



*Integra 1560 and 1580 multi function transducers provide high accuracy <0.2% measurement and communication of up to 50 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. The range offers a 1560 DIN rail mounted version, and a 1580 variant featuring a base plate for surface mounting. Both transducers offer the same high technical specification and incorporate pulsed, analogue and digital communication outputs. Transducers are fully programmable through a Windows based software configuration package, enabling remote commissioning and monitoring via building management systems. Alternatively, an optional menu driven display unit can be used to configure and monitor up to 32 measured parameters. 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.*

## Features

Measurement and communication of up to 50 electrical and power parameters

High accuracy <0.2%

THD measurement and power quality data

True RMS measurement

Pulsed, analogue and digital outputs

Modbus, Johnson Controls, Lonworks and Profibus interface options

Fully programmable VT and CT ratios

Configurable via software package or menu driven interface

## Benefits

Replaces multiple single function transducers

DIN rail or base mounted options

Local or remote configuration and monitoring via building management systems

ANSI style local or remote LED display option

Neutral CT input option

True 3 and 4 wire measurement

Monitoring, control and protection of expensive power assets

## Applications

Switchgear

Distribution systems

Control panels

Energy management

Building management

Utility power monitoring

Process control

Motor monitoring

## Approvals

UL File No. E200300

CSA pending

IEC 1010 / BSEN 61010-1

## Operation

The multi function Integra 1560 and 1580 transducers offer 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.

A simple Windows based software package is available to configure the transducer. Once configured, 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. Status may also be monitored through the software package via a PC.

Alternatively, an optional menu driven display unit can be used to configure and monitor up to 32 measured parameters including three phase voltage and current, and system Watts, VAR, VA, power factor, energy and total harmonic distortion. This Integra Display unit can be permanently panel mounted locally to the transducer, or simply connected at times when configuration, adjustment and/or status information is required.

## Accuracy

Integra transducers 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 1560 and 1580 offer programmable VT and CT ratio capability. Direct connected up to 480V AC with 5A CT inputs 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.



## Measurement and Communication

Up to 50 electrical and power quality parameters can be measured and communicated into building management systems or viewed through the software configuration package via a PC.

Volts L1-N, L2-N, L3-N  
Volts L1-L2, L2-L3, L3-L1  
System Volts L-N (Average)  
System Volts L-L (Average)  
Current Line 1, 2 and 3  
System Current (Average)  
Current Sum  
Current Demand  
Current Maximum Demand  
Neutral Current  
System Frequency  
Watts 1, 2 and 3  
System Watts (Sum)  
Watts Demand (Import)  
Watts Maximum Demand (Import)  
Watt-hours (Import)  
VAr 1, 2 and 3  
System VAr (Sum)  
VAr-hours (Import)  
VA 1, 2 and 3  
System VA (Sum)  
Power Factor 1, 2 and 3  
System Power Factor (Average)  
Phase Angle 1, 2 and 3  
System Phase Angle (Average)  
THD Volts 1, 2 and 3  
THD System Volts (Mean)  
THD Amps 1, 2 and 3  
THD System Amps (Mean)

## System Outputs

### Pulsed Outputs

Integra transducers offer optional 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.h active energy, with pulse width and rate easily programmable either locally or remotely. Output relays have fully isolated volt free contacts, with connection via screw clamp terminals.

### Analogue Outputs

Up to four 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. Analogue outputs share a common return which is galvanically isolated from non-analogue output terminals.

## Digital Communications

### RS485 Modbus RTU

Integra 1560 and 1580 transducers offer up to two RS485 communication ports for direct connection to SCADA systems using the Modbus RTU protocol, or optionally a single 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 transducers can be integrated into a single control network without requiring custom node or network tool development.

### Profibus

The Profibus interface option allows Integra 1560 and 1580 to communicate over a Profibus-DP network as a slave device. Integra can automatically detect the masters' baud rate and communicate 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 up to 50 measured parameters, outputs, pulsed relays, current and power demand are easily programmed through a Windows style user interface, which can be installed on any PC running Windows 95, NT or 2000. Communication to the transducer is achieved with 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 transducer. 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 transducer every few seconds to obtain data, which can be viewed on a dedicated measurements page.



## Measurement and Display

Up to 32 electrical and power quality measurements can be configured and monitored on the DIS-1540 optional display unit. The displayed parameters appear in the following order.

- 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 kVAr  
kVA  
kW
- 10 kW Hr (7 digit resolution)
- 11 kVAr Hr (7 digit resolution)
- 12 kW Demand  
Current Demand
- 13 kW Maximum Demand  
Current Maximum Demand

## Programmable Display Unit Option

As an alternative to the standard software configuration package, voltage and current transformer ratios, communication options and power measurement parameters can be configured via the optional menu driven Integra display unit.

A simple two button interface on the front panel of the unit allows display of 32 major electrical and power quality parameters. To prevent unauthorised access to the product configuration settings, all set-up screens can be protected by an optional customer programmable password.

Once configured, the status of each parameter can be viewed by scrolling through 13 screens, featuring a 3 line, 4 digit LED display. The unit requires an independent auxiliary power supply and thus may be positioned either locally, or remotely from the transducer at a distance limited only by the communication restrictions of RS485.

## Programmable Parameters

Parameter	Range
Password:	4 digit 0000 - 9999
Primary Current:	Max 9999A (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 parameters & ranges

## 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	
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:	Up to 6
Analogue Outputs:	Up to 4

Continued



## Accuracy Definition

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

THD accuracy relates to a typical harmonic profile.

## Specification Continued

<b>Auxiliary</b>	
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
<b>Measuring Ranges</b>	
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
THD:	Up to 31st harmonic 0% - 40%
Energy:	7 digit resolution
<b>Reference Conditions</b>	
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
<b>Accuracy</b>	
Voltage:	±0.17% of range
Current:	±0.17% of range
Frequency:	0.15% of mid frequency
Power:	±0.2% of range
Power Factor:	1% of unity
Reactive Power (VAr):	±0.5% of range
Apparent Power (VA):	±0.2% of range
THD:	±1%
Neutral Current Calculated:	±0.95% of range
Neutral Current Measured:	±0.17%
Energy:	KWh 1% IEC1036
KVArh:	2%
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% (Compliance 10V)
<b>Enclosure</b>	
Enclosure Style:	DIN rail or base mounted
Compliant With:	UL E200300 and IEC 1010/BSEN 61010-1
Material:	Polycarbonate
Terminals:	Shrouded screw clamp
Dielectric Voltage:	Withstand test 3.25kV RMS 50Hz for 1 minute between all electrical circuits
Operating Temperature:	-20 to +60°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
DIN Rail Transducer Dimensions:	5.5" high* x 3.72" wide x 3.72" deep 139.6mm high x 94.4mm wide x 94.4mm deep *Excluding connectors
Base Mounted Transducer Dimensions:	5.2" high* x 3.74" wide x 5.24" deep 131.5mm high x 95mm wide x 133.5mm deep *Excluding connectors
Transducer Display Dimensions:	4.31" high x 4.31" wide x 2.9" deep 109.4mm high x 109.4mm wide x 73.7mm deep
Transducer Display Panel Cut Out:	4.06" (103mm) diameter, 4 stud positions



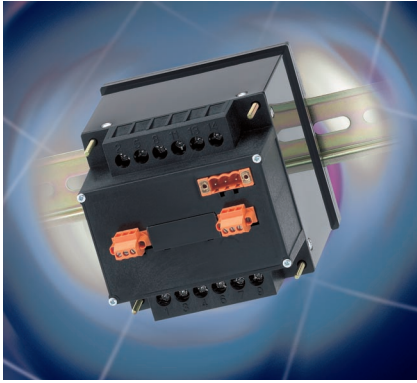
## Order Code Example

### INT-1564-M-5-M-120

Integra 1560 transducer, 3 phase 4 wire, DIN rail mounted, 241 to 480V L-L nominal input voltage, 5A CT input, auxiliary supply 100 to 250V AC or DC, one relay pulsed output and two RS485 Modbus communication ports.

## Product Codes

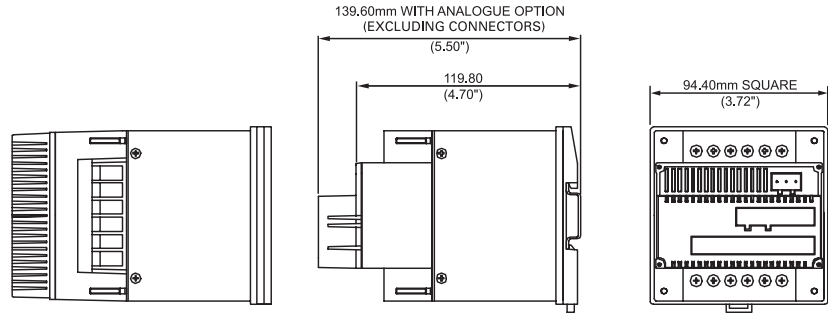
Ordering Code	Product Configuration				
INT-1561-*.***-option-#	Integra 1560 single phase, DIN rail				
INT-1562-*.***-option-#	Integra 1560 single phase 3 wire, DIN rail				
INT-1563-*.***-option-#	Integra 1560 3 phase 3 wire, DIN rail				
INT-1564-*.***-option-#	Integra 1560 3 phase 4 wire, DIN rail				
INT-1565-*.***-option-#	Integra 1560 3 phase 4 wire with neutral CT, DIN rail				
INT-1581-*.***-option-#	Integra 1580 single phase, base mount				
INT-1582-*.***-option-#	Integra 1580 single phase 3 wire, base mount				
INT-1583-*.***-option-#	Integra 1580 3 phase 3 wire, base mount				
INT-1584-*.***-option-#	Integra 1580 3 phase 4 wire, base mount				
INT-1585-*.***-option-#	Integra 1580 3 phase 4 wire with neutral CT, base mount				
<b>Input Voltage Suffix *</b>					
L	1561 & 1581: 57.7 – 139V L-N				
	1562 & 1582: 114 – 278 V L-L (57.7 – 139V L-N)				
	1563,4 & 1583/4: 100 – 240 V L-L (57.7 – 139V L-N)				
M	1561 & 1581: 140 – 277 V L-N				
	1562 & 1582: 279 – 480 V L-L (140 – 240V L-N)				
	1563,4 & 1583/4: 241 – 480 V L-L (140 – 277V L-N)				
<b>Input Range Suffix **</b>					
1	1A CT Input				
5	5A CT Input				
<b>Auxiliary Supply Suffix ***</b>					
L	12 – 48V DC				
M	100 – 250V AC/DC				
<b>Communications Options</b>					
	KWhr Pulsed Output	RS485 Modbus or Johnson Controls Metasys NII	Lonworks Interface	Profibus Interface	Analogue Output
010		1			
011		1			1
012		1			2
013		1			3
014		1			4
020		2			
021		2			1
022		2			2
023		2			3
024		2			4
040		1	1		
060		1		1	
110	1	1			
111	1	1			1
112	1	1			2
113	1	1			3
114	1	1			4
120	1	2			
121	1	2			1
122	1	2			2
123	1	2			3
124	1	2			4
210	2	1			
220	2	2			
<b>Analogue Output Range #</b>					
1	0-20 mA, 10V compliance (user configurable as 4-20 mA, 0-10mA and 0-5mA)				
3	-1/0/+1 mA, 10V compliance (user configurable as 0-1mA)				



**Integra 1560**

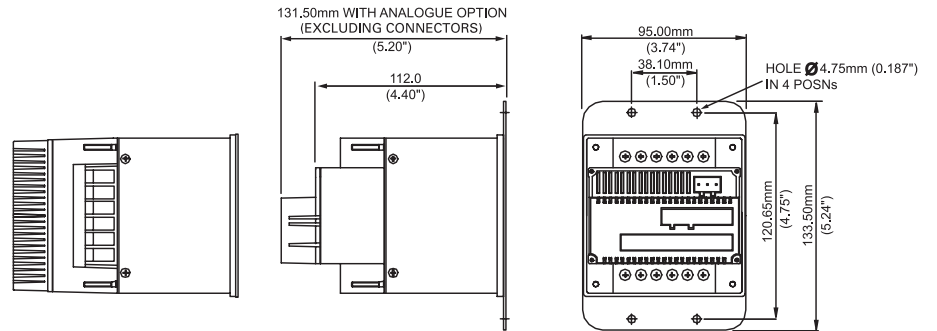
## Dimensions

### Integra 1560 DIN Rail Mounted Transducer



**Integra 1580**

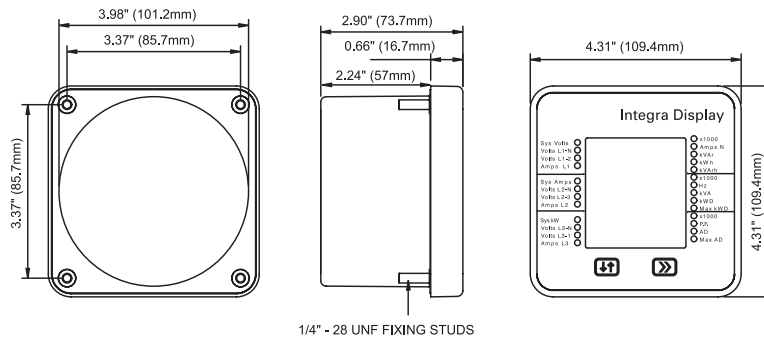
### Integra 1580 Base Mounted Transducer



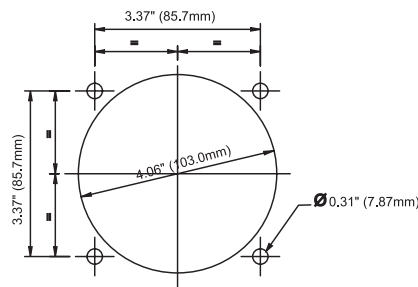
### Optional Remote Display (for use with Integra 1560 or 1580 Transducer)



**Optional Remote Display**



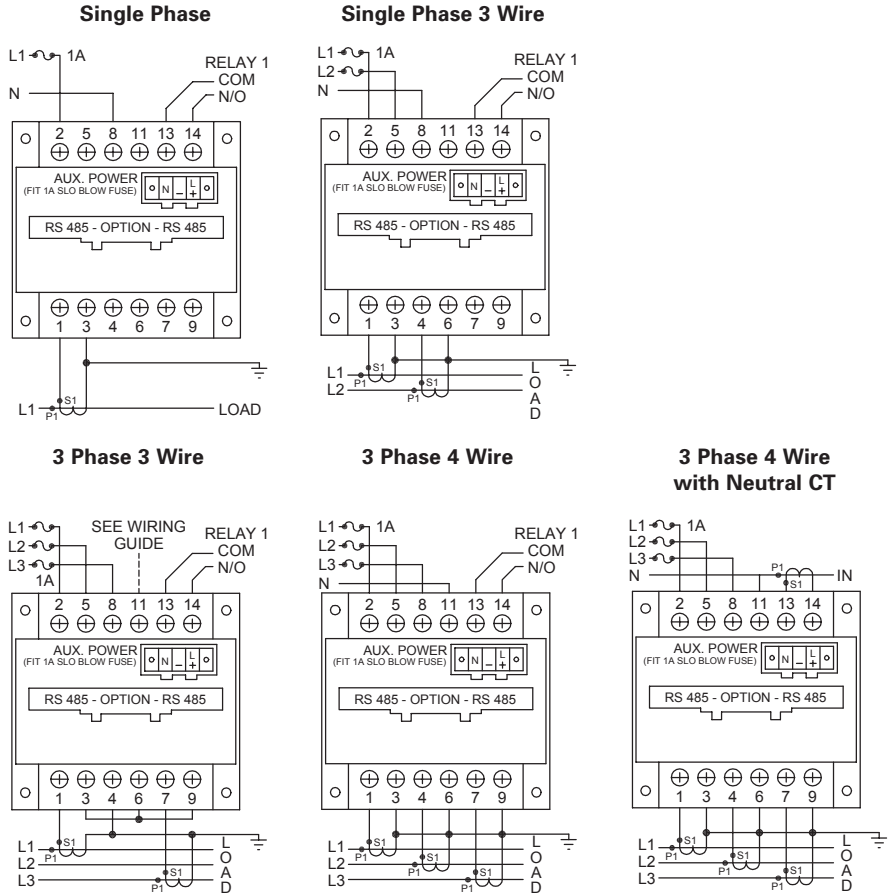
### Optional Remote Display Panel Cut Out



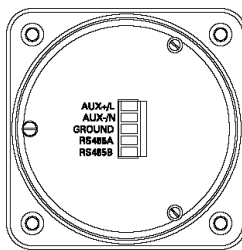


## Wiring

Input connections are made directly to shrouded screw clamp terminals. Terminals for both current and voltage connections are sized to accept two #9 AWG (3mm<sup>2</sup>) 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 (2.5mm<sup>2</sup>) solid or stranded wire. Digital interface connections are similarly via screw clamp connection, wire protection leaves and sized to accept one #14 AWG (1.5mm<sup>2</sup>) solid or stranded wire.



## DIS-1540 Remote Display



## Auxiliary Supply

The Integra family 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.