TRODEKSBUS® Series DIN Rail Mount Digital Transmitters

TRODEKS®

DIN-100 Series

1 YEAR WARRANTY CE

✔ **Complete Sensor to RS485 Interface**
✔ **500V RMS Analog**
✔ **Input Isolation 15-Bit Measurement Resolution**
✔ **Continuous Self-Calibration; No Adjustments of any Kind**
✔ **Programmable Digital Filter**
✔ **Requires 5 Vdc Supply**
✔ **Transient Suppression on RS485 Communications Lines**
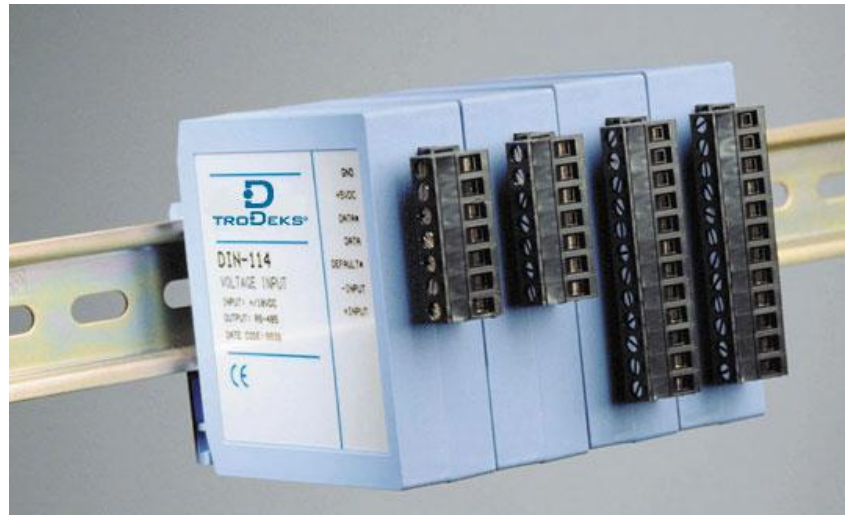✔ **Screw Terminal Plug Connectors Supplied**

APPLICATIONS

✔ **Process Monitoring and Control**
✔ **Remote Data Logging to any Host Computer**
✔ **Product Testing**
✔ **Interface to PLC**

The DIN-100 Sensor to Computer Modules are a family of data acquisition modules that convert analog input signals to digital data and transmit via RS485 to a controller which may be a computer or other processor-based equipment. The modules can measure temperature, pressure, voltage, current, digital input or digital output signals. The modules provide direct connection to a wide variety of sensors and perform all signal conditioning, scaling, linearization and conversion to either linearized ASCII data values or Modbus® RTU data values. Features such as address, baud rate, parity, echo, etc., are selectable using simple commands over the RS485 port.

The selections are stored in nonvolatile EEPROM which maintains data even after power is removed.

The key to the DIN-100 Series is that the modules are easy to use. You do not need engineering experience in complicated data acquisition hardware. With these modules, anyone familiar with a personal computer can construct a data acquisition system. This modular approach to data acquisition is extremely flexible, easy to use and cost effective. Data is acquired on a per channel basis so you only buy as many channels as you need. The modules can be mixed and matched to fit your application. They can be placed remote from the host and from each other. You can string up to 247 modules on a twisted pair of wires by using RS485 with repeaters.

DIN-114, shown smaller than actual size.

All modules are supplied with screw terminal plug connectors. The connectors allow system expansion, reconfiguration or repair without disturbing field wiring. No charge utility software is available to make the DIN-100 modules easier to learn and use.

THEORY OF OPERATION

Each module is a complete single channel data acquisition system. Each unit contains analog signal conditioning circuits optimized for a specific input type. Sensor signals are converted to digital data with a microprocessor controlled integrating A/D converter. Offset and gain errors in the analog circuitry are continuously monitored and corrected using microprocessor techniques. The DIN-100 module converts the digital signal data and stores the resultant data in a memory buffer.

The modules continuously convert data at the rate of 8 conversions per second and store the latest result in the buffer. Host processors may request data by sending a query to the module. The DIN-100 module will instantly respond by communicating the memory buffer data back to the host processor. Up to 247 modules may be linked to a single RS485 port. Each module on a serial line is identified by a unique user programmable address. This addressing technique allows modules to be interrogated in any order.

DIGITAL INPUTS/OUTPUTS

DIN-170 digital output modules contain open-collector transistor switches that may be controlled by the host processors. These switches may be used to control solid-state relays which in turn may control heaters, pumps and other power equipment. The digital inputs may be read by the host processor and used to sense the state of remote digital signals. They are ideal for sensing the state of limit or safety switches.

DIN-100 Series ASCII Command Set			
Command and Definition		**Typical Command Message ($ prompt)**	**Typical Response Message**
DI	**Digital Input**	$1D1	*0003
DO	**Digital Output**	$1DOFF	*
RD	**Read Data**	$1RD	*+00072.00
RS	**Read Setup**	$1RS	*31070142
RZ	**Read Zero**	$1RZ	*+00000.00
WE	**Write Enable**	$1WE	*
Write Protected Commands			
CZ	**Clear Zero**	$1CZ	*
RR	**Remote Reset**	$1RR	*
SU	**Setup Module**	$1SU31070142	*
TS	**Trim Span**	$ITS+00600.00	*
TZ	**Trim Zero**	$1TZ+00000.00	*

DIGITAL FILTER

The DIN-100 analog input modules include two unique programmable single pole digital filters. The filter is used to smooth analog data in noisy environments. Separate time constants may be specified for small and large signal changes. Typically a large time constant is specified for small signal changes to filter out noise and provide stable output readings. A smaller time constant may be chosen for large signal changes to provide fast response to such changes.

COMMAND SET

The DIN-100 Series uses the Modbus RTU or ASCII protocol for communication. The Modbus RTU binary protocol uses a master-slave technique, in which only the master device can initiate transactions. The slave devices respond by supplying the requested data to the master or by taking the action requested in the query. The master can address any slave device. The returned messages are considered response messages. The supported master codes are below in the chart.

Modbus RTU Functions and Descriptions	
01	Read Coil Status (Digital Inputs)
04	Read Input Register (Analog Inputs)
05	Force Single Coil (One Digital Output)
06	Preset Single Register (RTU Protocol)
15	Force Multiple Coils (Multiple Digital Output)

SETUP

DIN-100 modules are initiated at the factory using the ASCII protocol. This allows setup and configuration, including the Modbus device address, to be easily performed using the utility setup software or a dumb terminal. Each DIN-100 module must be properly configured before installation into a Modbus system.

UTILITY SOFTWARE

Complimentary Utility Software is included with each purchase order. The software is compatible with Windows XP, Vista, 7 and 8 operating systems and distributed on CD-ROM. The Utility Software simplifies configuration of all user-selectable options such as device address, baud rate and filtering constants. The latest version of the software is always downloadable from our website.

PROCESS CONTROL SOFTWARE

Modbus RTU protocol is supported by virtually all commercial process control software programs available today.

DIN-100 Common Specifications

(typical at +25°C and nominal power supply unless otherwise noted)

ANALOG

Channels: Single channel analog input

Common Mode Rejection: 500V RMS max CMV, input to output at 60Hz

Leakage Current: input to output at 115V RMS, 60 Hz; <2µA RMS

Resolution: 15 bit measurement resolution

Conversion Speed: 8 conversions per second

Calibration: Autozero and autocalibration; no adjustment pots

DIGITAL

Microcomputer: 8-bit CMOS; digital scaling, linearization and calibration

Memory: Nonvolatile memory eliminates pots and switches

DIGITAL FILTERING

Filtering: Small and large signal with user selectable time constants from 0 to 16 seconds

COMMUNICATIONS

Protocol: Communications in ASCII or MODBUS-RTU via RS485 ports

Baud Rates: Selectable baud rates; 300, 600, 1200, 2400, 4800, 9600, 19200, 38400

Data Format: NRZ asynchronous data format; 1 start bit, 8 data bits, 1 parity bit and 1 stop bit

Parity: Odd, even, none

Address: User selectable channel address

Multi-Drop Modules: Up to 247 multi-drop modules per host serial port

SPECIFICATIONS FOR SPECIFIC MODULES
DIN-100 VOLTAGE INPUTS

Voltage Ranges: +10 mV, +100 mV, +1V, +5V, +10V, +100 Vdc

Resolution: 0.01% of FS (4 digits)

Accuracy: +0.02% of FS max

Common Mode Rejection: 100 dB at 50/60Hz

Zero Drift: +1 count max (autozero)

Span Tempco: +50ppm/°C max

Input Burnout Protection: To 250 Vac normal mode

Input Impedance: < +1V input = 100MΩ min; > +5V input = 1MΩ min

POWER

Requirements: Regulated +5 Vdc, 0.75 W max (DIN-150, 2.0 W max); protected against power supply reversals

DIN-130 THERMOCOUPLE INPUTS

Thermocouple Input: Automatic cold junction compensation and linearization, open thermocouple indication, overrange indication

Thermocouple Types: J, K, T, E, R, S, B, C (factory set)

Ranges: J = -200 to 760°C;

B = 0 to 1820°C; K = -150 to 1250°C;

S = 0 to 1750°C; T = -200 to 400°C;

R = 0 to 1750°C; E = -100 to 1000°C;

C = 0 to 2315°C

Resolution: +1°

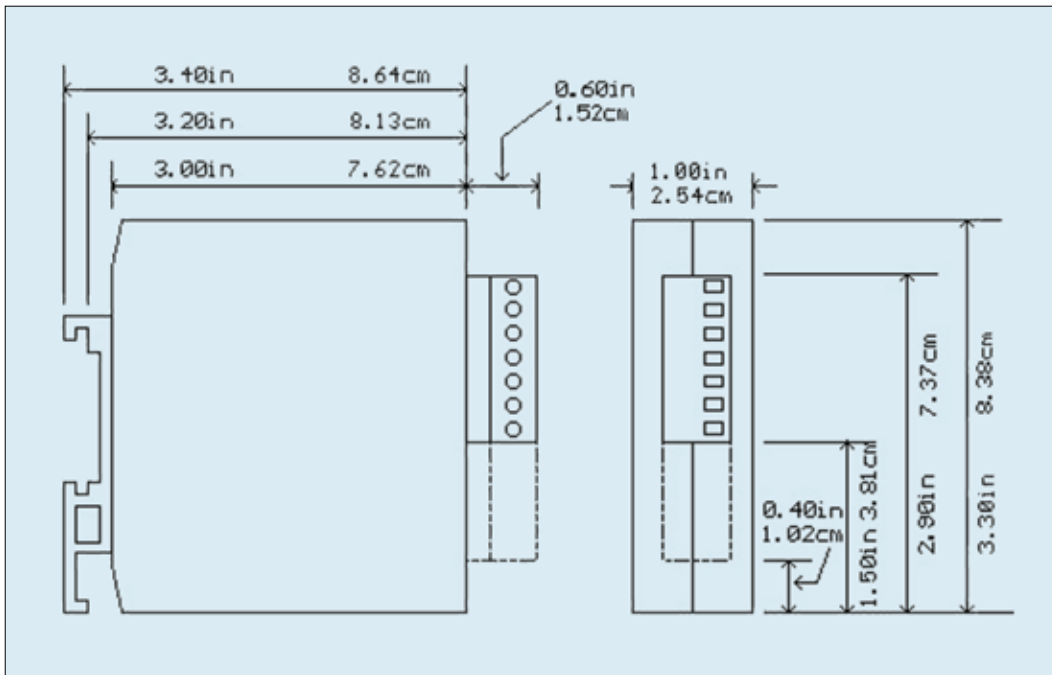**Overall Accuracy (error from all sources) from 0 to 40°C**
Ambient: +1.0°C max (J, K, T, E); +2.5°C max (R, S, B, C) (300°C to FS)

Common Mode Rejection: 100 dB at 50/60 Hz

Input Impedance: 100 MΩ min

Lead Resistance Effect: <20μV per 350 Ω

Input Burnout Protection: to 250 Vac normal mode

DIN-120 CURRENT INPUTS

Currents: 4 to 20 mAdc

Resolution: 0.04% of FS

Accuracy: 0.04% of FS

Common Mode Rejection: 100 dB at 50/60 Hz

Zero Drift: +1 count max (autozero)

Span Tempco: +50 ppm/°C max

Voltage Drop: +0.1V max

Communications: Distance up to 4000 feet (RS485)

Transient Suppression: On RS485 communications lines

Communications Setups: Stored in EEPROM

ENVIRONMENTAL

Operating Temperature Range: -25 to 70°C (-13 to 158°F)

Storage Temperature Range: -25 to 85°C (-13 to 185°F)

Relative Humidity: 0 to 95% noncondensing

MECHANICALS AND DIMENSIONS

Case: ABS case with captive hardware

Connector: Screw terminal barrier plug (supplied)

DIN-140 RTD INPUTS

RTD Input: Automatic linearization and lead compensation

RTD Types: α = .00385, .00392, 100 Ω at 0°C; .00388, 100 Ω at 25°C

Ranges: .00385 = -200 to 850°C; .00392 = -200 to 600°C; .00388 = -100 to 125°C

Resolution: 0.1°C

Accuracy: +0.3°C

Common Mode Rejection: 100dB at 50/60 Hz

Input Connections: 2, 3, or 4 wire

Excitation Current: 0.25 mA

Lead Resistance Effect: 3 wire = 2.5°C per Ω of imbalance; 4 wire = negligible

Max Lead Resistance: 50 Ω

Input Burnout Protection: To 120 Vac normal mode

DIN-145 THERMISTOR INPUTS

Thermistor Types: 2252 Ω at 25°C

Range: 0 to 100°C (32 to 212°F)

Resolution: 0.01°C or F

Accuracy: +0.1°C

Common Mode Rejection: 100 dB at 50/60 Hz

Input Burnout Protection: To 30 Vdc normal mode

DIN-150 BRIDGE INPUTS

Voltage Ranges: +30 mV, +100 mV

Resolution: 10 µV (mV spans); 0.02% of FS (V span)

Accuracy: +0.05% of FS max

Common Mode Rejection: 100 dB at 50/60 Hz

Input Burnout Protection: To 30 Vdc

Offset Control: Full input range

Excitation Voltage: 5V, 10 Vdc, 50 mA max

Zero Drift: +1µV/°C max

Span Tempco: +50 ppm/°C max

DIN-160 FREQUENCY INPUTS

Range: 1 Hz to 20 KHz

Resolution: 0.005% of reading + 0.01 Hz

Accuracy: +0.01% of reading +0.01 Hz

Tempco: +20 ppm/°C

Input Impedance: 1MΩ

Switching Level: Selectable 0V, +2.5V

Hysteresis: Adjustable, 10 mV-1.0V

Input Burnout Protection: 250 Vac

DIN-170 DIGITAL INPUTS/OUTPUTS

Digital I/O: 6 digital inputs or 6 digital outputs; inputs/outputs are read/set in parallel

Isolation: isolated from power supply ground

Input Voltage Levels: +30V without damage

Input Switching Levels: High, 3.5V min: low, 1.0V max

Outputs: Open collector to 30V, 100 mA max load

Vsat: 1.0V max @ 100 mA

DIN-190 RS232/485 CONVERTER/REPEATER

Baud Rates: 300-115200 (dip-switch selectable)

Termination and Biasing

Resistors: included (selectable via internal jumpers)

Isolation: 500Vrms

To Order

Model No.	Description
Voltage Input	
DIN-110	10 mV input/RS485 output
DIN-111	100 mV input/RS485 output
DIN-112	1V input/RS485 output
DIN-113	5V input/RS485 output
DIN-114	10V input/RS485 output
DIN-115	100V input/RS485 output
Current Inputs	
DIN-125	4 to 20 mA input/RS485 output
Thermocouple Inputs	
DIN-131	J thermocouple input/RS485 output
DIN-132	K thermocouple input/RS485 output
DIN-133	T thermocouple input/RS485 output
DIN-134	E thermocouple input/RS485 output
DIN-135	R thermocouple input/RS485 output
DIN-136	S thermocouple input/RS485 output
DIN-137	B thermocouple input/RS485 output
DIN-138	C thermocouple input/RS485 output
RTD/Thermistor Inputs	
DIN-141	0.00385 RTD input/RS485 output
DIN-142	0.00392 RTD input/RS485 output
DIN-143	0.00388 RTD input/RS485 output
DIN-145	2252Ω thermistor input/RS485 output
Bridge Inputs	
DIN-151	30 mV bridge input, 5V excitation/ RS485 output
DIN-152	30 mV bridge input,10V excitation/ RS485 output
DIN-153	100 mV bridge input, 5V excitation/ RS485 output
DIN-154	100 mV bridge input, 10V excitation/ RS485 output
Timer and Frequency Inputs	
DIN-161	Frequency input/RS485 output
Digital Inputs/Outputs	
DIN-171	6 digital inputs/RS485 output
DIN-172	6 digital outputs/RS485 output
RS232/485 Converter/Repeater	
DIN-191	RS232/485 converter
DIN-192	RS485 repeater