



9 Channel HMI

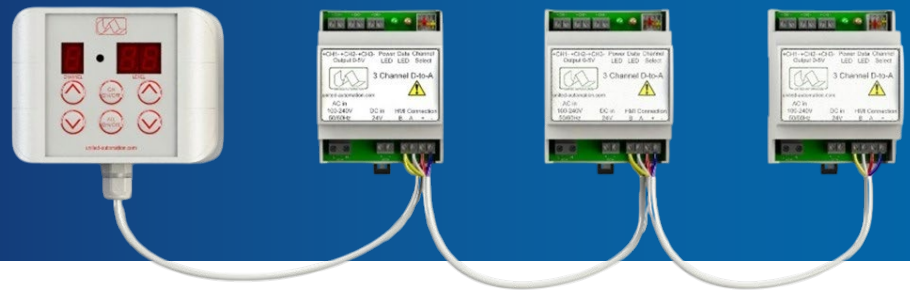
D/A Signal Controller System Installation & User Manual

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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

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

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)



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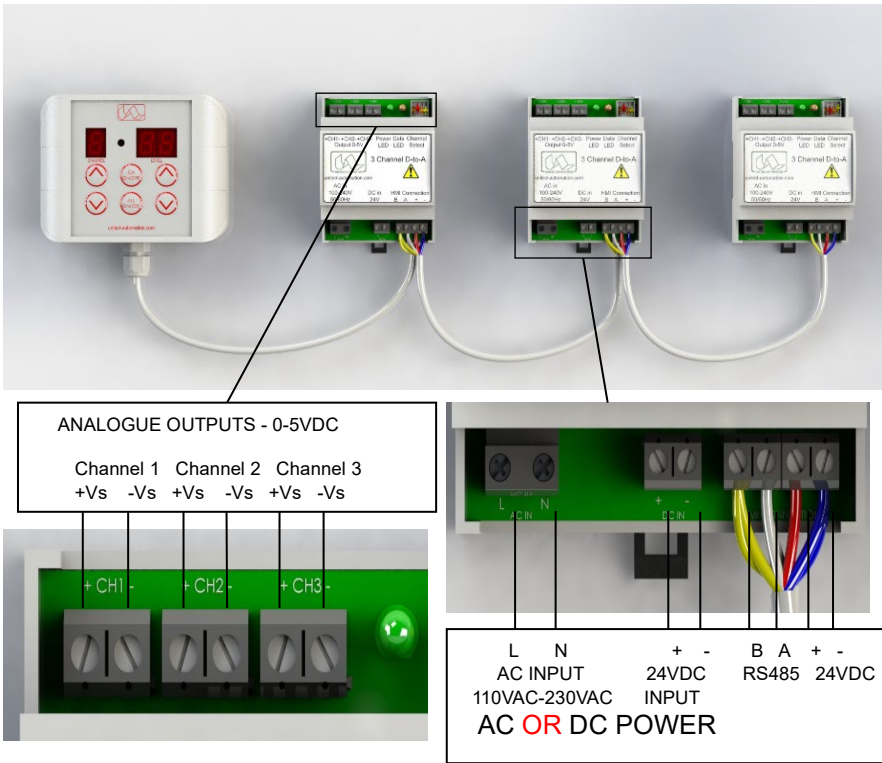


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INSTALLATION CIRCUIT

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, +, -.

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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:

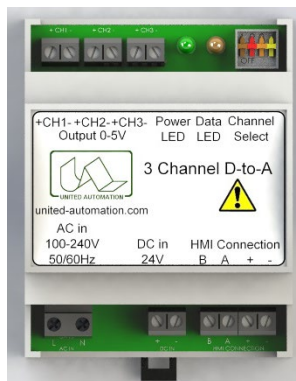
CHANNEL	Single digit, indicates the currently selected channel (1-9)
LEVEL	Two digits, displays the level of the currently selected channel. Each level step represents 50mV, e.g. a level of 50 is equivalent to an output voltage of 50 x 50mV = 2.5V

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.
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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.

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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