UTOUCH
Industrial Data Acquisition & Control Unit

1. Features

- 24 VDC nominal industrial power input
- 24-bit high-resolution ADC measurement
- Differential and Single-ended analog input measurement capability
- Programmable PGA gain
- Programmable IDAC external current sources
- 10 V external voltage output
- Supports RTD, thermocouple, 4–20 mA, voltage-output, load-cell, and bridge-type sensors
- 8-position DIP switch for sensor input configuration
- Internal temperature sensor
- Selectable analog control output (Potentiometer / 0–10 V / ±10 V)
- Valve and motor driver control interfaces
- Digital I/O interfaces
- Dual relay outputs
- RS-485, RS-232, and USB communication interfaces
- 128 MB NAND Flash data storage
- RTC-backed time-stamped data logging
- DIN-rail compatible mechanical design

2. Applications

- Industrial sensor measurement and monitoring systems
- RTD measurement (PT100/PT1000, 2-wire and 3-wire)
- Thermocouple measurement (Types B, E, J, K, N, R, S, and T)
- 4–20 mA industrial sensor signal acquisition
- Load-cell measurement
- Pressure transmitter and voltage-output sensor measurement
- Test, calibration, and measurement systems
- Industrial data acquisition systems
- Process monitoring and automation
- Industrial machine control systems

3. Description

UTOUCH is an industrial measurement and control platform designed for sensor measurement, signal conditioning, data acquisition, and process control applications. The device combines high-resolution measurement, signal conditioning, data logging, and control functions on a single hardware platform.

The measurement subsystem uses 24-bit ADC with programmable PGA gain and programmable IDAC external current sources. It supports RTD, thermocouple, 4–20 mA, load-cell, pressure transmitter, voltage-output, and bridge-type sensors. An internal temperature sensor is provided for thermocouple cold-junction compensation.

UTOUCH is powered from a nominal 24 VDC industrial supply and provides RS-485, RS-232, and USB communication interfaces. Analog control outputs, I/O, relay outputs, NAND Flash memory, and RTC-backed data logging make it suitable for industrial automation, testing, monitoring, and control applications.

Device Information

Part Number	Body Size (Nom)	Weight
VIMSMIDAC-U51A	158.0 × 91.0 × 58.4 mm	300 g

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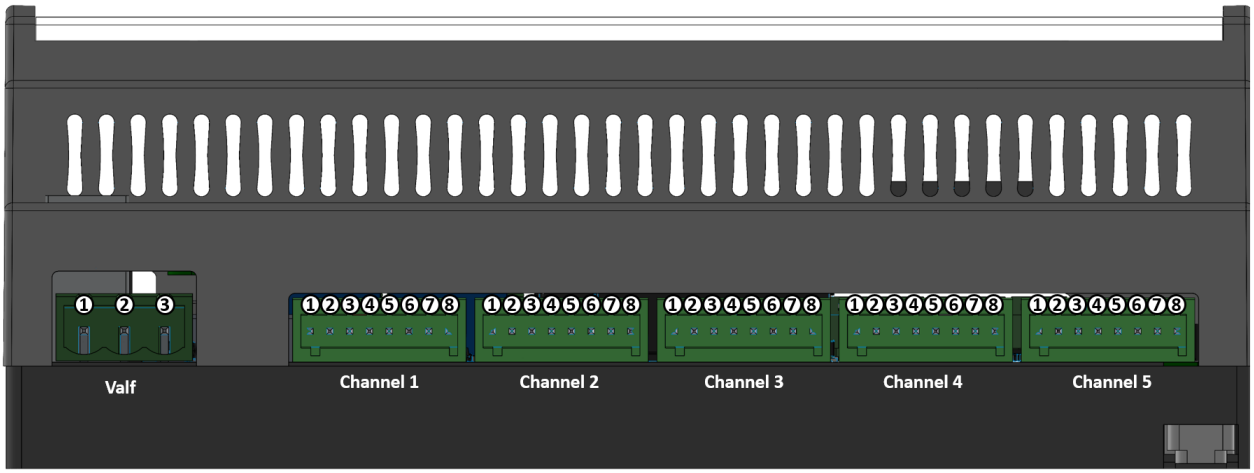
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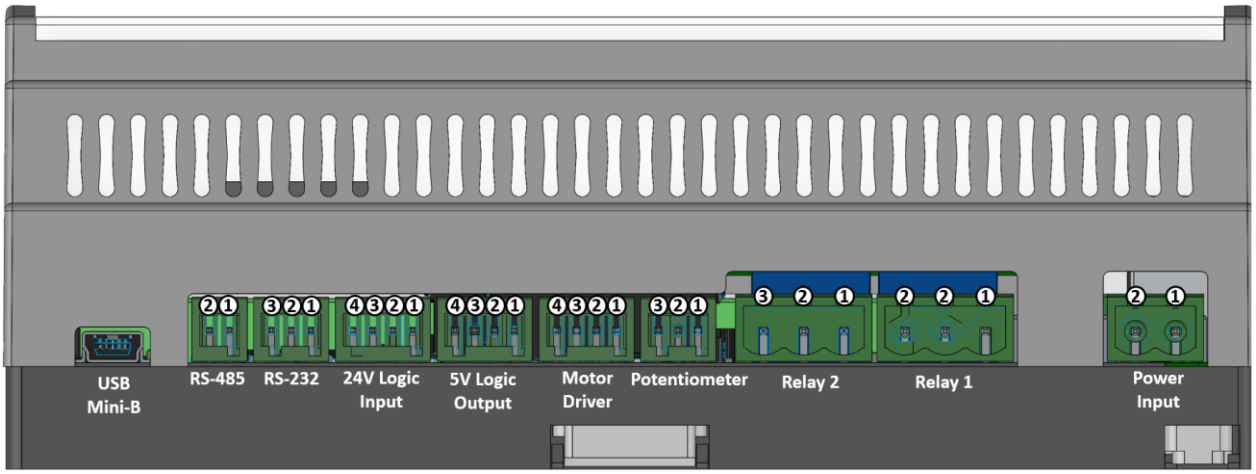
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4. Pin Configuration and Functions





4.1. Power Input Terminal Block

Pin	Name	Description	Type
1	+24 V	Nominal 24 VDC industrial power input	Power Input
2	GND	0 V power return	Power Return

4.2. Relay 1 and Relay 2 Terminal Blocks

Pin	Name	Description	Type
1	NC	Normally Closed contact.	Relay Output
2	COM	Common relay contact.	Relay Output
3	NO	Normally Open contact.	Relay Output

4.3. Potentiometer Terminal Block

Pin	Name	Description	Type
1	GND	Ground reference for the potentiometer.	Power Return
2	ADJ	Potentiometer wiper input.	Analog Input
3	VOUT	+10 V external output	Power Output

4.4. Motor Driver Control Terminal Block

Pin	Name	Description	Type
1	BW	Reverse rotation control input for the motor driver.	Digital Output
2	FW	Forward rotation control input for the motor driver.	Digital Output
3	EN	Enables or disables the motor driver operation.	Digital Output
4	MUX	Analog control output for the motor driver.	Analog Output

Note: The motor driver analog output source can be selected through the internal multiplexer. The output can be driven by the potentiometer wiper input, the 0–10 V DAC output, or the ±10 V DAC output.

4.5. 5 V Digital Input/Output Terminal Block

This terminal block provides three 5 V digital outputs and one optically hardware reset input for external control and system integration.

Pin	Name	Description	Type
1	OUT3	5 V digital output channel 3.	Digital Output
2	OUT2	5 V digital output channel 2.	Digital Output
3	OUT1	5 V digital output channel 1.	Digital Output
4	RST	Digital input used for external hardware reset control.	Digital Input

4.6. 24 V Digital Input Terminal Block

Four digital input channels designed for direct connection to 24 VDC industrial signals.

Pin	Name	Description	Type
1	IN4	24 VDC digital input channel 4.	Digital Input
2	IN3	24 VDC digital input channel 3.	Digital Input
3	IN2	24 VDC digital input channel 2.	Digital Input
4	IN1	24 VDC digital input channel 1.	Digital Input

4.7. RS-232 Terminal Block

Pin	Name	Description	Type
1	GND	Signal ground reference for RS-232 communication.	Power Return
2	RX	RS-232 receive data input.	Communication Input
3	TX	RS-232 transmit data output.	Communication Output

Note: RS-232 communication requires a crossed connection between devices. Connect the TX output of UTOUCH to the RX input of the external device, and connect the RX input of UTOUCH to the TX output of the external device.

4.8. RS-485 Terminal Block

Pin	Name	Description	Type
1	A	RS-485 Line A / D+	Communication
2	B	RS-485 Line B / D-	Communication

Note: RS-485 A/B naming may vary between manufacturers. Verify signal polarity before connecting UTOUCH to an external RS-485 device.

4.9. USB Type Mini-B

The USB Type Mini-B connector provides communication and configuration access between the uTouch controller and a host computer. It can be used for device configuration, firmware updates, diagnostics, and data transfer.

4.10. Valve Terminal Block

Pin	Name	Description	Type
1	24V_IN	+24 V input terminal for external valve connection.	Power Input
2	24V_OUT	+24 V output terminal for external valve connection.	Power Output
3	VALF GND	Ground return terminal for the external valve supply.	Power Return

4.11. Universal Measurement Channel Terminal Blocks

Applies to Channel 1, Channel 2, Channel 3, Channel 4, and Channel 5.

Pin	Name	Description	Type
1	IDAC1	Programmable external current source output 1	Current Output
2	IDAC2	Programmable external current source output 2	Current Output
3	AIN0 (1)	Configurable analog input	Analog Input
4	AIN1 (1)	Configurable analog input	Analog Input
5	REFP (2)	Positive ADC reference input / sensor reference node	Reference
6	VOUT	+10 V external output	Power Output
7	GND	Analog ground	Analog GND
8	BODY	Cable shield connection	Shield

(1) AIN0 and AIN1 are configurable analog input terminals. Each input can be used for single-ended measurement with respect to AINCOM, or both inputs can be used together for differential measurement. The input polarity for differential measurement is selectable through the user interface.

(2) For 3-wire PT100/PT1000 RTD measurements, connect one of the two same-side RTD leads to the REFP terminal. In typical 3-wire RTD sensors, these are the two same-colored wires, usually red. This connection is used for lead-wire compensation.

4.12. Sensor Configuration Switch

Each measurement channel includes an integrated 8-position configuration switch used to adapt the analog front-end for different sensor types. The switch positions must be configured according to the connected sensor before starting measurements.

Parameter	Value
Switch Type	DIP Switch
Number of Positions	8
Configuration Method	Manual
Function	Sensor Interface Selection

Supported Configurations

Sensor Type	Switch Configuration							
	S1	S2	S3	S4	S5	S6	S7	S8
Default	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Load Cell	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
LVDT	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
4–20 mA (2-Wire/ 3-Wire/ 4-Wire)	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
Thermocouple	OFF	OFF	OFF	**ON**	OFF	**ON**	OFF	OFF
PT100 (2-Wire)	OFF	**ON**	**ON**	OFF	OFF	OFF	OFF	**ON**
PT1000 (2-Wire)	**ON**	OFF	**ON**	OFF	OFF	OFF	OFF	**ON**
PT100 (3-Wire)	OFF	**ON**	OFF	OFF	**ON**	OFF	OFF	**ON**
PT1000 (3-Wire)	**ON**	OFF	OFF	OFF	**ON**	OFF	OFF	**ON**

Note: For detailed sensor connection diagrams, switch configuration settings, and application examples, refer to the UTOUCH User Guide.

5. Specifications

5.1. Recommended Operating Conditions

Parameter	Min	Typ	Max	Unit
POWER SUPPLY				
Supply Voltage	+21.6	+24	+26.4	VDC
Input Current		75	750	mA
Power Consumption		1.8		W
Input Fuse Rating		1.5		A
ANALOG INPUTS				
V_{AIN0} : AIN0 absolute input voltage	−11.5		+11.5	V
V_{AIN1} : AIN1 absolute input voltage	−11.5		+11.5	V
V_{DIFF} : Differential input voltage (1)	-20		+20	V
ENVIRONMENTAL CONDITIONS				
T_A : Operating ambient temperature	-20		+60	°C
RH: Operating relative humidity, noncondensing	0		90	%RH

(1) The full differential input voltage range may be limited by the selected PGA gain, reference voltage, and absolute input voltage limits. See the Analog Interface Characteristics section for details. V_{DIFF} = VAIN0 − VAIN1.

5.2. External Sources

Parameter	Min	Typ	Max	Unit
EXTERNAL VOLTAGE SOURCES				
Output Voltage		+10		VDC
Output Current per Channel			100	mA
EXTERNAL CURRENT SOURCES				
Programmable Output Current (IDAC1 / IDAC2) (1)	50, 100, 250, 500, 750, 1000, 1500, 2000, 2500, 3000			µA
Absolute Error	–6	±0.7%	+6	%

(1) The availability of IDAC outputs for external use depends on the selected RTD measurement configuration. For 2-wire PT100/PT1000 measurements, IDAC1 is reserved for RTD excitation. For 3-wire PT100/PT1000 measurements, both IDAC1 and IDAC2 are reserved for RTD excitation. Reserved IDAC outputs must not be used as external current sources.

5.3. Digital I/O Interface Characteristics

Parameter	Min	Typ	Max	Unit
24V DIGITAL INPUT				
Input Type		Active-Low / Sink Input		
Number of Inputs		4		channels
Active Input Voltage	0		5	VDC
Inactive Input Voltage	15	24	26.4	VDC
Input Current @ 24 V	2.02	2.28	2.52	mA
5V DIGITAL OUTPUT				
Output Type		Open-collector, internal pull-up		
Number of Outputs		3		channels
Output High Voltage		5		VDC
Output Low Voltage		0.2	0.4	VDC
Internal Pull-up Current		0.5		mA
Recommended External Load Current			0.2	mA

5.4. Relay Outputs

Parameter	Min	Typ	Max	Unit
Number of Relays		2		
Contact Type		SPDT / Form C		
Switching Voltage (AC)			250	VAC
Switching Voltage (DC)			110	VDC
Switching Current, Resistive Load			10	A
Switching Current, Inductive Load			3	A
Switching Power			800	VA
Contact Resistance			100	mΩ
Electrical Contact Life			1×10^5	cycles
Mechanical Contact Life			1×10^7	cycles

Potentiometer Input Characteristics

Parameter	Min	Typ	Max	Unit
Input Type		Potentiometer wiper input		
Excitation Voltage		10		V
Excitation Voltage Current			100	mA
Potentiometer Wiper Range	0		10	V
Potentiometer Value	100	1000		Ω

5.5. Motor Driver Control Characteristics

Parameter	Min	Typ	Max	Unit
ANALOG CONTROL OUTPUT				
Analog Output Source (1)	POT WIPER / 0–10 V DAC / ±10 V DAC			
Potentiometer Output Range	0		10	V
DAC1 Output Range	0		10	V
DAC2 Output Range	-10		10	V
DIGITAL CONTROL OUTPUTS				
Direction Outputs (2)		2		channels
Enable Output (2)		1		channel
Digital Output High Voltage		24		V
Digital Output Pull-up Resistance		10		kΩ
Digital Output Source Current		2.4		mA

(1) The motor driver analog control output is selected through an internal analog multiplexer. The output source can be selected as the potentiometer wiper input, the 0–10 V DAC output, or the ±10 V DAC output.

(2) BACK, FORWARD, and ENABLE are 24 V digital control outputs intended for motor driver logic inputs.

5.6. Valve Driver Output

Parameter	Min	Typ	Max	Unit
Output Type	Low-side MOSFET switch			
Load Supply Voltage		24		VDC
Output Current			5	A
Fuse Rating		5		A

Note: The valve output is implemented as a low-side MOSFET switch. The external valve load is connected to the valve supply terminal, and the valve return path is switched through the VALVE GND terminal. The output is protected by a resettable fuse (PPTC) and is intended for DC valve or solenoid loads.

5.7. RS-232 Interface Characteristics

Parameter	Min	Typ	Max	Unit
Standard	TIA/EIA-232-F			
Receiver Input Voltage Range	-25		+25	V
Driver Output Voltage, High Level	+5.0	+5.4		V
Driver Output Voltage, Low Level		-5.4	-5.0	V
Maximum Data Rate	150	250		kbps
Supported Baud Rate			115200	bps

5.8. RS-485 Interface Characteristics

Parameter	Min	Typ	Max	Unit
Standard		TIA/EIA-485		
Line Type		Half-duplex differential RS-485		
Differential Input Sensitivity	-0.2		+0.2	V
Common-Mode Input Range	−7		+12	V
Differential Output Voltage	+1.5		+3.5	V
Cable Length (1)			1200	m
Supported Baud Rate		115200		bps
Transceiver Signaling Rate		50		Mbps
Termination Resistor		120		Ω

(1) Maximum cable length is application-dependent and decreases as the communication baud rate increases.

5.9. USB Interface Characteristics

Parameter	Min	Typ	Max	Unit
Connector Type		Mini-B		
USB Version		USB 2.0 Full-Speed		

5.10. Internal Temperature Sensor

Parameter	Min	Typ	Max	Unit
Temperature Range	–40		+125	°C
Temperature Resolution		0.01		°C
Accuracy		±0.4		°C

Note: The internal temperature sensor is used for cold-junction compensation in thermocouple measurements and can also be used for optional temperature monitoring. The measured value represents the local PCB temperature and may differ from the ambient temperature.

5.11. Analog Interface Characteristics

Parameter	Min	Typ	Max	Unit
Number of Channels		5		channels
Resolution		24		bits
Data Rate	2.5		40000	SPS
Input Impedance	1	20		GΩ
Gain		0.125, 0.1875, 0.25, 0.5, 1, 2, 4, 8, 16, 32, 64, 128		V/V
Reference Voltage		2.5		V

5.11.1. ADC Input Range

The values in this table are valid only when the internal 2.5 V reference is selected. The PGA gain is configurable through the user interface.

GAIN	INPUT RANGE	
	DIFFERENTIAL	SINGLE-ENDED
0.125	±20 V	0 V to +11.5 V or 0 V to −11.5 V
0.1875	±13.3 V	0 V to +11.5 V or 0 V to −11.5 V
0.25	±10 V	0 V to +10 V or 0 V to −10 V
0.5	±5 V	0 V to +5 V or 0 V to −5 V
1	±2.5 V	0 V to +2.5 V or 0 V to −2.5 V
2	±1.25 V	0 V to +1.25 V or 0 V to −1.25 V
4	±0.625 V	0 V to +0.625 V or 0 V to −0.625 V
8	±0.312 V	0 V to +0.312 V or 0 V to −0.312 V
16	±0.156 V	0 V to +0.156 V or 0 V to −0.156 V
32	±0.0781 V	0 V to +0.0781 V or 0 V to −0.0781 V
64	±0.0391 V	0 V to +0.0391 V or 0 V to −0.0391 V
128	±0.0195 V	0 V to +0.0195 V or 0 V to −0.0195 V

Note: Single-ended input ranges are referenced to AINCOM. Either AIN0–AINCOM or AIN1–AINCOM can be selected through the user interface. For differential measurements, the input polarity can be selected as AIN0–AIN1 or AIN1–AIN0.

5.11.2. 4–20 mA Measurement Performance

Parameter	Min	Typ	Max	Unit
Input Range	4		20	mA
Supported Transmitters		2-wire, 3-wire, 4-wire		
Measurement Accuracy		±0.05	±0.10	%FS
Repeatability Error		0.08	0.20	%FS

Validation Conditions: Performance values were verified using calibrated 4–20 mA pressure transmitters over the full-scale measurement range. Results are based on four independent validation runs performed under laboratory conditions at 25 °C.

5.11.3. Load Cell Measurement Performance

Parameter	Min	Typ	Max	Unit
Measurement Accuracy		±0.30	±0.50	%FS
Repeatability Error		0.20	0.50	%FS

5.11.4. LVDT Measurement Performance

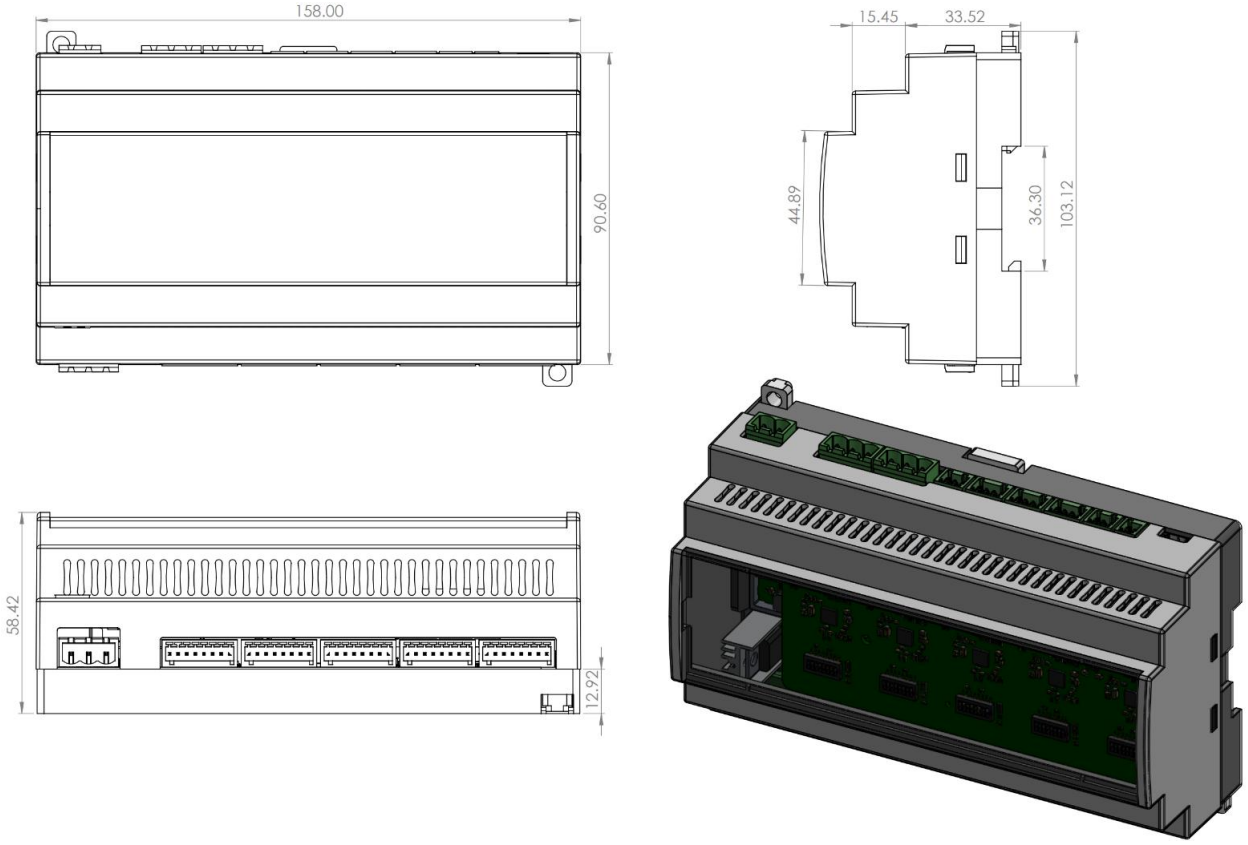
Parameter	Min	Typ	Max	Unit
Measurement Accuracy		±0.10	±0.20	%FS
Repeatability Error		0.10	0.20	%FS

5.11.5. P100 Measurement Performance

Parameter	Min	Typ	Max	Unit
Measurement Accuracy		±0.20	±0.50	°C
Repeatability Error		0.10	0.3	°C
Display Resolution		0.10		°C

Validation Conditions: Temperature measurement performance was verified against a reference temperature instrument over the 5 °C to 80 °C range. The stated accuracy represents the maximum deviation between the displayed temperature and the reference temperature under laboratory conditions.

6. Dimensional Drawing



Note: All dimensions are in millimeters.

Mounting Type: Snap-fit mounting on 35 mm DIN rail (EN 60715).