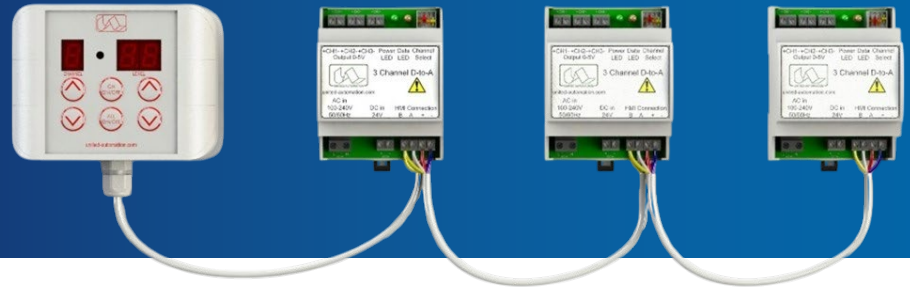


9 Channel HMI

D/A Signal Controller System Installation & User Manual

**CONTACT US:**

☎ 0044 (0) 1704-516 501

✉ enquiries@united-automation.com🌐 www.united-automation.com**KEY FEATURES:**

- ✓ Provides 9 x 0–5V DC control outputs
- ✓ Modular design with up to 3 D/A slave modules
- ✓ RS485 communication over two twisted pairs
- ✓ HMI allows output voltage control in 100 steps (50mV increments)
- ✓ Optional **infra-red remote control**
- ✓ **IP65-rated HMI** enclosure for robust protection
- ✓ DIN rail-mounted D/A modules for easy installation
- ✓ Dual power input: 110–240V AC or 24V DC

The **UAL 9 Channel HMI (Human-Machine Interface) System** is a microprocessor-based solution designed to deliver up to **nine independent 0–5 VDC control signal outputs**. The system consists of one HMI master unit and up to three Digital-to-Analogue (D/A) slave modules, each capable of providing three separate 0–5 VDC outputs. These outputs are commonly used as control signals for power controllers and automation systems.

Power is supplied via a single D/A unit, which offers two input options: **110–240V AC, 50/60Hz** or **24V DC**. Only one power input should be used at a time. For detailed input specifications, refer to the Technical Specification section.

The system communicates using a **RS485 interface** over one twisted pair, while the second twisted pair supplies 24V DC power from the powered D/A unit to the rest of the system components.

The HMI interface enables users to select and set the voltage of any of the nine output channels in **50mV increments**, delivering a control range of 0–5V. Output levels are displayed on the interface as values from **0–99** and “F”, where “F” signifies full output (5V DC).

All HMI functions can also be accessed via an **optional infrared remote control handset**, providing flexible and remote operation.

The HMI is enclosed in an **IP65-rated casing** suitable for wall or panel mounting using four secure fixings. Each D/A module is housed in a **DIN-rail mountable enclosure** with a spring-loaded clip for quick and secure installation.

SYSTEM SPECIFICATIONS

Mains Supply Voltage	110VAC - 240VAC +/- 10% 50/60Hz
DC Supply Voltage	24VDC +/- 10%
Number of Channels per D-A module	9 total, 3 per D/A unit
Power Consumption	50mA max per unit (HMI and D/A)
D-A, IP Rating	IP00
HMI, IP Rating	IP65
Gland Diameter (HMI)	Max Cable Entry 2.5mm ²
Operating Temperature Range	-20°C to 40°C
HMI Unit Dimensions	W=118mm D=110mm H=50mm
D to A Unit Dimensions	W=72mm D=96mm H=65mm
Remote Handset Dimensions	W=45mm D=22mm H=160mm
HMI Cable	4 core data cable, 2 x twisted pair, 26AWG minimum gauge.
Remote Handset Batteries	2 X AAA (1.5V)

APPLICATIONS:

- Suitable for any industrial or automation system requiring multiple analogue outputs
- Ideal for power controller signal input, HVAC control systems, or distributed analogue signal control across multiple loads

YOU MUST READ THIS BEFORE INSTALLATION

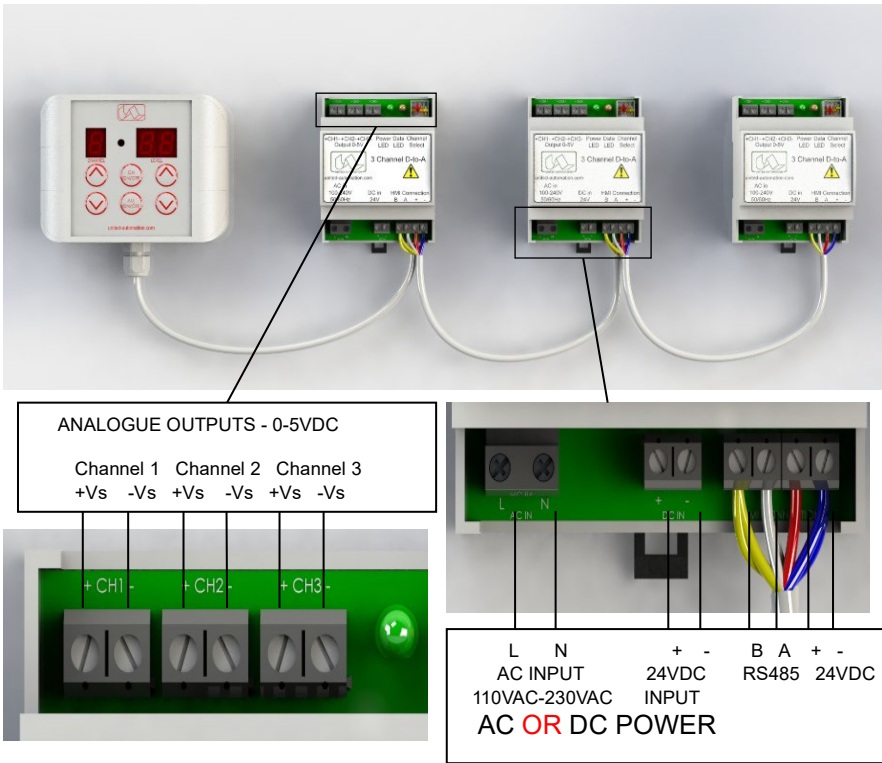
 ELECTRICAL SAFETY	 INSTALLATION REQUIREMENTS	 USER RESTRICTIONS	 USAGE ENVIRONMENT	 HOT SURFACE WARNING
WARNING: RISK OF ELECTRIC SHOCK Always consult the Installation & Maintenance Instructions before connecting this product to the power supply. WARNING: Disconnect Power Before Servicing Ensure the electrical supply is safely disconnected before connecting to any supply, load, or control terminals.	WARNING: Installation by Qualified Personnel Only This product must only be installed or fitted by a competent, qualified installer familiar with the relevant electrical standards and installation practices.	WARNING: Not for Use by Vulnerable Individuals This product is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they are supervised or instructed by a person responsible for their safety.	WARNING: Industrial Use Only This is an industrial-grade product and is not intended for household use.	WARNING: Hot Surfaces On certain models, surfaces marked with this symbol become hot during use. Avoid direct contact and follow all thermal safety precautions.

9 Channel HMI

D/A Signal Controller System Installation & User Manual

INSTALLATION CIRCUIT

A typical system with 3 x D/A units is shown below:



CONFIGURATION OPTIONS

The HMI unit can control up to 3 D/A units, the HMI selects a particular D/A unit by means of a 2 bit address. The address of each D/A unit is selected by switches 3 and 4, on DIP switch SW1, on each D/A unit. Switch 4 on SW1 is used to set the least significant bit of the address, switch 3 on SW1 is used to set the most significant address. The HMI unit uses addresses 01, 10 and 11 to access the three D/A units. The 9 possible output channels, as indicated on the HMI display, are mapped across the 3 D/A units. The Table below shows how to set up the D/A switches for the three allowable address values and how the displayed channels are mapped to each D/A unit:

D/A 1	D/A 2	D/A 3
Switch setup xx01	Switch setup xx10	Switch setup xx11
Mapped Channels 1,2,3	Mapped Channels 4,5,6	Mapped Channels 7,8,9

Switches 1 and 2 on SW1 are not used and are ignored by the D/A and HMI units.

Please note that the D/A units should be set up with unique addresses; duplication of D/A addresses will result in unknown output levels being driven on the analogue outputs.

SET UP

CAUTION! Ensure the mains supply is disconnected before proceeding.

Set the D/A address switches on each D/A unit to a unique address, refer to the "Configuration Options" section.



Connect the HMI unit to the D/A slave units using four core, dual twisted pair type cable, the cable should have a minimum gauge of 26AWG. One twisted pair should be used for the RS485 A and B signals, the other for the power connection. The corresponding signals on each unit should be connected, namely: A, B, +, -.

9 Channel HMI

D/A Signal Controller System Installation & User Manual

Connect the analogue output signals of the D/A units to the signal input connections of the equipment being controlled. The "-" output terminals, on each D/A in the system are connected together and are also connected to the 24VDC system supply ground. If an external DC supply is used to power the system, the DC supply -ve is also connected the system ground and hence also the analogue output "-" terminals. The complete system including the equipment being controlled should have a common ground connection.

If the system is being powered by a mains AC supply, connect the supply to the "AC IN" terminals on one of the D/A units in the system

If the system is being powered by a 24VDC supply, connect the supply to the "DC IN" terminals.

NOTE: A SINGLE POWER SOURCE, EITHER AC OR DC, SHOULD BE CONNECTED TO ONLY ONE D/A UNIT

The system should be fused externally, the typical power consumption is 30mA@24VDC per unit (HMI or D/A).

HMI UNIT DESCRIPTION

The HMI unit provides buttons to allow control of the connected D/A units output channels and 7 segment LED displays to display the selected channel and its power level. The HMI unit auto detects the connected D/A units and will only allow valid channels to be selected.



The HMI unit has the following buttons:

CHANNEL+	Increment channel selection (1 to 9)
CHANNEL -	Decrement channel Selection (1 to 9)
CHANNEL OFF	Switch off Current Channel
ALL ON/OFF	Switch ON or OFF all channels (Toggle)
LEVEL +	Increment Current Channel Power Level: 0 to 99, F (Fully on)
LEVEL -	Decrement Current Channel Power Level (0 to 99)

The HMI unit has the following 7 segment displays:

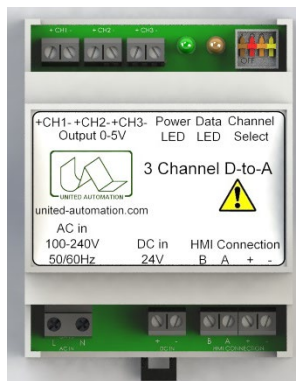
CHANNEL	Single digit, indicates the currently selected channel (1-9)
LEVEL	Two digits, displays the level of the currently selected channel. Each level step represents 50mV, e.g. a level of 50 is equivalent to an output voltage of 50 x 50mV = 2.5V

The HMI unit has the following terminal connections:

"-"	DC power supply negative connection
"+"	DC power supply positive connection: 24VDC
"A"	RS485 interface A leg

D/A UNIT DESCRIPTION

The D/A unit receives messages from the HMI master unit and sets the analogue output levels to the level requested by HMI unit. The D/A slave unit also acknowledges the message from the HMI unit so that the HMI unit knows that the addressed D/A unit has received and decoded the message.



The D/A unit has the following terminal connections:

AC Supply Input (L and N)	Single Phase Supply, Live (L) and Neutral (N) connections. 100-240V AC +/-10%, 50/60Hz.
DC Supply Input (+ and -)	DC IN, 24VDC Supply, positive and negative connections.
HMI CONNECTION "+"	Positive power supply, 24VDC, power connection to all other units in the System.
HMI CONNECTION "-"	Negative power supply, ground connection to all other units in the system.
HMI CONNECTION "A"	RS485 A leg to all other units in the system.
HMI CONNECTION "B"	RS485 B leg to all other units in the system.
Analogue Outputs	3 x Analogue Channels: CH1 "+", CH1 "-", CH2 "+", CH2 "-", CH3 "+", CH3 "-". The "-" terminals are common and also connected to the system DC ground.

The D/A unit has the following switch for slave unit address configuration:

SW1	4 Way DIL Switch for D/A channel configuration, only switch positions 3 and 4 are used.
-----	---

The D/A unit has the following LED indicators:

POWER	Green LED indicating that the unit is powered
DATA	Orange LED, which flashes when the D/A unit is communicating with the HMI unit.

9 Channel HMI

D/A Signal Controller System Installation & User Manual

REMOTE HANDSET DESCRIPTION



The infrared remote control handset has the following buttons:

1-9	Selects the channel to be controlled
CHANNEL "-"	Decrements the channel selected (1-9)
CHANNEL "+"	Increments the channel selected (1-9)
CHANNEL OFF	Toggles the ON/OFF state of the currently selected channel
ALL ON/OFF	Turns all channels ON or all channels OFF, toggle function
POWER "+"	Increments the voltage level of the currently selected channel.
POWER "-"	Decrements the voltage level of the currently selected channel.

The infrared remote control is powered by 2 x AAA batteries.

RECOMMENDATION

DOCUMENTS

Other documents, which may be appropriate for your applications, are available on request.

Code	Identity	Description
X10255	SRA	Safety requirements: Addressing the Low Voltage Directive (LVD) including Thermal Data/Cooling, Live parts warning, Earthing requirements and fusing recommendations
	DoC	Declaration of conformity (relating to purchase order)
P01.1	COS	UAL Conditions of Sale



NOTE: It is recommended that installation and maintenance of this equipment should be done with reference to the current edition of the I.E.E. wiring regulations (BS7671) by suitably qualified/trained personnel. These regulations contain important requirements regarding safety of electrical equipment (for International Standards refer to I.E.C/ directive IEC950).



Please read these instructions before installing and operating this product.

PRODUCT CODE AND RELATED PRODUCT CODE

Product Code	Product Description
A402190	Infresco – 9- Channel HMI Controller
A402191	Multi-Channel Controller HMI – D/A UNIT (for 9 Channel HMI)
A86357	Remote Handset