



Multi function Integra 1530 digital metering systems provide high accuracy <0.2% measurement, display and communication of all major electrical and power quality parameters, including true RMS system values, power quality data and total harmonic distortion (THD) measurement up to the 31st harmonic. To suit requirements the range offers single phase, single phase 3 wire, 3 phase 3 or 4 wire, and 3 phase 4 wire with neutral CT configurations.

This DIN 96 panel mounted enclosure offers simple programming and display of up to 34 power measurement parameters via a simple menu driven user interface on the front panel. Integra 1530 benefits from optional pulsed, analogue and digital communication outputs, allowing enhanced status information of up to 50 measured parameters to be communicated into building management systems. Additionally, a simple Windows based software package is available to remotely configure, monitor and communicate all 50 major electrical and power quality parameters.

Features

- Measurement and display of up to 34 electrical and power parameters
- Measurement and communication of up to 50 electrical and power parameters
- High contrast red LED display
- LED annunciators for each measured parameter
- THD measurement and power quality data to 31st harmonic
- True RMS measurement
- Pulsed, analogue and digital outputs
- Modbus, Johnson Controls, Lonworks and Profibus interface options
- Fully programmable VT and CT ratios

Benefits

- Replaces multiple single function instruments
- Pre-calibrated plug-in options
- High accuracy <0.2%
- Configurable via software package or menu driven interface
- Import and export monitoring
- Neutral CT input option
- True 3 and 4 wire measurement

Applications

- Switchgear
- Distribution systems
- Control panels
- Embedded generation
- Energy management
- Building management
- Utility power monitoring
- Process control
- Motor monitoring

Compliant With

- UL File No: E20300
- UL 61010B-1
- IEC 1010-1/BSEN 61010-1 CAT III

Operation

The multi function Integra 1530 offers uncomplicated operation and high accuracy <0.2% measurement of three phase voltage, current, frequency, Watts, VAR, VA, energy, power factor, and total harmonic distortion measurement of both phase and system, current and voltage.

3 phase 4 wire system line to line voltage measurements are usually derived from a calculation of the vector of the line to neutral voltage measurements. However, Integra 1530 includes true measurement of both line to neutral, and line to line measurements, ensuring accurate readings even under phase fault conditions.

To suit the requirements of individual power monitoring applications the Integra 1530 offers simple programming and display, via the menu driven interface. Alternatively, an optional Windows based software configuration package can be used for remote configuration and monitoring. Once configured by either method, simultaneous monitoring of up to 50 electrical and power quality variables can be communicated into building management systems via pulsed, analogue or digital communication options.

If customer requirements extend beyond the original capabilities of their metering, the functionality of this innovative product is easily enhanced to meet new client expectations. Integra pre-calibrated plug-in option cards allow cost effective upgrades with any combination of pulsed, analogue and digital communication outputs. Cards slot simply into the back of the unit, products do not need to be removed from the installation or recalibrated.

Accuracy

Integra 1530 digital metering systems utilise true RMS measurement techniques up to the 31st harmonic, providing <0.2% accuracy. An exceptional tolerance to high harmonic frequencies is achieved from a robust frequency detection method, which is able to lock the fundamental frequency onto any phase. High integrity measurements are possible where the system approximates CT current in the absence of voltage signals.

System Input

Designed for all low, medium and high voltage switchgear and distribution systems, the Integra 1530 offers programmable VT and CT ratio capability. Direct connected up to 480V AC with 5A CT inputs as standard, and 1A CT inputs available as an option.

Neutral CT Input Option

High harmonic environments can produce unexpected and dangerous neutral currents. Traditional 3 phase systems are only able to calculate the vector of line to neutral current measurements, which may not register the true reading. Integra 1530 offers a 3 phase 4 wire version with a neutral 4th CT allowing true neutral current measurement and protection in high harmonic environments.



System Outputs

Pulsed Outputs

Integra 1530 offers optional single or dual pulsed outputs enabling the retransmission of kW.Hr and kVAr.Hr time based parameters. Outputs are pulsed at a rate proportional to the measured kW.Hr active energy, with pulse width and rate easily programmable either locally or remotely. The output relays have fully isolated volt free contacts, with connections via screw clamp terminals.

Analogue Outputs

Up to two analogue outputs may also be included, enabling onward transmission of linear parameters using industry standard analogue signalling. Each analogue channel can be assigned to one of 47 measured parameters with the output span fully adjustable to suit customer requirements, and can be configured to operate in normal, reverse, threshold or constant current modes. Both analogue outputs share a common return which is galvanically isolated from non-analogue output terminals.

Digital Communications

RS485 Modbus RTU

Integra 1530 digital metering systems offer an RS485 communication port for direct connection to SCADA systems using the Modbus RTU protocol, or the Johnson Controls Metasys NII protocol. Remote monitoring enables the user to record the systems parameters in real time, using high resolution numbers. The Modbus protocol establishes the format for the master's query by placing it into the device address. The slave's response is also constructed using the Modbus protocol; it contains the fields confirming the action taken, the data to be returned, and an error-checking field. The Modbus option includes function 8 subfunction 0, which provides return query data diagnostic support, and the ability to change Modbus word order to suit the requirements of the user.

Lonworks Interface

The Lonworks interface option is designed to conform to the LonMark Interoperability Guidelines version 3.2. This ensures Integra digital metering systems can be integrated into a single control network without requiring custom node or network tool development.

Profibus

The Profibus interface option allows Integra 1530 to communicate over a Profibus-DP network as a slave device. Integra can automatically detect the masters' baud rate and communicates at data rates up to 12Mbit over the optically isolated RS485 port. Connection is made via a Profibus standard 9-way D type connector. The interface supports standard DP protocol functionality, class 1 and class 2 services and Networks can be configured using the GSD file.

INT-SOFT Communication and Configuration Software

Configuration of system parameters, outputs, pulsed relays, current and power demand are easily programmed through the INT-SOFT Windows style user interface, which can be installed on any PC running Windows 95, NT or 2000. Communication to Integra 1530 is achieved with a Modbus connection to a COM port on the PC via an RS485/RS232 converter.

The configuration software allows the user to load and save the configuration to and from a hard disk on a PC, and to send and retrieve settings to and from the Integra 1530. Settings can be saved to disk for later use, and can be copied from one Integra to the next.

Status information will usually be communicated into a building management system, but can also be monitored through the configuration software. The software interrogates the selected Integra 1530 every few seconds to obtain data, which can be viewed on a dedicated measurements page.

For more detailed information, please refer to the INT-SOFT Communication and Configuration Software section of this brochure.



Measurement and Display

Up to 34 electrical and power quality parameters can be configured and displayed on the Integra 1530 unit.

- 1 System Volts
System Current
System kW
- 2 System Volts THD %
System Current THD %
- 3 Volts L1 – N (4 wire only)
Volts L2 – N (4 wire only)
Volts L3 – N (4 wire only)
- 4 Volts L1 – L2
Volts L2 – L3
Volts L3 – L1
- 5 Volts Line 1 THD %
Volts Line 2 THD %
Volts Line 3 THD %
- 6 Current L1
Current L2
Current L3
- 7 Current Line 1 THD %
Current Line 2 THD %
Current Line 3 THD %
- 8 Neutral Current (4 wire only)
Frequency
Power Factor
- 9 kVA
kVA
kW
- 10 kW Hr Import (7 digit resolution)
- 11 kVA Hr Import (7 digit resolution)
- 12 kW Hr Export (7 digit resolution)
- 13 kVA Hr Export (7 digit resolution)
- 14 kW Demand
Current Demand
- 15 kW Maximum Demand
Current Maximum Demand

Enhanced status information of up to 50 measured parameters can be communicated into building management systems via optional pulsed, analogue and digital outputs.

Programmable Display

A two button interface on the front panel of Integra 1530 units provides simple programming of VT and CT ratio settings, configuration of selected communication options, and adjustment of operating parameters. To prevent unauthorised access to the product configuration settings, all set up screens offer password protection. Once configured, status information can be viewed by scrolling through 15 screens featuring a high contrast 3 line, 4 digit LED display, with separate annunciators for each of the 34 measured parameters. Optional pulsed, analogue or digital outputs allow enhanced status information of up to 50 measured parameters to be communicated into building management systems.

Programmable Parameters

| Parameter | Range |
|----------------------------|---|
| Password: | 4 digit 0000 - 9999 |
| Primary Current: | Max 9999:5A (360MW max**) |
| VT Primary: | 400kV (360MW max**) |
| Secondary Voltage: | Nominal system voltage |
| | ** maximum VT or CT ratios are limited so that the combination of primary voltage and current do not exceed 360MW at 120% of relevant input |
| Demand Integration Time: | 8, 15, 20, 30 and 60 minutes |
| Reset: | Max demand & active energy registers |
| Pulse Output Duration: | 60, 100, 200 ms |
| Pulse Rate Divisors: | 1, 10, 100, 1000 |
| RS485 Interface Baud Rate: | 2.4, 4.8, 9.6, 19.2 kB |
| RS485 Parity: | Odd / Even / No, 1 or 2 stop bits |
| Modbus Address: | 1 - 247 |
| Analogue Outputs: | User definable upper and lower levels and limits |

Specification

| | |
|-----------------------------------|---|
| Input | |
| Nominal Input Voltage: | 57.7 to 277V L-N, 100 to 480V L-L |
| Max Continuous Input Voltage: | 120% nominal |
| Max Short Duration Input Voltage: | 2 x for 1 second, repeated 10 times at 10 second intervals |
| System VT Ratios (primary): | Any value up to 400kV ** |
| Nominal Input Voltage Burden: | < 0.2 VA |
| Nominal Input Current: | 5A (1A option) |
| System CT Primary Values: | 9999:5A or 9999:1A max 360MW ** |
| Max Continuous Input Current: | 120% nominal |
| Max Short Duration Current Input: | 20 x for 1 second, repeated 5 times at 5 second intervals |
| Nominal Input Current Burden: | < 0.6 VA |
| | ** maximum VT or CT ratios are limited so that the combination of primary voltage and current do not exceed 360MW at 120% of relevant input |
| Outputs (Optional) | |
| RS485 Communications: | Two wire half duplex |
| Baud Rates: | 2400, 4800, 9600, 19200 |
| Pulsed: | Clean contact SPNO |
| Pulse Duration: | 60, 100 or 200 milliseconds |
| Pulsed Outputs: | 1 or 2 |
| Analogue Outputs: | 1 or 2 |
| Auxiliary | |
| Standard Nominal Supply Voltage: | 100 V – 250 V AC or DC (85 V – 287 V AC Absolute) (85 V – 312 V DC Absolute) |
| AC Supply Frequency Range: | 45 – 66 Hz |
| AC Supply Burden: | 6VA |
| Optional Auxiliary DC Supply: | 12 V - 48 V DC (10.2 V – 60 V DC Absolute) |
| DC Supply Burden: | 6VA |



Accuracy Definition

Error change due to variation of an influence quantity in the manner described in section 6 of IEC688:1992

2 * Error allowed for the reference condition applied in the test.

Error in measurement when a measured quantity is within its measuring range, but outside its reference range.

2 * Error allowed at the end of the reference range adjacent to the section of the measuring range where the measured quantity is currently operating / being tested.

THD accuracy relates to a typical harmonic profile.

Specification Continued

| | |
|-------------------------------|--|
| Measuring Ranges | |
| Voltage: | 80 .. 120% of nominal (functional 5..120%) |
| Current: | 5 .. 120% of nominal |
| Frequency: | 45 .. 66Hz |
| Power Factor: | 0.8 capacitive – 1 – 0.8 inductive (functional 4 quadrant, 0-1 lag/lead) |
| THD: | Up to 31st harmonic 0% - 40% |
| Energy: | 7 digit resolution |
| Reference Conditions | |
| Ambient Temperature: | 23°±1°C |
| Input Frequency: | 50 or 60 Hz ±2% |
| Input Waveform: | Sinusoidal (distortion factor < 0.005) |
| Auxiliary Supply Voltage: | Nominal ±1% |
| Auxiliary Supply Frequency: | Nominal ±1% |
| AC Auxiliary Supply Waveform: | Sinusoidal (distortion factor < 0.05) |
| Magnetic Field of Origin: | Terrestrial flux |
| Accuracy | |
| Voltage: | ±0.17% of range maximum |
| Current: | ±0.17% of nominal |
| Frequency: | 0.15% of mid frequency |
| Active Power: | ±0.2% of range maximum |
| Power Factor: | 1% of unity |
| Reactive Power (VAr): | ±0.5% of range maximum |
| Apparent Power (VA): | ±0.2% of range maximum |
| THD: | ±1% |
| Neutral Current Calculated: | ±0.95% of nominal |
| Neutral Current Measured: | ±0.17% |
| Energy: | 0.3% of range maximum (Better than Class 1 IEC1036 Sect 4.6) |
| KVAr.Hr: | 0.6% of range maximum |
| Temperature Coefficient: | Voltage & current typical: 0.013%/°C Watts typical: 0.018%/°C |
| Update Time: | Display: 1 second. Optional digital port: 250ms |
| Analogue Output: | ±0.2% |
| Enclosure | |
| Enclosure Style: | DIN 96 panel mount |
| Compliant With: | UL E20300, UL 61010B-1, IEC 1010-1/ BSEN 61010-1 CAT III, EMC and LVD |
| Material: | Polycarbonate |
| Terminals: | Shrouded screw clamp |
| Dielectric Voltage: | Withstand test 3.25kV RMS 50Hz for 1 minute between all electrical circuits |
| Operating Temperature: | 0 to +55°C |
| Storage Temperature: | -30 to +80°C |
| Relative Humidity: | 0 .. 90% non condensing |
| Warm-up Time: | 1 minute |
| Shock: | 30g in 3 planes |
| Vibration: | 10 .. 15Hz, 1.5mm peak to peak / 15 .. 150Hz @1g |
| IP Protection: | IP54 |
| Dimensions: | 96mm wide x 96mm high x 149mm deep (max) 3.78" wide x 3.78" high x 5.87" deep (max) |
| Panel Cut Out: | 92mm x 92mm, 3.62" x 3.62" |



Order Code Example

INT-1534-M-5-M-110

Integra 1530 digital metering system, 3 phase 4 wire, nominal input voltage, 140-277V L-N and 241-480V L-L, 5A CT input, auxiliary supply 100 to 250V AC or DC, one relay pulsed output and one RS485 Modbus communication port.

Product Codes

| Product Code | Product Configuration | | | | |
|------------------------------------|---|--|--------------------|--------------------|-----------------|
| INT-1531-***-option-**** | Integra 1530 single phase | | | | |
| INT-1532-***-option-**** | Integra 1530 single phase 3 wire | | | | |
| INT-1533-***-option-**** | Integra 1530 3 phase 3 wire | | | | |
| INT-1534-***-option-**** | Integra 1530 3 phase 4 wire | | | | |
| INT-1535-***-option-**** | Integra 1530 3 phase 4 wire with neutral CT | | | | |
| Input Voltage Suffix * | | | | | |
| L | 100 - 240V L-L (57.7 - 139V L-N) | | | | |
| M | 241 - 480V L-L (140 - 277V L-N) | | | | |
| Input Range Suffix ** | | | | | |
| 1 | 1A CT Input | | | | |
| 5 | 5A CT Input | | | | |
| Auxiliary Supply Suffix *** | | | | | |
| L | 12 - 48V DC | | | | |
| M | 100 - 250V AC/DC | | | | |
| Communications Options | | | | | |
| | KW/hr Pulsed Output | RS485 Modbus or Johnson Controls Metasys NII | Lonworks Interface | Profibus Interface | Analogue Output |
| 000 - Display Only | | | | | |
| 001 | | | | | 1 |
| 002 | | | | | 2 |
| 010 | | 1 | | | |
| 011 | | 1 | | | 1 |
| 012 | | 1 | | | 2 |
| 030 | | | 1 | | |
| 050 | | | | 1 | |
| 100 | 1 | | | | |
| 101 | 1 | | | | 1 |
| 102 | 1 | | | | 2 |
| 110 | 1 | 1 | | | |
| 111 | 1 | 1 | | | 1 |
| 112 | 1 | 1 | | | 2 |
| 200 | 2 | | | | |
| 210 | 2 | 1 | | | |
| Analogue Output Range **** | | | | | |
| 1 | 0-20 mA, 10V compliance (user configurable as 4-20mA, 0-10mA and 0-5mA) | | | | |
| 3 | -1/0/+1 mA, 10V compliance (user configurable as 0-1mA) | | | | |

Pre-calibrated plug-in options

The functionality of existing Integra 1530 units can be easily enhanced with the use of Crompton pre-calibrated plug-in cards.

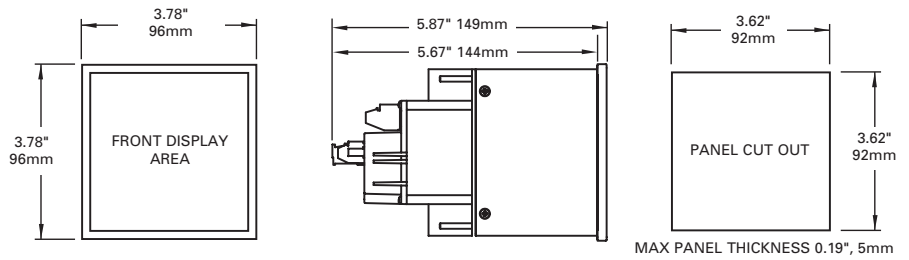
| | KW/hr Pulsed Output | RS485 Modbus or Johnson Controls Metasys NII | Lonworks Interface | Profibus Interface | Analogue Output |
|----------------------------|---------------------|--|--------------------|--------------------|-----------------|
| OPT-1530-002-1 (0-20mA) | | | | | 2 |
| OPT-1530-002-3 (-1/0/+1mA) | | | | | 2 |
| OPT-1530-010 | | 1 | | | |
| OPT-1530-012-1 (0-20mA) | | 1 | | | 2 |
| OPT-1530-012-3 (-1/0/+1mA) | | 1 | | | 2 |
| OPT-1530-030 | | | 1 | | |
| OPT-1530-050 | | | | 1 | |
| OPT-1530-200 | 2 | | | | |
| OPT-1530-210 | 2 | 1 | | | |



Import and Export Connections

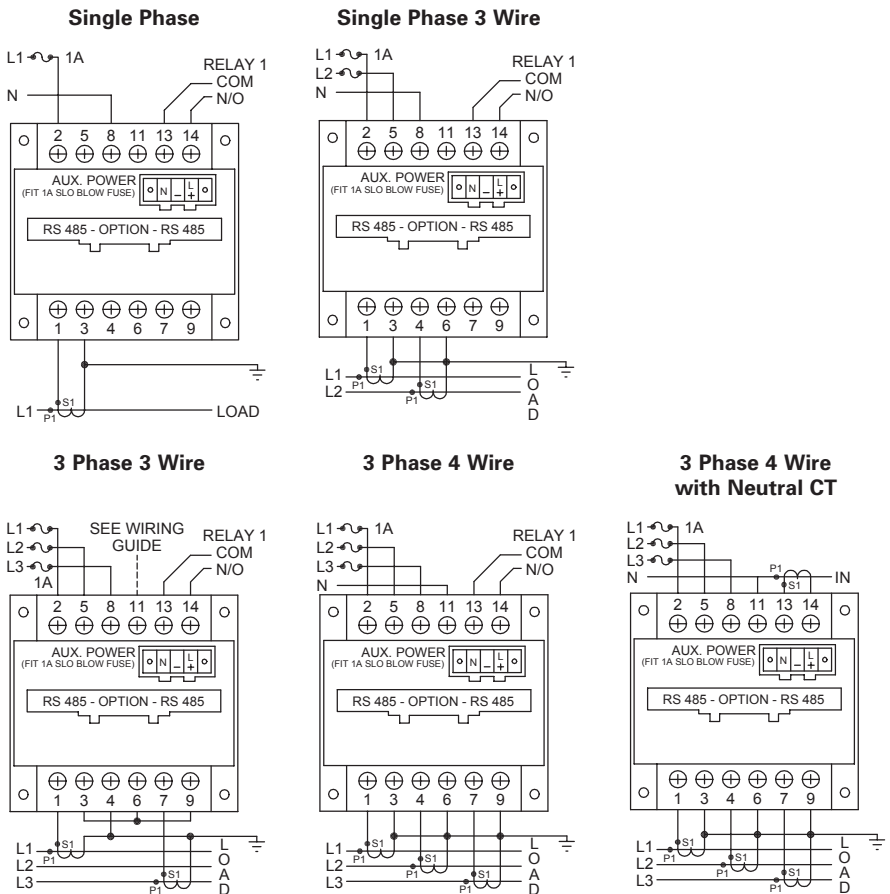
The connection diagrams shown assume an import power configuration, therefore any power flow towards the load will register as importing energy. If power flows away from the load in an export power situation, then the power will register as exporting energy.

Dimensions



Wiring

Input connections are made directly to shrouded screw clamp terminals. Terminals for both current and voltage connections are sized to accept two #9 AWG (3mm²) solid or stranded wires. Connections for auxiliary power, pulsed and analogue options are via screw clamp connectors. Connectors offer retained wire protection leaves suitable for one #10 AWG (2.5mm²) solid or stranded wire. Digital interface connections are similarly via screw clamp connection, wire protection leaves and sized to accept one #15 AWG (1.5mm²) solid or stranded wire.



Auxiliary Supply

The Integra 1530 should ideally be powered from a dedicated supply, either 100–250V AC or DC (85V–280V AC Absolute or 85V–312V DC Absolute) or 12–48V DC (10.2V–60V DC Absolute). However the device may be powered from the signal source, provided the source remains within the working range of the chosen auxiliary supply.

Fusing

It is recommended that all voltage lines be fitted with 1 Amp fuses.

Safety / Ground Connections

For Safety reasons all CT secondary connections should be grounded in accordance with local regulations.