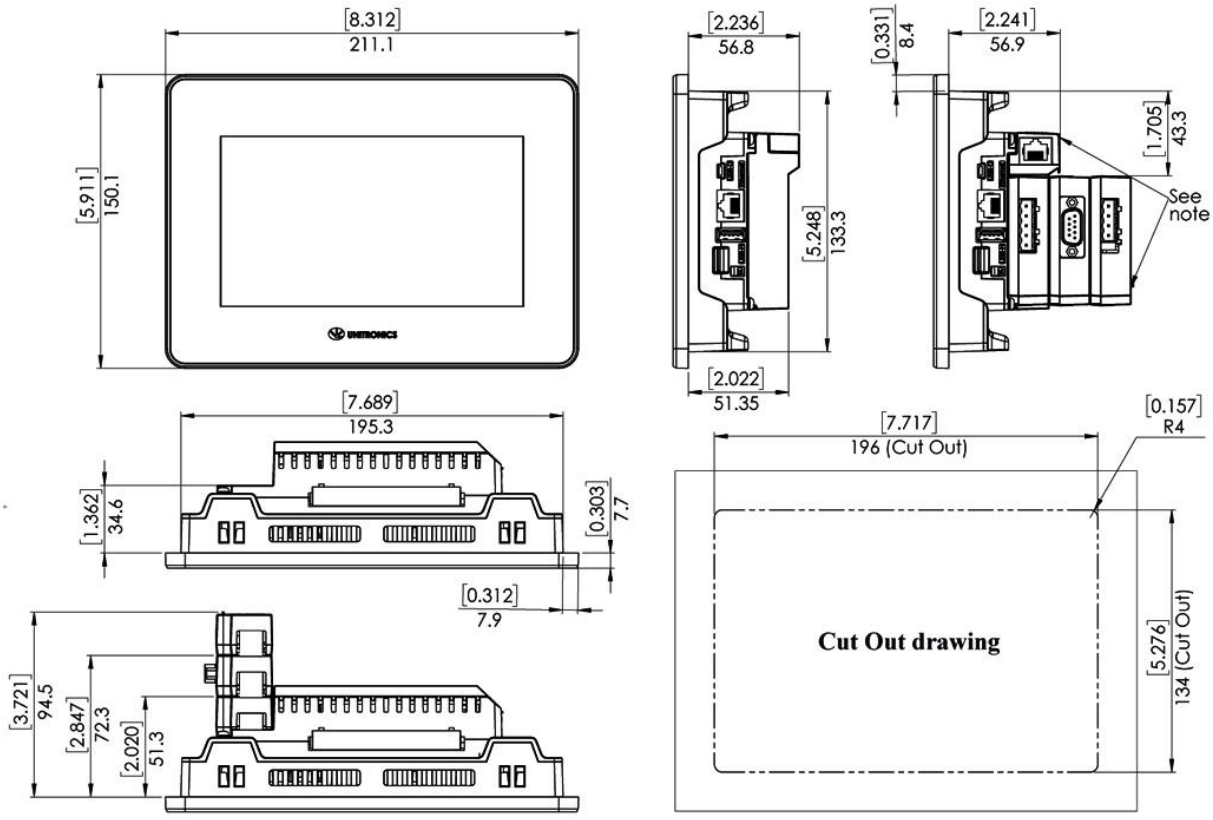
For exact dimensions, please refer to the Mechanical Dimensions shown below.

Mechanical Dimensions

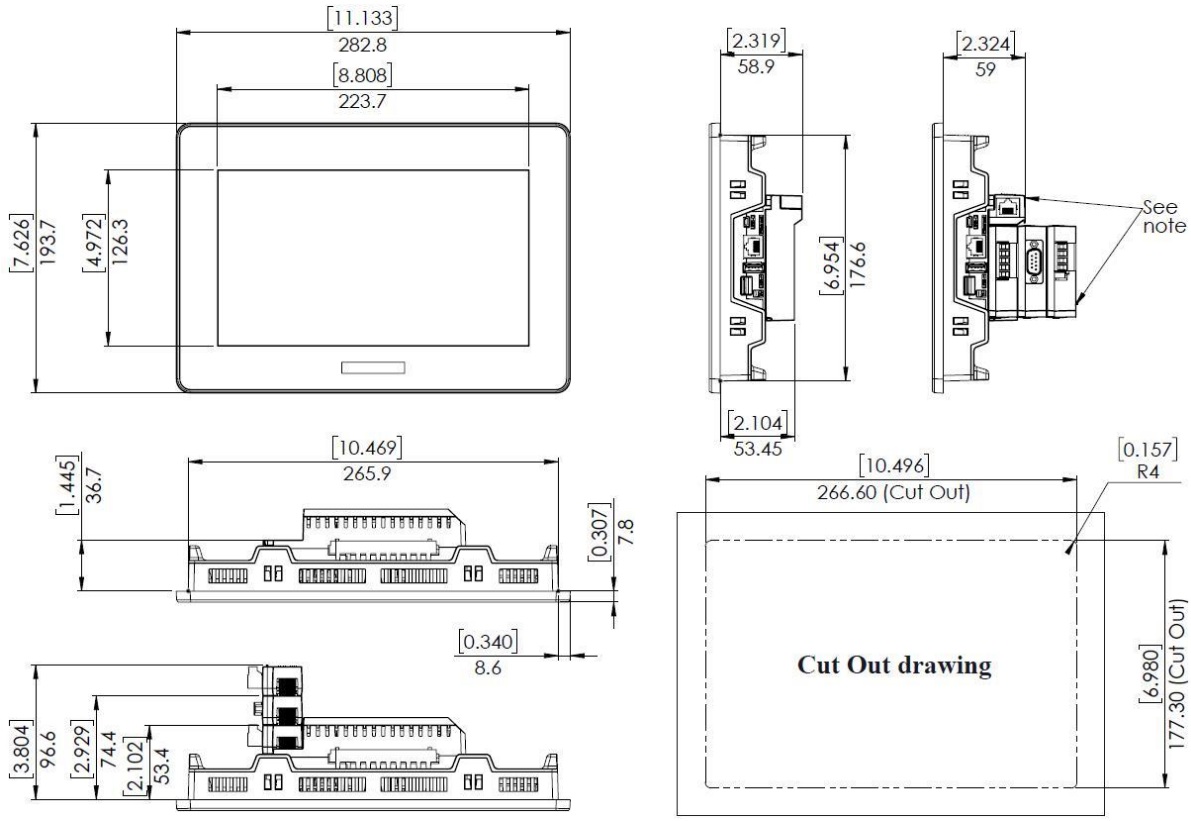
UniStream 5”



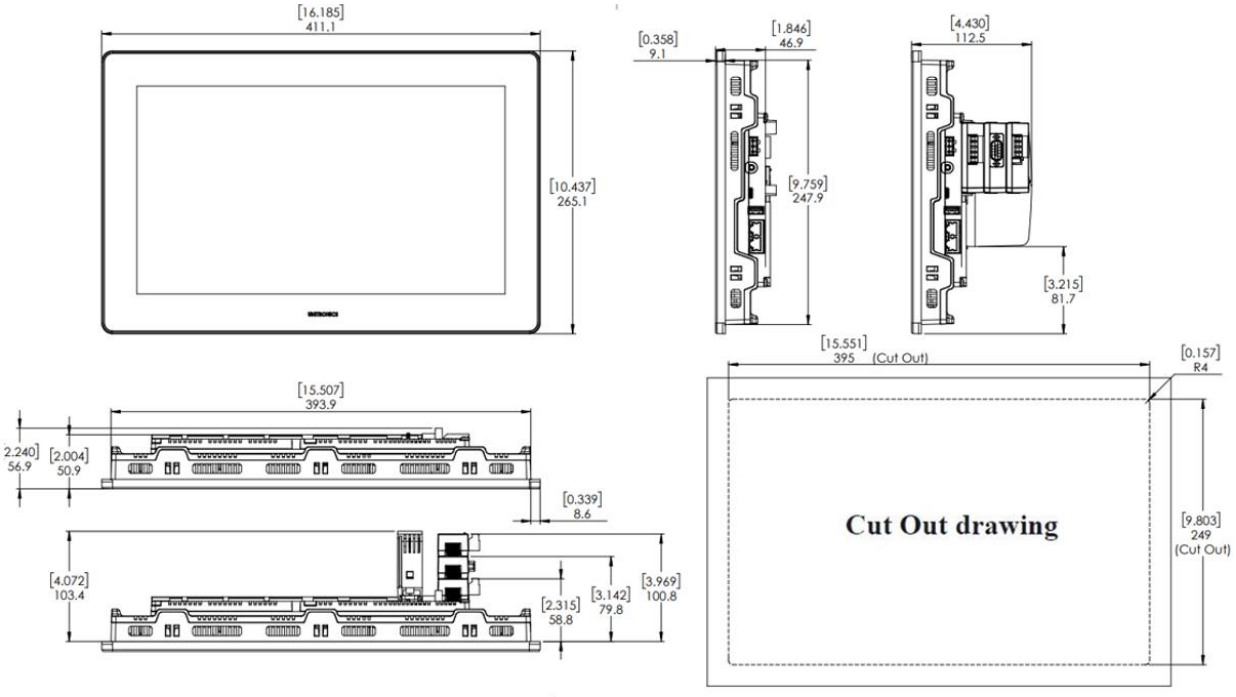
UniStream 7"



UniStream 10.1"



UniStream 15.6"



NOTE	Allow space for modules to be snapped onto the back of the controller, if required by your application. Modules are available by separate order.

Panel Mounting

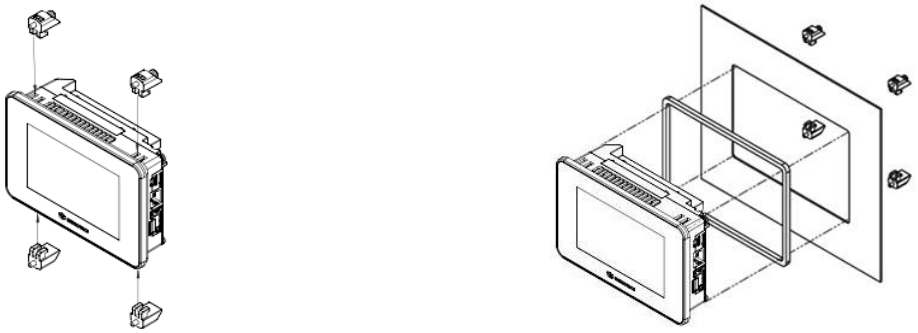
NOTE	▪ Mounting panel thickness must be less or equal to 5mm (0.2”). ▪ Ensure that the space considerations are met.

1. Prepare a panel cut-out according to the dimensions as shown in the previous section.
2. Slide the controller into the cut-out, ensuring that the Panel Mounting Seal is in place as shown below.
3. Push the mounting brackets into their slots on the sides of the panel as shown below.
4. Tighten the bracket screws against the panel. Hold the brackets securely against the unit while tightening the screws. The torque required is 0.35 N·m (3.1 in-lb).

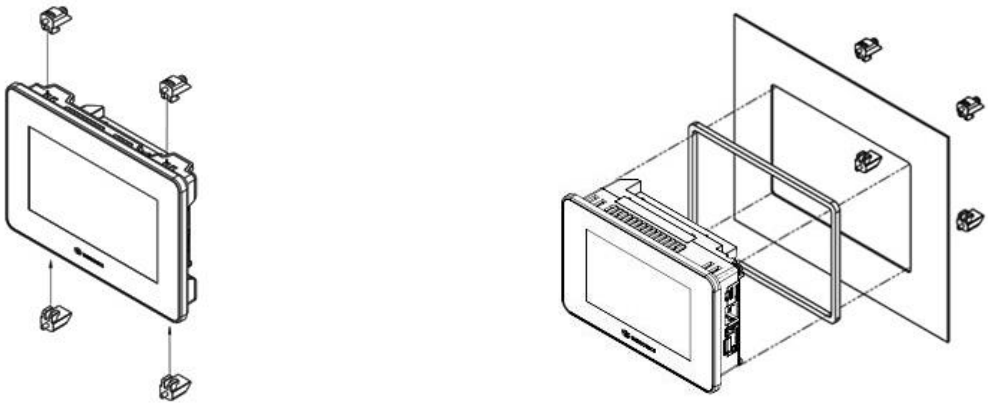
When properly mounted, the panel is squarely situated in the panel cut-out as shown below.

Caution	▪ Do not apply torque exceeding 0.35 N·m (3.1 in-lb) of torque to tighten the bracket screws. Using excessive force to tighten the screw can damage this product.

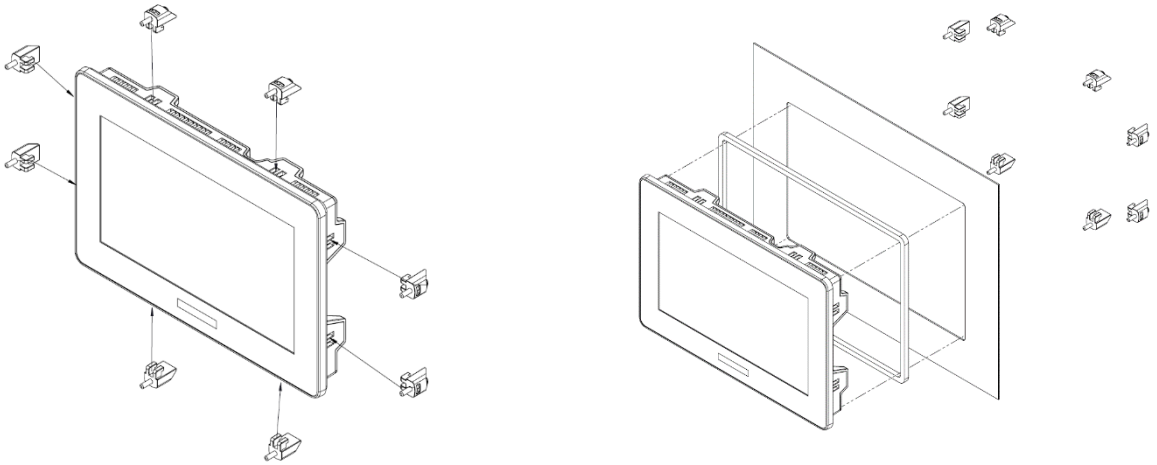
UniStream 5”



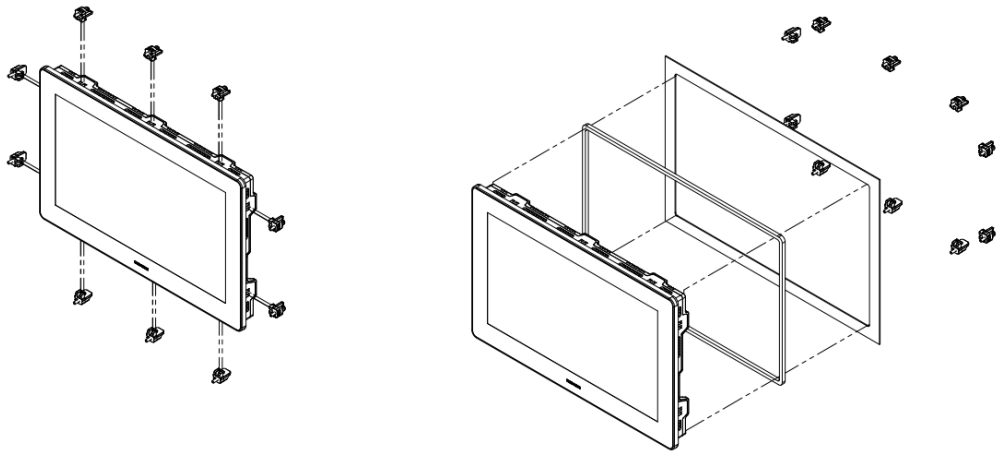
UniStream 7”



UniStream 10.1”



UniStream 15.6"



Battery: Back-up, First Use, Installation, and Replacement

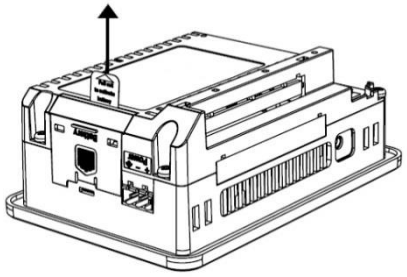
Back-up

In order to preserve back-up values for RTC and system data in the event of power off, the battery must be connected.

First Use

The battery is protected by a removable cover on the side of the controller.

The battery is supplied installed inside the unit, with a plastic tab preventing contact which must be removed by the user.

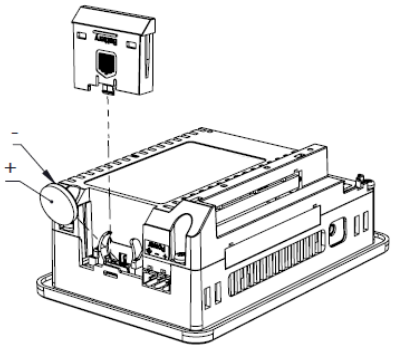


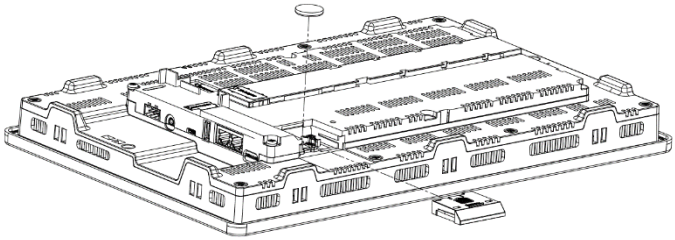
Battery Installation and Replacement

⚠ ▪ Use proper precautions to prevent Electro-Static Discharge (ESD) while servicing the battery.

Caution
- To preserve back-up values for RTC and system data during battery replacement, the controller must be powered.
- Note that disconnecting the battery halts the preservation of back-up values and causes them to be deleted.

1. Remove the battery cover from the controller as shown in the accompanying figure:
   - Press the tab on the module to disengage it.
   - Slide it up to remove it.
2. If you are replacing the battery, remove the battery from its slot on the side of the controller.
3. Insert the battery, ensuring that the polarity is aligned with the polarity marking as shown in the accompanying figure.
4. Replace the battery cover.
5. Dispose of the used battery according to local and national standards and regulations.





Wiring

⚠

- This equipment is designed to operate only at SELV/PELV/Class 2/Limited Power environments.
- All power supplies in the system must include double insulation. Power supply outputs must be rated as SELV/PELV/Class 2/Limited Power.
- Do not connect either the 'Neutral' or 'Line' signal of the 110/220VAC to device's 0V point.
- Do not touch live wires.
- All wiring activities should be performed while power is OFF.
- Use over-current protection, such as a fuse or circuit breaker, to avoid excessive currents into the power supply connection point.
- Unused points should not be connected (unless otherwise specified). Ignoring this directive may damage the device.
- Double-check all wiring before turning on the power supply.

Caution

- To avoid damaging the wire, use a maximum torque of 0.5 N·m (4.4 in-lb).
- Do not use tin, solder, or any substance on stripped wire that might cause the wire strand to break.
- Wire and cable should have a temperature rating of minimum 75°C.
- Install at maximum distance from high-voltage cables and power equipment.

Wiring Procedure

Use crimp terminals for wiring; use 26-12 AWG wire (0.13 mm^2 –3.31 mm^2)

1. Strip the wire to a length of 7±0.5mm (0.250–0.300 inches).
2. Unscrew the terminal to its widest position before inserting a wire.
3. Insert the wire completely into the terminal to ensure a proper connection.
4. Tighten enough to keep the wire from pulling free.

Wiring Guidelines

In order to ensure that the device will operate properly and to avoid electromagnetic interference:

- Use a metal cabinet. Make sure the cabinet and its doors are properly earthed.
- Use wires that are properly sized for the load.
- Use shielded twisted pair cables for wiring High Speed and Analog I/O signals.
  In either case, do not use the cable shield as a signal common / return path.
- Route each I/O signal with its own dedicated common wire. Connect common wires at their respective common (CM) points at the controller.
- Individually connect each 0V point and each common (CM) point in the system to the power supply 0V terminal, unless otherwise specified.
- Individually connect each functional ground point (⏚) to the earth of the system (preferably to the metal cabinet chassis). Use the shortest and thickest wires possible: less than 1m (3.3') in length, minimum thickness 14 AWG (2 mm^2).
- Connect the power supply 0V to the earth of the system.

- Earthing the cables' shield:
  - Connect the cable shield to the earth of the system (preferably to the metal cabinet chassis). Note that the shield must be connected only at one end of the cable; it is recommended to earth the shield at the PLC-side.
  - Keep shield connections as short as possible.
  - Ensure shield continuity when extending shielded cables.

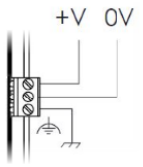
NOTE For detailed information, refer to the document System Wiring Guidelines, located in the Technical Library in the Unitronics' website.

Wiring the Power Supply

The controller requires an external power supply.

⚠ ▪ In the event of voltage fluctuations or non-conformity to voltage power supply specifications, connect the device to a regulated power supply.

Connect the +V and 0V terminals as shown in the accompanying figure.



Connecting Ports

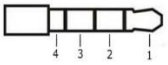
- Ethernet — CAT-5e shielded cable with RJ45 connector
- USB Device — Standard USB cable with Mini-B USB plug (USC-C plug in US15)
- USB Host — Standard USB device with Type-A plug

Connecting Audio

- Audio-Out — Use 3.5mm stereo audio plug with shielded audio cable
  Note that only Pro models support this feature.

  Audio Pinout

1	Headphone Left Out (Tip)
2	Headphone Right Out (Ring)
3	Ground (Ring)
4	Don't connect (Sleeve)



Note that below, the letters "xx" that is used in the model numbers means that the section refers both to B5/C5 and B10/C10 models.

US5-xx-TR22, US5-xx-T24
US7-xx-TR22, US7-xx-T24
US10-xx-TR22, US10-xx-T24

I/O Connection Points

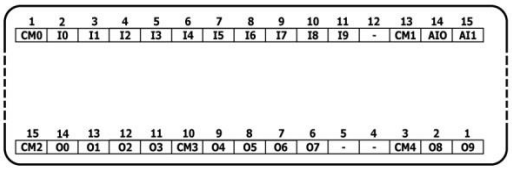
The IOs for these models are arranged in two groups of fifteen points each, as shown in the figures to the right.

Top group
Input connection points

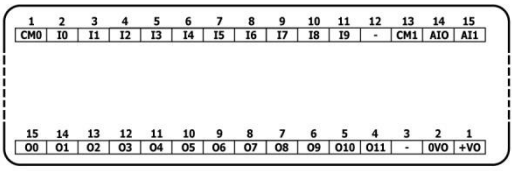
Bottom group
Output connection points

The function of certain I/Os may be adapted via wiring and software settings.

US5-xx-TR22, US7-xx-TR22, US10-xx-TR22



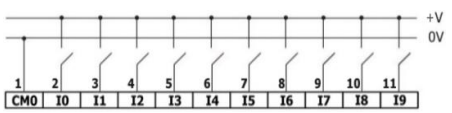
US5-xx-T24, US7-xx-T24, US10-xx-T24



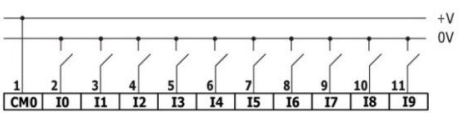
Wiring the Digital Inputs

All 10 digital inputs share the common point CM0. The digital inputs may be wired together as sink or source.

Input wiring, sink



Input wiring, source



NOTE Use sink input wiring to connect a sourcing (pnp) device. Use source input wiring to connect a sinking (npn) device.

Wiring the Analog Inputs

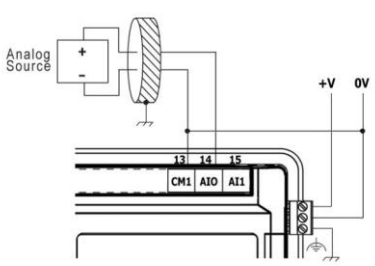
Both inputs share the common point CM1.

NOTE

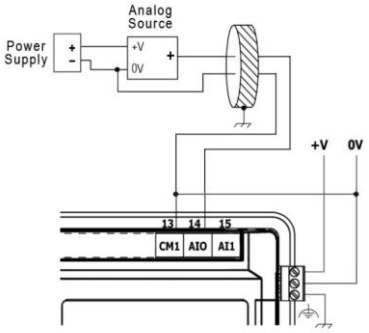
- The inputs are not isolated.
- Each input offers two modes: voltage or current. You can set each input independently.
- The mode is determined by the hardware configuration within the software application.
- Note that if, for example, you wire the input to current, you must also set it to current in the software application.

Voltage

Differential

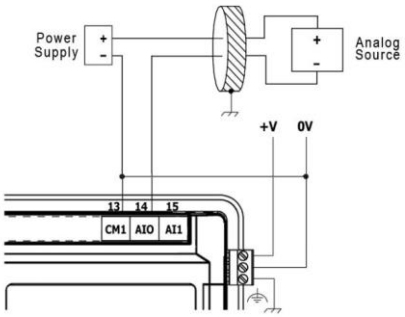


Single-ended

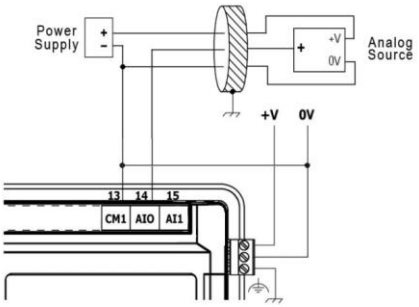


Current

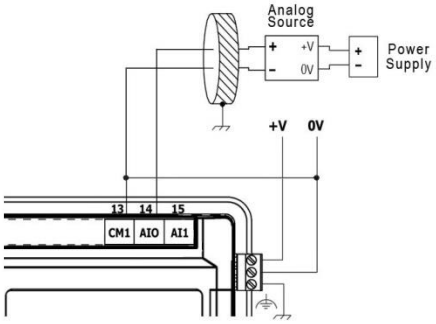
2-wire



3-wire



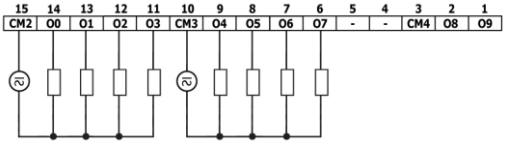
4-wire



Wiring the Relay Outputs (US5-xx-TR22, US7-xx-TR22, US10-xx-TR22)

⚠ ▪ To avoid risk of fire or property damage, always use a limited current source or connect a current limiting device in series with the relay contacts

The relay outputs are arranged in two isolated groups:
O0-O3 share the common return CM2.
O4-O7 share the common return CM3.

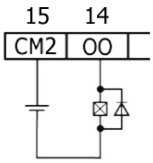


Increasing Contact Life Span

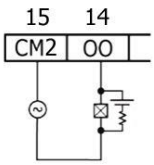
To increase the life span of the relay contacts and protect the controller from potential damage by reverse EMF, connect:

- a clamping diode in parallel with each inductive DC load,
- a RC snubber circuit in parallel with each inductive AC load

DC Load



AC Load

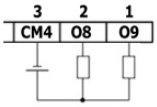


Wiring the Sink Transistor Outputs (US5-xx-TR22, US7-xx-TR22, US10-xx-TR22)

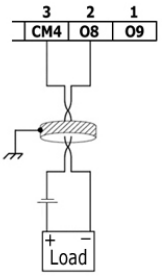
⚠ ▪ Connect a current limiting device in series with outputs O8 and O9. These outputs are not short-circuit protected.

- Outputs O8 and O9 can independently be configured as either normal digital outputs or as high speed PWM outputs.
- Outputs O8 and O9 share the common point CM4.

Normal Transistor Output



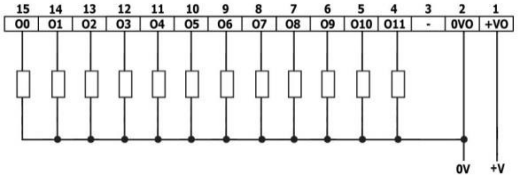
High Speed PWM Output



Wiring the Source Transistor Outputs (US5-xx-T24, US7-xx-T24, US10-xx-T24)

Output's power supply

The use of any of the outputs requires an external 24VDC power supply as shown in the accompanying figure.



Outputs

Connect the +VO and 0VO terminals as shown in the accompanying figure.

O0-O11 share common return 0VO.

Installing Uni-I/O™ & Uni-COM™ Modules

Refer to the Installation Guides provided with these modules.

⚠
- Turn off system power before connecting or disconnecting any modules or devices.
- Use proper precautions to prevent Electro-Static Discharge (ESD).

Uninstalling the Controller

1. Disconnect the power supply.
2. Remove all wiring and disconnect any installed devices according to the device's installation guide.
3. Unscrew and remove the mounting brackets, taking care to support the device to prevent it from falling during this procedure.