Tyco Electronics

Crompton Instruments Dintegra 1260

Operation, Set up and specification

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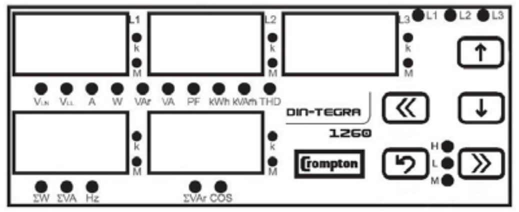
Important safety information is contained in this Installation guide and separate Set up and Operation Guide. Users must familiarise themselves with this information before attempting installation or other procedures.

1 Features and Options

The multifunction Dintegra 1260 provides monitoring of three-phase voltage, current, frequency, Watts, VAr, VA, energy kWh, power factor, min/max values and total harmonic distortion measurement of both current and voltage. Status of all parameters can be viewed though the screens on the 5-position, 3-digit LED display.
Register values are saved in non volatile memory and preserved values are maintained during loss of auxiliary power



1.1 Digital Inputs

Dintegra has 2 digital inputs. Digital inputs are used to monitor the status of electrical contacts via Modbus™ (e.g. circuit breakers auxiliary contacts or similar). They can also be used to control which of the two energy registers internal to the Dintegra will accumulate kWh, according to the state of the inputs. Consequently the Dintegra can offer dual rate capability, if an external rate switching signal is available.

1.2 Energy Pulsed Outputs

Dintegra has 2 Pulsed Outputs: "Pul1" and "Pul2". The function and pulse rate of these outputs may be set at installation.

1.3 Min – Max and Demand Values

Maximum Demand (maximum integrated load over a user specified period) is available for A, W, VAr, VA, ΣW, ΣVA and ΣVAr. If a new value of demand calculated is greater than that stored, the new, higher value replaces the existing. Demand integration time may be set between 1 and 60 minutes.

Maximum and Minimum values are recorded for V L-N; V L-L; A; W; VAr; VA; ΣW,; Σvar and ΣVA. In each case, if the measured instantaneous value is less than previous recorded min value, then a new minimum value is stored. If the measured instantaneous value is more than previous recorded max value, then a new maximum value is recorded.

1.4 Monitoring THD Values

All voltage and current measurements are true RMS incorporating up to 19th of odd harmonics for accurate measurement of non sinusoidal waveforms. Both voltage and current THD is monitored via the front display.

1.5 Calculation Methods for Active / Reactive Power Values

Export (negative) energy displays are indicated when the left decimal point LED flashes within the ΣW display.
There are two methods for calculating total active and total reactive powers:
1) Active / Reactive power can be calculated by summing import and export values and displaying as a single value.
2) Active / Reactive power can be calculated according to direction as import / export.

2 Display operation

When showing cumulative energy values (kWh, kVArh etc), the top left block of digits indicate the register being viewed. All 12 remaining digits of the display may be read as one 12 digit number, indicating the amount of energy since last reset.

When showing instantaneous parameters (V, A W etc), the top line shows per phase parameters, while bottom left shows W, VA or Hz and bottom right shows VAr or Power Factor (Cos**φ**).

Display operation during set up mode is described in section 3.

2.1 Function Keys

Function keys have 3 modes of operation, depending whether the display is showing energy values, per phase values, or in setup mode. Move between Per Phase Mode and Energy Mode using the (□) or (□) buttons. Enter set up mode using (» "Set") button.

While displaying measured values

Key(s)	Per phase Mode	Energy Mode
(↑) or (↓)	Select V_{LN}, V_{LL}, A, W, VAr, VA, PF or THD or Energy Mode	Select kWh or kVArh or Per Phase Mode
(») Set	Select min, max, demand and instant values, as available. Hold to enter set up mode.	No effect, unless held down, when it is used to enter set up mode
(«) Back	Select W, VA or Hz	No effect
(↺) Esc	Select VAr or Cos**φ**	No effect

While in set up mode

Key(s)	Action
(↑) or (↓)	Increase or decrease digit value or view a multiple choice option
(») Set	Allows entry to Set Up mode and selection of options and choices
(«) Back	Return to previous screen
(↺) Esc	Used to exit Set Up mode and initiate Save routine

2.2 Display Sequence

Button	Top Left Line	Top Middle Line	Top Right Line	Bottom Left Line	Bottom Middle Line
↑ & ↓	THD $V_{1\ L\text{-}N}$ Volts	THD $V_{2\ L\text{-}N}$ Volts	THD $V_{3\ L\text{-}N}$ Volts	ΣW System Total Active Power Or ΣVA System Total Apparent Power Or Hz Frequency As selected by («) button	ΣVAR System Total Reactive Power Or Cos φ As selected by (↺) button
	THD I_1 Current	THD I_2 Current	THD I_3 Current		
	$V_{1\ L\text{-}N}$ Volts	$V_{2\ L\text{-}N}$ Volts	$V_{3\ L\text{-}N}$ Volts		
	$V_{1\ L\text{-}L}$ Volts	$V_{2\ L\text{-}L}$ Volts	$V_{3\ L\text{-}L}$ Volts		
	I_1 Current	I_2 Current	I_3 Current		
	W_1 Watts	W_2 Watts	W_3 Watts		
	var_1 Reactive Power	var_2 Reactive Power	var_3 Reactive Power		
	PF_1 Power Factor	PF_2 Power Factor	PF_3 Power Factor		
↓	**Switches to Energy Mode** (see below)				

↑ & ↓	**KWh 1**	MSB			LSB
	1-1 Import	000	000	000	00.0
	1-E Export	000	000	000	00.0
	Kvarh 1				
	1-L Inductive	000	000	000	00.0
	1-C Capacitive	000	000	000	00.0
	KWh 2	MSB			
	1-1 Import	000	000	000	00.0
	1-E Export	000	000	000	00.0
	Kvarh 2 **1-L** Inductive	000	000	000	00.0
	1-C Capacitive	000	000	000	00.0
↓	**Switches to Per Phase Mode** (see first part of table)				

2.3 Viewing Max/Min and Max Demand

The » button is used to select maximum, minimum or maximum demand (MD) displays. When max, min or MD values are displayed, the H, L or M annunciators respectively show the stored value.
Min and Max values are recorded for VLN, VLL, A, W, VAr, VA , ΣW, ΣVAr, ΣVA. Demand values are recorded for A, W, VAr, VA, ΣW, ΣVA, ΣVAr. H,L and M annunciators for any other parameters have no meaning.

3 Setting up trA:Fo:

Set up mode is entered by holding down the **SET** button for 3 seconds. Dintegra will automatically leave programming mode if no buttons are pressed for 20 seconds or by pressing the **ESC** key. Optionally, a set up password (PIN) can be set by the user to prevent unauthorised access to set up screens. If set, the correct password/PIN must be selected before access to set up mode is permitted.
After entering the set up mode, the set up initial screen is shown. Pressing SET a second time selects basic set up screens. Pressing the up or down arrows immediately after entry to set up mode selects advanced set up screens

3.1 Basic set up

One of three screens may be selected with the ↓↑keys

CT ratio	trA:Fo:Ctr
VT ratio	trA:Fo:Utr
Reactive Energy calculation method	trA:Fo:CAL

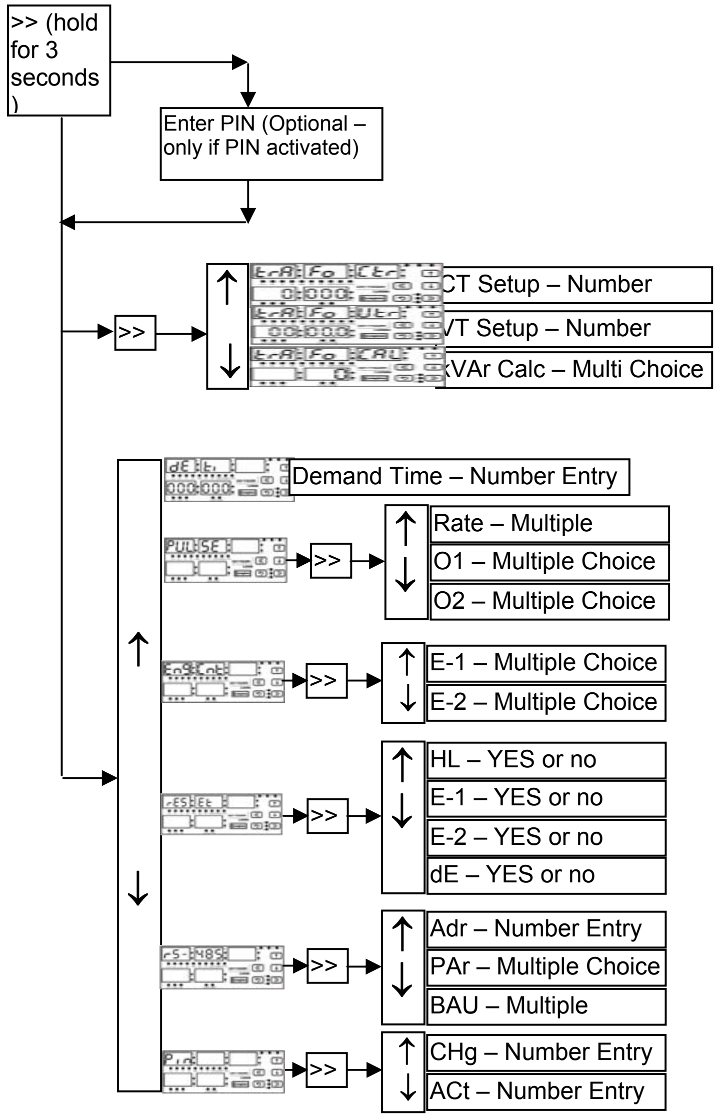
3.2 Advanced Set Up

One of six set up screens may be selected with ↓↑ keys:

Demand Integration Time	dE:ti:
Pulsed Outputs	PUL:SE:
Energy Register (counter) set up	En9:Cnt:
Reset stored values	rES:Et
Communications Parameters	rS-:485:
Set Up password	Pin: : :

3.3 Set Up Menu

The diagram below shows the menu structure to access all user settable parameters



3.4 Number Entry

The same basic number entry procedure is used in most set up screens. When the selected parameter is shown e.g.:
trA:Fo:Ctr
Press **SET** button. The first digit blinks. By using **UP-DOWN** buttons, select the value required for the first digit.
Press **SET** button. The second digit blinks. By using **UP-DOWN** buttons, select the value required for the second digit.
Press **SET** button. The third digit blinks. By using **UP-DOWN** button select the value required for the third digit
Press **SET** button. The last digit blinks. By using **UP-DOWN** buttons, select the value required for the last digit
Press **SET** button. The parameter name is displayed e.g.:
trA:Fo:Ctr
When required changes have been made, they must be saved before leaving set up mode in order to become active. To save, press the **ESC** button.
trA:Fo:
is shown. Press the Esc button again. When "**SAVE Set yES**" is displayed, press **SET** to save the changes or **ESC** to abandon the changes.
If required, other values may be modified sequentially, for example by selecting the VT ratio next. Saving as above can be

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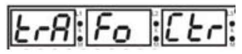
executed when all changes have been made, and then all the revised values will be saved in one step

3.5 Multiple choice selection

Procedure is similar to that used for number entry, except that the ↓↑ arrow keys are used to step through the available options. The SET(**>>**) key selects the currently shown option.
As above, the changes must be saved before leaving the set up mode if they are to become active.

3.6 Current Transformer Ratio



The current transformer ratio can be set between 1 and 2000. Enter the actual primary to secondary ratio. For example, if a current transformer which has a ratio of 200/5A is connected set the current transformer ratio to 40 (40=200/5).

Factory default for CT ratio is 1.

3.7 Voltage Transformer Ratio Setup

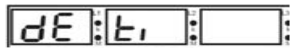
If the system does not include voltage transformers, as is the case with many low voltage installations, then enter a VT ratio of 1. The VT ratio may be set between 0.1 and 4000.0. For example if a voltage transformer which has a ratio of 33KV/100V is used between the system and Dintegra; Voltage transformer ratio is entered as 330. (330= 33000/100)
Factory default for VT ratio is 1.0 (unity)

3.8 Reactive Energy Calculation Method

Different methods can be specified for reactive energy calculation in Dintegra. Factory default method 1 is recommended for most applications. If the Dintegra kVAr reading does not give good agreement with other instruments, then a different setting may be appropriate for special circumstances. Request technical support if kWh is accurate but kVAr is not.

CAL	Method
0	Quadrature multiplication of V and I samples per phase, summing +(Inductive) and –(capacitive) to give a single net figure
1	Quadrature multiplication of V and I samples , summing +(Inductive) and –(capacitive) to give a total inductive and total capacitive figure
2	Summation of voltage and current harmonics allowing for phase angle of each harmonic summing +(Inductive) and –(capacitive) to give a single net figure.
3	Summation of voltage and current harmonics allowing for phase angle of each harmonic summing +(Inductive) and –(capacitive) to give a total inductive and total capacitive figure
4	Reactive power computed from active and apparent power, summing +(Inductive) and –(capacitive) to give a single net figure.
5	Reactive power computed from active and apparent power summing +(Inductive) and –(capacitive) to give a total inductive and total capacitive figure

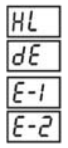
3.9 Demand Time Setup



The demand integration time can be set between 1 and 60 minutes using this screen. The factory default value is 15 minutes

3.10 Reset of minimum, maximum and energy values:

Stored values including max/min, energy counting registers and max demand can be reset.



Choose the appropriate option required as described above in section 3.5 (**Multiple choice selection**). The abbreviation meanings are shown in the table below.

Abbreviation	Reset Action
HL	Reset max/min values (High, Low)
E-1	Reset Energy counter registers 1
E-2	Reset Energy counter registers 2
dE	Reset maximum demand

As with numeric values, the input must be saved, or there will be no change to registers.

3.11 Pulse Menu (PULSE)

This option allows three parameters to be set: The pulse rate (for both outputs), source for pulse output 1 and source for pulse output 2, respectively "**rAt**", "**o-1**" and "**o-2**"

Pulse ratio (**rAt**) can be chosen from I pulse per 1, 10 or 100 Wh/VArh/VA; 1, 10 or 100 kWh/ kVArh/ KVA or 1 MWh/MVArh/ MVA. Factory Default is 1.

Output 1 source (**o-1**) and Output 2 (**o-2**) source can be chosen from :

Display	Source
ACt	Counter register set 1 Active power Export or Import
A-I	Counter register set 1 Active power Import only
A-E	Counter register set 1 Active power Export only
rEA	Counter register set 1 Reactive power Inductive or Capacitive
r-L	Counter register set 1 Reactive power Inductive only
r-C	Counter register set 1 Reactive power Capacitive only

Defaults are: Output 1: **A-I**, Output 2: **r-L**

Note that the outputs only pulse <u>when Counter register set 1 is active</u>. When Counter register set 1 is not active, the pulse relays will not operate.

3.12 Energy Counter Register (Eng Cnt) Menu

DIN-TEGRA has 2 energy register sets: Energy counter register set 1 (E1) and Energy counter register set 2 (E2). Select either E1 or E2 using the arrows, then press to enable selection of the option required. As default, both register sets are active.
"E-1" has 4 options:

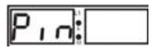
On	E1 active always
ı-1	Activate E1, active when digital input 1 is on (energised)
ı-2	Activate E1, when digital input 2 is on (energised)
E-2	E1 inactive when E2 is active.

"E-2" also has 4 options:

On	E2 active always
ı-1	Activate E2, active when digital input 1 is on (energised)
ı-2	Activate E2, when digital input 2 is on (energised)
E-1	E-2 inactive when E1 is active.

If E-1 is set to "E-2" and E2 is set to "E-1" energy is cumulated to both registers (as if both were set to "On".

3.13 User password Setup (PIN)



This set up screen allows the user to define and activate the password. A four digit user password can be used for preventing device settings from being changed due to unauthorised access.
There are 2 sub menus available to change the password (**CHg**), and to activate or deactivate it(**ACt**).

3.14 Changing the PIN

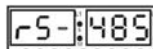
This is used to change the user PIN.
Before changing the Pin, the old Pin must be entered, to ensure the pin change is authorised. The Factory default value for user password is "1234", inactive. After entering the old pin, the new Pin may be entered.

3.15 Activating the PIN

Activation is a separate process from setting the PIN
During activation, the PIN must be entered before the user is allowed to change the setting.

As before, the changes must be saved before leaving the set up mode if they are to become active.

3.16 Serial Communication (rS-485)



Dintegra provides Modbus™ RTU communication via an optically isolated RS485 port. All measured parameters can be read via the Modbus™ port.

3.16.1 Modbus™ Parameter Settings

Parameters which may be set for the RS485 port are shown in the table below.

Abbreviation	Setting
Adr	Modbus™ Address : Range 1-247
PAr	Parity: odd, Even or no(none)
BAU	Baud Rate: 2400,4800,9600,19200,38400

Factory default Communications settings are:
Address (Adr): 1, Baud Rate (Bau): 9600, Parity (PAr): no

4 Specification

4.1 Inputs

Nominal voltage range:	10 to 300V L-N, 10 to 500V L-L
Max voltage burden:	< 0.5 VA per phase
Nominal current range:	0.05 - 5.5 A
Max current burden:	< 1 VA per phase
System CT primary	1 … 2000 (i.e. 10,000A max)
System VT ratios	0.1 … 4000, 400kV max

4.2 Auxiliary

Auxiliary supply voltage range	190 - 260V AC 50/60Hz
Auxiliary supply burden	< 4VA

4.3 8.3 Measuring Ranges

Voltage:	10 -110% of nominal
Current:	10 -110%of nominal
Frequency:	45-65 Hz
Power factor:	functional 4 quadrant, 0-1 lag/lead
THD:	Up to 19th (odd harmonics only)
Energy:	11 digit resolution
Demand Time	1-60 min (programmable)

4.4 Accuracy

Voltage	1 % of nominal upper ± 1 digit
Current	1 % of nominal upper ± 1 digit
Frequency	1 % of mid range ± 1 digit
Power factor	1% of Unity (0.01)
Active power (W)	1 % of nominal upper ± 1 digit
Reactive power (VAr)	2 % of nominal upper ± 1 digit
Apparent power (VA)	1 % of nominal upper ± 1 digit
Active energy (Wh)	1 % of nominal upper ± 1 digit
Reactive energy (VArh)	2 % of nominal upper ± 1 digit
Total Harmonic Distortion	2 %, up to 19th harmonic (odd only)

4.5 Outputs

RS485 communications:	Modbus™ RTU
Baud rates:	2400, 4800, 9600, 19200, 38400
Pulsed outputs:	2 max
Pulse duration:	80 msec
Contact rating	50mA max at 30V DC max
Contact form:	Opto Isolated, Open Collector (NPN Transistor)

4.6 Digital Inputs

Input Pulse Width	50 milliseconds min
Operation Voltage	12-48V DC

4.7 Enclosure and Environmental

Enclosure style:	DIN 43880, 106mm rail length
Material:	UL94-V0 Flame retardant
Terminals:	Shrouded screw-clamp 0.05mm to 4mm wire
Dielectric voltage:	Withstand test 3.25kV rms 50Hz for 1 minute between all electrical circuits
Operating temperature:	-5 to +50°C
Storage temperature:	-20 to +70°C
Relative humidity:	95%
Weight	0.45 kg
Shock:	static shock: 30 Newton dynamic shock : 5 Joule
Vibration:	5-50Hz (10 min.)
IP protection:	IP40 Front Panel
Dimensions:	106mm wide x 90mm high x 58mm deep 4.17" wide x 3.54" high x 2.28" deep
Standards Compliance	IEC61010 Cat III, 300V IEC61326 Emissions and Immunity See Section 5.2

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Dintegra 1260

Installation and Modbus™ guide

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Warning

During normal operation, voltages hazardous to life may be present at some of the terminals of this unit.
Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations. Ensure all supplies are de-energised before attempting connection or other procedures.
Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
Never open circuit the secondary winding of an energised current transformer.
Auxiliary circuit (communications, Pulsed Output and Digital Inputs) are separated from metering inputs and the 190-260V AC auxiliary circuit by at least basic insulation. Such auxiliary circuit terminals are only suitable for connection to equipment which has no user accessible live parts. The insulation for such auxiliary circuits must be rated for the highest voltage connected to the instrument and suitable for single fault condition. The connection at the remote end of such auxiliary circuits should not be accessible in normal use. Depending on application, equipment connected to auxiliary circuits may vary widely. The choice of connected equipment or combination of equipment should not diminish the level of user protection specified.

5 Installation and Maintenance

5.1 Location and mounting

Units should be installed in a dry position, where the ambient temperature is reasonably stable and will not be outside the range -5 to +50°C. Vibration should be kept to a minimum. Preferably, mount the Dintegra so that the display contrast is not reduced by direct sunlight or other high intensity lighting.
The Dintegra may be mounted on a standard DIN Rail. The terminals of the product must be protected from liquids or other contamination.
These units are intended for indoor use only at an altitude of less than 2000m.

5.2 Electromagnetic Compatibility

This unit has been designed to provide protection against EM (electro-magnetic) interference in line with requirements of EU and other regulations. Precautions necessary to provide proper operation of this and adjacent equipment will be installation dependent and so the following can only be general guidance:-

- Avoid routing wiring to this unit alongside cables and products that are, or could be, a source of interference.
- The auxiliary supply to the unit should not be subject to excessive interference. In some cases, a supply line filter may be required.
- To protect the product against incorrect operation or permanent damage, surge transients must be controlled. It is good EMC practice to suppress differential surges to 2kV or less at the source. The unit has been designed to automatically recover from typical transients, however in extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 10 seconds to restore correct operation.
- Screened communication and small signal leads are recommended and may be required. These and other connecting leads may require the fitting of RF suppression components, such as ferrite absorbers, line filters etc., if RF fields cause problems.
- It is good practice to install sensitive electronic instruments that are performing critical functions in EMC enclosures that protect against electrical interference causing a disturbance in function.
- Incident EM radiation may cause accuracy to deviate from the specified accuracy while the EM radiation is present.

6 Input wiring and fusing

Input connections are made to screw clamp terminals. Choice of cable should meet local regulations for the operating voltage and current. Terminals for both current and voltage inputs will accept one stranded 0.05 - 2.5mm^2 cable or one solid 0.05 - 4mm^2 in 5.3.2 it says 2.5 mm cable. This unit must be fitted with external fuses in voltage and auxiliary supply lines. Voltage input lines must be fused with a quick blow AC fuse 1A maximum. Auxiliary supply lines must be fused with a slow blow fuse rated 1A maximum. Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.
Where fitted, CT secondary's must be grounded in accordance with local regulations. It is desirable to make provision for shorting links to be made across CTs. This permits easy replacement of a unit should this ever be necessary.
A switch or circuit breaker allowing isolation of supplies to the unit must be provided.
Terminal screws should be tightened to 0.5Nm or 4.5 lbf-in only.

6.1 Wire type

Voltage and current measuring terminal blocks are suitable for use with copper wire only.

6.2 Wire size

Voltage and current measuring terminal blocks will accept one stranded 0.05 - 2.5mm^2 or less cross sectional area cables [30 - 11 AWG]. Main terminal screws should be tightened to 0.5Nm or 4.5 lbf-in only.

6.3 Mounting position

Instruments are intended for Din rail mounting. Terminals must be enclosed within the panel. Ensure wiring to terminals complies with regulations in the installation location.

6. Auxiliary and Output Connections

6.4 6.1 Auxiliary Supply

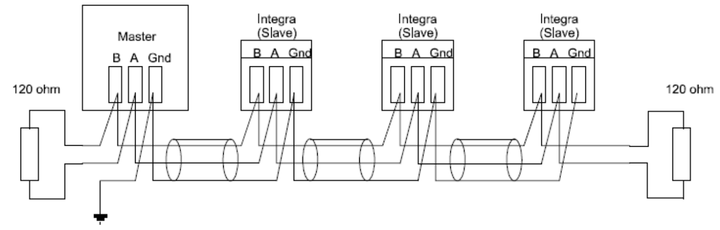
The auxiliary supply is marked on the side label. The Dintegra should ideally be powered from a dedicated supply, but may be powered from the metered supply provided this remains within specified limits.

6.5 6.2 Output Connections

Output connections are made directly to a screw clamp style connector. Terminals will accept one stranded 0.05 - 2.5mm^2 cable or one 0.05 - 4mm^2 cable.

6.6 6.3 Modbus™ RTU RS485

The recommended cable between the RS485 master is two core screened cable. Preferably select a cable specifically recommended for RS485 use (for example Belden 9860, 8761) although for shorter distances of a few metres most two core screened cables will usually be satisfactory.
Connect units to the RS485 line as shown. Stubs or star connections may give rise to reflections and poor communication. Ensure the line is terminated at each end of the wire as shown.

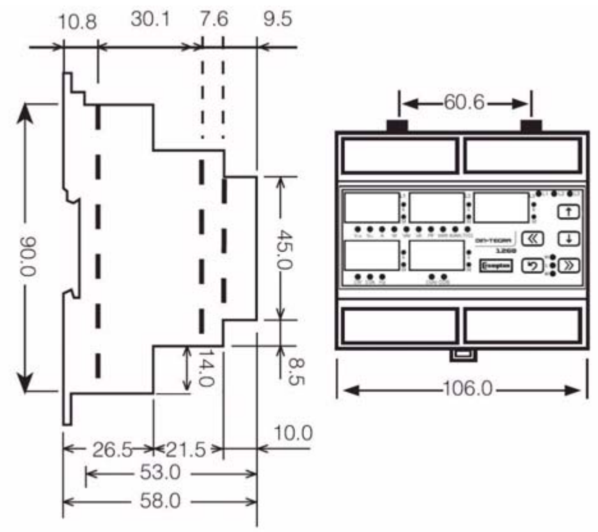


6.7 6.4 Pulsed Output

Pulse outputs are internally connected to NPN transistors of electrical rating 5 to 24V DC, 50mA, maximum.

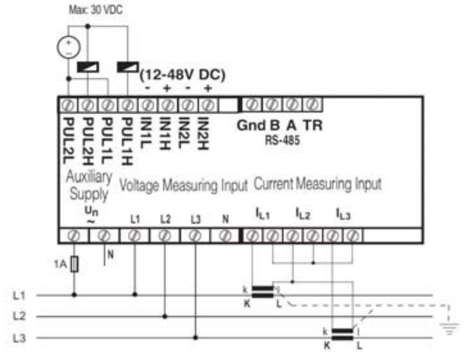
8. Dimensions

All dimensions shown in mm

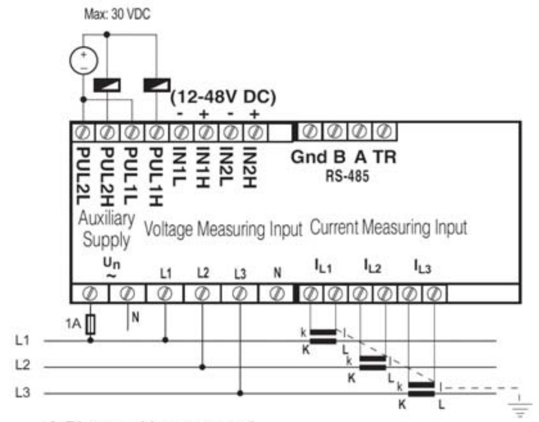


7. Metered Supply Connection Diagrams

3-PHASE 3 WIRE 2 CT CONFIGURATION

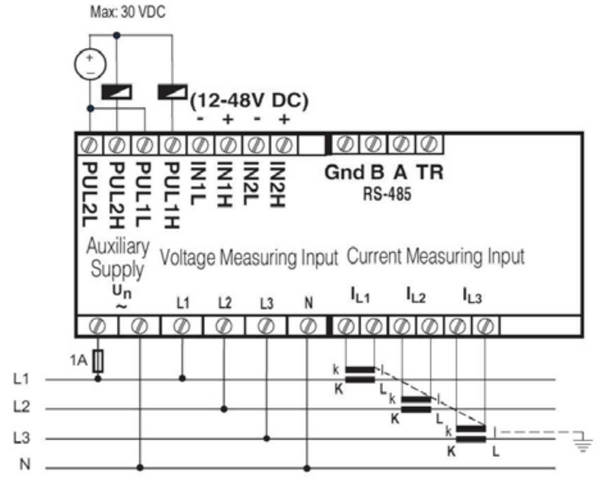


3-PHASE 3 WIRE, 3 CT CONFIGURATION



3 Phase without neutral

3-PHASE 4 WIRE



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7 Modbus™ RTU Protocol

General information on the Modbus™ protocol is shown in the Integra 1630 Communications Guide, available from the website www.crompton-instruments.com
Information specific to the Dintegra 1260 is shown in this document.
The Dintegra Address may be set in the range 1-247

Available Modbus™ Functions

03H	Read Input Registers
06H	Write single register
10H	Write multiple registers

7.1 Number representation

All data from the Dintegra is returned as 16 bit Modbus™ words, except energy registers which are returned as long integers.

(Caution – other models in the Integra range return values in IEEE floating point format held in 2 consecutive Modbus™ registers)

Values returned via the Modbus™ are the actual values present at the Dintegra input, without regard for the VT and CT ratio that has been set. Scaling is as in the table below. Taking Amps for example, values returned will be in the range of 0 to 6 amps, with 1 binary digit representing 0.001A. If the CT ratio has been set to 20:5 and the metered I1 current is 50A, the Dintegra will return 2500 in register 6. To convert to physical current, divide by 1000 and multiply by the CT ratio in register 32770. Power values must be multiplied by VT and CT ratio (e.g. CT=20, VT=10, multiply power readings by 200 to get kW/kVAr/KVA. Power Factor (Cosφ) and frequency reading do not need to be scaled.

7.2 Digital Inputs

Digital Inputs may be read in Modbus™ word 82(52H).

44H 1 0

U	U	U	U	U	U	U	U	U	U	U	U	U	U	DIN2	DIN1

High Byte Low Byte input 2 input 1
U: Undefined

If 12-48V DC is applied to IN1 (Input 1), the 15th bit reads 1. If the corresponding input is not energised, then this bit reads as zero. Similarly, if 12-48V DC is applied to IN2 (Input 2), the 14th bit of DIN (DIN2) register reads 1

7.3 Modbus™ Holding Registers

ADDR.	ADDR (HEX)	R/W	RANGE	1 bit =	Type	Description
32768	8000	R/W	4000.0	0.1	short int	Voltage Transformer Ratio
32769	8001	R/W	2000	1	short int	Current Transformer Ratio
32770	8002	R/W	0-1		short int	Calculation Method
32771	8003	R/W	1-60	1 min.	short int	Demand Integration Time
32772	8004	R/W	0-6		short int	Pulse Ratio
32773	8005	R/W	0-5		short int	Pulse Output 1 Parameter Setting
32774	8006	R/W	0-5		short int	Pulse Output 2 Parameter Setting
32775	8007	R/W	0-3		short int	Energy Counter 1 Selection
32776	8008	R/W	0-3		short int	Energy Counter 2 Selection
32777	8009	R/W	0 - 247		short int	Communication Address
32778	800A	R/W	1 - 5		short int	Baud Rate
32779	800B	R/W	0 - 2		short int	Parity
32780	800C	R/W	0-1		short int	Password Enable
32781	800D	R/W	0-9999		short int	Password

7.4 Holding register coding system:

PULSE RELAYS

0	Counter register set 1 Active power Export or Import
1	Counter register set 1 Active power Import only
2	Counter register set 1 Active power Export only
3	Counter register set 1 Reactive power Inductive or Capacitive
4	Counter register set 1 Reactive power Inductive only
5	Counter register set 1 Reactive power Capacitive only

ENERGY COUNTER FUNCTION SELECTION

0	Active always
1	Activate E1, active when digital input 1 is on (energised)
2	Activate E1, when digital input 2 is on (energised)
3	Inactive when other resister set is active.

BAUD RATE

1	38400 bps
2	19200 bps
3	9600 bps
4	4800 bps
5	2400 bps

PARITY

0	No
1	Odd
2	Even

PASSWORD ENABLE

0	Disable
1	Enable

7.5 Modbus™ Register Map

ADDR.	ADDR. (HEX)	R/W	RANGE	1bit =	Type	Description
0	0000	R	(0:3000)xUT	0.1 Volts	USI	L1-N Voltage
2	0002	R	(0:3000)xUT	0.1 Volts	USI	L2-N Voltage
4	0004	R	(0:3000)xUT	0.1 Volts	USI	L3-N Voltage
6	0006	R	(0:6000)xCT	0.001 Amps	USI	L1 Current
8	0008	R	(0:6000)xCT	0.001 Amps	USI	L2 Current
10	000A	R	(0:6000)xCT	0.001 Amps	USI	L3 Current
12	000C					BLANK
14	000E	R	(0:5000)xUT	0.1 Volts	USI	L1-L2 Voltage
16	0010	R	(0:5000)xUT	0.1 Volts	USI	L2-L3 Voltage
18	0012	R	(0:5000)xUT	0.1 Volts	USI	L3-L1 Voltage
20	0014	R	(-18000:18000)xCTxUT	0.1 Watt	SI	L1 Active Power
22	0016	R	(-18000:18000)xCTxUT	0.1 Watt	SI	L2 Active Power
24	0018	R	(-18000:18000)xCTxUT	0.1 Watt	SI	L3 Active Power
26	001A	R	(-18000:18000)xCTxUT	0.1 VAr	SI	L1 Reactive Power
28	001C	R	(-18000:18000)xCTxUT	0.1 VAr	SI	L2 Reactive Power
30	001E	R	(-18000:18000)xCTxUT	0.1 VAr	SI	L3 Reactive Power
32	0020	R	(0:18000)xCTxUT	0.1 VA	USI	L1 Apparent Power
34	0022	R	(0:18000)xCTxUT	0.1 VA	USI	L2 Apparent Power
36	0024	R	(0:18000)xCTxUT	0.1 VA	USI	L3 Apparent Power
38	0026	R	-1000:1000	0.001	SI	L1 Cosφ
40	0028	R	-1000:1000	0.001	SI	L2 Cosφ
42	002A	R	-1000:1000	0.001	SI	L3 Cosφ
44	002C	R	(0:54000)xCTxUT	0.1 Watt	SI	Total Import Active Power
46	002E	R	(0:54000)xCTxUT	0.1 Watt	SI	Total Export Active Power
48	0030	R	(0:54000)xCTxUT	0.1 VAr	SI	Total Inductive Reactive Power
50	0032	R	(0:54000)xCTxUT	0.1 VAr	SI	Total Capacitive Reactive Power
52	0034	R	(0:54000)xCTxUT	0.1 VA	USI	Total Apparent Power
54	0036	R	-1000:1000	0.001	SI	AVERAGE INDUCTIVE Cosφ
56	0038	R	-1000:1000	0.001	SI	AVERAGE CAPACITIVE Cosφ
58	003A	R	4000:7000Hz	0.01 Hz	USI	Frequency
60	003C	R	0:360 Deg.	1 Deg.	USI	L1 Voltage Angle
62	003E	R	0:360 Deg.	1 Deg.	USI	L2 Voltage Angle
64	0040	R	0:360 Deg.	1 Deg.	USI	L3 Voltage Angle
66	0042	R	0:360 Deg.	1 Deg.	USI	L1 Current Angle
68	0044	R	0:360 Deg.	1 Deg.	USI	L2 Current Angle
70	0046	R	0:360 Deg.	1 Deg.	USI	L3 Current Angle
72	0048	R	0:999%	0.1 %	USI	L1 Voltage Thd
74	004A	R	0:999%	0.1 %	USI	L2 Voltage Thd
76	004C	R	0:999%	0.1 %	USI	L3 Voltage Thd
78	004E	R	0:999%	0.1 %	USI	L1 Current Thd
80	0050	R	0:999%	0.1 %	USI	L2 Current Thd
82	0052	R	0:999%	0.1 %	USI	L3 Current Thd
84	0054	R		-	-	Digital Input Status
86	0056	R/W	0:4x10x10e9 Wh	1 Wh	LGI	Import Active Energy:Reg 1
88	0058					
90	005A	R/W	0:4x10e9 Wh	1 Wh	LGI	Export Active Energy:Reg1
92	005C					
94	005E	R/W	0:4x10e9h	1 VArh	LGI	Inductive Reactive Energy:Reg 1
96	0060					
98	0062	R/W	0:4x10e9h	1 VArh	LGI	Capacitive Reactive Energy:Reg 1
100	0064					
102	0066	R/W	0:4x10e9 Wh	1 Wh	LGI	Import Active Energy:Reg 2
104	0068					
106	006A	R/W	0:4x10e9 Wh	1 Wh	LGI	Export Active Energy:Reg 2
108	006C					
110	006E	R/W	0:4x10e9h	1 VArh	LGI	Inductive Reactive Energy:Reg 2
112	0070					
114	0072	R/W	0:4x10e9h	1 VArh	LGI	Capacitive Reactive Energy:Reg 2
116	0074					
118	0076	R/W	(0:3000)xUT	0.1 Volt	USI	L1 Min. Voltage
120	0078	R/W	(0:3000)xUT	0.1 Volt	USI	L2 Min. Voltage
122	007A	R/W	(0:3000)xUT	0.1 Volt	USI	L3 Min. Voltage
124	007C	R/W	(0:3000)xUT	0.1 Volt	USI	L12 Min. Voltage
126	007E	R/W	(0:3000)xUT	0.1 Volt	USI	L23 Min. Voltage
128	0080	R/W	(0:3000)xUT	0.1 Volt	USI	L31 Min. Voltage
130	0082	R/W	(0:6000)xCT	0.001 Amps	USI	L1 Min. Current
132	0084	R/W	(0:6000)xCT	0.001 Amps	USI	L2 Min. Current
134	0086	R/W	(0:6000)xCT	0.001 Amps	USI	L3 Min. Current
136	0088	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L1 Min. Active Power
138	008A	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L2 Min. Active Power
140	008C	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L3 Min. Active Power
142	008E	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L1 Min. Reactive Power
144	0090	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L2 Min. Reactive Power
146	0092	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L3 Min. Reactive Power
148	0094	R/W	(0:18000)xCTxUT	0.1 VA	USI	L1 Min. Apparent Power
150	0096	R/W	(0:18000)xCTxUT	0.1 VA	USI	L2 Min. Apparent Power
152	0098	R/W	(0:18000)xCTxUT	0.1 VA	USI	L3 Min. Apparent Power
154	009A	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Min. Import Active Power
156	009C	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Min. Export Active Power
158	009E	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Min. Import Reactive Power
160	00A0	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Min. Export Reactive Power
162	00A2	R/W	(0:18000)xCTxUT	0.1 VA	USI	Total Min. Apparent Power
164	00A4	R/W	(0:3000)xUT	0.1 Volt	USI	L1 Max. Voltage
166	00A6	R/W	(0:3000)xUT	0.1 Volt	USI	L2 Max. Voltage
168	00A8	R/W	(0:3000)xUT	0.1 Volt	USI	L3 Max. Voltage
170	00AA	R/W	(0:5000)xUT	0.1 Volt	USI	L12 Max. Voltage
172	00AC	R/W	(0:5000)xUT	0.1 Volt	USI	L23 Max. Voltage
174	00AE	R/W	(0:5000)xUT	0.1 Volt	USI	L31 Max. Voltage
176	00B0	R/W	(0:6000)xCT	0.001 Amps	USI	L1 Max. Current
178	00B2	R/W	(0:6000)xCT	0.001 Amps	USI	L2 Max. Current
180	00B4	R/W	(0:6000)xCT	0.001 Amps	USI	L3 Max. Current
182	00B6	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L1 Max. Active Power
184	00B8	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L2 Max. Active Power
186	00BA	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L3 Max. Active Power
188	00BC	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L1 Max. Reactive Power
190	00BE	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L2 Max. Reactive Power
192	00C0	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L3 Max. Reactive Power
194	00C2	R/W	(0:18000)xCTxUT	0.1 VA	USI	L1 Max. Apparent Power
196	00C4	R/W	(0:18000)xCTxUT	0.1 VA	USI	L2 Max. Apparent Power
198	00C6	R/W	(0:18000)xCTxUT	0.1 VA	USI	L3 Max. Apparent Power
200	00C8	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Max. Import Active Power
202	00CA	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Max. Export Active Power
204	00CC	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Max. Import Reactive Power
206	00CE	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Max. Export Reactive Power
208	00D0	R/W	(0:18000)xCTxUT	0.1 VA	USI	Total Max. Apparent Power
210	00D2	R/W	(0:6000)xCT	0.001 Amps	USI	L1 Max. Dem. Current
212	00D4	R/W	(0:6000)xCT	0.001 Amps	USI	L2 Max. Dem. Current
214	00D6	R/W	(0:6000)xCT	0.001 Amps	USI	L3 Max. Dem. Current
216	00D8	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L1 Import Max. Dem. Active Power
218	00DA	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L1 Export Max. Dem. Active Power
220	00DC	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L2 Import Max. Dem. Active Power
222	00DE	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L2 Export Max. Dem. Active Power
224	00E0	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L3 Import Max. Dem. Active Power
226	00E2	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	L3 Export Max. Dem. Active Power
228	00E4	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L1 Import Max. Dem. Reactive Power
230	00E6	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L1 Export Max. Dem. Reactive Power
232	00E8	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L2 Import Max. Dem. Reactive Power
234	00EA	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L2 Export Max. Dem. Reactive Power
236	00EC	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L3 Import Max. Dem. Reactive Power
238	00EE	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	L3 Export Max. Dem. Reactive Power
240	00F0	R/W	(0:18000)xCTxUT	0.1 VA	USI	L1 Max. Dem. Apparent Power
242	00F2	R/W	(0:18000)xCTxUT	0.1 VA	USI	L2 Max. Dem. Apparent Power
244	00F4	R/W	(0:18000)xCTxUT	0.1 VA	USI	L3 Max. Dem. Apparent Power
246	00F6	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Import Max. Dem. Active Power
248	00F8	R/W	(-18000:18000)xCTxUT	0.1 Watt	SI	Total Export Max. Dem. Active Power
250	00FA	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Import Max. Dem. Reactive Power
252	00FC	R/W	(-18000:18000)xCTxUT	0.1 VAr	SI	Total Export Max. Dem. Reactive Power
254	00FE	R/W	(0:18000)xCTxUT	0.1 VA	USI	Total Max. Dem. Apparent Power

Type Code:

USI =	Unsigned integer (4 bytes)
SI =	Signed integer (4 bytes)
LGI =	Long integer (8 bytes)