



DIN-100 OMEGABUS® Series DIN RAIL MOUNT DIGITAL TRANSMITTERS

\$140

Basic Unit



- ✓ Complete Sensor to RS-485 Interface
- ✓ 500V RMS Analog Input Isolation
- ✓ 15-Bit Measurement Resolution
- ✓ Continuous Self-Calibration; No Adjustments of any Kind
- ✓ Programmable Digital Filter
- ✓ Requires +5VDC Supply
- ✓ Transient Suppression on RS-485 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 serial data and transmit via RS-485 to a master unit which may be a computer or other processor-based equipment. The modules can measure temperature, bridge inputs, 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 from your serial 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 RS-485 with repeaters.

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 RS-485 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.

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)

The ASCII protocol is a command and response protocol using ASCII characters for easy troubleshooting and interpretation of data values.

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	\$1TS+00600.00	*
TZ	Trim Zero	\$1TZ+00000.00	*

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.

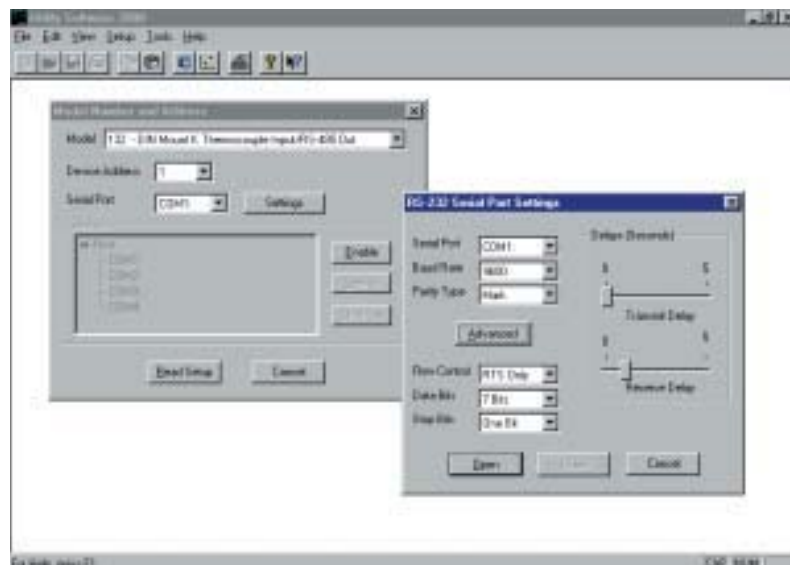
UTILITY SOFTWARE

Complimentary Utility Software is included with each purchase order. The software is compatible with Windows 95, 98, NT 4.0+, 2000

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 web site.

PROCESS CONTROL SOFTWARE

Modbus RTU protocol is supported by virtually all commercial process control software programs available today. These programs operate on IBM and compatible personal computers in the Windows 95, 98, NT and IBM OS/2 environments.





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, 60Hz; <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 RS-485 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

Communications: distance up to 4,000 feet (RS-485)

Transient Suppression:

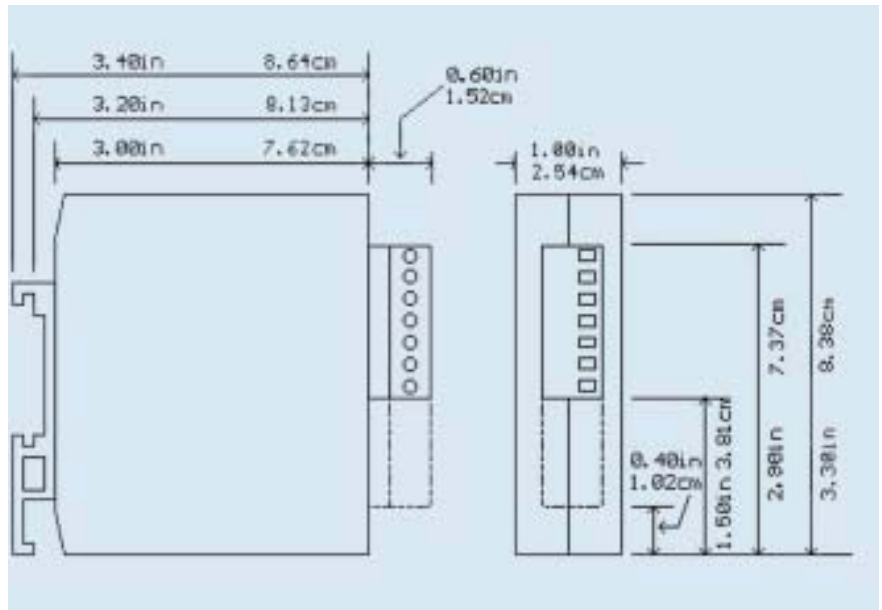
on RS-485 communications lines

Communications Setups:

stored in EEPROM

POWER

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



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)

SPECIFICATIONS FOR SPECIFIC MODULES

DIN-100 VOLTAGE INPUTS

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

Resolution: 0.01% of FS (4 digits)

Accuracy: ±0.02% of FS max

Common Mode Rejection: 100dB at 50/60Hz

Zero Drift: ±1 count max (autozero)

Span Tempco: ±50ppm/°C max

Input Burnout Protection:

to 250Vac normal mode

Input Impedance:

≤ ±1V input = 100MΩ min;

≥ ±5V input = 1MΩ min

DIN-120 CURRENT INPUTS

Currents: 4-20 mAdc

Resolution: 0.04% of FS

Accuracy: 0.04% of FS

Common Mode Rejection:

100dB at 50/60Hz

Zero Drift: ±1 count max (autozero)

Span Tempco:

±50ppm/°C max

Voltage Drop: ±0.1V max

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:

100dB at 50/60Hz

Input Impedance: 100 MΩ min

Lead Resistance Effect: <20μV per 350 Ω

Input Burnout Protection:

to 250Vac normal mode



DIN-140 RTD INPUTS

RTD Input: automatic linearization and lead compensation
RTD Types: $\alpha = .00385, .00392, 100 \Omega$ at 0°C ; $.00388, 100 \Omega$ at 25°C
Ranges: $.00385 = -200$ to 850°C ; $.00392 = -200$ to 600°C ; $.00388 = -100$ to 125°C
Resolution: 0.1°C
Accuracy: $\pm 0.3^\circ\text{C}$
Common Mode Rejection: 100dB at 50/60Hz
Input Connections: 2, 3, or 4 wire
Excitation Current: 0.25mA
Lead Resistance Effect:
 3 wire - 2.5°C per Ω of imbalance;
 4 wire - negligible
Max Lead Resistance: 50 Ω
Input Burnout Protection: to 120Vac common mode

DIN-145 THERMISTOR INPUTS

Thermistor Types: 2252 Ω at 25°C
Range: 0 to 100°C
Resolution: 0.01°C or $^\circ\text{F}$
Accuracy: $\pm 0.1^\circ\text{C}$
Common Mode Rejection: 100dB at 50/60Hz
Input Burnout Protection: to 30Vdc common mode

DIN-150 BRIDGE INPUTS

Voltage Ranges:
 $\pm 60\text{mV}$, $\pm 120\text{mV}$
Resolution: $10\mu\text{V}$
Accuracy: $\pm 0.05\%$ of FS max
Common Mode Rejection: 100dB at 50/60Hz
Input Burnout Protection: to 30Vdc common mode
Offset Control: full input range
Excitation Voltage: 5Vdc, 10Vdc, 50mA max
Zero Drift: $\pm 1\mu\text{V}/^\circ\text{C}$ max
Span Tempco: $\pm 50\text{ppm}/^\circ\text{C}$ max

DIN-160 FREQUENCY INPUTS

Range: 1Hz to 20KHz
Resolution: 0.005% of reading + 0.01Hz
Accuracy: $\pm 0.01\%$ of reading $\pm 0.01\text{Hz}$
Tempco: $\pm 20\text{ppm}/^\circ\text{C}$
Input Impedance: $1\text{M}\Omega$
Switching Level: selectable 0V, +2.5V
Hysteresis: adjustable, 10mV-1.0V
Input Burnout Protection: 250Vac common mode

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: $\pm 30\text{V}$ without damage
Input Switching Levels: high, 3.5V min; low, 1.0V max
Outputs: open collector to 30V, 100mA max. load

Vsat: 1.0V max @ 100mA

DIN-190 RS-232/485

CONVERTER/REPEATER
Baud Rates: 300-115200 (dip-switch selectable)
Termination and Biasing Resistors: included (selectable via internal jumpers)
Isolation: 500Vrms

MOST POPULAR MODELS HIGHLIGHTED

To Order (Specify Model Number)

Model No.	Price	Description
Voltage Input		
DIN-110	\$180	+/-10mV input/RS-485 output
DIN-111	180	+/-100mV input/RS-485 output
DIN-112	180	+/-1V input/RS-485 output
DIN-113	180	+/-5V input/RS-485 output
DIN-114	180	+/-10V input/RS-485 output
DIN-115	180	+/-100V input/RS-485 output
Current Inputs		
DIN-125	180	4-20mA input/RS-485 output
Thermocouple Inputs		
DIN-131	180	J thermocouple input/RS-485 output
DIN-132	180	K thermocouple input/RS-485 output
DIN-133	180	T thermocouple input/RS-485 output
DIN-134	180	E thermocouple input/RS-485 output
DIN-135	180	R thermocouple input/RS-485 output
DIN-136	180	S thermocouple input/RS-485 output
DIN-137	180	B thermocouple input/RS-485 output
DIN-138	180	C thermocouple input/RS-485 output
RTD/Thermistor Inputs		
DIN-141	180	.00385 RTD input/RS-485 output
DIN-142	180	.00392 RTD input/RS-485 output
DIN-143	180	.00388 RTD input/RS-485 output
DIN-145	180	2252 Ω thermistor input/RS-485 output
Bridge Inputs		
DIN-151	250	+/-60mV bridge input, 5V excitation/RS-485 output
DIN-152	250	+/-60mV bridge input, 10V excitation/RS-485 output
DIN-153	250	+/-120mV bridge input, 5V excitation/RS-485 output
DIN-154	250	+/-120mV bridge input, 10V excitation/RS-485 output
Timer and Frequency Inputs		
DIN-161	180	Frequency input/RS-485 output
Digital Inputs/Outputs		
DIN-171	140	6 digital inputs/RS-485 output
DIN-172	140	6 digital outputs/RS-485 output
RS-232/485 Converter/Repeater		
DIN-191	120	RS-232/485 converter
DIN-192	120	RS-485 repeater

Each unit is supplied with a complete operator's manual and software on CD rom.
Ordering Example: DIN-132 type K thermocouple input, RS-485 output DIN rail mount digital transmitter and OMEGACARESM 1-year extended warranty for DIN-132 (adds 1 year to standard 1-year warranty) and DIN-191 RS232/485 converter and OMEGACARESM 2-year extended warranty for DIN-191 (adds 2 years to standard 1-year warranty), \$180 + 25 + 120 + 25 = \$350.

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