Analog Digital Input Converter

301ADI
User Manual

ERP 510846
4/07

Notices and Trademarks

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Honeywell Analytics
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Contacts

World Wide Web

The following Honeywell Websites may be of interest to our customers:

Honeywell Organization	WWW Address (URL)
Honeywell Analytics	http://www.honeywellanalytics.com
Corporate	http://www.honeywell.com
International	http://content.honeywell.com/global/

Telephone

Contact us by telephone at the numbers listed below:

Organization		Phone Number
United States and Canada	Honeywell Analytics International Inc.	1-800-563-2967 1-450-619-2450 Fax: 1-888-967-9938
Asia Pacific	Honeywell Asia Pacific Inc. Hong Kong	(852) 23 31 9133
Europe	Honeywell Pace Brussels, Belgium	[32-2]728-2711
Latin America	Honeywell International Inc. Sunrise, Florida, U.S.A.	(954) 845-2600

Sales Informations

Contact us at sales@vulcaininc.com

Symbol Definitions

The following table lists the symbols used in this document to denote certain conditions:

Symbol	Definition
	**ATTENTION**: Identifies information that requires special consideration
	**TIP**: Identifies advice or hints for the user, often in terms of performing a task
	**REFERENCE _ INTERNAL:** Identifies an additional source of information within the bookset.
CAUTION	Indicates a situation which, if not avoided, may result in equipment or work (data) on the system being damaged or lost, or may result in the inability to properly operate the process.
	**CAUTION**: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. **CAUTION:** Symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.
	**WARNING**: Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death. **WARNING** symbol on the equipment refers the user to the product manual for additional information. The symbol appears next to required information in the manual.

Contents

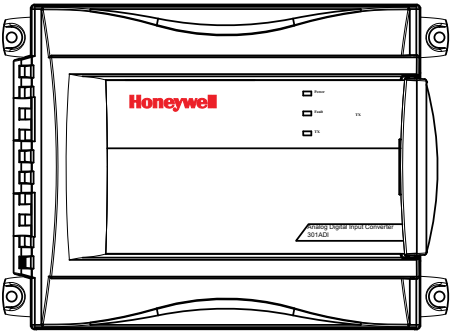
Safety Instructions

To ensure safety, this equipment must be serviced by qualified Honeywell personnel or certified service technicians only.

- Read and understand the user manual completely before operating or servicing the equipment.
- Substituting components may severely impair product safety.
- Perform regular equipment inspections and keep an inspection log. Contact Honeywell immediately if the unit is damaged or is missing parts.
- Do not use the product if any components/parts are damaged.
- Do not expose the unit to electrical shocks or to prolonged, severe mechanical shock.
- Do not disconnect or replace any parts unless the power has been shut off or unless the area has been certified non-hazardous.

Introduction

The 301ADI is a microprocessor based converter unit for use with Honeywell control units, such as the 301C.



The 301ADI LCD display screen, enclosed in the housing, serves as a programming interface.

The unit has 3 LED indicators, 16 (loop) inputs that read 4-20mA signals and 8 contact inputs that read contact, or relay signals.

Receiving and Verification

Before proceeding to the installation instructions, you must first verify the equipment and any components. Please make certain that no equipment or component is missing, that all items match those listed on the order form (or packing slip) and that none of the equipment is damaged.

Installation

The 301ADI must be installed according to the following installation instructions to ensure proper functioning of the unit.

Note: Failure to respect the installation instructions provided by Honeywell may result in improper functioning of the unit, for which Honeywell will not be held responsible or liable in any way.

Installation Guidelines

The 301ADI converter is designed for installation in general purpose areas. Installation personnel should be qualified technicians. Local electrical code and safety standards must be observed throughout the installation.

The following is a list of guidelines that will help ensure that the unit functions properly and that it is not exposed to conditions that might affect its performance:

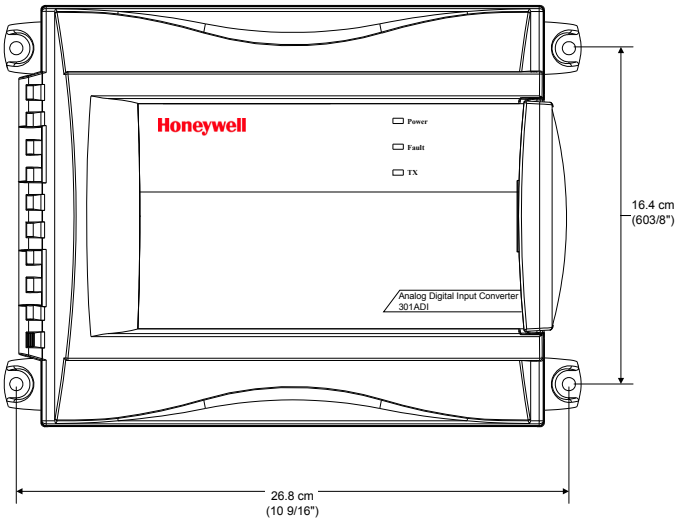
- Locate unit in easily accessible areas to facilitate access for service
- Avoid installing unit in locations where it could be subject to vibrations
- Avoid installing the unit close to sources of electromagnetic interference
- Avoid installing the unit in areas subject to significant temperature swings
- Verify local governmental requirements and existing regulations that might affect the choice of location.

Make sure to disconnect power from the unit before proceeding to any physical wiring.

Wall Mount Installation

The converter should be mounted on a wall where there is minimum vibration, away from heat and with sufficient ventilation room around the unit. Its location should be within easy reach of operating personnel.

301ADI



Mounting Instructions

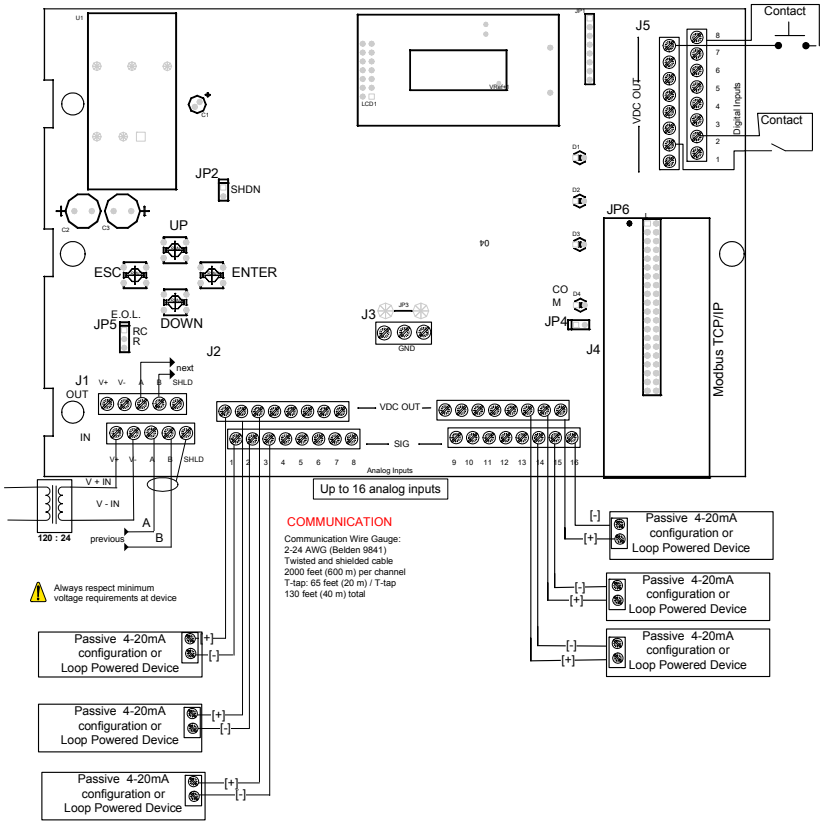
1. Select installation location
2. Measure and mark mounting holes (as shown)
3. Pre-drill or prepare as required by mounting surface (drywall plugs, etc.)
4. Position unit and align mounting holes with markings and install necessary screws.

Note: Remember to remove knock-outs before mounting the unit.

Wiring Details 301ADI

The image below is the 301ADI PCB.

Pass the wires up through the knock-outs provided at the bottom of the unit.



Wiring Instructions

1. Disconnect power supply before proceeding to connect any wiring.
2. Connect the communication wires from the controller's (301C) RS-485 port into communication terminals A and B (J1).
3. Connect the transmitter wires to the analog inputs (J2, J4), in SIG and VDC OUT.
4. Connect the contact device to the digital inputs (J5).

When all connections are complete, you can proceed to the configuration of the unit.

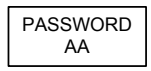
Configuration

Accessing the Menus

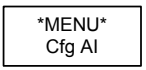
The 301ADI is equipped with a 2 x 8 character LCD display screen within its housing that allows you to configure the settings for the 16 analog inputs and the 8 digital inputs. Use the keypad arrows (Up, Down, Esc, Enter) provided on the PCB to scroll through programming options.

When you open the 301ADI housing (to access the display screen), the LCD screen displays only the product name and the Modbus address. This is displayed whenever the screen is idle. The programming function is password protected, you must log a password to access this function. The default password is VA.

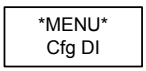
- Press Enter once to display the password screen.
- When the password screen is first displayed, it shows AA as the password, with the cursor under the first letter.
- Use the Up or Down arrow buttons to change characters.
- When the first letter is correct, press Enter to move to the second letter.
- Press Enter once more to validate the password.



Once the password has been validated, the screen displays "*Menu* ConfigAI?", the first of three (3) main menu options. Use the Up and Down buttons to scroll through the options and Enter to select the desired one:



- Press the UP button once to move from the Config AI screen to the Config DI screen (press DOWN to return to the previous screen)
- Press the UP button again to move to the “Modbs ID” screen
- Pressing ENTER at any screen opens a sub-menu that allows you to either enable or disable an input or to change the Modbus address.

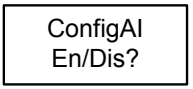


CfgAI Menu Options

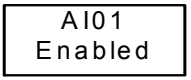
The steps below show the "Cfg AI" menu progress for each main menu option.

ConfigAI En/Dis?

This option lets you configure whether a transmitter is enabled or not or simply to verify its status. The screen displays the transmitter number and whether it is enabled or not.



- Use the Up and Down buttons to scroll through all 16 analog inputs, or transmitters.
- Use the Enter button to change a transmitter's status from Enabled to Disabled (depending on status displayed)
- When you are done configuring input statuses, press ESC to return to the main menu. Pressing ESC will not cancel the changes you made.

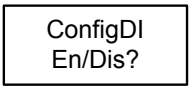


ConfigDI Menu Options

The steps below show the "Cfg DI" menu progress for each main menu option.

ConfigDI En/Dis?

This option lets you configure whether a transmitter is enabled or not or simply to verify its status. The screen displays the transmitter number and whether it is enabled or not.



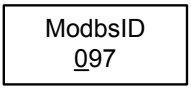
- Use the Up and Down buttons to scroll through all 8 contact inputs.
- Use the Enter button to change a contact input's status from Enabled to Disabled (depending on status displayed)
- When you are done configuring input statuses, press ESC to return to the main menu. Pressing ESC will not cancel the changes you made.

ModbsID Menu Options

This option lets you set a different Modbus address than the factory set address.

CAUTION	**The 301ADI Modbus address must be set to 097 for it to be recognized by the 301C controller.**

When you first access the Modbus ID option, the screen displays the current address with the first character underlined.



- Use the UP or DOWN buttons to increase or decrease the character value.
- When the correct value is displayed, press ENTER.
- Continue until all characters are set as desired for the new Modbus address

- Press ESC to return to the previous menu.

Specifications

Communication Protocol

The 301ADI communicates with Honeywell 301C controller through Modbus RTU communication protocols. The controller continuously "polls" to read devices connected to it. The unit's Modbus address can be changed through the programming interface (accessible only when the unit is open).

Communication cables must be grounded using the shield terminal. Use twisted and shielded (Belden 9841) #24/2 AWG cable to wire the connection. The network can be up to 2000 feet (600m) per channel. The length of a T-tap cannot exceed 65 feet (20m), and the maximum of 130 feet (40 m for all T-taps must be respected.

LED Indicators

The 301ADI has three externally visible LED indicators, or lights. Each LED communicates a specific function, as shown in the table below:

LED Number/ Color	Indication	Description	Circuit Board Position
LED 1 - green	Power	If the light is on, unit is powered up and functional.	D2
LED 2 - Amber	Fault	Indicates a possible fault on one of the 4-20 mA inputs. Typically when nominal current is below 3 mA.	D3
LED 3 -- Amber	Tx Modbus	Light is on when the 301ADI responds to a poll on the Modbus port. (The LED shows not polls but replies from the unit itself. This is useful when selecting an address because it allows troubleshooting the communication setup.)	D4

Technical Specifications

Power:	18-36 Vdc, 520mA @24Vdc 17-25 Vac, 520mA@24Vac,
Over Voltage Category:	II
Analog inputs:	Sixteen (16) 4-20 mA current loop measurement (max 28 mA) 100 ohms input impedance
Contact (Digital) inputs:	Eight (8) contact inputs (max 30 Vdc)
Communication protocol:	Modbus standard RTU over 2-wire multi-drop RS-485
Baud rate:	9600 bps
Recommended wire:	Up to 2000 ft. Two twisted / shielded wires 24 AWG
Dimensions:	7.99" x 11.02" x 2.76" (20.3 x 28 x 7 cm)
Concentrator weight:	2.26 lbs (1.02 kg)
Pollution degree:	2
Operating altitude:	Up to 9843 feet (3000 M)
Enclosure rating:	NEMA 4x - Indoor Six (6) Knock-outs for wiring access

Maintenance and Care

The 301ADI is a maintenance free concentrator unit. If the unit must be cleaned, use a soft, damp cloth. DO NOT use solvents, soaps or polishes.

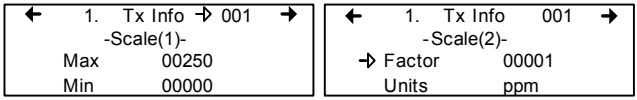
Annex A

301ADI/420MDBS Technical Bulletin

Reading Value Scale Formulas

When used with the 301ADI and the 420MDBS, the 301C menu “Scale” option (within the Tx Info menu) allows users to scale their 4-20 mA signal to more practical reading values. This menu also allows the system to display values below 4mA (for non-standard devices that operate on a 0 - 20 mA range).

The Scale menu option is composed of two screens that let you set specific data for your scale conversion: Min, Max, (scaling) factor and Units (of measurement):



The basic Engineering Unit* conversion formula for standard 4-20 mA devices is:

$$\frac{(\text{loop current} - 4\text{ mA}) \times (\text{range maximum} - \text{range minimum})}{20\text{ mA} - 4\text{ mA}) \times (\text{specified factor})} + \frac{\text{range minimum}}{\text{specified factor}}$$

Here are two examples of the scale conversion formula:

Example 1: $\frac{(12\text{ mA} - 4\text{ mA}) \times (1000\text{ ppm} - 0\text{ ppm})}{(20\text{ mA} - 4\text{ mA}) \times 1} + \frac{0\text{ ppm}}{1}$

Example 1 result = 500 ppm

Example 2: $\frac{(12\text{ mA} - 4\text{ mA}) \times (+500^{\circ}\text{C} - -200^{\circ}\text{C})}{(20\text{ mA} - 4\text{ mA}) \times 10} + \frac{-200^{\circ}\text{C}}{10}$

Example 2 result = 15.0 ºC

Note: In the example 2, the range is multiplied by a factor of 10, which allows you to obtain a range of +50.0ºC to -20.0ºC with a precision of one decimal point.

*Engineering units represent the following measurement types: %, ppm, ºC, ºF and RH.

There is also a basic Raw Unit* conversion formula for non-standard 0 - 20 mA devices:

$$\frac{\text{(Loop current) x (range maximum - range minimum)}}{\text{(28 mA** - 0 mA) x (specified factor)}} + \frac{\text{range minimum}}{\text{specified factor}}$$

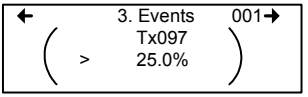
In this formula, there is no 4 mA offset, which enable the controller to read devices that do not adhere to the 4-20 mA standard. *Note that, in this mode, no fault will be generated for signal readings below 3 mA (for 301ADI) or below 1 mA (for 420MDBS).*

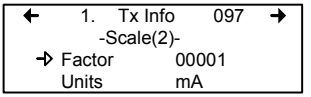
*Raw units represent the following measurement types: mA, mV, V and no units.

** The mA range for the 301ADI is 28 mA to 0, however, the range for the 420MDBS is 25 mA - 0 mA.

Special notes for 301ADI and for 301C (firmware version 2):

301C Event menu: Measurement units other than PPM for all 4-20 inputs (identified as AI) will be displayed as %, however the selected value will be correct and the even will function normally (as shown in the menu samples below).





It is not possible to program an event using a negative value with this version of the firmware.

Limited Warranty

Limited Warranty

Honeywell Analytics, Inc. warrants to the original purchaser and/or ultimate customer ("Purchaser") of Vulcain products ("Product") that if any part thereof proves to be defective in material or workmanship within twelve (12) months, such defective part will be repaired or replaced, free of charge, at Honeywell Analytics' discretion if shipped prepaid to Honeywell Analytics at 4005 Matte Blvd., Unit G, Brossard, Quebec, J4Y 2P4, in a package equal to or in the original container. The Product will be returned freight prepaid and repaired or replaced if it is determined by Honeywell Analytics that the part failed due to defective materials or workmanship. The repair or replacement of any such defective part shall be Honeywell Analytics' sole and exclusive responsibility and liability under this limited warranty.

Re-Stocking Policy

The following re-stocking fees will apply when customers return products for credit:

- 15% re-stocking fee will be applied if the product is returned within **1 month** following the shipping date
- 30% re-stockingfee will be applied if the product is returned within **3 months** following the shipping date

A full credit (less re-stocking fee) will only be issued if the product is in perfect working condition. (If repairs are required on the returned product, the cost of these repairs will be deducted from the credit to be issued.)

No credits will be issued beyond the three month period.

Exclusions

a. If Gas sensors are part of the Product, the gas sensor is covered by a twelve (12) month limited warranty of the manufacturer.
b. If gas sensors are covered by this limited warranty, the gas sensor is subject to inspection by Honeywell Analytics for extended exposure to excessive gas concentrations if a claim by the Purchaser is made under this limited warranty. Should such inspection indicate that the gas sensor has been expended rather than failed prematurely, this limited warranty shall not apply to the Product.
c. This limited warranty does not cover consumable items, such as batteries, or items subject to wear or periodic replacement, including lamps, fuses, valves, vanes, sensor elements, cartridges, or filter elements.

Warranty Limitation and Exclusion

Honeywell Analytics will have no further obligation under this limited warranty. All warranty obligations of Honeywell Analytics are extinguishable if the Product has been subject to abuse, misuse, negligence, or accident or if the Purchaser fails to perform any of the duties set forth in this limited warranty or if the Product has not been operated in accordance with instructions, or if the Product serial number has been removed or altered.

Disclaimer of Unstated Warranties

The warranty printed above is the only warranty applicable to this purchase. All other warranties, express or implied, including, but not limited to, the implied warranties of merchantability or fitness for a particular purpose are hereby disclaimed.

Limitation of Liability

It is understood and agreed that Honeywell Analytics' liability, whether in contract, in tort, under any warranty, in negligence or otherwise shall not exceed the amount of the purchase price paid by the purchaser for the product and under no circumstances shall Honeywell Analytics be liable for special, indirect, or consequential damages. The price stated for the product is a consideration limiting honeywell analytics' liability. No action, regardless of form, arising out of the transactions under this warranty may be brought by the purchaser more than one year after the cause of actions has occurred.